

A stylized map of North West Cambridge is shown in the bottom left corner. It is a light brown color and depicts the irregular coastline of the area, including the River Cam and the surrounding land. The map is set against a light blue background that represents the water.

NORTH WEST **cambridge**

Environmental Statement Volume 1
Main Report
March 2012

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for the Environmental Statement prepared on behalf of:-

University of Cambridge



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1 INTRODUCTION AND ASSESSMENT APPROACH

1.1 Introduction

1.1.1 The University of Cambridge (the “Applicant”) is seeking to obtain planning permission for a mixed use development (the “Proposed Development”) on land to the north-west of Cambridge, Cambridgeshire (the “Application Site”).

1.1.2 The Application Site is situated astride the administrative boundary of South Cambridgeshire District Council (SCDC) and Cambridge City Council (CCC). The location of the Application Site is shown on **Figure 1.1** and the extent of the Application Site is shown on **Figure 1.2**.

1.2 EIA Regulations and Procedures

1.2.1 Due to its scale, nature and location, the Proposed Development is considered to constitute ‘Environmental Impact Assessment (EIA) Development’ under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (hereafter referred to as the “EIA Regulations”).

1.2.2 The Proposed Development falls within Schedule 2 development, development likely to have significant effects on the environment by virtue of factors such as its nature, size or location under the category of Infrastructure Projects “Urban Development Projects” (Schedule 2, 10 b) as described in the EIA Regulations.

1.2.3 EIA is the process of collection, publication and consideration of environmental information in the determination of a planning application. Where an application is made for planning permission for EIA development the planning authority is not permitted under the EIA Regulations to grant planning permission unless they have first taken environmental information into consideration. Consequently, information required to assess the likely significant effects of the Proposed Development on the environment during construction and on completion, as required by Regulation 2(1) and Schedule 4 of the EIA Regulations, has been compiled and is presented in this document, the Environmental Statement (ES).

1.3 Structure of Environmental Statement

1.3.1 This ES comprises studies on each of the aspects of the environment identified as likely to be significantly affected by the Proposed Development, which are supported with technical appendices where appropriate. This ES is structured as follows:

- Volume 1: Comprises the main volume of the ES, and a breakdown of the contents of each chapter is provided below;
- Volume 2: Contains graphic material in the form of Figures and drawings;
- Volume 3: Contains the Technical Appendices to the main volume of the ES; and
- Volume 4: Non-Technical Summary which provides a concise summary of the ES.

1.3.2 Volume 1 of the ES is structured as follows:

- Chapter 1 introduces the Proposed Development, sets out the structure of this ES and describes the Assessment Approach and the methodology which has been used within this ES.
- Chapter 2 provides a description of the Application Site and of the Proposed Development. This chapter also outlines the main alternatives to the proposed development considered by the applicant.
- Chapter 3 describes the Phasing and Implementation programme for the Proposed Development.
- Chapter 4 describes the planning policy context of the Proposed Development.

- Chapter 5 considers the likely significant socio-economic effects of the Proposed Development of the Application Site.
- Chapter 6 considers the existing landscape conditions and character; assesses how the landscape conditions and character would be affected by the Proposed Development; and examines the likely significant visual effects of the Proposed Development upon the nearby townscape, countryside and sensitive receptors.
- Chapter 7 reviews the ecological and nature conservation value of the Application Site and its surroundings as currently exist and assesses the likely significant effects of the Proposed Development on that ecological and nature conservation value.
- Chapter 8 appraises the potential for contamination to arise from the Proposed Development. In doing so, this chapter identifies the underlying geology at the Application Site and assesses the significance of any potential effects by way of a source-pathway-receptor methodology and also assesses the likely significant effects of the Proposed Development on the Site of Special Scientific Interest within the Application Site.
- Chapter 9 examines the existing archaeological resource at the Application Site and assesses the likely significant effects of the Proposed Development on the archaeological resource.
- Chapter 10 This chapter describes the existing cultural heritage of the Application Site and its surroundings and assesses the likely significant effects of the Proposed Development on cultural heritage.
- Chapter 11 describes the existing agricultural circumstances on the Application Site and assesses the likely significant effects of the Proposed Development on agricultural circumstances.
- Chapter 12 examines the transport issues associated with the Proposed Development and assesses the likely significant effects on various modes of public and private transport.
- Chapter 13 considers the noise environment by assessing the existing noise environment, the noise originating from the construction and operation of the Proposed Development and likely significant on neighbouring receptors and receptors within the Proposed Development. The scope for likely significant effects to arise from vibration associated with the construction phase is also assessed.
- Chapter 14 assesses the existing local air quality and assesses the likely significant effects of the Proposed Development on air quality for the locality as well as considering whether any local pollution sources would be likely to have significant effects on receptors within the Proposed Development.
- Chapter 15 considers the likelihood of any significant drainage, flood risk, water quality and hydrogeological effects associated with the Proposed Development arising.
- Chapter 16 identifies the existing availability and capacity of utilities and services which exist within the locality of the Proposed Development and assesses the likely significant effects of the Proposed Development on these utilities and services and of the provision of any additional services required to service the Proposed Development.
- Chapter 17 reviews the sustainability considerations taken into account during the evolution of the Proposed Development.
- Chapter 18 considers and draws together any likely significant cumulative and interactive effects associated with the Proposed Development
- Chapter 19 provides a summary of the ES's findings and conclusions.

1.3.3 The chapters in Volume 1 are broadly structured as follows:

- **Introduction** – to introduce the topic under consideration, the scope of the assessment undertaken and aspects of the Proposed Development material to the topic assessment.
- **Planning Policy Context** – to describe the planning policy framework relevant to the Application Site and Proposed Development.

- **Assessment Approach** – to describe the method and scope of the assessment undertaken and responses to consultation in relation to method and scope in each case pertinent to the topic under consideration.
- **Baseline Conditions** – a description of the baseline conditions pertinent to the topic under consideration including baseline survey information.
- **Identification and Assessment of Likely Significant Effects** - identifying the likely effects, evaluation of those effects and assessment of their significance, considering both construction and operational and direct and indirect effects.
- **Mitigation and Enhancement** - describing any mitigation strategies which are additional to the measures embodied in or proposed in connection with the Proposed Development to avoid or manage any adverse effects and noting any residual effects of the proposals.
- **Cumulative and In combination Effects** - consideration of: potential cumulative effects of the Proposed Development with other developments; of any interaction between different elements of the Proposed Development to give rise to additional or greater or smaller effects; and of any interaction between effects on different environmental media to give rise to any further, additional, fewer or smaller effects.
- **Summary** – a non-technical summary of the findings of the chapter is provided in conclusion.

1.3.4 A non-technical summary is also available separately.

1.3.5 For continuity, the figures and appendices in Volumes 2 and 3 are arranged and presented using the same reference numbers as the Chapters as a means of providing supportive background and technical information.

1.4 The EIA Consultant Team

1.4.1 The ES has been coordinated and managed by Pegasus Planning Group Ltd. The consultants who have contributed to the preparation of this ES are referenced in the project directory at the front of this document.

1.5 Other Documents

1.5.1 A number of other documents have been submitted to SCDC and CCC as part of or accompanying the planning application. These are set out in the covering letter to the planning application and summarised below:

- Planning Application Documentation;
- Description of Development and Application Drawings;
- Planning Statement;
- Design, Access and Landscape Statement;
- Health Impact Assessment;
- Key Worker Housing Statement;
- Health Impact Assessment;
- Hotel Needs Case;
- Senior Living Needs Case;
- Community/Faith Needs Case;

- Public Arts Strategy;
- Retail Impact Assessment;
- Sustainability Statement;
- Carbon Reduction Strategy;
- Site Waste Management Plan;
- Sustainable Resource and Waste Management Strategy;
- Statement of Community Involvement; and
- Flood Risk Assessment.

1.6 Environmental Statement Availability and Comments

1.6.1 This ES is available for public viewing during normal office hours at the SCDC and CCC Planning Department. Comments on the planning application should be forwarded to:

Planning Department, South Cambridgeshire District Council
South Cambridgeshire Hall
Cambourne Business Park
Cambourne, Cambridge CB23 6EA

Or

Planning Department, Cambridge City Council
Mandela House, 4 Regent Street, Cambridge CB2 1BY

1.6.2 The ES may be purchased in Volumes, the costs for which are set out below:

- Non-Technical Summary – Free of charge
- Volume 1: Main Volume - £50
- Volume 2: Figures - £50
- Volume 3: Technical Appendices - £150

1.6.3 Copies of all documents can be obtained on CD for £15. For copies of any of the above please contact Pegasus Planning Group Ltd at the following address:

Pegasus Planning Group
Pegasus House
Querns Business Centre
Whitworth Road
Cirencester
Gloucestershire
GL7 1RT

Tel: 01285 641717
Fax: 01285 642348

1.6.4 Copies of all documents are available to view electronically at www.nwcambridge.co.uk.

1.7 Assessment Approach

1.7.1 The purpose of EIA is to identify and assess the likely significant effects of the Proposed Development on the environment for both the construction and operational phases of the Proposed Development. This ES provides data to identify and assess any likely significant environmental effects resulting from the Proposed Development and provides a description of the measures proposed in order to avoid, reduce or remedy any significant adverse effects.

1.7.2 In accordance with the EIA Regulations, this ES comprises the following information:

- A description of the Proposed Development comprising information about the Application Site including the nature, size and scale of the Proposed Development;
- The data necessary to identify and assess the main effects which the Proposed Development is likely to have on the environment;
- A description of the likely significant effects of the Proposed Development covering, direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative, explained by reference to the Proposed Development's possible effect on: human beings, flora, fauna, soil, water, air, climate, cultural and archaeological heritage, landscape and the interaction between any of the foregoing material assets;
- Where significant adverse effects are identified with respect to any of the foregoing, mitigation measures will be proposed in order to avoid, reduce or remedy those effects; and
- A summary in non-technical language of the information specified above.

1.8 Development Parameters

1.8.1 The Proposed Development, which has been the subject of this EIA, is described further within Chapter 2: Application Site Description and Proposed Development. Development Parameters and accompanying Parameter Plans define those aspects of the Proposed Development capable of having significant environmental effects, as defined in the EIA Regulations.

1.8.2 The Development Parameters and Parameter Plans are attached as Figures in Chapter 2.

1.9 Screening

1.9.1 Due to the scale, nature and potential for significant environmental effects the Applicant considered that the Proposed Development constituted EIA Development under the category of "Urban Infrastructure Projects" (Schedule 2, 10 b) of the EIA Regulations. Therefore, no formal screening opinion was requested from SCDC and CCC and the Applicant has voluntarily prepared and submitted this ES.

1.10 Scoping the EIA

1.10.1 A Scoping Report setting out the proposed scope of the ES and the methodology by which it would be undertaken was submitted to CCC and SCDC in November 2009 (included at **Appendix 1.1**). A Scoping Opinion was received from CCC and SCDC in December 2009 (included at **Appendix 1.2**). The Scoping Opinion concluded that the following environmental issues associated with the Proposed Development should be considered within the ES:

- Socio-Economic Issues;
- Landscape and Visual Issues;
- Ecology and Nature Conservation;
- Geological Resource (SSSI);

- Archaeology;
- Cultural Heritage;
- Agricultural Circumstances;
- Traffic and Transport;
- Noise Environment;
- Air Quality;
- Hydrology, Drainage and Flood Risk;
- Geotechnical Issues and Contaminated Land;
- Utilities and Services; and
- Sustainability Considerations.

1.11 Consultation Process

1.11.1 As part of the design process associated with the Proposed Development, an extensive programme of consultation has been conducted with stakeholders and the public details of which are set out in the Statement of Community Involvement which is a separate document accompanying this planning application (see Paragraph 1.5.1).

1.12 The Environmental Statement

1.12.1 The scope and content of the ES is based on the following:

- Review of the baseline situation through existing information, including data, reports, surveys and desk-top studies;
- Consideration of relevant National and Development Plan policies;
- Consideration of potential sensitive receptors;
- Identification of likely significant environmental effects and an evaluation of their duration and magnitude;
- Expert opinion;
- Modelling;
- Use of relevant technical and good practice guidance; and
- Specific consultations with appropriate bodies.

1.13 Assessment Methodology

1.13.1 This ES identifies and assesses the likely significant effects of the Proposed Development in relation to both the construction and operational phases of the Proposed Development. Environmental effects have been evaluated with reference to definitive standards and legislation where available. Where it has not been possible to quantify effects, assessments have been based on available knowledge and professional judgement.

1.14 Determining Significance

1.14.1 Significance reflects the relationship between two factors:

- The magnitude or severity of an effect (i.e. the actual change taking place to the environment); and
- The sensitivity, importance or value of the resource or receptor.

1.14.2 The broad criteria methodology for determining magnitude are set out in **Table 1.1**

Table 1.1: Degrees of Magnitude and their criteria

Magnitude of Effect	Criteria
High	Total loss or major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Medium	Loss or alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernable/detectable but the underlying character / composition / attributes of the baseline condition will be similar to the pre-development.
Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, approximating to a 'no change' situation.

1.14.3 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in **Table 1.2**.

Table 1.2: Degrees of sensitivity and their criteria

Sensitivity	Criteria
High	The receptor / resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Medium	The receptor / resource has moderate capacity to absorb change without significantly altering its present character, or is of high and more than local (but not national or international) importance.
Low	The receptor / resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor / resource is can accommodate change without material effect, is of limited importance.

Significance

1.14.4 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive or negative. **Table 1.3** shows how magnitude and sensitivity interact to derive significance of effects.

Table 1.3: Degrees of Significance and their criteria

Magnitude of Change	Sensitivity of Receptor				
		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Minor to Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

1.14.5 The above magnitude and significance criteria are provided as a guide for specialists to categorise the significance of effects. Where discipline specific methodology has been applied that differs from the generic criteria above, this is explained within the given chapter under the heading of Assessment Approach.

1.14.6 Effects are also described as:

- * Adverse – detrimental or negative effects on an environmental resource or receptor;
- * Beneficial – advantageous or positive effect on an environmental resource or receptor; or
- * Negligible – a neutral effect on an environmental resource or receptor.

1.15 Mitigation

1.15.1 Measures to avoid, minimise or manage any significant adverse environmental effects, or to ensure realisation of significant beneficial effects, are assumed to have been incorporated into the design of the Proposed Development and the methods of its construction from the outset. The nature of the measures assumed are outlined within the individual topic chapters as appropriate. Further information appears in Chapter 2: Application Site Description and Proposed Development. It is assumed that where measures are not capable of being set out in the Description of the Development or the Parameter Plans these will be the subject of appropriate planning conditions or obligations. The assessment is of the Proposed Development incorporating these measures. Where nevertheless, the assessment of the Proposed Development has identified potential for significant adverse environmental effects, the scope for mitigation of those effects, for example by way of compensatory measures, has been considered.

1.15.2 Where the effectiveness of the mitigation proposed has been considered uncertain, or where it depends upon assumptions of operating procedures, data and/or professional judgement has been introduced to support these assumptions.

1.16 Assessment Years

1.16.1 The baseline year for assessment is 2010, followed by 2014 as approximately the first phase completion date. The overall completion date for assessment will be 2026. The landscape assessment will consider a period of 15 years from this final completion date to address the overall implications of proposed mitigation in terms of the visual and planting aspects of the Proposed Development. Each environmental discipline has considered the likely significant effects of the Proposed Development as at 2014 and as at

2026. Further assumptions regarding the phasing of the Proposed Development are provided in Chapter 3: Phasing and Implementation

1.17 Cumulative and In combination Effects

1.17.1 Cumulative effects are those which would be likely to arise from the combination of likely significant effects from the Proposed Development and those from other proposed or permitted schemes in the vicinity acting together during either or both the construction and operational phases.

1.17.2 In combination effects are those which would be likely to arise from interactions between different elements of the Proposed Development to give rise to additional or greater or smaller effects; and of any interaction between effects on different environmental media to give rise to any further, additional, fewer or smaller effects

1.17.3 The cumulative and in combination effects of the Proposed Development and other proposed or permitted schemes are described within individual topic chapters and Chapter 18: Cumulative and Interactive Effects of this ES.

1.17.4 The schemes with which it is considered that the effects of the Proposed Development may be cumulative have been identified through consultation with CCC and SCDC are listed in **Table 1.4** and identified on **Figure 1.3**. The level of assessment detail has been dependent upon the information available for each of these schemes and is described within each technical chapter.

Table 1.4: Schemes Considered in the Assessment of Cumulative Effects

1	2	3	4	5	6
Scheme	Location	Planning Application Reference	Scheme Details	Assumed Cumulative Development Rates 2014	Sites assessed via the Scoping of the Transport Impact Assessment – December 2010 following postponement of the A14
West Cambridge	South of the Application Site		Site developed for university-related purposes. The floor space is 175,120 sqm, within academic departments, research institutes, indoor sports centre and commercial research, social amenity facilities together with improved infrastructure to include car and cycle parking, park and cycle facilities, new internal roads, ecological and landscaping improvements.	N/A	Not considered – clearly under construction
Northstowe	North-west of Cambridge, known as the former Oakington Barracks Site	SCDC: S/7006/07/O	A new town with residential development, approximately 9500 dwellings, employment development (knowledge based and other businesses, research and light industry) community uses and non-residential institutions, research institutes, retail, showrooms, financial and professional services, restaurants, snack bars and cafés, drinking establishments, hot food takeaways, hotel and guest houses, assembly (including places of worship and conference facilities), entertainment and leisure (including casino, cinema and nightclubs), education (including nursery, pre-school, primary, secondary and post 16 education), health, library, cultural facilities (including art centre), residential institutions, open space including town car park and town square, sport and recreational facilities, public transport routes, footpaths and cycleways, landscaping, cemetery / burial ground, allotments, tree nursery, household waste recycling	Up to 250 dwellings	December 2010 – 2026 Committed Development core scenario – 1,500 dwellings

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1	2	3	4	5	6
Scheme	Location	Planning Application Reference	Scheme Details	Assumed Cumulative Development Rates 2014	Sites assessed via the Scoping of the Transport Impact Assessment – December 2010 following postponement of the A14
			facilities and all related infrastructure (including roads, car and cycling parking, electricity and power generation plant and equipment, gas facilities, water supply, telecommunications, drainage systems, foul and surface water, flood plain compensation (including pumping station) and lighting).		
National Institute of Agricultural Botany 1	Land between Huntingdon Road and Histon Road, Cambridge	CCC: 07/0003/OUT	Mixed use development comprising up to 1593 dwellings, primary school, community facilities, retail units (use classes A1,A2,A3,A4 and A5) and associated infrastructure including vehicular, pedestrian and cycleway accesses, open space and drainage.	Up to 250-300 dwellings	1,780 dwellings NIAB 1 & 2
National Institute of Agricultural Botany 2	Land at North West Cambridge, Huntingdon Road to Histon Road	Site allocated and is detailed in Policy Sp/2 in South Cambridgeshire's Site Specific Policies DPD (Adopted January 2010) –	"will be developed as part of a sustainable housing led urban extension of Cambridge" – No application has yet been submitted.	See Phase I above	1,780 dwellings NIAB 1 & 2
Orchard/Ardbury Park	Kings Hedges Road, Cambridge	SCDC: S/7006/07/0	Development comprising residential, employment, leisure, social/community uses, open space, educational facilities and associated transport infrastructure.	Up to 450 dwellings	1,120 dwellings

1.18 General Assumptions and Limitations

1.18.1 The principal assumptions that have been made and any limitations that have been identified in preparing this ES are set out below:

- All of the principal land uses adjoining the Application Site remain, except where redevelopment proposals have been granted planning consent. In those cases it is assumed the redevelopment proposals will be implemented;
- Information received from third parties is complete and up to date;
- The design, construction and completed stages of the Proposed Development will satisfy legislative requirements; and
- Conditions and/or planning obligations will be attached to or accompany the planning permission that will reflect the measures assumed to be inherent in the Proposed Development as per paragraph 1.15.1 and that will be designed to avoid or manage any adverse effects during construction;

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2 APPLICATION SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 Introduction

2.1.1 This chapter of the ES provides a description of the Application Site and the Proposed Development.

2.2 Application Site Context & Description

2.2.1 The Application Site is located approximately 2km to the north-west of the centre of Cambridge in Cambridgeshire on the edge of the urban area. It lies within an approximately triangular area of land bounded by three highways. To the north the Application Site incorporates Huntingdon Road, beyond which lies residential development and agricultural fields. To the west the Application Site is bound by the M11 motorway, beyond which lies land in agricultural use, while to the south the Application Site incorporates the A1303 (Madingley Road), and is bound by residential properties and the Park and Ride car park. Agricultural fields and residential properties bound the Application Site to the east. The Application Site context is shown on **Figure 1.1**.

2.2.2 Topographically the Application Site is gently undulating and has few distinctive features although it rises slightly in a north easterly direction across the Application Site. On the western margins adjacent to the M11, is a very shallow valley occupied by the Wash Pit Brook which flows in a northerly direction eventually joining the River Cam off site. Beyond the M11 is largely open agricultural land.

2.2.3 The built form of Cambridge closely abuts the Application Site. The south eastern margins extend to the suburban edge of the City served off Storeys Way, a residential thoroughfare which comprises mainly two storey dwellings and the edge of Churchill College campus. This suburban edge also extends along the north eastern boundary of the Application Site. On the south side of Huntingdon Road is a ribbon of detached dwellings fronting the highway. The northern side of Huntingdon Road abuts the south western edge of the settlement of Girton. On the southern margin of the Application Site there are groups of University buildings accessed from Madingley Road via an existing roadway. Further to the west along Madingley Road is another area of residential development served by Lansdowne Road and Conduit Head Road; further west again lies the Madingley Road Park & Ride site on the southern margins of the site. On the south side of Madingley Road is the West Cambridge Campus comprising University faculty and other buildings.

2.2.4 The Application Site as shown on **Figure 1.2** comprises approximately 150ha of land predominantly in agricultural use.

2.2.5 The Application Site is subdivided into a number of fields most of which are given over to arable production it also includes parts of Huntingdon Road and Madingley Road. The fields are generally separated by fences and low hedgerows with occasional small groups of trees typical of the scenery in this part of Cambridgeshire. A fuller description of the site is given in Chapter 6 which examines the Landscape & Visual Impact.

2.2.6 For the purposes of the ES the Application Site has been split up into three Zones. Zones A, B and C are shown on **Figure 2.1** and a description is provided below.

Zone A

2.2.7 Zone A comprises land within the highway and road verges along Huntingdon Road (A1307) as shown on **Figure 2.1**.

Zone B

2.2.8 Zone B comprises the majority of the Application Site

Zone C

2.2.9 Zone C comprises land within the highway and road verges along Madingley Road (A1307) as shown on **Figure 2.1**.

2.3 Proposed Development

2.3.1 The Planning Application seeks planning permission with details of appearance, landscaping, layout, scale and (save for the matters submitted in respect of zones A and C) access reserved within the parameters set out in the Parameter Plans and Statements.

2.3.2 The development proposals comprise:

Zone B:

- Up to 3,000 dwellings; (Class C3 and C4)
- Up to 2,000 student bedspaces; 98,000 sq.m. (Class C2)
- Up to 100,000 sq.m. new employment floorspace, of which:
 - Up to 40,000 sq.m. commercial employment floorspace (Class B1(b) and sui generis research uses)
 - At least 60,000 sq.m. academic employment floorspace (Class D1)
- Up to 5,300 sq.m. gross retail floorspace (Use Class A1/A2/A3/A4/A5) (of which the supermarket is not more than 2,000 sq.m. net floorspace)
- Senior living; up to 6,500sq.m. (Class C2)
- Community centre; up to 500 sq.m. (Class D1)
- Indoor sports provision, up to 450 sq.m. (Class D1)
- Police; up to 200 sq.m. (Class B1)
- Primary Health Care; up to 700 sq.m. (Class D1)
- School; up to 3,750 sq.m. (Class D1)
- Nurseries; up to 2,000 sq.m. (Class D1)
- Community Residential; up to 500 sq.m. (Class C3)
- Hotel (130 rooms); up to 7,000 sq.m. (Class C1)
- Access roads
- Pedestrian, cycle and vehicle routes
- Parking
- Energy Centre; up to 1,250 sq.m.
- Provision and/or upgrade of services and related service media and apparatus including pumping stations, substations and pressure regulators
- Drainage works (including sustainable ground and surface water attenuation and control)
- Open space and landscaping (including parks, play areas, playing fields, allotments, water features, formal/informal open space, maintenance sheds, pavilions and support facilities)
- Works to Washpit Brook (including enlarged channel, storage area and flow control structure)
- Earthworks to provide revised ground contours
- Demolition of existing buildings and structures

Zone A: Huntingdon Road - Highway and Utility Works

- Construction of a new three arm and a new four arm signal controlled junctions, including pedestrian and cycle crossings, to provide access to the Proposed Development from Huntingdon Road
- Installation of a toucan crossing across Huntingdon Road

- Construction of sections of unsegregated footway/cycleway and provision of sections of on-carriageway cycleway on the southern side of Huntingdon Road
- Diversion and/or replacement and/or protection of existing utilities affected by the proposed highway works
- Provision of new telecommunications infrastructure and connection to existing utility infrastructure situated along Huntingdon Road
- Related landscaping, accommodation works, street furniture, drainage, telemetry and utilities

Zone C: Madingley Road - Highway and Utility Works

- Junction improvement works at the High Cross/Madingley Road junction to alter it from a three arm priority junction to a four arm signal controlled junction, including pedestrian and cycle crossings, to provide access to the Proposed Development
- Installation of a toucan crossing across Madingley Road
- Diversion and/or replacement and/or protection of existing utilities affected by the proposed highway works
- Construction of sections of unsegregated footway/cycleway and provision of sections of on-carriageway cycleway on the northern side of Madingley Road
- Installation of a retaining wall along Madingley Road
- Provision of a new pumped foul water rising main, including chamber connection, and new telecommunications, electricity and gas infrastructure and the associated connection to existing utility infrastructure situated along Madingley Road
- Related landscaping, accommodation works, street furniture, drainage, telemetry and utilities

2.4 Development Parameters

2.4.1 A set of Development Parameters and the associated statements define the limit of the Proposed Development, as illustrated on **Figures 2.1 to 2.8**.

2.4.2 The Parameter Plans set out the Applicant's intentions for the layout of the Proposed Development within the limits set out by the Development Parameters. The salient features of the parameters are outlined below.

2.5 Land Uses, Zone B (Figure 2.2)

2.5.1 The disposition of land uses within the development shall conform to **Figure 2.2**.

2.5.2 Built development shall be divided between the 3 development areas shown on **Figure 2.2**. The disposition of floorspace (or dwellings) between the development areas and of floorspace within particular areas shall be as per the floorspace schedule below. The figures for each development area are subject to the overriding maxima in terms of total floorspace (or dwellings) for the Development and total floorspace (or dwellings) within particular categories as specified within the Description of Development.

2.5.3 The black hatched area on **Figure 2.2** indicates zones in which land use flexibility may be achieved through extension of adjacent land uses into these zones.

2.5.4 The blue hatched area on **Figure 2.2** indicates zones in which land use flexibility may be achieved on the Western Edge through extension of either C2 or D1,B1(b) Sui Generis use.

2.5.5 Within area 3 and within the SSSI in area 1 on **Figure 2.7**, no buildings shall be constructed. Within the remainder of area 1, and in areas 2, 4 and 5 on **Figure 2.7**, buildings will be restricted as set out in **Figure 2.7**.

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2.5.6 Where land use zones shown on **Figure 2.2** overlap with zones for movement corridors or Secondary Open Land, the width of Secondary Open Land shall not be less than as described in **Figure 2.7**, the boundaries between buildings and their curtilage movement routes and open land shall be determined by approval of reserved matters and the land uses shown on **Figure 2.2** shall apply within the curtilage of any building constructed within any Building Zone.

2.6 Building Heights, Zone B (Figure 2.3)

2.6.1 **Figure 2.3** defines the maximum heights of buildings as measured to the apex of the roof (excluding any lightning conductors, weather vanes, rooftop plant (or parapet used to screen rooftop plant), equipment telecommunications equipment, floodlighting and aerals). In the event of conflict between **Figure 2.4** and **Figures 2.5/2.3**, the maximum building heights stipulated in **Figure 2.3** prevail subject to the following exception. Within Building Zones C,H,M,N,O,S and T, the maximum building heights stipulated in **Figure 2.5** will prevail (and only to the extent that) the resultant building height AOD would be lower.

2.6.2 For any building the footprint of which would fall within more than one Building Zone as shown on **Figure 2.4**, the building height will not exceed the height AOD permitted within the Building Zone within which the majority of the building footprint is located.

2.6.3 In areas of overlap between any Building Zone as shown on **Figure 2.3** and any movement corridor, area of Secondary Open Land as indicated on **Figures 2.6, 2.7 and 2.2**, respectively the boundaries between buildings and their curtilage, the width of Secondary Open Land shall not be less than as described in **Figure 2.7**, movement routes and open land shall be determined by approval of reserved matters and where areas are occupied by buildings, within any of the uses shown on **Figure 2.2** the maximum building height shall be as set out above.

Energy Centre Chimney Flue Locations and Heights

2.6.4 Local Centre: the chimney flue associated with the Energy Centre shall be located within the zone within the area tinted red delineated by a black dotted line on **Figure 2.3**. The height of this flue will not (excluding any lightning conductor or aerial) exceed 42.5m AOD.

Contextual Information:

2.6.5 Northwest Corner: the chimney flue associated with the reserved site for an alternative Energy Centre shall be located within the area tinted yellow on delineated by a purple dotted line. The height of this flue will not (excluding any lightning conductor or aerial) exceed 53.5m AOD.

2.7 Building Zones, Zone B (Figures 2.4 and 2.5)

2.7.1 The maximum and minimum dimensions of the buildings (excluding temporary structures or outbuildings) within each building zone of the development identified in **Figure 2.4** are set out in the table in **Figure 2.5**.

2.7.2 For the purpose of this table, length is represented as frontage, and width is represented as depth.

2.7.3 Within any given zone, the maximum height of street lighting columns will not exceed 8m. Floodlighting for formal sports pitches will not exceed 15m.

2.7.4 In the event of conflict between **Figure 2.4/Figure 2.5** and **Figure 2.3**, the maximum building heights stipulated in **Figure 2.5** prevail subject to the following exception. Within Building Zones C,H,M,N,O,S and T the maximum building heights stipulated in **Figure 2.5** will prevail if (and only to the extent that) the resultant building height in AOD would be lower.

2.7.5 Where Building Zones shown on **Figure 2.4** overlap with zones for movement corridors or open land, as set out in **Figure 2.6 or 2.7**, respectively, the width of Secondary Open Land shall not be less than as described in **Figure 2.7**, the boundaries between buildings and their curtilage, movement routes and Secondary Open Land shall be determined by approval of reserved matters and the land uses shown on

Figure 2.2 shall apply within the curtilage of any building constructed within any Building Zone as indicated on **Figure 2.4**.

2.8 Access, Zone B (Figure 2.6)

Movement Corridors

2.8.1 **Figure 2.6** identifies movement corridors within which primary vehicular routes, secondary vehicular routes, primary pedestrian/cycle routes and secondary pedestrian/cycle routes are to be constructed.

2.8.2 Land within any movement corridor not occupied by a primary and/or secondary vehicular and/or pedestrian or cycle route may be developed for any purpose for which any zone abutting or overlapping with that corridor may be developed. All vehicle routes will be speed limited to 20mph or less.

Primary Vehicular Routes

2.8.3 The Zones within which Primary Vehicular Routes may be constructed are shown on **Figure 2.6**. The lane width on any primary carriageway along any Primary Vehicular Route shall not exceed 3.65m.

Secondary Vehicular Routes

2.8.4 The Zones within which Secondary Vehicular Routes may be constructed are shown on **Figure 2.6**. The lane width on any secondary carriageway shall not exceed 3m.

2.8.5 Primary and Secondary Pedestrian/Cycle Routes

2.8.6 The carriageway width of any primary or secondary pedestrian or cycle route shall not be less than 2m or exceed 4m, except for the Ridgeway, which shall not be less than 2m or exceed 6m in width.

2.8.7 Pedestrian and cycle movement corridors within the Site and linking the Site to existing development in the surrounding area may be constructed within (but shall not be limited to) the areas shown on **Figure 2.6**, and may connect to areas outside the site at (but not shall be limited to) the pedestrian and cycle access points indicated in **Figure 2.6**.

Tertiary Routes

2.8.8 Tertiary vehicular and/or pedestrian/cycle routes may be constructed within any of the Building Zones indicated on **Figure 2.4** for the purpose of connecting buildings and areas with Primary and/or Secondary Vehicular or Pedestrian/ Cycle routes. Tertiary pedestrian/cycle routes may additionally be constructed for the purpose of connecting buildings and areas with areas of open land or with other buildings.

2.8.9 The total carriageway widths of any Tertiary vehicular route shall not be less than 3.5m or more than 7m excluding any turning head, verge, footways, central reservations, visibility splays, passing places and pull-ins for bus stops. The total carriageway widths of any tertiary pedestrian/cycle route shall not be less than 2m or exceed 4m.

Access Points

2.8.10 There shall be no more than four general use permanent vehicular accessways into the Application Site when the Proposed Development has been completed.

2.8.11 The principal points between which access may be gained into the Application Site shall be are indicated marked A-B; C-D; E-F and G-H on **Figure 2.6** and set out in **Figures 2.9 – 2.12**.

Restricted Access Zone

2.8.12 A restricted access zone will be created in the vicinity of the local centre within the zone indicated on **Figure 2.6**. Access to this zone will (at times of the day to be specified) be limited to pedestrians, cyclists, and public transport, service and emergency vehicles.

Market Square Pedestrianised Zone

2.8.13 Within the Market Square Pedestrianised Zone, access will be limited to pedestrian, cyclists, service and emergency vehicles, except for access to designated car parking areas, where vehicle access will be permitted.

2.9 Topography (Figure 2.13)

2.9.1 **Figure 2.13** defines the finished ground contours for Primary Open Land across Zone B. These contours are +/- 2.5m, except within the designated SSSI area. Within the designated SSSI area, ground levels will not be modified.

2.10 Landscaping and Open Land, Zone B (Figure 2.7)

2.10.1 The zones within which open land may be provided are identified on **Figure 2.7**. The exact location and configuration of each space, including recreation provision and size, will be defined at the reserved matters stage.

Primary Open Land

2.10.2 Development of any buildings or structures within Primary Open Land shall be restricted to buildings and structures consistent with the use of the land as open land, including plant and equipment storage, bridges, pavilions, cafes, changing rooms, public toilets, car parking, hardstanding, information centres and buildings for housing utility undertakers' apparatus.

2.10.3 Development and/or use within Primary Open Land for the following purposes is (unless otherwise indicated) acceptable: open land; formal and informal recreation and outdoor entertainment; landscaping; surface water balancing and other water features; sustainable drainage systems; nature conservation; allotments; woodland; vehicular, pedestrian and cycle routes within the movement corridors defined on **Figure 2.6**; informal pedestrian and/or cycle routes; and utility and maintenance corridors for predominantly underground utility undertakers' apparatus and private utilities.

2.10.4 The Primary Open Land is divided into the 5 areas shown on **Figure 2.7**.

Primary Open Land 1 (excluding SSSI)

2.10.5 Primary Open Land 1 land for formal and informal recreation and floodlighting will not be included in this area.

Primary Open Land 1 (SSSI)

2.10.6 Use and development within the SSSI will accord with the Geological Site Management Plan, and floodlighting will not be included in this area.

Primary Open Land 2

2.10.7 Primary Open Land 2 will not include floodlighting.

Primary Open Land 3

2.10.8 Primary Open Land 3 Formal playing pitches and floodlighting will not be included in this area.

Primary Open Land 4

2.10.9 Primary Open Land 4 Floodlighting may be provided in connection with sports pitches.

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Primary Open Land 5

2.10.10 Primary Open Land 5 land for formal and informal recreation and will not include floodlighting. Primary Open Land 5 includes installation of a new flow control structure that will be capable of reducing the peak flows downstream of the Application Site for a range of return periods, up to and including a 1 in 100 year event, including an allowance for climate change. Excavation of a new two stage channel that will be capable of storing attenuated floodwater and provision of additional channels to enable floodwater to be effectively distributed within the two stage channel. These channels will be designated to create ecological opportunities through the provision of steep slopes, planting shelves and on line ponds. Construction of earthworks on the western edge of the Proposed Development to assist in the storage of floodwater.

- The minimum percentage reduction in peak flow downstream of the Application Site shall be 25% and 10% for events with a return period of 1 in 20 and 1 in 100 years (including an allowance for climate change) respectively.
- The flow control structure shall be designed ensuring that the peak flood level at the M11 culverts does not exceed 12.54mAOD and 12.76mAOD for events with a return period of 1 in 20 and 1 in 100 years (including an allowance for climate change) respectively.
- Floodwater shall be stored within landscaped areas of the area designated as Primarily Open Land 5 shall not encroach upon structures within the Proposed Development.
- Within Primary Open Land 5, slopes on earthworks visible from the west of the Application Site will not exceed a 1:3 gradient.

2.10.11 Development within Primary Open Land 2-5 will be consistent with use the Green Belt planning status of the land. Within Primary Open Land 1, development within the land designated as Green Belt will be consistent with the Green Belt planning status of that land.

Secondary Open Land

2.10.12 The zones within which Secondary Open Land is to be located are identified on **Figure 2.7** shaded in light blue. The minimum width of any area of Secondary Open Land (measured between its two longest boundaries) shall not be less than 20m, except where there is a drainage channel running longitudinally along the Secondary Open Land, where the minimum width shall not be less than 25m.

2.10.13 Development and/or use within Secondary Open Land for the following purposes is (unless otherwise indicated) acceptable: open land; formal and informal recreation and outdoor entertainment; landscaping; surface water balancing and other water features; water retention berms and structures sustainable drainage systems; nature conservation; allotments; woodland; car parking and hardstanding; vehicular pedestrian and cycle routes within the movement corridors defined on **Figure 2.6**; informal pedestrian and/or cycle routes; and utility and maintenance corridors for predominantly underground utility undertakers' apparatus and private utilities.

2.10.14 Development of buildings within Secondary Open Land shall be restricted to buildings consistent with the use of the land as open space, including plant and equipment storage, bridges, pavilions, public toilets and information centres and buildings for housing utility undertakers' apparatus.

Tertiary Open Land

2.10.15 Tertiary Open Land may be located within any of the Building Zones shown on **Figure 2.4** on areas not occupied by buildings for the uses indicated on **Figure 2.2**.

2.10.16 Development of buildings within Tertiary Open Land shall be restricted to buildings consistent with the use of such land as open space including plant and equipment storage, bridges, pavilions and buildings for housing utility undertakers' apparatus. Development and/or use within Tertiary Open Land for the following purposes is (unless otherwise indicated) acceptable: open land; informal recreation and outdoor

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entertainment; landscaping; surface water balancing and other water features; sustainable drainage systems; nature conservation; allotments; woodland; vehicular pedestrian and cycle routes within the movement corridors defined on **Figure 2.6**; informal pedestrian and/or cycle routes and utility and maintenance corridors for predominantly underground utility undertakers' apparatus and private utilities.

2.11 Highway and Utility Works

2.11.1 Highway and utility works will be undertaken within Zones A and C. These works are shown in **Figure 2.8 and 2.11** and described below.

Huntingdon Road - East Junction

2.11.2 Construction of a new three arm signal controlled at grade junction, including pedestrian and cycle crossings, to provide access to the Proposed Development to be located on Huntingdon Road between points C and D on **Figure 2.6** (referred to in this description of development as "the Huntingdon East Road Junction") together with ancillary works required for or associated with the construction of the new junction as shown on **Figure 2.9** to include:

- breaking out of existing carriageway, kerbs, street furniture and underground service media
- tying into existing footways and carriageways, including; provision and installation of new carriageway and footway sub-base, base, binder course and surface course
- provision and installation of new kerb foundation and backing, kerbing, and edging
- provision of traffic islands
- construction of controller, kiosks and vehicle hardstanding
- the construction of a trench and the laying of vehicle detector loops and associated cables, ducts and access chambers within that trench on the approaches to the new junction to provide MOVA and SCOOT. This trench will be located within the highway boundary and it will have a maximum width of 1m and a minimum width of 0.45m; and a maximum depth of 1.5m and a minimum depth of 0.6m (save for connections to surface apparatus)
- taking down and re-erecting of street furniture and traffic signs and provision and erection of new street furniture including traffic signal lights, and associated poles and kiosks, traffic signs, pedestrian guardailing and street lighting
- removal of part of existing vegetation to enable visibility splays to be created and provision of new landscaping

Huntingdon Road - West Junction

2.11.3 Construction of a new four arm signal controlled at grade junction, including pedestrian and cycle crossings, to provide access to the Proposed Development to be located on Huntingdon Road between points A and B on **Figure 2.6** and as shown on **Figure 2.10** (referred to in this Description of Development as "the Huntingdon Road West Junction") together with ancillary works required for or associated with the construction of the new junction including:

- breaking out of existing carriageway, kerbs, street furniture and underground service media
- tying into existing footways and carriageways, including; provision and installation of new carriageway and footway sub-base, base, binder and surface course
- provision and installation of new kerb foundation and backing, kerbing, and edging
- provision of traffic islands

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- construction of controller, kiosks and vehicle hardstanding
- the construction of a trench and the laying of vehicle detector loops and associated cables, ducts and access chambers within that trench on the approaches to the new junction to provide MOVA and SCOOT. This trench will be located within the highway boundary and it will have a maximum width of 1m and a minimum width of 0.45m; and a maximum depth of 1.5m and a minimum depth of 0.6m (save for connections to surface apparatus)
- taking down and re-erecting of street furniture and traffic signs and provision and erection of new street furniture including traffic signal lights and associated poles and kiosks, traffic signs, pedestrian guardrailling and street lighting
- removal of part of existing vegetation to enable visibility splays to be created and provision of new landscaping

Huntingdon Road - Toucan Crossing

2.11.4 Installation of a toucan crossing across Huntingdon Road located between the proposed Huntingdon Road East junction and the Whitehouse Lane/Huntingdon Road junction as shown on **Figure 2.10** to include:

- erection of new street furniture including traffic signal lights and poles and associated equipment kiosks, pedestrian guardrailling, traffic signs and installation of utilities

Huntingdon Road - Footway/cycleway

- Construction of a combination of unsegregated footway/cycleway and on-carriageway cycleway on the southern side of Huntingdon Road and associated works including:
 - taking down and re-erecting of street furniture and traffic signs and provision and erection of new street furniture including traffic signal lights and associated poles and kiosks, traffic signs, pedestrian guardrailling and street lighting and installation of utilities
 - breaking out of existing footway, carriageway, kerbs, street furniture and underground service media
 - tying into existing footways and carriageways, including; provision and installation of new carriageway and footway sub-base, base, binder and surface course
 - provision and installation of new kerb foundation and backing, kerbing, and edging

Huntingdon Road - Telecommunications Infrastructure

2.11.5 Installation of new telecommunication infrastructure in the form of ducts and fibre optic and copper cables to be laid within trenches a maximum width of 2m and a minimum width of 0.5m; and a maximum depth of 2m and a minimum depth of 0.5m (save for connections to surface apparatus). The telecommunications infrastructure is to be situated below the proposed roads, footpaths and cycleways within the Proposed Development shown on **Figure 2.6** and connected to the existing apparatus situated below Huntingdon Road within the zone for new utility apparatus shown on **Figure 2.8** together with associated access chambers and above ground kiosks.

Huntingdon Road - Utility diversion and protection works

2.11.6 Diversion and/or replacement and/or protection of existing utilities affected by the proposed highway works on Huntingdon Road, including drainage, electricity cables, low pressure gas mains, telecommunications apparatus, potable water mains and street lighting equipment within the zone of the highway works shown on **Figure 2.8**.

Zone C

Madingley Road - High Cross/Madingley Road Junction

2.11.7 Junction improvement works at the High Cross/Madingley Road junction to alter it from a three arm priority junction to a four arm signal controlled at grade junction, including pedestrian and cycle crossings, to provide access to the Proposed Development with ancillary works as shown on **Figure 2.12** to include:

- breaking out of existing carriageway, kerbs, street furniture and underground service media;
- tying into existing footways and carriageways, including; provision and installation of new carriageway and footway sub-base, base, binder course and surface course;
- provision and installation of new kerb foundation and backing, kerbing, and edging;
- provision of traffic islands;
- construction of controller, kiosks and vehicle hardstanding;
- the construction of a trench and the laying of vehicle detector loops and associated cables, ducts and access chambers within that trench on the approaches to the new junction to provide MOVA and SCOOT. This trench will be located within the highway boundary and it will have a maximum width of 1m and a minimum width of 0.45m; and a maximum depth of 1.5m and a minimum depth of 0.6m (save for connections to surface apparatus);
- Taking down and re-erecting of street furniture and traffic signs and provision and erection of new street furniture including traffic signal lights and associated poles and kiosks, traffic signs, pedestrian guardrailling and street lighting;
- Construction of retaining walls and associated parapets; and
- Removal of part of existing vegetation to enable visibility splays to be created and provision of new landscaping.

2.11.8 Madingley Road - Toucan Crossing

2.11.9 Installation of a toucan crossing across Madingley Road on the eastern side of the Madingley Road/JJ Thomson Avenue Junction to include:

- Erection of new street furniture including traffic signal lights and poles and associated equipment kiosks, pedestrian guardrails and traffic signs.

2.11.10 Madingley Road - Unsegregated footway/cycleway

2.11.11 Construction of a new 2.5m wide unsegregated footway/cycleway on the northern side of Madingley Road from the Madingley Road West Junction to the Madingley Road East Junction as shown on **Figure 2.12** and associated works including:

- breaking out of existing footway, street furniture and underground service media;
- Construction of retaining walls and associated parapets;
- tying into existing footways and carriageways, including; provision and installation of new carriageway and footway sub-base, base, binder course and surface course; and
- taking down and re-erecting of street furniture and traffic signs, provision and erection of new street furniture, traffic signs and installation of utilities.

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2.11.12 Madingley Road - New Pumped Foul Water Rising Main

2.11.13 Provision of a new pumped foul water rising main within a trench with a maximum width of 1.5m and a minimum width of 0.5m; and a maximum depth of 2m and a minimum depth of 0.9m to be situated within the zone for installation of new utility apparatus shown on **Figure 2.11** and to extend in an easterly direction from the High Cross/Madingley Road junction to the existing trunk sewer which is situated near to the Madingley Road/ Wilberforce Road junction.

2.11.14 Madingley Road - Utility diversion and protection works

2.11.15 Diversion and/or replacement and/or protection of existing utilities affected by the proposed highway works on Madingley Road, including drainage, electricity cables, low pressure gas mains, telecommunications apparatus, potable water mains and street lighting equipment within the zone of the highway works shown on **Figure 2.11**.

2.11.16 Madingley Road - Electric Supply

2.11.17 Installation of high voltage electrical connections to electricity substations within the Proposed Development comprising cables installed within trenches with a maximum width of 1.5m and a minimum width of 0.5m; and a maximum depth of 1.5m and a minimum depth of 0.75m (save for connections to surface apparatus). This electrical apparatus is to be situated within the zone for installation of new utility apparatus shown on **Figure 2.11** from the existing Primary Substation also shown on **Figure 2.11** to the High Cross/Madingley Road junction together with transformer upgrades to the Primary Substation.

2.11.18 Madingley Road - Gas Supply

2.11.19 Installation of a new gas supply for the Proposed Development in the form of a pressurised main to be laid within trenches a maximum width of 1m and a minimum width of 0.3m; and a maximum depth of 1.5m and a minimum depth of 0.75m (save for connections to surface apparatus). The main is to extend below the proposed roads, footpaths and cycleways within the Proposed Development shown on **Figure 2.6** from a new Pressure Reducing Station to the existing medium pressure gas main situated beneath Madingley Road within the zone for new utility apparatus shown on **Figure 2.11**.

2.11.20 Madingley Road - Telecommunications Infrastructure

2.11.21 Installation of new telecommunication infrastructure in the form of ducts and fibre optic or copper cables to be laid within trenches a maximum width of 2m and a minimum width of 0.5m; and a maximum depth of 2m and a minimum depth of 0.5m (save for connections to surface apparatus). The new telecommunications infrastructure is to be situated below the proposed roads, footpaths and cycleways within the Proposed Development shown on **Figure 2.6** and connected to the existing apparatus situated below Madingley Road within the zone for new utility apparatus shown on **Figure 2.11** together with associated access chambers and above ground kiosks.

2.11.22 Madingley Road – District Heating Infrastructure

2.11.23 Installation of new district heating infrastructure in the form of flow and return pipes to be laid within trenches a maximum width of 2m and a minimum width of 0.5m; and a maximum depth of 2m and a minimum depth of 1m (save for connections to surface apparatus). The district heating pipework is to extend from the Energy Centre, below the proposed roads, footpaths and cycleways within the Proposed Development shown on **Figure 2.6**.

Potable water main extension

2.11.24 Cambridge Water Company has indicated that it will be necessary to reinforce the existing potable water supply network to allow the Proposed Development to be supplied in 2014 as the northern arm of the ring main system around Cambridge is currently close to capacity. The proposed reinforcement works would include the provision of a new 450mm diameter ring main that would extend over a length of 3.2km from the 18" main located 1.5km to the south of the Application Site to the existing water mains situated near the Histon junction of the A14 trunk road.

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2.11.25 Links to the new water ring main are not included within the application since they would be provided by Anglian Water following a requisition under the Water Industry Act 1991. Nevertheless, in recognition of the importance of this connection to the Proposed Development, the likely significant environmental effects of provision of this connection have been considered and reported alongside utility connections required in connection with the Proposed Development.

2.11.26 There are two connection routes for the proposed water main connection:

2.11.27 Option 1 would require installation across third party land. To the north of the Application Site the possible route for option 1 would be along Whitehouse Lane and the line of a public footpath heading north-east to a connection with an existing 18 inch water main below Kings Hedges Road. To the south of the Application Site the possible route for option 1 would be through the West Cambridge development and then across farmland to the south to connect with an existing 18 inch water main.

2.11.28 Option 2 would install the extension along existing streets.

2.12 Measures to avoid or reduce adverse effects

2.12.1 A number of measures are proposed as part of the Proposed Development. As a result of the iterative design process the Proposed Development has been refined to incorporate the following measures: The measures incorporated are set out in **Table 2.1**.

2.12.2 **Table 2.1** provides a summary of the measures to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects identified in each of the individual chapters. **Table 2.1** should be read alongside each of these individual chapters.

Table 2.1: Measures to avoid or reduce adverse effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
General	Construction and Environmental Management Plan to guide and/or cover issues identified in ES chapters.	X		X	Within individual ES chapters
Socio Economics	Primary school (1FE to be provided within Phase 1 of the Proposed Development)	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Nursery school provision, including early years provision at the primary school and 2 additional nursery locations.	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio economics	Secondary school provision, to be provided at NIAB 2. It is expected that the University will contribute to the funding of these facilities through legal agreement.		X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	500m2 community centre and 450m2 indoor sports provision (if provision cannot be secured at West Cambridge).	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	700m2 primary care centre	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	200 m2 police touchdown space	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Formal outdoor open space provision (sports pitches)	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Socio Economics	Informal outdoor open space provision	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Areas for children and teenager recreation	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Allotments	X	X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Library provision, to be provided at NIAB.		X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Socio Economics	Swimming pool contribution in existing city centre facility.		X		Section 5.6 Measures to Avoid or Mange Adverse Effects and to Deliver Beneficial Effects.
Landscape and Visual	Inclusion of four typical local character landscape areas: <ul style="list-style-type: none"> • Western Edge • Parkland (the area of the Western Edge adjacent to the built form) • Landscape fingers • Girton Gap, Central Open Space and Ridge & Furrow 	X	X		Section 6.2 Landscape Principles
Landscape and Visual	A destination and an area where the whole community can enjoy a range of facilities and high quality spaces and good pedestrian and cycle links.	X			Section 6.2 Landscape Principles
Landscape and Visual	Retention of existing planting (where practicable) and extensive planting of new woodland, trees and hedgerows;	X			Section 6.2 Landscape Principles

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Landscape and Visual	Retaining/ replacing existing on site footpaths and providing new connections to the existing wider footpath/ cycleway network Relating the heights and densities of the proposals adjoining existing properties to adjacent existing housing ;	X	X		Section 6.2 Landscape Principles
Landscape and Visual	Creating a new, well-screened and integrated urban/ rural edge to Cambridge and ensuring that the new landforms and development platforms are not over engineered in appearance and tie in smoothly with adjacent land;	X			Section 6.2 Landscape Principles
Landscape and Visual	Forming a new network of open spaces that contributes to the new landscape and visual resource and provides recreational opportunities;	X	X		Section 6.2 Landscape Principles
Landscape and Visual	Phasing the implementation of the landscape framework in advance of, or concurrently with, the development as far as practicable / viable; and			X	Section 6.2 Landscape Principles
Landscape and Visual	Careful consideration of building layout and orientation to minimise landscape and visual effects.	X			Section 6.2 Landscape Principles
Ecology and Nature Conservation	Appropriate construction site drainage to avoid pollution of the Washpit Brook	X		X	Section 7.6 Washpit Brook
Ecology and Nature Conservation	Balancing and attenuation ponds designed to provide valuable habitat for water voles and other associated wetland species. In addition two artificial otter holts and kingfisher nests will be constructed in open land provision along the brook. Four Kingfisher nest chambers will also be provided in appropriate	X	X		Section 7.6 Washpit Brook Section 7.9 Measures to avoid Reduce of Manage Effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	sections of locally steepened bank.				
Ecology and Nature Conservation	New trees and hedgerows will be planted to replace those lost	X		X	Section 7.6 Mature, Veteran and Specimen Trees
Ecology and Nature Conservation	Protective fencing where necessary during construction to protect retained vegetation from damage. At least 700m of new hedgerow will be planted within the area of open land along the western edge	X		X	Section 7.6 Hedgerows Section
Ecology and Nature Conservation	The most valuable habitat features for dead wood invertebrates will be retained, including the veteran oak tree and horse chestnut trees.	X		X	Section 7.6 Terrestrial Invertebrates
Ecology and Nature Conservation	5m wide buffer zones alongside retained hedgerows	X		X	Section 7.6 Hedgerows; Section
Ecology and Nature Conservation	Low level directional street lighting to minimise light spillage.	X		X	Section 7.6 Bats
Ecology and Nature Conservation	Re-survey of the Washpit Brook for water voles and outfalls/bridges where they are absent. Animals relocated by vegetation strimming and undertaking a careful destructive search in accordance with current best practice. Also resurvey of Brook to confirm absence of otter resting sites.			X	Section 7.6 Washpit Brook
Ecology and Nature Conservation	Construction of an amphibian tunnel under the access road to Madingley Road, with associated amphibian resistant fencing alongside the access road to guide the animals into the tunnel			X	Section 7.6 Great Crested Newts

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Ecology and Nature Conservation	Construction of artificial refuge/hibernation sites within open land on Western Edge. Toads moved from pond 4 in advance of clearance plus southern part of site. Site clearance works overseen by qualified ecologist. All toads released into artificial refuge/hibernation sites. A green corridor linking north and south of the Application Site			X	Section 7.6 Common Toads
Ecology and Nature Conservation	Update newt surveys to inform the newt license application (dependent upon timing of works in this area).			X	Section 7.6 Great Crested Newts
Ecology and Nature Conservation	Amphibian tunnels provided to the north of WCMC and also beneath road to the south of this area which will complement tunnel indicated in 28 above.			X	Section 7.6 Common Toads
Ecology and Nature Conservation	Site clearance during the construction phase within 500m of the Park and Ride will take place under license to Natural England			X	Section 7.6 Great Crested Newts
Ecology and Nature Conservation	An artificial badger sett will be provided within the open land along the Western Edge	X		X	Section 7.6 Badgers
Ecology and Nature Conservation	Heavy machinery within 30metres of any retained setts may also need to proceed under license from Natural England			X	Section 7.6 Badgers
Ecology and Nature Conservation	Closure of the northern end of sett A to allow access road construction, under license from Natural England		X		Section 7.6 Badgers
Ecology and Nature Conservation	New areas of grassland will be created in open land to provide more valuable foraging resource. Open land and	X		X	Section 7.6 Badgers

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	landscape planting will be designed to maximise the value of these parts of the Application Site for badgers.				
Ecology and Nature Conservation	Enhancement of arable farmland outwith the Application Site to provide Skylark plots, valuable habitat for nesting linnets and yellowhammers, additional foraging for all 3 species. Other measures to increase the availability of nesting and foraging habitat could be considered			X	Section 7.6 Breeding Birds
Ecology and Nature Conservation	Creation of habitat feature in field corners and in strips adjacent to ditches (straightening field edges where there are 'meanders' in a ditch), with 1ha of wild bird seed mix sown and 1ha of unharvested fertiliser-free headlands created in such locations to provide food resource of small seeds for a variety of farmland birds, including linnets and yellowhammers. The provision of wild bird seed mix and conservation headlands will follow the methods set-out in Natural England's Higher Level Stewardship Handbook (HF12 and HF14) (Natural England, 2010).		X		Section 7.6 Breeding Birds
Ecology and Nature Conservation	Site clearance (trees/hedgerows and arable fields in particular) outside the nesting bird period where possible (i.e. not during end-Feb to mid-August). Or surveys in advance of clearance to confirm absence of nesting birds (with the associated risk of having to retain areas supporting nests until the chicks have fledged. If these time periods cannot be avoided surveys to confirm absence of			X	Section 7.6 Breeding Birds

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	nesting birds, plus surveys to confirm absence of nesting birds in buildings to be demolished. Should birds be identified a buffer zone will be put around until chicks have fledged.				
Ecology and Nature Conservation	Update barn owl survey to confirm continued absence of nesting barn owls.			X	Section 7.6 Breeding Birds
Ecology and Nature Conservation	Demolition of building supporting a bat roost under license to Natural England, and timed to avoid periods when bats are present (given the status of the roost it is likely that a period of absence could be identified at any time of year).Resurveying of all suitable trees and buildings prior to each phase of site clearance.			X	Section 7.6 Bats
Ecology and Nature Conservation	Incorporation of features of value for roosting bats into a proportion of the new buildings, by allowing bats into roofspaces (such as through raised tiles or cavities at roof apexes) as well as bat bricks. Such features to be provided in Communal buildings.		X	X	Section 7.6 Bats
Ecology and Nature Conservation	Provision of bat boxes on retained trees within the POS on the site's western edge.		X	X	Section 7.6 Bats Section 7.9Measures to avoid Reduce of Manage Effects
Ecology and Nature Conservation	New nest sites for swifts , starlings and house sparrows and blue /great tits incorporated into building design	X		X	Section 7.9Measures to avoid Reduce of Manage Effects
Ecology and Nature Conservation	Areas of relative darkness will provide more valuable foraging habitat.	X			Section 7.8 Enhancement Measures

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Soils and Geology	Standard contamination planning conditions covering such aspects as ground investigation, foundation solutions, may be applied to the proposed planning permission and implemented as the Scheme develops			X	Section 8.2.4 Hazard source Investigation
Soils and Geology	A Site Waste Management Plan and Sustainability Strategy complemented by the CEMP will commit the project to sustainability through appropriate management of the excavation, demolition, construction and operational phases phase			X	Section 8.4 Likely significant effects; Section 8.4.63 Measures to Avoid, Manage or Reduce Effects.
Soils and Geology	All built environment is indicated outside the buffer zone around the SSSI. No construction activities within the SSSI unless in accordance with by Geological Site Management Plan.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Within the SSSI, paths will preferentially be located on ground not underlain by Observatory Gravels. Where it is necessary for paths to cross areas underlain by Observatory Gravels, the form of any necessary path chosen should enable it to be moveable and/or demountable to allow future access for research Paths shall be raised to ensure that they do not introduce a requirement for the Observatory Gravels to be removed during their construction. Concrete or bituminous paths will not be permitted.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Litter bins, benches, signs and other street furniture will be designed to avoid damage to the underlying geology.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Soils and Geology	As much as possible access will be made in areas outside the 2010 notified SSSI boundary. Ramps for disabled or cycle access will be formed outside the 2010 notified SSSI boundary	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Steps down the quarry slopes, within the SSSI boundary, will be created by filling against the slope in order to ensure that the insitu geology will not be damaged. The use of steps formed by cutting into the slope should not be permitted. The details of any steps or ramp proposed will be discussed and agreed with the local planning authorities and relevant consultees, including Natural England, at the detailed design stage.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Deep rooting plants and trees will not be permitted within the SSSI as roots penetrating into the Observatory Gravels could have the potential to disturb the sedimentary structures within the geological sequence and toppling trees could significantly disturb the sequence of strata within the root zone.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Structures will not be located within the SSSI as their foundations have the potential to disturb geology in localised areas and to restrict access to underlying areas.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Children's play areas and hard surface sports facilities will not be located within the SSSI boundary.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Formal turf sports facilities, such as football or cricket pitches will not be laid out or considered within the SSSI.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	Informal sports may take place if they are considered compatible with the conservation of the geology by Natural England. Leveling of the ground surface within the SSSI should not be undertaken.				
Soils and Geology	If investigatory pits or boreholes are required in areas designated for sports turf, consideration will have to be given to the means of achieving an adequate standard of reinstatement.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Ponds will not be located within the SSSI as they have a high probability of disturbing or destroying the geological resource and are likely to restrict access to significant areas of the resource for future research.	X			Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	A control strategy will be implemented to actively manage access to the SSSI for study and research purposes.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Drainage pipes and buried services will not be laid through the SSSI, wherever an alternative route exists, as they have the potential to damage the geological resource during the trenching operation.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	No construction activities (e.g. storage of materials, access for movement of construction traffic) will take place in the SSSI unless required to carry out the mitigation and enhancement measures	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Management of vegetation on the site. In particular removal of undergrowth, trees and shrubs from the degraded quarry slopes and regular mowing of the SSSI to prevent the SSSI becoming overgrown in future and ensure that the geological	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	resource is not damaged by toppling trees. Where it is necessary to remove trees the roots and a stump will be left in place so that the Observatory Gravels are not disturbed. Stumps will be treated to prevent re-growth. Covering exposed gravels on the slopes with topsoil and seeding to reduce erosion and help stabilise the slopes. Ongoing maintenance will be required to maintain the grassed surface.				
Soils and Geology	Restricting public access to the most sensitive areas such as slopes could be controlled or discouraged. This will be agreed with Natural England.	X		X	Section 8.14 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Surveying and recording the geology prior to, or during, construction in order to mitigate potential loss of localised areas of the Observatory Gravels, or locally reduced accessibility for future research. Retaining the soil cover is more appropriate than attempting to provide permanent exposures of the geology for public observation	X		X	Section 8.15 Measures to Avoid, Manage or Reduce Effects
Soils and Geology	Geological Site Management Plan prepared in consultation with Natural England.	X		X	Section 8.15 Measures to Avoid, Manage or Reduce Effects
Archaeology	A scheme of archaeological works will be enacted in advance of and during construction operations. This will include further evaluations to investigate those areas where access restrictions prevent surveys that could have informed this assessment. The further evaluations will			X	Section 9.7 Measures to Avoid, Reduce or Manage Effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	be followed by a programme of archaeological excavations. The full programme of archaeological investigations will be devised in consultation with the Historic Environment Team at Cambridgeshire County Council.				
Cultural Heritage	Best practice will be followed during construction to reduce noise dust and other irritants			X	Section 10.4 Construction Phase
Cultural Heritage	Apply CEMP.			X	Section 10.4 Construction Phase
Agricultural Circumstances	Effects on the loss of the farm through actions undertaken on additional land.	X			Section 11.7 Completed Projects 2026
Traffic and Transport	A Construction and Environmental Management Plan will be applied to all construction activities.	X		X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Design consideration of alternative service routes to minimise construction work in the local highway.			X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Co-ordination of development works to undertake all necessary works such as utility provision to avoid having to re-install traffic management measures.			X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Co-ordination of development works to avoid two parallel routes been affected at the same time			X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Consideration of anti –social working hours in areas where sensitivity of receptors is limited to reduce overall duration of works			X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Possible removal of traffic management measures during peak hours			X	Section 12.6 Likely Significant Effects before 2014 Opening.
Traffic and Transport	Installation of intelligent traffic light controls (automatic or manual to minimise any inefficient use of green time			X	Section 12.6 Likely Significant Effects before 2014 Opening.

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Traffic and Transport	Implementation of a travel demand management strategy, governance and Travel Plan management;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Reducing the car parking provision across the Proposed Development, and managing the use of adjacent parking areas;	X	X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Introduction of co-ordinated Travel Plan measures across the University's facilities across the City;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Funding of a promotional campaign for the guided busway, to maximise the patronage from communities along the route and the extraction of trips from the A14 and M11 to the Park and Ride sites;		X		Section 12.2 Transport Strategy and Measures to Manage Effects
Traffic and Transport	Measures directed at demand management across the network:		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Provision of MOVA and SCOOT traffic signal optimisation apparatus to the linked traffic signal junctions along Madingley Road and Huntingdon Road to maximise the existing capacity of the network;			X	Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	A monitoring scheme leading to possible traffic calming measures along the Oxford Road / Windsor Road link;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Pedestrian and cyclist measures, including signalised crossings of Huntingdon and Madingley Roads junctions and an additional crossing point to Whitehouse lane commuter cycle route			X	Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Provision of enhancements to the movement of cyclists along Huntingdon		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	Road to town;				Assessment Approach
Traffic and Transport	Improvement of pedestrian and cyclist movement through the Huntingdon Road / Victoria Road / Castle Street junction;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Implementation of quality, frequent bus services to a series of destinations on orbital and radial routes through Cambridge;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Measures to reduce vehicle speeds on Huntingdon Road		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Capacity enhancement scheme to the M11 Junction 13 Southbound Slip road, possibly including ramp metering;		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Traffic and Transport	Local highway measures at the Queen Street / Madingley Road / Northampton Street junction.		X		Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach
Noise Environment	With regards to general construction activities, it is assumed that the contractor will follow best practicable means to reduce the noise effect on the local community including the guidelines established in the CEMP.	X		X	Section 13.3 Development Assumptions
Noise Environment	Selection of inherently quiet plant where appropriate. Fixed and semi-fixed ancillary plant such as generators, compressors and pumps will be located away from receptors;	X		X	Section 13.3 Development Assumptions
Noise Environment	All plant used on site will comply with the EC Directive on Noise Emissions for Outdoor Equipment, where applicable; Construction contractors will adhere to the codes of construction working in BS 5228 regarding minimising noise emissions	X		X	Section 13.3 Development Assumptions

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	from the site.				
Noise Environment	All plant used on site will be regularly maintained, paying particular attention to the integrity of silencers and acoustic enclosures; All ancillary plant positioned to minimise noise disturbance to sensitive receptors.	X		X	Section 13.3 Development Assumptions
Noise Environment	Equipment in intermittent use will be shut down when not in use or throttled down to a minimum;	X		X	Section 13.3 Development Assumptions
Noise Environment	Plant and equipment such as flatbed lorries skips and chutes should be lined with noise attenuating materials. Materials will be handled with care e.g. material such as scaffolding and steelwork will be placed rather than dropped; and	X		X	Section 13.3 Development Assumptions
Noise Environment	Drop heights of materials from lorries and other plant will be kept to a minimum.	X		X	Section 13.3 Development Assumptions
Noise Environment	All buildings will be designed to avoid adverse noise effects. With regards to the piling of foundations, if this is required for any of the proposed buildings, the avoidance of driven piling, for example by using rotary bored piling where possible, will ensure noise and vibration effects during these works will be reduced.	X		X	Section 13.5 Construction Vibration.
Noise Environment	As the various phases of the Proposed Development are completed and occupied, ongoing construction works may effect on future residents. Some construction works will be carried out in close proximity to occupied buildings. For each phase, of the Proposed Development, as per the CEMP noise	X		X	Section 13.5 Assessment Year 2026

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	attenuation measures will be provided. For each phase, of the Proposed Development, method statements will be provided and appropriate measures implemented such as temporary noise barriers use of low noise plant.				
Noise Environment	Provision of noise barriers if appropriate to the southern access on to Huntingdon Road which will look to will reduce the noise for the small number of existing properties which will be affected by noise from traffic entering and leaving the site. A strip of land north of this junction will be landscaped as part of the Proposed Development to provide acoustic shielding,	X		X	Section 13.5 Assessment Year 2026
Noise Environment	Energy Centres will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be minimal.			X	Section 13.3 Development Assumptions;
Noise Environment	Fixed plant associated with the Proposed Development will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be minimal.			X	Section 13.6 Operational Fixed Plant Noise
Noise Environment	Construction contractors will adhere to codes of practice BS5288 for construction works			X	Section 13.3 Development Assumptions
Noise Environment	Building massing and orientation, internal layouts of specific building, employment of appropriate stand-off distances from internal site roads and the specification of appropriate glazing and ventilation will be employed to provide acceptable internal noise climates to all buildings.	X		X	Section 13.3 Development Assumptions

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Noise Environment	Less sensitive parts of the Proposed Development such as commercial and academic buildings, will be located on the western fringe.	X			Section 13.3 Development Assumptions
Noise Environment	Where practicable, habitable rooms such as living rooms and bedrooms will be located on the quiet facades of residential buildings. Less sensitive spaces such as hallways, bathrooms and kitchens will be located on the noisier facades.	X			Section 13.3 Development Assumptions
Air Quality	During the construction phase, the adoption of a dust management plan incorporating good working practices, such as those associated with CCC's considerate contractors scheme would provide the required level of protection of pre-existing receptors to construction phase effects on amenity and health.	X		X	Section 14.6 Mitigation and Enhancement
Hydrology, Drainage and Flood Risk	Production of a site Construction Environmental Management Plan (CEMP).	X			Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	The Washpit Brook will be remodeled in order to assist in the attenuation and storage of floodwater. The proposed improvements include the realignment of the southern section of the brook. Linear ponds will also be constructed along the route of the watercourse.	X			Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	The handling, use and storage of hazardous materials to be undertaken in line with the EA's Pollution Prevention Guidelines (e.g. PPG2 Above Ground Oil Storage Tanks);			X	Section 15.5 Measures to Avoid or Manage Significant Effects.

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Hydrology, Drainage and Flood Risk	Adequately bunded and secure areas with impervious walls and floor for the temporary storage of fuel, oil and chemicals on site during construction;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Drip trays to collect leaks from diesel pumps or from standing plant.			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Oil interceptor(s) fitted to all temporary discharge points and for discharge from any temporary oil storage/ refuelling areas;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Development of pollution control procedures in line with the EA's Pollution Prevention Guidelines, and appropriate training for all construction staff;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Provision of spill containment equipment such as absorbent material on site.			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Restrictions on use of machinery near adjacent water bodies;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Treatment of any development site runoff with elevated suspended solids prior to discharge. Treatment measures could include perimeter cut-off ditches, settlement lagoons, overland flow and/or settlement tanks;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Wheel wash facilities should be provided for vehicles moving to and from the construction site at all entry and exit points. Silty water from wheel-washes will require appropriate disposal to prevent unacceptable levels of suspended solids entering any nearby surface water bodies. Wheel washing facilities should be			X	Section 15.5 Measures to Avoid or Manage Significant Effects.

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	located as far from surface waters as possible;				
Hydrology, Drainage and Flood Risk	If dewatering is required along any part of the construction corridor, pumped groundwater should be disposed of appropriately according to EA Pollution Prevention Guidelines;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	The reseeded of cleared land as soon as practicable, to minimise exposed land and the entrainment of sediment by overland flow; and this can be managed by ensuring construction plant/ materials are stored on hardstanding surfaces where possible. Where this is unavoidable, the Contractor will ensure any compacted soil is loosened as soon as possible following completion of the works;			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Temporary structures/crossings over the Washpit Brook should be designed to the appropriate standard, thereby ensuring flood risk is not exacerbated on site or to downstream areas.			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Best practice during construction as defined within CIRIA C698 site handbook for the construction of SuDS to ensure that construction works do not adversely effect the subsequent performance of SudS that are provided to attenuate and improve the quality of surface runoff from the proposed development.			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Utilities and Services	Consultations will be held with the Statutory Undertakers to ensure that all new services are installed following a similar route, where possible at the same	X		X	Section 16.6 Measures to Avoid or Manage effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	time. The new utilities will be installed below the footway, or in close proximity to the existing kerb line, to reduce the requirement for road closures. The position of utilities will be identified in advance of the works taking place through the use of non intrusive geophysical surveys and hand dug excavations to reduce the likelihood of conflicts that could cause the utility installation works programme to be increased unnecessarily.				
Utilities and Services	Temporary signals will be provided to enable a safe working area to be provided within the carriageway, whilst enabling vehicular traffic to continue to use the opposing carriageway. The traffic flows along Huntingdon Road and Madingley Road are tidal and it will therefore be necessary for intelligent signals to be used in order to provide extended green time for the most heavily trafficked route and thereby minimise congestion and delay.			X	Section 16.6 Measures to Avoid or Manage effects
Utilities and Services	The Statutory Undertakers utility installations works will be phased to ensure that temporary traffic signals are not erected on more than one road at any time and traffic diversions will be provided at strategic locations to control			X	Section 16.6 Measures to Avoid or Manage effects

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	congestion.				
Utilities and Services	Use will be made of local media to provide local drivers with appropriate information to assist them in making decisions regarding their choice of route.			X	Section 16.6 Measures to Avoid or Manage effects
Utilities and Services	Contract documents will include obligations on Contractors to maintain access to properties at all times or to agree in advance and undertake works at times when access will not be required			X	; Section 16.6 Measures to Avoid or Manage effects
Hydrology, Drainage and Flood Risk	Provide a control structure within Washpit Brook and a landform meeting the flood storage attenuation and conveyance criteria set out in the FRA.	X		X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Not to place structures in Flood Zone 2 which affect flood storage attenuation and conveyance criteria set out in the FRA.			X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Soils and Geology	Existing fencing and gates will be removed from the edges of the Traveller's Rest Pit. The boundary of the SSSI will be marked by appropriate boundary posts, located outside the SSSI.			X	Section 8.15.10 Measures to Avoid, Manage or Reduce Effects – Major Beneficial
Soils and Geology	The farm access track and storage area outside the pit, but within the SSSI, will be removed. The area within the SSSI currently occupied by the road, storage area and farmland will be reinstated as grassland.			X	Section 8.15 Measures to Avoid, Manage or Reduce Effects – Major Beneficial

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Hydrology, Drainage and Flood Risk	Surface management plan has been developed as part of the FRA to attenuate and improve the quality of water runoff	X		X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Hydrology, Drainage and Flood Risk	Following measures incorporated into development to reduce overall water demand from dwellings and non residential buildings to allow portable water to be replaced , water efficiency measures, visible water meters, rainwater harvesting and grey water recycling	X		X	Section 15.5 Measures to Avoid or Manage Significant Effects.
Utilities and Services	Mobile noise barriers will be provided, where practicable, when the most noisy utility works are undertaken in order to enable the noise level to receptors on Huntingdon Road and Madingley Road to be reduced. With noise avoidance and management measures and construction traffic routeing in place, as outlined in the Development Assumptions, off-site construction works for utilities will be effectively managed, minimising significant effects at off-site receptors.			X	Section 16.6 Measures to Avoid or Manage effects
Utilities and Services	Measures to avoid negative effects on air quality would include use of low emission vehicles running on low sulphur diesel, and damping down to avoid dust generation.			X	Section 16.6 Measures to Avoid or Manage effects
Sustainability Considerations	All homes constructed to Code for Sustainable Homes level 5 ensuring that up to 60% of regulated CO2 emissions are reduced using on-site measures.	X		X	Section 17.4 Assessment Approach

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	.				
Sustainability Considerations	All domestic buildings (from 2016) and non domestic buildings (from 2019) being net zero carbon, using a mix of on-site measures and CO ₂ offsets through the proposed Building Regulations Part L “Allowable Solutions” scheme.	X		X	Section 17.4 Assessment Approach
Sustainability Considerations	Across the site, renewable energy will reduce CO ₂ emissions from the non-domestic buildings by approximately 20%. Design guides are proposed to ensure that appropriate levels of renewable energy technologies are installed to achieve this target.	X		X	Section 17.4 Assessment Approach
Sustainability Considerations	Mandating minimum standards for energy efficiency. For domestic buildings, the Fabric Energy Efficiency Standard (FEES) is proposed for all homes. For non-domestic buildings, target benchmarks are proposed, and design guides for efficient building design, promoting natural ventilation and high levels of daylight.	X		X	Section 17.4 Assessment Approach
Sustainability Considerations	The use of gas-fired combined heat and power and district heating. This will provide heating to a large proportion of the buildings on the site.	X		X	Section 17.4 Assessment Approach
Sustainability Considerations	The installation of renewable energy systems potentially including photovoltaics, solar thermal, and heat			X	Section 17.4 Assessment Approach

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
	pumps				
Sustainability Considerations	Education of residents to stimulate behaviour change and increase awareness of energy consumption			X	Section 17.4 Assessment Approach
Sustainability Considerations	Most Code for Sustainable Homes and BREEAM credits covering occupancy phase waste will be achieved where feasible. . .			X	Section 17.11 Waste
Sustainability Considerations	On-site composting with local (either communal or individual garden) compost bins for individual residents to operate.			X	Section 17.11 Waste
Sustainability Considerations	For other non-university owned commercial/industrial units either individual in-vessel composters will be provided to treat food waste, or if there is insufficient space; a suitably equipped designated area will be provided to store food waste for treatment elsewhere			X	Section 17.11 Waste
Sustainability Considerations	Waste storage capacity will generally be provided in line with the RECAP guide, and checked against the RECAP waste management design guide toolkit. The exception will be external waste storage where for single households a requirement for 720 litres capacity will be sufficient rather than the stated 775 litres. This is in line with the WCA's current systems, and has been agreed in the consultation process.			X	Section 17.11 Waste
Sustainability	For non-residential buildings (inc. Halls of			X	Section 17.11 Waste

Discipline	Measures to avoid, reduce or manage any adverse effects and/ or to deliver beneficial effects	How measures would be secured			Reference
		Inherent within scheme	S.106	Conditions	
Considerations	Residence) storage capacities and requirements shall be in line with the Wst 3 requirements of the relevant BREEAM scheme.				
Sustainability Considerations	For non-residential buildings (inc. Halls of Residence) storage capacities and requirements shall be in line with the Wst 3 requirements of the relevant BREEAM scheme.			X	Section 17.11 Waste
Sustainability Considerations	Local Bring sites for more specialist waste streams and public area recycling	X	X		Section 17.11 Waste
Agricultural Circumstances	All works carried out in accordance with 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites'			X	Section 11.7 Completed Projects 2026
Traffic and Transport	Construction haul roads will be considered in terms of effect on noise and disturbance to the local community and will avoid the Travellers Rest Pit SSSI			X	Section 12.2 Transport Strategy and Measures to Manage Effects and Section 12.10 Assessment Approach

- It is anticipated that wherever elements are noted in the table above as being subject to a condition, an appropriate condition will be attached to planning permission for the Proposed Development in order to secure that item. Similarly where items are noted in the table as being subject to section 106 planning obligations, it is anticipated that appropriate planning obligations will be entered into by the Applicant.

2.12.3 The Applicant has held ongoing discussions over the S106 heads of terms. Currently, it is anticipated that the Draft Heads of Terms will cover the following areas:

- Affordable (key worker) housing for University and College staff
- Sports and open land.
- Ecology
- Access to countryside
- Community Infrastructure
- Education
- Waste
- Public Art
- Management
- Monitoring
- Transport

2.13 Construction Environmental Management Plan

2.13.1 A Construction Environmental Management Plan (CEMP) has been prepared and is included at **Appendix 2.1**. The CEMP details how environmental issues that arise during the construction of the Proposed Development will be handled to ensure compliance with relevant legislation.

2.13.2 The CEMP describes the measures which have been devised during the consultation process with statutory bodies in order to avoid, minimise and mitigate construction effects.

2.14 Alternatives

2.14.1 Part 2 of Schedule IV (Paragraph 4) to the EIA Regulations refers to consideration of alternatives by the applicant as part of the ES.

2.14.2 In this case the area around North West Cambridge has been subject to consideration initially at strategic level (Cambridgeshire and Peterborough Structure Plan) then at local level through the Local Plan process where the sustainability credentials have been considered in comparison with other potential sites. Subsequently the area has been considered again at the regional and sub regional level through the RSS process for the East of England Plan and then more recently still it has been considered in site specific terms during the preparation of the Area Action Plan. Both of these latter processes were accompanied by Sustainability Appraisals during the course of preparation which identified the benefits of this site/area over other alternatives. The adopted policies emanating from this plan make specific reference to the area/site being required to satisfy the expansion needs of the University. As a consequence of the detailed assessment work carried out under the former Structure/Local Plan system (pre 2004) and more recently under the RSS/LDD system post 2004, and the advice set out in Paragraph 8 of PPS1 relating to the plan led system, the Applicant has not studied any alternative sites as part of this ES on the basis that this exercise has already been carried out twice through the forward planning process.

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2.14.3 The need to plan for the University's future residential and research requirements led to the University's decision to commence a collaborative masterplanning process in 2005. In early 2005 a series of masterplan workshops were held. A number of early parameters were identified to inform the masterplanning process. This included an initial understanding of constraints, including the geological SSSI. The scheme also ensured it reflected good neighbourhood principles, by focussing on the need to minimise the effect of the development along the existing built up edges (particularly Huntingdon Road) through sensitive, low rise development. An initial masterplan was formed as shown on **Figure 2.14**.

2.14.4 Views into and out of the development were assessed in design terms, and it was established that key views into the Application Site were restricted to a number of long distance experiences principally from vehicle traffic. The scheme also assessed the relationship of development to the M11 to provide an effective noise barrier and to maximise open space within the development, in so doing providing accessible and high quality open space throughout the development and focusing non-residential development on the western built edge. As part of this, early landscape principles were established, which focussed on the importance of a new quality urban edge to the city, close to the M11 that would act as the gateway to the city from the west.

2.14.5 The indicative Masterplan Framework was generated through a series of workshop sessions and public forums/exhibitions held in January and March 2005. Building on the issues and parameters emerging from the first workshop, initial development options were produced by participants at the second workshop sessions and subsequently refined by the consultant team. These are illustrated on **Figure 2.15**.

2.14.6 In October 2007 prior to the formulation of the Area Action Plan five potential site footprints were assessed by way of the Site Footprint Assessment Document. This was supplemented by a Site Footprint Assessment Supplementary Paper, March 2008 which included a revised site boundary to be shown on the Proposals Map contained in the draft Area Action Plan for submission to the Secretary of State. The map pertaining to this document showed the site contours, the Preferred Option Site Boundary and a proposed alternative site boundary, see **Figure 2.16**.

2.14.7 Prior to the production of the supplementary paper five different development options were considered via the Site Footprint Assessment. The sites were designated as Option 10.1 to 10.5 as shown on **Figure 2.17 to 2.21** in the paper and are described as:

"Option 10.1 The preferred option of Cambridge University covering the largest footprint, which extends closest to the M11 and furthest down the slope which runs down to Washpit Brook, which runs roughly parallel to the M11 in this area. This option has a large circular central open space on the strategic gap through the development. It would fully meet the University's development aspirations, as set out in the Issues and Options Report."

Option 10.2 – An alternative configuration of site which is contained at the top of the slope broadly on the 20m contour and includes additional land further south. It has a slightly smaller, but broadly comparable, footprint to 10.1. The footprint has a broad strategic gap but no circular central open space.

Option 10.3 – An option drawn from the recommendations of a Green Belt Landscape Study for this area prepared by David Brown Associates and Richard Morrish Associates (May 2006), which contains development at the top of the slope broadly on the 20m contour and excludes land further south which is identified as being of historic importance. It includes a strategic gap running broadly north-south towards Madingley Road

Option 10.4 – Similar to Option 10.3 but with the strategic gap running northeast-southwest to link out towards open countryside out to and beyond the M11.

Option 10.5 – The smallest site footprint with development contained close to the existing built up area of Cambridge".

2.14.8 However, none of these sites following detailed assessment were considered to perform sufficiently well against the 2 key tests of meeting the University's needs and protecting the Green Belt setting of Cambridge that they could be recommended as the preferred option.

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2.14.9 As a consequence of the above the Joint Officer Reference Group worked with the University to identify options that would meet the 2 key tests of meeting the University's need. As a consequence of this exercise 5 sites, identified as Options A-E were produced and are provided at **Figures 2.22 to 2.26**.

2.14.10 Following an assessment of these sites the Councils concluded that the Draft Area Action Plan should include site Option E. Paragraph 7.4 of the Site Footprint Assessment states that *"From the detailed assessments of the site options, and taking account of the University's needs/aspirations, the supporting Green Belt landscape studies, an examination of viewpoints of the site and from the modelling work undertaken by EDAW, and the desirability of providing a large central open space in the strategic gap where it is shielded from the M11 by development, the Councils concluded that the draft Area Action Plan should include site Option E"*.

2.14.11 So far as the potential alternatives for the distribution of uses within the Application Site the 2007/2008 masterplan underpinned the University's representations to the Area Action Plan Public Examination. A key element of the 2008 masterplan was a review of existing densities across the Application Site and review of the open space provision, in order to allow for the development required, at a scale and density appropriate to the development's surroundings and to Cambridge. The 2008 plan placed a greater focus on the open space network and the new urban edges, focussing the need for better connections and the creation of a high quality frontage and noise buffer. The role of green infrastructure was heightened, focussing on the need to link and enhance valuable habitats and important species populations within and outside the Application Site.

2.14.12 The masterplan also focussed on the need to respect and enhance the main features, including the geological SSSI and ecological assets at specific locations.

2.14.13 The plan also established the primary road structure consisting of an east-west central spine allowing for even distribution, and the strategic north-south public transport priority route.

2.14.14 Following the submission of the draft AAP to the Secretary of State examinations of this document took place in November-December 2008, January 2009 and June 2009. The Inspector recommended changes to the area identified to accommodate the University requirements based on environmental considerations submitted in evidence to him. These amendments were subsequently incorporated into the adopted AAP. Overall these examinations of various development options through the AAP process have resulted in the Application Site being identified for the Proposed Development on the basis that it was clearly the most environmentally acceptable option.

2.14.15 The North West Cambridge Area Action Plan, adopted in October 2009, identified a new boundary for development which expanded the development footprint and provided a series of detailed sustainability and energy standards for the scheme.

2.14.16 The University's 2009 plan reviewed the principles that had evolved over time. The plan optimised development capacity and began to address the detail of the masterplan, overhauling many elements to establish a workable series of parameters. The design creates a well defined central open space on a similar scale to that of Parker's Piece in Central Cambridge, establishing a new central open space for North West Cambridge. A stronger series of structuring principles were established to delineate frontage to the central open space and by introducing the key pedestrian and cycle route – the Ridgeway.

2.14.17 The 2009 plan reinforced the existing landscape structures with a series of landscape threads running from north of the Application Site into the Western Edge. These threads will function as Sustainable Urban Drainage Systems, areas for ecological habitats and biodiversity and provide space for informal recreation and play spaces. A series of further testing of open space elements also took place at this stage in the plan development process.

2.14.18 Since the AAP boundary was fixed by the adoption of the AAP in October 2009, further design development and refinement of the masterplan have led to land use proposals, including residential, academic and commercial research space, community facilities and landscaping proposals. In particular, detailed capacity and 3-dimensional studies have informed a comprehensive understanding of land use distribution and potential character.

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2.14.19 The Applicant held a series of Stakeholder Workshops, Public Exhibitions and a Public Workshop during 2009 and 2010. The first round of consultation was held in November 2009 and the second round of consultation in July 2010. The consultation responses received and the outputs from the workshop events and public exhibitions took into account various environmental effects and the need to minimise them have informed both the masterplan evolution and the masterplan parameters prior to the submission of this application.

2.14.20 In June 2010 the Cambridgeshire Quality Panel held a review of the North West Cambridge site. The Panel concluded that there has been some dedicated, robust work behind the development of the plans to date and the aspiration to create a world class place to live and the desire to link the city with the Proposed Development is highly commended by the panel. Further, in July 2010 a CABA Review of the North West Cambridge scheme was conducted. The CABA reviewers commented that the design team had presented a logical masterplan strategy for the Application Site which placed a clear emphasis on connectivity, landscape character and environmental sustainability. The reviewers felt that the mix and planning of uses has the potential to create a richness and vibrancy across the development.

2.14.21 Both of the design reviews informed the later development stages of the masterplan, and the illustrative masterplan set out in the Design, Access and Landscape Statement responding to issues raised by both panels.

2.14.22 The 2011 plan sees a 'refresh' of elements of open space and green infrastructure provision, including further focus on the creation of the Western Edge as a distinctive landscape, establishing a high performance and multi-functional integrated landscape and the consolidation of the 'avenue of horse chestnut trees' and the new 'Ridgeway' as a primary pedestrian and cycle route. The focus on the local centre and its role as the heart of the development has been further clarified and cemented, the market square, foodstore, and the social and community infrastructure will ensure the development of a sustainable community.

2.14.23 In conclusion, as detailed above a number of alternative forms of development have been extensively explored prior to and since the publication and adoption of the AAP. The Applicant and consultants have undertaken a number of masterplanning and public consultation exercises which, after taking into account environmental considerations, have led to refinements as to the location and form of the built development, as opposed to the actual extent of the application site identified by the adopted AAP.

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3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

10 Cultural Heritage

11 Agricultural Circumstances

12 Traffic and Transport

13 Noise Environment

14 Air Quality

15 Hydrology, Drainage and Flood Risk

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3 PHASING AND IMPLEMENTATION

3.1 Introduction

3.1.1 The Proposed Development is intended to meet the Applicant's requirements over an extended period of 15 years with completion occurring in 2025 – 2026. This ES has already indicated that an assessment of all aspects will be undertaken at 2014 and this date is intended to represent the end of Phase 1 of the Proposed Development where the basic structure of the development and the construction of the central physical and social infrastructure of the new community, will be undertaken. Thereafter in the period to 2025/2026 the Proposed Development has been split into a further 3 phases (Phases 2 – 4) covering 3 – 4 year periods.

3.1.2 The four phases are identified in broad terms on **Figures 3.1 – 3.4** indicating the locational extent of the phases and the access arrangements. **Table 3.1** shows the intended development that will occur in each of the phases subdivided into the various Use Class Orders. In order to maintain some degree of flexibility each land use within each phase has a range of development occurring within it; as a consequence the horizontal rows in this Table are not intended to be aggregated. The total number of dwellings/accommodation is totalled in the last column to emphasise that the total amount of development proposed is not intended to exceed the description and amount of development specified on the application forms.

3.1.3 In addition to the built development that is expected to occur in each of the phases, areas of open land will also be brought forward in a phased manner to meet both the formal and informal recreational needs of the new residents of the Proposed Development; these are shown in general terms on **Figures 3.1 – 3.4**.

3.1.4 The anticipated phasing of the Proposed Development is also pertinent to the provision of elements of social infrastructure and these will be examined further in Chapter 5 Socio Economic Assessment. As shown in **Table 3.1** the approximate provision of such social infrastructure is allotted to specific Phases but it is expected that more specific trigger points will arise from negotiations on Section 106 obligations.

3.1.5 As with all phasing proposals the Figures and Tables in this Chapter are based on a best estimate of likely delivery in the current circumstances assuming a gradual recovery in economic conditions. Many of the uses will be dependent upon the strength of the market for both housing and employment and if these economic pre-requisites are not met the phasing will inevitably change. Even those uses which are less dependent on open market conditions will nonetheless be dependent on public sector finances which may also change throughout the lifespan of the Proposed Development. As such the proposed phasing described in this Chapter is a general indication of the location and rate of development, rather than a precise indication of delivery rates.

3.2 Phase 1

3.2.1 The years of anticipated completion of this first phase was selected as a specific assessment point in the ES because it was originally envisaged that this phase might be the subject of a separate full application to run concurrently with the outline application for the whole of the Proposed Development. In the event, this possible course of action has not been followed but the intention is that the University will pursue the rapid construction of the Key Worker housing in conjunction with a slightly lower rate of provision of Open Market Housing. Similarly the Applicant wishes to pursue the intention of making an early and significant start on the Collegiate accommodation in this phase. However, as the existing land at West Cambridge is still available. It is not the intention that either faculty or employment land will come forward in this period. The Local Centre which will provide the focus for the new community will commence during this period with the construction of the supermarket and the hotel in the period before 2014 together with Assisted Living for the Elderly. Further development in the Local Centre will take place in later phases. Access arrangements will open up the main vehicular link to the south onto Madingley Road with a through link to Huntingdon Road via the Local Centre, by 2014. The open space comprising the Green Belt linking to the Girton "gap" is also proposed for layout in this period.

Utilities Provision

- Constructing Huntingdon Road West and Huntingdon Road East junctions, toucan crossing between Huntingdon Road East and NIAB, construction of Madingley Road junction, Madingley Rise toucan.
- Constructing foul water rising main and pumping station. Constructing potable water main reinforcement and installing a booster station at the entrance to the Proposed Development together with a water main to serve Phase 1.
- Installing an 11kV electrical connection to the Proposed Development in 2014 from Madingley Road and upgrading transformer at the Primary Substation
- Installing an 11kVA ring main throughout the Proposed Development with step down substations, each serving approximately 200 dwellings.
- Installing a Pressure Reducing Station to reduce the gas pressure to low pressure for distribution throughout the Proposed Development
- Expanding the low pressure gas network through the Proposed Development.
- Expanding the telecommunications network through the Proposed Development.
- Expanding the fibre optic network through the Proposed Development

Transport Provision

- Construction of the Site Access junctions to Madingley Road, Huntingdon Road East, and Huntingdon Road West – although the latter one will not come into use until later in the Development stages;
- Construction of the Orbital Route through the Development, and the southern part of the radial route;
- Construction of the Ridgeway combined cycleway / footway from Storey's Way to Huntingdon Road.
- Commencement of the first phase of the Development Public Transport services
- Delivery of the various off-site footway and cycleway improvement schemes.
- Delivery of the Site-Wide Framework Travel Plan
- Commencement of the University -Wide Framework Travel Plan

3.3 Phase 2

3.3.1 Development in this period consolidates the area around the Local Centre with a full range of residential, and University/employment, taking place both sides of the Girton “gap” the landscaping for which will also be completed in this period. It is expected that the Key Worker housing will slow down slightly over this and the subsequent phase. Open market housing will accelerate but this will be dependent upon overall economic conditions. The first phase of the Primary School providing a 1.5 or 2 Form entry capacity will be provided before this phase is completed.

Utilities Provision

- Installing an 11kVA ring main throughout the Proposed Development with step down substations, each serving approximately 200 dwellings.

- Expanding the potable water network through the Proposed Development.
- Expanding the foul water network through the Proposed Development
- Expanding the low pressure gas network through the Proposed Development.
- Expanding the telecommunications network through the Proposed Development.
- Expanding the fibre optic network through the Proposed Development

Transport Provision

- Continuation of the Radial Route through the Development to reflect the emerging development;
- Start of the second phase of the Development Public Transport services
- M11 Junction 13 Enhancement measures.
- Continued delivery of the University -Wide Framework Travel Plan

3.4 Phase 3

3.4.1 Development in this period is expected at a similar rate to Phase 2 and will extend northwards to the rear of properties on Huntingdon Road. During this phase the new Northern vehicular access onto Huntingdon Road will be formed. Both Key Worker housing and open market housing are expected to be complete during this period as will most of the Collegiate accommodation. The Local Centre is also expected to be nearing completion and an Extension to the Primary School will also be completed to meet educational requirements generated from later phases.

Utilities Provision

- Installing an 11kVA ring main throughout the Proposed Development with step down substations, each serving approximately 200 dwellings.
- Expanding the potable water network through the Proposed Development.
- Expanding the foul water network through the Proposed Development
- Expanding the low pressure gas network through the Proposed Development.
- Expanding the telecommunications network through the Proposed Development.
- Expanding the fibre optic network through the Proposed Development

Transport Provision

- Continuation of the Radial Route through the Development to reflect the emerging development.
- Full Delivery of the second phase of the Development Public Transport services.
- Continued delivery of the University -Wide Framework Travel Plan.

3.5 Phase 4

3.5.1 This phase will comprise primarily University/employment uses on the western margin of the Proposed Development which will overlook the open land adjacent to the M11, most of which will have been landscaped in the preceding two phases.

Utilities Provision

- Installing an 11kVA ring main throughout the Proposed Development with step down substations, each serving approximately 200 dwellings.
- Expanding the potable water network through the Proposed Development.
- Expanding the foul water network through the Proposed Development
- Expanding the low pressure gas network through the Proposed Development.
- Expanding the telecommunications network through the Proposed Development.
- Expanding the fibre optic network through the Proposed Development

Transport Provision

- Completion of the Radial Route through the Development.
- Full Delivery of the Final Development Public Transport service scheme.
- Full delivery of the University -Wide Framework Travel Plan.

Utility Provision in Phase 3 or Phase 4

- Upgrading the substation to incorporate two 30 MVA transformers
- Constructing second foul water pumping station

3.6 Existing Uses

3.6.1 As described in Chapter 11 the Application Site is largely devoted to farming uses which will inevitably cease when development is completed. Although a significant part of the site will be retained as open land especially on the western margin it will be used for purposes in connection with the Proposed Development including recreation (both formal and informal) as well as for Sustainable Urban Drainage arrangements and noise mitigation structures (bundings).

3.6.2 Phase 1 land will clearly be required for development immediately as will a significant tranche of open land alongside the M11 which will be needed for infrastructure improvements described in the preceding paragraph. However, land in the later phases i.e. post 2014 to the north and west of the site can continue to be used for agricultural purposes although these would expect to be extinguished during Phase 3 when a second northern vehicular access is constructed onto Huntingdon Road. Until this time the Applicant would seek to prolong the agricultural use of the site in accordance with the phased programme to fit into the development programme outlined above.

3.7 Implementation

3.7.1 Implementation is expected to occur shortly after planning permission is granted although this will be dependent upon timely decisions on individual reserved matter applications. Rapid implementation is required not only to meet the University's pressing needs for Key Worker accommodation for its employees but also to ensure that SCDC can demonstrate a 5 Year supply of residential land.

3.7.2 Reserved Matter Applications will be directly linked to the Phasing arrangements set out in this Chapter and will probably commence with an application for the construction of major accesses and utilities into the site to serve at least Phase 1. This will be followed shortly thereafter by further reserved matter applications for the various uses which may well be subdivided especially for the residential uses.

3.7.3 Prior to commencement of development the University expects to discharge any conditions/obligations precedent before starting work as well as undertaking the preparation of Design Codes to accord with the Character Areas as set out in the Design & Landscape Access Statement.

Table 3.1

	Phase 1	Phase 2	Phase 3	Phase 4	Total
	2012 – 2014	2014 - 2017	2017 – 2021	2021 – 2025	
Residential (Class C3-C4)					
Open market	50 - 200	450 – 600	650 – 850		Up to 1,500
Key Worker	150 - 400	350 – 650	450 – 850		Up to 1,500
Collegiate Accommodation (Class C2)	0-300	300-600	400-1,000	200-1,000	Up to 2,000
Academic Research Class D1, B1(b)	-	5,000-30,000 sq.m	20,000-50,000 sq.m	25,000-70,000 sq.m	Up to 100,000 sq.m.
Primary School	0-1FE	Primary school to be built in stages over Phases 2 & 3, with completion by 2021			
Neighbourhood Centre					
Retail A1-A5	2,900-5,000sq.m., of which supermarket is 2,900 gross (2,000 net)	2,800-3,300 sq.m	-	-	Up to 5,300 sq.m.
Residential C1-C2	0-7,000 sq.m (Hotel)	0-7,000 sq.m (Hotel)			
	0-6,500 sq.m. (Senior Care)	0-6,500 sq.m. (Senior Care)			
Community uses D1-D2	Nursery (alongside 1FE school)	Nursery	Nursery		
		Community 8500 sq.m.			
		Indoor sports 450 sq.m			
		200 sq.m (Police)			
		700 sq.m. (PCT)			
	Community Hall, Indoor Sports (if not provided at West Cambridge), Police, PCT to be built in Phase 1 or 2, depending on scale of residential in Phase 1				
Open Space					
• Pitches	To meet anticipated requirements	To meet anticipated requirements	To meet anticipated requirements		
• Informal ¹					

Maxima and minima ranges of completions for dwellings/floorspace on each of the first three rows should not be aggregated but will be limited to the total in the final column.

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4 PLANNING POLICY CONTEXT

4.1 Introduction

4.1.1 This chapter of the ES assesses the planning policy background against which the Proposed Development is to be judged. The scope of this chapter is to identify the relationship between the proposed development plan and relevant policy statements contained within the East of England Plan, the Cambridgeshire and Peterborough Structure Plan 2003, the Northwest Cambridge Area Action Plan 2009, the Cambridge City Council Local Plan and the South Cambridgeshire District Council Local Development Framework, Localism Act, the National Planning Policy Framework ("the NPPF") and the themes from the previous national planning policy guidance and statements now embedded in the NPPF.

4.1.2 The Government's approach to land use planning indicates that a central role of the planning system is to secure the provision of homes and buildings, investment and jobs in a way which is consistent with the principles of sustainable development. However, several factors, including the special and unique needs of the University of Cambridge, need to be taken into account when considering the nature and effects of the Proposed Development.

4.1.3 This requires the construction of a policy framework which promotes consistent, predictable and prompt decision making. Development Plans seek to provide such an element of certainty within the planning system. Section 38(6) of the Planning & Compulsory Purchase Act 2004 requires that, in circumstances where the Development Plan contains relevant policies, applications for development which are in accordance with the Plan shall be allowed unless material considerations indicate otherwise.

4.1.4 The Proposed Development accords with national guidance both in previous national planning policy and the NPPF relating to the achievement of sustainable patterns of development. The development strategy for the Application Site was first established in the Cambridgeshire and Peterborough Structure Plan 2003, Policy 9/7 Land between Madingley Road and Huntingdon Road of the Cambridge Local Plan. This has been more firmly established by way of the site specific land use proposals contained in the Northwest Cambridge Area Action Plan 2009.

4.1.5 Paragraph 8 of PPS1 Delivering Sustainable Development stated that "This plan led system and the certainty and predictability it aims to provide, is central to planning and plays the key role in integrating sustainable development objectives. Where the development plan contains relevant policies, planning permission should be determined in line with the plan, unless material considerations indicate otherwise".

4.1.6 The NPPF does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved, and proposed development that conflicts should be refused unless other material considerations indicate otherwise.

4.1.7 In the particular case of the Proposed Development, the Development Plan does contain material policies and proposals and, as such, the application can be considered appropriately within the context of the approved development plan, in particular the AAP and statements of planning guidance and advice issued by the Government.

The Localism Act

4.1.8 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

4.1.9 Central to the Localism Act is the principle of devolution to local communities. The provisions of the Act create a new category of community and neighbourhood planning provisions (Neighbourhood Development

Plans and Neighbourhood Development Orders) ultimately controlled by local communities through referendums and 'qualifying bodies' such as, but not limited to, parish councils and neighbourhood forums. Local planning authorities under the Localism Act have a duty to make a Neighbourhood Planning Order if there is a referendum vote in favour.

4.1.10 Amendments to the Town and Country Planning Act 1990 will place a statutory requirement on prospective developers to consult local communities before submitting planning applications.

4.1.11 The Act also provides a mechanism through which part of the revenue raised by Local Planning Authorities through the Community Infrastructure Levy (CIL) will be made available for use by the local community.

National Planning Policy Framework

4.1.12 The NPPF was published on 27 March 2012, with immediate effect. Paragraph 12 of the NPPF states that the NPPF "does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to date development plan should be approved, and proposed development that conflicts should be refused unless material considerations indicate otherwise...". The NPPF goes on to say that the NPPF itself is a material consideration in planning considerations.

4.1.13 The NPPF will set out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations. As already noted the NPPF continues to recognise that planning system is plan-led and that therefore Local Plans, incorporating neighbourhood plans where relevant, are the starting point for the determination of any planning application. The key policy changes applicable to the development are:

- The presumption in favour of sustainable development (the 'presumption') is central to the policy approach in the NPPF, as it sets the tone of the Government's overall stance and operates with and through the other policies in the document. Its purpose is to send a strong signal to all those involved in the planning process about the need to plan positively for appropriate new development; so that both plan-making and development management are proactive and driven by a search for opportunities to deliver sustainable development, rather than barriers. It does this by placing increased emphasis on the importance of meeting development needs through plans; on the need to approve proposals quickly where they are in line with those plans; and on the role of the Framework as a basis for decisions where plans are not an adequate basis for deciding applications.
- The time horizon for assessing impacts of unplanned, retail and leisure schemes in the edge or out of centre locations remains at 5 years from the time the planning application is made, save for major schemes where the full impact will not be realised in 5 years where, in such cases, the impact is also to be assessed up to 10 years from the time the application is made;
- The NPPF removes the maximum non-residential car parking standards for major developments currently set out in PPG13.
- The removal of the brownfield target for housing development enabling local councils to allocate sites that they consider are the most suitable for development without being constrained by a national brownfield target
- Requiring local councils to allocate an additional 5% of sites against their five year housing requirement increasing to 20%. where there has been a record of persistent under delivery of housing

Presumption in favour of Sustainable Development

4.1.14 Due regard needs to be given to the Ministerial Statement: Planning for Growth. On the 23rd March 2011, Decentralisation Minister Greg Clark released a statement titled 'Planning for Growth' which set out

the steps the Government expects local planning authorities to take with “*immediate effect*” to ensure the planning system does “*everything it can to help secure a swift return to economic growth*”.

4.1.15 Following the announcement of the Chancellor of the Exchequer the same day in which he “*issued a call to action growth*”, the priority is to promote sustainable economic growth and jobs with the intention “*that the answer to development and growth wherever possible should be ‘yes’, except where this would compromise key sustainable development principles set out in national planning policy.*”

4.1.16 When deciding whether to grant planning permission, the statement indicates that “local planning authorities should support enterprise and facilitate housing, economic and other forms of sustainable development. Where relevant - and consistent with their statutory obligation - they should therefore:

- i) *Consider fully the importance of national planning policies aimed at fostering economic growth and employment, given the need to ensure a return to robust economic growth after the recent recession*
- ii) *Take into account the need to maintain a flexible and responsive supply of land for key sectors,*
- iii) *Consider the range of likely economic, environmental and social benefits of proposals; including long term or indirect benefits such as increased consumer choice, more viable communities and more robust local economies (which may, where relevant, include matters such as job creation and business productivity)*
- iv) *Be sensitive to the fact that local economies are subject to change and so take a positive approach to development where new economic data suggest that prior assessments or needs are no longer up-to-date*
- v) *Ensure that they do not impose unnecessary burdens on development.”*

4.1.17 On 15th June 2011, the Minister for Decentralisation published a statement entitled ‘Presumption in Favour of Sustainable Development’. This statement indicates an approach that the Government could take to introducing a presumption in favour of sustainable development in the National Planning Policy Framework. The Government’s approach to sustainable development involves making the necessary decisions now to realise its vision of stimulating economic growth and tackling the deficit, maximising wellbeing and protecting our environment, without negatively impacting on the ability of future generations to do the same.

4.1.18 The NPPF places a presumption in favour of sustainable development at its heart. The presumption is describes as a “golden thread running through both plan making and decision-taking.” The planning policies within the NPPF are grouped under the heading “delivering sustainable development”. According to the NPPF the presumption in favour of sustainable development means, for decision taking, that unless material considerations indicate otherwise:

- approving development proposals that accord with the development plan without delay; and
- where the development plan is absent silent or relevant policies are out of date, granting permission unless:
 - any adverse impacts of doing so would significantly and demonstrably outweigh its benefits, when assessed against the policies in [the NPPF] taken as a whole; or
 - specific policies [in the NPPF] indicate development should be restricted”

4.1.19 The presumption is key to the Government’s ambitions, by creating a positive, pro-development framework, but one that is underpinned by the wider economic, environmental and social provisions in the National Planning Policy Framework. The presumption is as follows: “*There is a presumption in favour of sustainable development at the heart of the planning system, which should be central to the approach taken to both plan-making and decision-taking. Local planning authorities should plan positively for new development, and approve all individual proposals wherever possible.*”

4.1.20 The NPPF notes that planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise. It addresses the relationship between the NPPF and existing adopted policies within this context. Within paragraphs 211 to 215 of Annex 1 to the NPPF it is stated that:

- for the purposes of decision making the policies in the Local Plan should not be considered out of date simply because they were adopted prior to the publication of the NPPF;
- the policies contained in the NPPF are material considerations which planning authorities should take into account from the day of its publication;
- for 12 months from the day of publication of the NPPF, decision takers may continue giving full weight to policies adopted since 2004 even if there is a limited degree of conflict with the NPPF;

4.1.21 In other cases and following the 12 month period, due weight should be given to relevant policies in existing plans according to their degree of consistency with the NPPF and that the closer the policies in the plan are to those within the NPPF the greater the weight that may be given.

4.1.22 The relationship of the Proposed Development to both current and emerging policy and guidance is addressed in the following sections and sets the framework for the subsequent Chapters dealing with specific issues identified in the Scoping Report. Not all of the documents referred to below still form (either in whole or in part) part of the statutory Development Plan. The documents are dealt with in hierarchical terms first but within the each section the documents are referred to chronologically so that the emergence of relevant policies can be traced. In addition, it is recognised that the previous PPGs and PPSs have been replaced by the National Planning Policy Framework. Given that most of the overarching principles within the PPG and PPS documents have been carried through into the NPPF the detail on the policy previously contained in the PPGs and PPSs is retained and where relevant the appropriate references to the NPPF are made. It will also be noted where the document forms part of the statutory Development Plan

Regional Spatial Strategy

East of England Plan May 2008

4.1.23 The adopted East of England Plan 2008 is the Regional Strategy for the East of England region of which Cambridge forms part. The recently enacted Localism Act provides for the abolition of Regional Strategies although the abolition of individual Regional Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, LPAs are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited. For this reason the relevant policies of the East of England Plan are still detailed below.

4.1.24 Policy CRS1 advises that *"the vision for the Cambridge Sub-Region to 2021 and beyond is to continue to develop as a centre of excellence and world leader in higher education and research, fostering the dynamism, prosperity and further expansion of the knowledge-based economy spreading outwards from Cambridge. The historic character and setting of Cambridge should be protected and enhanced, together with the character and setting of the market towns and other settlements and the important environmental qualities of the surrounding area."*

A comprehensive approach should be adopted to secure the necessary infrastructure, including green infrastructure.

Local Development Documents should provide for development focused on making the most of the development potential of land in the following order of preference:

- *on the periphery of the built-up area of Cambridge on land released from the green belt following the Cambridgeshire and Peterborough Structure Plan 2003 and through the Cambridge Local Plan and development plan documents prepared by the local planning authorities."*

4.1.25 The desire to develop the sub-region as a centre of high technology and research is outlined at Policy CRS2 which states *“Employment land in and close to Cambridge, within boundaries to be defined in local plans/LDDs, should be reserved for development which can demonstrate a clear need to be located in the area to serve local requirements or contribute to the continuing success of the sub-region as a centre of high technology and research.”*

Employment-related development proposals should demonstrate that they fall into the following categories:

- a) *High technology and related industries and services concerned primarily with research and development including development of D1 educational uses and associated sui generis research institutes, which can show a need to be located close to the universities, established research facilities or associated services in the Cambridge area.”*

4.1.26 Finally Policy CRS3 recognises that the Green Belt around Cambridge will need to be altered to allow growth whilst recognising that its function and purpose are maintained. This policy advises that *“In making provision for housing, employment and all other development a green belt should be maintained around Cambridge to define the extent of urban growth in accordance with the purposes of the Cambridge Green Belt which are to:*

- *preserve the character of Cambridge as a dynamic city with a thriving historic centre;*
- *maintain and enhance the quality of Cambridge’s setting; and*
- *prevent communities in the environs of Cambridge from merging into one another and with the city.”*

Cambridgeshire and Peterborough County Structure Plan 1999-2016

4.1.27 The Cambridgeshire and Peterborough County Structure Plan 1999-2016 was adopted on the 20th October 2003. This document sets out the broad requirements for new homes, industry and shops and supporting services and infrastructure. Following the approval of the East of England Plan on the 12th May 2008, only a limited number of the policies of the Structure Plan have been “saved” and therefore still form part of the statutory Development Plan.

4.1.28 The County Structure Plan was the principal strategic document in respect of planning policy issues affecting the application site prior to the adoption of the Area Action Plan in 2009. This is a view which was acknowledged by the East of England Plan at Policy CRS1 where it is advised that *“Local Development Documents should provide for development focused on making the most of the development potential of land in the following order of preference:...*

- 1 *On the periphery of the built-up area of Cambridge on land released from the green belt following the Cambridgeshire and Peterborough Structure Plan 2003 and through the Cambridge Local Plan and development plan documents by the local planning authorities”.*

4.1.29 Of particular relevance are Policies P9/2b and P9/2c of the Structure Plan. Policy P9/2b notes that Local Planning Authorities will need to carry out a review of the Green Belt in their administrative areas to identify areas to be released to serve the long-term development needs of Cambridge. The locations to be considered were indicated in the Key Structure Diagram and Policy P9/2c.

4.1.30 Policy P9/2c Location and Phasing of Development Land to be Released From the Green Belt as indicated above) underpins the policy context for the development of NWC. This policy states that *“Local Plans will make provision for housing and mixed-use development on land to be released from the Green Belt in accordance with the principles set out in Policy P9/2b and in the following locations as shown on the Key Diagram.*

- 2 *North of Newmarket Road*
- 3 *North of Cherry Hinton*
- 4 *Cambridge Airport*
- 5 *South and West of Addenbrooke’s Hospital*
- 6 *East and south-east of Trumpington*

- 7 *Between Huntingdon Road and Histon Road*
- 8 *Between Madingley Road and Huntingdon Road*

4.1.31 In relation to phasing, this policy states that “...*With the exception of the following all the above sites should be brought forward as early as possible in within the Plan period...*”

- 1 *Land between Madingley Road and Huntingdon Road should be reserved for predominantly University-related uses and only brought forward when the University can show a clear need for the land to be released*

Phasing policies will be set out in Local Plans in accordance with Policy P9/1. Cambridge City Council and South Cambridgeshire District Council will work together on the form and phasing of the Green Belt releases”.

4.1.32 Paragraph 9.26 of the Structure Plan notes that “*The City will grow considerably over the next 30 years and that growth must be in accordance with the principles of sustainable development. This plan provides for three expanded communities within the context of the overall vision. These are focussed on the University in West/North-West Cambridge, on Addenbrooke’s in the south and on the airport site to the east... The new areas will be compact, mixed developments with efficient use of land, improved connections between housing, jobs, amenities and services and a very high quality of urban design*”.

4.1.33 Policy P6/1 – Development related provision is also of relevance. This policy advises that “*Development will only be permitted where the additional infrastructure and community requirements generated by the proposals can be secured, which may be by condition or legal agreement or undertaking. Local Plans should include appropriate policies and identify the key infrastructure requirements in their site-specific policies*”. This policy is reinforced by Policy P9/8-Infrastructure Provision which provides greater details as to the type of infrastructure for which funding or works will be sought including transport, affordable and key worker housing, education, healthcare etc.

4.1.34 The Proposed Development accords fully with the policies governing the general principles for development at North West Cambridge set out in the East of England Plan and the “saved” policies in the Structure Plan. As will be seen from the Socio Economic, Transport and Utilities and Services Chapters of this ES, the Proposed Development makes suitable provision for infrastructure and community infrastructure.

Local Policies

4.1.35 A number of documents provide policies affecting the Application Site at the local level.

(i) Cambridge City Local Plan (1999-2016)

4.1.36 The CLP was adopted in July 2006 and is still relevant to this proposed development as a significant part of the built development is to be provided within the administrative area of Cambridge City Council. However, the later AAP, referred to in more detail below, sets the detailed policy framework for the application site which falls within the administrative areas of both South Cambridgeshire District Council and Cambridge City Council; therefore the Local Plan has been superseded by the AAP as part of the statutory Development Plan. Nonetheless it is still of relevance and the following paragraphs set out those parts of the Plan which contributed to the AAP

4.1.37 Paragraph 2.8 of the plan identifies North West Cambridge as forming one of the key components in The Spatial Strategy in the Local Plan. Whilst recognising that events have moved forward since this plan was adopted, it is advised that “*When the need for more land can be established further Cambridge University related development will be allowed in north-west Cambridge between Madingley Road and Huntingdon Road. Land is also identified for a new residential community between Huntingdon Road and Histon Road*”.

4.1.38 The employment credentials of the Application Site are identified within Policy 7/4 Promotion of Cluster Development where it is advised that “*Development will be permitted which fosters innovation and*

helps reinforce the existing high technology and research clusters of Cambridge, and which can demonstrate a clear need to be located in the area. This will include:

- a. healthcare, biomedical and biotechnology development;
- b. higher education and related research institutes;
- c. computer software and services;
- d. telecommunications; and
- e. other technology clusters as they emerge....

Locations particularly suited to these activities include:

c. Land between Madingley Road and Huntingdon Road for higher education and associated research facilities to enable the continued development of the University education and research cluster”.

4.1.39 The Application Site falls under Local Plan **Policy 9/7** Land between Madingley Road and Huntingdon Road, which is reserved for predominantly University of Cambridge related uses. The policy recognises that the Proposed Development will need to provide a clear need for the land to be released, required for collegiate development for staff and student accommodation and University academic faculty development. The detail of this policy has now been superseded by the North West Cambridge Area Action Plan, which recognises the Applicant's demonstrated need. The sustainability checklist is a requirement of the sustainability SPD, which has been superseded by the North West Cambridge AAP. Though the development is not required to specifically address the sustainability checklist, the content is addressed in the accompanying Sustainability Statement and Carbon Reduction Strategy.

(ii) South Cambridgeshire District Council Core Strategy (2007)

4.1.40 The South Cambridgeshire Core Strategy forms part of the Statutory Development Plan for the whole of its area but it has been superseded by the later North West Cambridge AAP for the purposes of the Application Site..

4.1.41 The Core Strategy DPD which was adopted in January 2007 recognises in its strategic vision for South Cambridgeshire that *“Much of the high level of development needed to support the cluster and improve the balance between homes and jobs in the sub-region must take place in South Cambridgeshire, and will be focussed into urban extensions to the built-up area of Cambridge”*. Policy ST2 anticipated the NW Cambridge allocation being identified in the AAP and states:-

“POLICY ST/2 Housing Provision

The District Council will make provision for 20,000 new homes in South Cambridgeshire during the period 1999 to 2016 in locations in the following order of preference:

- 1. On the edge of Cambridge;*
- 2. At the new town of Northstowe;*
- 3. In the rural area in Rural Centres and other villages.*

The provision of affordable housing, including housing for Key Workers, will be sought as part of overall housing provision.

The supporting text expands on this as follows:-

“2.7 As a major part of the Cambridge Sub-Region, the pressures for housing development in South Cambridgeshire remain strong and must be carefully managed to ensure that the qualities and characteristics that attract people to the area in the first place are not damaged. The Strategy is one of concentrating development on Cambridge through a number of urban extensions to the city and at the new town of Northstowe north west of Cambridge. These major developments are addressed in a series of Area Action Plans. The strategy also allows for limited development to meet local needs in Rural Centres and other villages. The development strategy is illustrated on the Key Diagram.

2.8 The Local Development Framework aims to ensure that enough land is genuinely available to provide a realistic prospect of meeting the Structure Plan 2003 housing

guideline of approximately 20,000 new homes in South Cambridgeshire during the period 1999 to 2016. Land so far identified has a capacity of approximately 19,000 dwellings during the plan period. Of this, about 4,180 dwellings are likely to come from urban extensions to Cambridge, 4,800 from Northstowe, and 10,050 from the rural area. The shortfall between land so far identified and the housing requirement will be made up by sites to be identified in Area Action Plans and the Site Specific Policies DPD”.

(iii) North West Cambridge Area Action Plan DPD (adopted October 2009)

4.1.42 This Area Action Plan was prepared in the period since 2006 and the draft submission version was subject to an independent examination during hearings on the 25th November 2008 and the 9th June 2009. The Inspector’s report which was received on the 4th August 2009, concluded in summary that the AAP was sound subject to the following principal changes:”

- a) *The addition of an explanation of the establishment of need by the University*
- b) *Clarification of the requirement to establish need for individual applications*
- c) *Enlargement of the Major Development Site to the west and by reducing the extent of the central open area”*

4.1.43 The AAP was amended to incorporate the Inspector’s findings and was formally adopted by both Local Planning Authorities on the 22nd October 2009. The Northwest Cambridge AAP forms part of the Cambridge Local Development Framework (LDF) and the South Cambridgeshire LDF, and replaces part of the existing Cambridge Local Plan 2006. It forms a part of the Statutory Development Plan and is most relevant in determining the current application.

4.1.44 The Area Action Plan contains a large number of policies and advice as to how the development of North West Cambridge should proceed.

4.1.45 Policy NW1: Vision provides that: North West Cambridge will create a new University quarter, which will contribute to meeting the needs of the wider city community, and which will embody best practice in environmental sustainability. Development will be of the highest quality and support the further development of the University, Cambridge and the Sub-Region as a centre of excellence and a world leader within the fields of higher education and research, and will address the Applicant’s long-term development needs to 2021 and beyond. There will be a new local centre which will act as a focus for the development and which will also provide facilities and services for nearby communities. A revised Green Belt and a new landscaped urban edge will preserve the unique character of Cambridge, enhance its setting and maintain the separate identity of Girton village.

4.1.46 The University’s Proposed Development for North West Cambridge is compliant with the Vision set out in the AAP, and meets the University’s long term development needs.

4.1.47 Policy NW4: Site and Setting advises that:- *“Land between Madingley Road and Huntingdon Road, comprising two areas totalling approximately 91ha, as shown on the Proposals Map, is allocated for predominantly University-related uses...Any land not required for predominantly University-related development for the period post-2016 to meet the longer-term development needs of Cambridge University”.* It is important to note that the 91ha figure quoted above, excludes areas of open land which increase the application site to approximately 140ha.

4.1.48 The extent of residential development and the proposed mix is detailed in Policy NW5: Housing Supply which states that :-

“1. Approximately 3,000 dwellings will be provided (about 1,050 by 2016), with a priority on providing for University needs. An average net housing density of at least 50 dwellings per hectare will be achieved across the development as a whole. A range of densities will be provided following a design-led approach, including higher densities in and around the local centre and close to public transport stops, and with development of an appropriate scale and form where it adjoins existing housing

2. Approximately 2,000 units of student accommodation will also be provided”.

4.1.49 Further clarification as to the mix of the housing to be provided is detailed in Policy NW6 Affordable Housing which requires that 50% of the housing must be provided to meet the needs of Cambridge University and College Key Workers (as distinct from units of student accommodation). The occupation of such housing will be limited to Cambridge University and College Key workers in housing need.

4.1.50 Policy NW8: Employment Uses provides:

1. North West Cambridge will provide employment land for:
 - a) Predominantly D1 educational uses, associated sui generis research establishments and academic research institutes where it is in the national interest or where they can show a special need to be located close to the University in order to share staff, equipment or data, and to undertake joint collaborative working;
 - b) A mix of commercial research uses within Use Class B1(b) that can demonstrate a special need to be located close to the University.
2. The occupation of development will be controlled by condition or legal agreement, for a period of 10 years from the first date of occupation

It is clear that the development which is subject to this application is in accordance with Policy NW8.

4.1.51 The mix of employment uses is also detailed within Policy NW10: Mix of Uses which advises that *“Employment and academic development at North West Cambridge will constitute 100,000m² of floorspace as follows:*

- a) *Approximately 60,000m² of higher education uses, including academic faculty development and a University Conference Centre within Use Class D1; and*
- b) *Up to 40,000m² of University-related sui generis research institutes and commercial research uses within Use Class B1(b).”*

4.1.52 In addition, to the above, the sustainability credentials of this site are an important consideration. Policy NW11 requires the development and transport systems to be planned in order to reduce the need to travel and encourage people to use sustainable travel modes, to ensure that no more than 40% of trips to work will be by car. The requirement for sustainability of the development is reinforced by Policy NW24 Climate Change & Sustainable Design and Construction which requires all dwellings approved after the 1st April 2013 to meet the Code for Sustainable Homes Level 5 or higher. The non residential development and student housing are expected to achieve BREEAM excellent standards or equivalent. The scheme is also required to incorporate some form of decentralised energy to minimise both carbon and greenhouse gas emissions.

4.1.53 The development is required to provide an appropriate level and type of services and facilities in suitable locations to serve all phases of development (Policy NW20: Provision of Community Services and Facilities, Arts and Culture).

4.1.54 The issue of the local centre is addressed by Policy NW21 A Local Centre with the supporting text advising that this will comprise a range of services and facilities including

- “a. Primary Schools and pre-school care*
- b. An appropriate level of local shopping and services*
- c. A library, life-long learning centre and information access point*
- d. Flexible community meeting rooms and spaces adjacent to the primary schools*
- e. Provision for the emergency services including the police*
- f. A Children’s play area*
- g. Neighbourhood recycling point*
- h. Healthcare Provision”.*

4.1.55 The Applicant makes provision for all of these elements. It also proposes a hotel and a care home. Whilst these are not specifically identified within the AAP, needs cases have been provided in accordance with the requirement of PPS4 Planning for Sustainable Economic Growth.

4.1.56 Improvements to both the strategic, local and site specific highway network are required within Policies NW12-NW15 and require the identified key improvements to be timed to relate to the commencement of development or the occupation of the first occupation of the relevant phase of development. The policies are set out in Chapter 10.

4.1.57 Policy NW23: Open Space and Recreation Provision requires that:

Development will provide public open space and sports facilities in accordance with the Open Space and Recreation Standards set out in Appendix 3. Development will also provide improved linkages to the adjacent open countryside.

The extensive open land and public realm strategy for the Application Site meets the policy goals of NW23. The landscape strategy is outlined in the accompanying Design, Access and Landscape Statement.

4.1.58 Since this policy was formulated Cambridge City Council has published Open Space Strategy Revised Draft for Consultation which will need to be considered in finalising the open space and recreational standards for this development.

4.1.59 Policy NW24: Climate Change & Sustainable Design and Construction advises that:

1. Development will be required to demonstrate that it has been designed to adapt to the predicted effects of climate change;
2. Residential development will be required to demonstrate that:
 - a) All dwellings approved on or before 31 March 2013 will meet Code for Sustainable Homes Level 4 or higher, up to a maximum of 50 dwellings across the Application Site. All dwellings above 50 will meet Code for Sustainable Homes Level 5 or higher (these Levels include water conservation measures);
 - b) All dwellings approved on or after 1 April 2013 will meet Code for Sustainable Homes Level 5 or higher;
 - c) There is no adverse effect on the water environment and biodiversity as a result of the implementation and management of water conservation measures.
3. Non residential development and student housing will be required to demonstrate that:
 - d) It will achieve a high degree of sustainable design and construction in line with BREEAM "excellent" standards or the equivalent if this is replaced;
 - e) It will reduce its predicted carbon emissions by at least 20% through the use of on-site renewable energy technologies only where a renewably fuelled decentralised system is shown not to be viable;
 - f) It will incorporate water conservation measures including water saving devices, greywater and/or rainwater recycling in all buildings to significantly reduce potable water consumption; and
 - g) There is no adverse effect on the water environment and biodiversity as a result of the implementation and management of water conservation measures.
4. Decentralised energy will be required at North West Cambridge to meet the targets specified above. The form of decentralised energy system to be used will be determined on the basis of minimising carbon and greenhouse gas emissions. The system will need to serve the whole Application Site unless there are specific circumstances which would render it inappropriate.
5. The above requirements are subject to wider viability testing.

4.1.60 The means by which the Proposed Development can meet all requirements of policy NW24 is explained by the accompanying Sustainability Statement and Carbon Reduction Strategy and outlined in Table 2.1 of the ES.

4.1.61 Policy NW31: Infrastructure Provision indicates that:

Planning permission will only be granted where there are suitable arrangements for the improvement or provision and phasing of infrastructure, services & facilities necessary to make the scheme acceptable in planning terms.

The Proposed Development seeks to meet the majority of the proposed community's needs on-site, through provision of recreation provision, community centre, primary school, nursery/early years provision, primary health care and police on site. Contributions will be made for off-site contributions to secondary education and library provision (north of Huntingdon Road).

Contributions may also be made toward provision of other necessary transportation and infrastructure improvements related to the Proposed Development.

4.1.62 Overall the Proposed Development has been designed to accord with the policies deriving from the local level DPD and other documents that relate to the Application Site with particular reference to the latest Area Action Plan which contains a detailed policy framework.

National Planning Guidance

4.1.63 Planning Policy Statements and Planning Policy Guidance notes are replaced by the NPPF, which is designed to consolidate and simplifies national planning policies and thereby reduce duplication and contradiction and improve ease of understanding. We set out below summaries of relevant provisions from the Planning Policy Guidance and Planning Policy Statements now replaced by the NPPF and a summary of the provisions of the NPPF which have replaced those provisions. We comment on how the Proposed Development reflects (and how its evolution has taken into account) provisions of Planning Policy Statements and Planning Policy Guidance Notes and the simplified and more streamlined provisions of the NPPF which replace them

PPS1 Delivering Sustainable Development

4.1.64 Planning Policy Statement 1 was published in February 2006 and is now replaced by the NPPF. Paragraph 3 states that sustainable development is the core principle underpinning planning and paragraph 8 notes that the plan-led system and the certainty and predictability it aims to provide, is central to the process and plays the key role in integrating sustainable development objectives. Where the development plan contains relevant policies *"applications for planning permission should be determined in line with the plan, unless material considerations indicate otherwise"*.

4.1.65 Paragraph 13 notes that planning policies should promote high quality inclusive design in the layout of new developments and individual buildings *"in terms of function and impact, not just for the short term but over the lifetime of the development. Design which fails to take the opportunities available for improving the character and quality of an area should not be accepted"*.

4.1.66 Paragraph 17 states that the Government is committed to protecting and enhancing the quality of the natural and historic environment, in both rural and urban areas. Planning policies should seek to protect and enhance the quality, character and amenity value of the countryside and urban areas as a whole. A high level of protection should be given to the most valued townscapes and landscapes, wildlife habitats and natural resources. Planning decisions should be based on up-to-date information on the environmental characteristics of an area and the potential impacts, positive as well as negative, on the environment of development proposals.

4.1.67 Paragraph 23 advises that the *"Government is committed to promoting a strong, stable and productive economy that aims to secure jobs and prosperity for all. Planning authorities should:*

- *Recognise that economic development can deliver environmental and social benefits;*
- *Recognize the wider sub regional, regional or national benefits of economic development and consider these alongside any adverse local impacts;*
- *Acknowledge that all local economies are subject to change;*
- *Actively promote and facilitate good quality development, which is sustainable and consistent with their plans;*
- *Ensure the provision of sufficient, good quality, new homes in suitable locations. The aim should be to ensure that everyone has the opportunity of a decent home, in locations that reduce the need to travel."*

4.1.68 Paragraph 34 indicates that local planning authorities should plan positively for the achievement of high quality and inclusive design for all development including individual buildings, public private spaces and wider area development schemes. Good design should contribute positively to making places better for people. This is reinforced by paragraph 36 which states that one of the key objectives of design policies is to optimise the potential of sites to accommodate development, create and sustain an appropriate mix of uses and support local facilities/transport networks.

4.1.69 The Planning System: General Principles was published in January 2005. Paragraph 10 states that local planning authorities *“must determine planning applications in accordance with the statutory Development Plan, unless material considerations indicate otherwise. If the Development Plan contains material policies or proposals and there are no other material considerations, the application should be determined in accordance with the development plan. Where there are other material considerations, the Development Plan should be the starting point, and other material considerations should be taken into account in reaching a decision. One such consideration will be whether the plan policies are relevant and up to date. The 2004 Act provides that if there is a conflict between policies in an RSS or policies in the DPD the most recent policy will take precedence”*.

4.1.70 The Government’s commitment to the delivery of sustainable development is reiterated in PPS1, which states that planning should facilitate and promote sustainable patterns of development by:

- Making suitable land available in line with objectives to improve the quality of life;
- Contributing to sustainable economic growth;
- Protecting and where practicable enhancing the natural and historic environment and existing successful communities;
- Ensuring high quality development through good design;
- Ensuring that development supports existing communities and contributes to the creation of safe, sustainable and liveable communities with good access to services.

4.1.71 PPS1 promotes development that builds socially inclusive communities. It states that planning should address accessibility to jobs, health, housing, education, shops, leisure and community facilities.

4.1.72 PPS1 also refers to community involvement in the planning process, stating that community involvement is vitally important to planning and the achievement of sustainable development. One of the principles of sustainable development is to involve the community in developing the vision for its area. Communities should be asked to offer ideas about what that vision should be, and how it can be achieved.

4.1.73 A supplementary document to PPS1 - Planning and Climate Change sets out how planning should contribute to reducing emissions and stabilising climate change, taking into account unavoidable consequences. The key principles related to the development are outlined below:

- The proposed provision for new development, its spatial distribution, location and design should be planned to limit carbon dioxide emissions;
- New development should be planned to make good use of opportunities for decentralised and renewable or low carbon energy; and
- New development should be planned to minimise future vulnerability in a changing climate.

4.1.74 The Proposed Development takes into account all the principles of Sustainable Development and the other guidance in this PPS. The Proposed Development is also fully in accordance with the Government’s commitment to sustainable development and the development of socially inclusive communities. In addition, various consultation events have been undertaken throughout the process to ensure community involvement and buy in to the Proposed Development.

4.1.75 The advice within PPS1 is reinforced by both the presumption in sustainable development as detailed in the Ministerial Statement: Planning for Growth and the National Planning Policy Framework.

PPG2 Green Belts

4.1.76 PPG2 was published in January 1995 and is now replaced by the NPPF. Its principal aim is to maintain the presumption against inappropriate development in the Green Belt. Whilst this document is dated it is still of relevance.

Paragraph 2.6 advises that:

“Once the general extent of a Green Belt has been approved it should be altered only in exceptional circumstances. If such an alteration is proposed the Secretary of State will wish to be satisfied that the authority has considered opportunities for development within the urban areas contained by and beyond the Green Belt. Similarly, detailed Green Belt boundaries defined in adopted local plans, or earlier approved development plans should be altered only exceptionally. Detailed boundaries should not be altered or development allowed merely because the land has become derelict”.

Paragraph 2.7 is of particular relevance and advises that:

“Where existing local plans are being revised and updated, existing Green Belt boundaries should not be changed unless alterations to the Structure Plan have been approved, or other exceptional circumstances exist, which necessitate such revision”.

The advice detailed within Paragraph 3.2 states:

“Inappropriate development is, by definition, harmful to the Green Belt. It is for the applicant to show why permission should be granted. Very special circumstances to justify inappropriate development will not exist unless the harm by reason of inappropriateness, and any other harm, is clearly outweighed by other considerations. In view of the presumption against inappropriate development, the Secretary of State will attach substantial weight to the harm to the Green Belt when considering any planning application or appeal concerning such development”.

4.1.77 The Cambridgeshire Structure Plan (2003) identified NWC as a location for housing and mixed use development on land to be released from the Green Belt (Policy 9/2c). The Structure Plan highlighted the need for Cambridge City Council and South Cambridgeshire District Council to work together on the form and phasing of Green Belt release where cross-boundary issues are involved. The Structure Plan also highlighted the need for a comprehensive masterplan or design framework to be prepared to guide future development. Furthermore, the Structure Plan stated that in order to avoid delays in bringing land forward for development, the masterplanning process should proceed in parallel with the preparation of the relevant local plans.

4.1.78 The Cambridge Local Plan (2006) sets out specific policy and proposals relating to the part of the Application Site within Cambridge City, identifying that the land between Huntingdon Road and Maddingley Road is reserved for the development of predominantly University-related uses, following the development of a comprehensive masterplan for the Application Site.

4.1.79 The adopted North West Cambridge Area Action Plan (2009) provides the current context for development, and establishes core principles for development of the Application Site across both local authorities. The AAP was subject to public examination in 2008/2009, and the Inspectors confirmed the release of 91 ha of land for development, on the basis of the Applicant's established needs. The detailed policy and proposals for the Application Site supersede those provided in the Cambridge Local Plan.

4.1.80 The Application Site includes land that is designated as Green Belt. These areas of open space will be retained, maintaining the openness of the land and intended uses include formal and informal recreation and allotments. Some areas will provide balancing ponds to function as part of the drainage network across the Application Site. Earth shaping in the Western Edge will enable creation of balancing ponds to function as part of the drainage network across the Application Site, ensuring that the flooding of Washpit Brook downstream of the Application Site is not worsened. Any development within the areas designated as Green Belt will be compliant with Green Belt purposes, maintain its openness and will not be harmful to the Green Belt, which has been tested as part of the Landscape and Visual Assessment included within the Environmental Impact Assessment and submitted as part of the planning application. Anticipated

development includes small-scale pavilions, support facilities and parking related to formal sports provision and allotments, as well as maintenance sheds related to upkeep and maintenance of the open space.

4.1.81 The NPPF at paragraph 83 states that: *“Local planning authorities with Green Belts in their areas should establish a Green Belt boundary in their Local Plans which set the framework for Green Belt and settlement policy. Once established, Green Belt boundaries should only be altered in exceptional circumstances.”*

4.1.82 The above is reinforced by paragraph 84 which states *“when drawing up or reviewing green belt boundaries local planning authorities should take account of a need to promote sustainable patterns of development. They should consider the consequences for sustainable development of channelling development towards urban areas inside the green belt boundary, towards towns and villages inset within the green belt or towards the locations beyond the outer green belt boundary.”*

PPS3 Housing

4.1.83 On the 9th June 2010, the Coalition Government issued a revised version of PPS3 Housing, the primary changes related to the removal of gardens from the definition of previously developed land and the deletion of minimum density requirements. This document has now been replaced by the NPPF but the overarching principles within it have been carried forward into the NPPF.

4.1.84 Paragraph 2 notes that a principal aim of this guidance is to underpin the *“necessary step-change in housing delivery, through a new, more responsive approach to land supply at the local level”*. Paragraph 10 states that the specific outcomes that the planning system should deliver are

- *High quality housing that is well designed and built to a high standard*
- *A mix of housing, both market and affordable, particularly in terms of tenure and price, to support a wide variety of households in all areas;*
- *A sufficient quantity of housing taking into account need and demand and seeking to improve choice.*
- *Housing developments in suitable locations, which offer a good range of community facilities and with good access to jobs, key services and infrastructure.*
- *A flexible, responsive supply of land – managed in a way that makes efficient and effective use of land, including re-use of previously-developed land, where appropriate”*

4.1.85 Paragraph 15 Local Planning Authorities should encourage applicants to bring forward sustainable and environmentally friendly new housing developments, including affordable housing developments, and in doing so should reflect the approach set out in the forthcoming PPS on climate change [see above in relation to the Supplement to PPS1 - “Planning and Climate Change”], including on the Code for Sustainable Homes.

4.1.86 Paragraph 16 outlines the matters which should be considered when assessing design quality which include the extent to which the proposed development

- *“Is easily accessible and well-connected to public transport and community facilities and services, and is well laid out so that all the space is used efficiently, is safe, accessible and user-friendly.*
- *Provides, or enables good access to, community and green and open amenity and recreational space (including play space) as well as private outdoor space such as residential gardens, patios and balconies.*
- *Is well integrated with, and complements, the neighbouring buildings and the local area more generally in terms of scale, density, layout and access.*
- *Facilitates the efficient use of resources, during construction and in use, and seeks to adapt to and reduce the impact of, and on, climate change.*
- *Takes a design-led approach to the provision of car-parking space, that is well integrated with a high quality public realm and streets that are pedestrian, cycle and vehicle friendly.*
- *Creates, or enhances, a distinctive character that relates well to the surroundings and supports a sense of local pride and civic identity.*
- *Provides for the retention or re-establishment of the biodiversity within residential*

environments“.

4.1.87 Paragraph 36 notes that In support of its objective of creating mixed and sustainable communities, the Government's policy is to ensure that housing is developed in suitable locations which offer a range of community facilities and with good access to jobs, key services and infrastructure. Paragraph 37 states that the Regional Spatial Strategy should identify broad strategic locations for new housing developments so that the need and demand for housing can be addressed in a way that reflects sustainable development principles. Regional Planning Bodies should, working with stakeholders, set out the criteria to be used for selecting suitable broad locations for new housing, taking into account:

- *Evidence of current and future levels of need and demand for housing, at the local, sub-regional, regional and national level, as well as the availability of suitable land.*
- *The contribution to be made to cutting carbon emissions from focusing new development in locations with good public transport accessibility and/or by means other than the private car and where it can readily and viably draw its energy supply from decentralised energy supply systems based on renewable and low-carbon forms of energy supply, or where there is clear potential for this to be realised.*
- *The objectives of relevant national policies and programmes that seek to support the provision of new housing developments for example, Growth Areas.*
- *Particular circumstances across the regional or sub-regional housing market that may influence the distribution of housing development. For example:*
 - *Where need and demand are high, it will be necessary to identify and explore a range of options for distributing housing including consideration of the role of growth areas, growth points, new free-standing settlements, major urban extensions and the managed growth of settlements in urban and rural areas and/or where necessary, review of any policy constraints.*
 - *Where need and demand are low, it may be necessary to renew or replace the existing housing stock in particular locations in both urban and rural areas.*
- *The availability and capacity of, and accessibility to, existing major strategic infrastructure, including public and other transport services, and/or feasibility of delivering the required level of new infrastructure to support the proposed distribution of development.*
- *The need to create and maintain sustainable, mixed and inclusive communities in all areas, both urban and rural”*

4.1.88 The advice in paragraph 37 is taken forward by paragraph 38 which advises that “At the local level, Local Development Documents should set out a strategy for the planned location of new housing which contributes to the achievement of sustainable development.” In this instance this has taken the form of the North West Cambridge Area Action Plan. The particular elements of paragraph 38 which are detailed within the AAP and have been considered in relation to this application include:

- *The contribution to be made to cutting carbon emissions from focusing new development in locations with good public transport accessibility and/or by means other than the private car and where it can readily and viably draw its energy supply from decentralised energy supply systems based on renewable and low-carbon forms of energy supply, or where there is clear potential for this to be realised.*
- *Any physical, environmental, land ownership, land-use, investment constraints or risks associated with broad locations or specific sites, such as physical access restrictions, contamination, stability, flood risk, the need to protect natural resources eg water and biodiversity and complex land ownership issues.*
- *Options for accommodating new housing growth (or renewal of existing housing stock), taking into account opportunities for, and constraints on, development. Options may include, for example, re-use of vacant and derelict sites or industrial and commercial sites for providing housing as part of mixed-use town centre development, additional housing in established residential areas, large scale redevelopment and re-design of existing areas, expansion of existing settlements through urban extensions and creation of new freestanding settlements.*
- *Accessibility of proposed development to existing local community facilities, infrastructure and services, including public transport. The location of housing should facilitate the creation of communities of sufficient size and mix to justify the development of, and sustain, community facilities, infrastructure and services“.*

4.1.89 Paragraph 45 notes that *“using land effectively is a key consideration in planning for housing”*. Local planning authorities are to develop housing density policies having regard to the desirability of using land efficiently and reducing, and adapting to, the impacts of climate change. Efficiency in the use of land will also need to have regard to the current and future levels of accessibility, particularly public transport accessibility.

4.1.90 Paragraph 69 states that in general local planning authorities should have regard to the following issues when deciding planning applications

“-- Achieving high quality housing.

- Ensuring developments achieve a good mix of housing reflecting the accommodation requirements of specific groups, in particular, families and older people.*
- The suitability of a site for housing, including its environmental sustainability.*
- Using land effectively and efficiently.*
- Ensuring the proposed development is in line with planning for housing objectives, reflecting the need and demand for housing in, and the spatial vision for, the area and does not undermine wider policy objectives e.g. addressing housing market renewal issues”.*

4.1.91 Paragraph 71 indicates that where planning authorities are unable to demonstrate a 5 Year supply of deliverable residential land then they should consider planning applications favourably subject to the criteria set out in Paragraph 69 (see above).

4.1.92 The Proposed Development incorporates a mix of housing types and tenures and other development components in a way and of a design and quality which fully accord with the advice in PPS3.

4.1.93 Paragraph 19 advises that *“A set of core land-use planning principles should underpin both plan-making and development management and should be taken into account by all those engaged in the planning system, from local authorities and developers through to communities. These principles are:*

- Planning should proactively drive and support the development that this country needs. Every effort should be made to identify and meet the housing, business, and other development needs of an area, and respond positively to wider opportunities for growth. Decision-takers at every level should assume that the default answer to development proposals is “yes”, except where this would compromise a key sustainable development principles set out in this Framework.*
- Planning policies and decisions should take into account local circumstances and market signals such as land prices, commercial rents and housing affordability. Plans should set out a clear strategy for allocating sufficient land which is suitable for development in their area, taking account of the needs of the residential and business community.*

4.1.94 Paragraph 28 advises that *“local planning authorities should have a clear understanding of housing requirements in their area. They should:...*

- Prepare a Strategic Housing Land Availability Assessment to establish realistic assumptions about the availability, suitability and the likely economic viability of land to meet the identified requirement for housing over the plan period.*

4.1.95 The issue of viability is dealt with by paragraph 39 which states *“To enable a plan to be deliverable, the sites and scale of development identified in the plan should not be subject to such a scale of obligations and policy burdens that their ability to be developed viably is threatened. To ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing, local standards, infrastructure contributions or other requirements should when taking account of the normal cost of development and on-site mitigation, provide acceptable returns to a willing landowner and willing developer to enable the development to be deliverable.”*

4.1.96 One of the main objectives of the NPPF is to boost significantly the supply of housing as detailed at paragraph 47 . This paragraph requires local planning authorities to *“identify and maintain a rolling supply of specific deliverable sites sufficient to provide five years worth of housing against their housing requirements with an additional buffer of 5%. e Where there has been a record of persistent under delivery of housing the supply should include an additional allowance of at least 20% to provide a realistic prospect of achieving*

the planned supply and to ensure choice and competition in the market for land.” The advice contained within paragraph 71 of PPS3 is repeated by paragraph 49 of the NPPF which advises “.” Housing applications should be considered in the context of the presumption in favour of sustainable development. Relevant policies for the supply of housing should not be considered up-to-date if the local planning authority cannot demonstrate a five-year supply of deliverable housing sites”.

PPS4 Planning for Sustainable Economic Growth

4.1.97 PPS4, now replaced by the NPPF, sets out the following planning objectives for achieving sustainable growth:

- build prosperous communities by improving the economic performance of cities, towns, regions, sub-regions and local areas, both urban and rural
- reduce the gap in economic growth rates between regions, promoting regeneration and tackling deprivation
- deliver more sustainable patterns of development, reduce the need to travel, especially by car and respond to climate change
- promote the vitality and viability of town and other centres as important places for communities.
- raise the quality of life and the environment in rural areas by promoting thriving, inclusive and locally distinctive rural communities whilst continuing to protect the open countryside for the benefit of all

4.1.98 The Proposed Development meets the objectives of PPS4 (and now the NPPF) by ensuring job creation and employment on the Application Site and relates well to adjacent University academic clusters and College accommodation which are within close proximity and will be easily accessed by cyclists and pedestrians alike. On-site employment provision coupled with the key worker housing provision will therefore reduce the need to travel by University staff. Retail provision in the local centre and elsewhere within the Proposed Development is considered by the accompanying Retail Impact Assessment, which identifies the demand for convenience food provision in the area and demonstrates that there are no alternative sites in the city centre to meet the specified demand and concludes that the Applicant's foodstore proposals will have a negligible effect on town centre vitality and viability and in-centre trade/turnover and no effect on existing, committed or proposed development. The statement also considers the need for and effects of other Class A uses proposed as part of the Proposed Development and concludes them to be: consistent with sustainable development principles; needed in the context of the Proposed Development; and policy compliant.

4.1.99 Hotel provision is considered by the Hotel Needs Assessment, which identifies that given the current and proposed hotel provision in Cambridge there is need for further hotel provision in the location of the Proposed Development and a clear site specific need for a facility on the Application Site to serve the new uses.

4.1.100 At paragraph 24 of the NPPF (as with PPS4) it is recognised that local planning authorities should require applications for retail and leisure uses to be located in town centres, then in edge of centre locations and only if suitable sites are not available, should out of centre sites be considered.

4.1.101 The NPPF continues to require an impact assessment when assessing applications for retail and leisure development outside of town centres, which are not in accordance with an up to date Local Plan, if the development is over a proportionate, locally set floorspace threshold or, if no locally set threshold, the default threshold is 2,500 sq m.

4.1.102 The NPPF also states that planning policies and decisions should assess the impact of retail and leisure proposals, including:

- the impact of the proposal on existing, committed and planned public and private investment in a centre or centres in the catchment area of the proposal; and
- the impact of the proposal on town centre vitality and viability, including local consumer choice and trade in the town centre and wider area, up to five years from the time the application is made. For major schemes where the full impact will not be realized in five years, the impact should also be assessed up to ten years from the time the application is made.

PPS5 Planning for the Historic Environment

4.1.103 PPS5 sets out government policies for the identification and protection of historic buildings, conservation areas, and other elements of the historic environment and has been replaced by the NPPF. It explains the role of the planning system in their protection. Part One of the PPS deals with conservation policy which interacts most directly with the planning system and Plan-Making policies. These include matters of climate change, economic prosperity and regeneration, high quality design and the character of an area. Part Two addresses the Development Management, including; policy guiding the determination of applications for consent relating to heritage assets, designated heritage assets and the setting of a designated heritage asset. In addition this section identifies and records the historic environment including listing procedures, upkeep and repairs.

4.1.104 Policy HE6.1 is of particular relevance and advises that “Local planning authorities should require an applicant to provide a description of the significance of the heritage assets affected and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. As a minimum the relevant historic environment record should have been consulted and the heritage assets themselves should have been assessed using appropriate expertise where necessary given the application’s impact. Where an application site includes, or is considered to have the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where desk-based research is insufficient to properly assess the interest a field evaluation”..

4.1.105 Policy HE7.2 is also of importance and advises that “In considering the impact of a proposal on any heritage asset, local planning authorities should take into account the particular nature of the significance of the heritage asset and the value that it holds for this and future generations. This understanding should be used by the local planning authority to avoid or minimise conflict between the heritage asset’s conservation and any aspects of the proposals”.

4.1.106 Policy HE8.1 states that “The effect of an application on the significance of such a heritage asset or its setting is a material consideration in determining the application. When identifying such heritage assets during the planning process, a local planning authority should be clear that the asset meets the heritage asset criteria set out in Annex 2. Where a development proposal is subject to detailed pre-application discussions (including, where appropriate, archaeological evaluation (see HE6.1)) with the local planning authority, there is a general presumption that identification of any previously unidentified heritage assets will take place during this pre-application stage. Otherwise the local planning authority should assist applicants in identifying such assets at the earliest opportunity”..

4.1.107 Due regard has been given to Policies HE10.1 and HE10.2 in the formulation of the development proposals and this ES. Policy HE10.1 states that “When considering applications for development that affect the setting of a heritage asset, local planning authorities should treat favourably applications that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset. When considering applications that do not do this, local planning authorities should weigh any such harm against the wider benefits of the application. The greater the negative impact on the significance of the heritage asset, the greater the benefits that will be needed to justify approval”.

4.1.108 HE10.2 advises that “Local planning authorities should identify opportunities for changes in the setting to enhance or better reveal the significance of a heritage asset. Taking such opportunities should be seen as a public benefit and part of the process of place- shaping”.

4.1.109 In accordance with the above policies extensive field evaluation has been undertaken in addition to the production of appropriate desk based assessments. The findings of these assessments have been used to inform the archaeological and cultural heritage sections of this ES.

4.1.110 The heritage section of the NPPF incorporates – and streamlines - the previous policies contained in PPS5. It does not alter those policies or create new ones. The PPS5 policies have been condensed and are included within the heritage section or incorporated elsewhere within the NPPF.

4.1.111 The NPPF states at paragraph 126 that “Local planning authorities should set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. In doing so, they should recognise that heritage assets are an irreplaceable resource and conserve them in a manner appropriate to their significance. In developing this strategy, local planning authorities should take into account:

- the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
- the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
- the desirability of new development making a positive contribution to local character and distinctiveness; and
- opportunities to draw on the contribution made by the historic environment to the character of a place.

4.1.112 Paragraph 128 of the NPPF states that in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where an application site includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

4.1.113 In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the presumption in favour of sustainable development, the scale of any harm or loss and the significance of the heritage asset (paragraph 135).

4.1.114 Paragraph 141 of the NPPF notes states that Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record, evidence of our past should not be a factor in deciding whether such loss should be permitted.

PPS9 Biodiversity and Geological Conservation

4.1.115 PPS9 now replaced by the NPPF promotes sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development. It seeks to sustain and improve the quality and extent of natural habitat..

4.1.116 As a result of the presence of the geological SSSI located within the Application Site, the considerable biodiversity enhancements proposed as part of the Proposed Development and ecological features mentioned in the Ecology and Nature Conservation Chapter of this ES, PPS9 is of relevance. Paragraph 1 advises that planning decisions should be based upon up-to-date information about the environmental characteristics of an area. These characteristics should include the relevant biodiversity and geological resources of the area. In reviewing environmental characteristics local authorities should assess the potential to sustain and enhance those resources. Plan policies and planning decisions should aim to maintain, and enhance, restore or add to biodiversity and geological conservation interests. In taking decisions, local planning authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; and to biodiversity and geological interests within the wider environment. The aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests.

4.1.117 The design of the Proposed Development has been prepared to accord with the biodiversity principles in this PPS and which are followed through into the NPPF.

PPS 10: Sustainable Waste Management

4.1.118 PPS10 is concerned with delivering the national waste targets set at EU level; it aims to: ‘...protect human health and the environment by producing less waste and by using it as a resource wherever possible. Through more sustainable waste management, moving the management of waste up the ‘waste hierarchy’ of reduction, reuse, recycling and composting, using waste as a source of energy, and only disposing as a last resort the Government aims to break the link between economic growth and the environmental impact of waste...’

4.1.119 The waste hierarchy is an important consideration with regard to the Proposed Development. During excavation, demolition, construction, and occupation every effort should be made to adhere to its principles, with disposal to landfill only being undertaken as a last resort.

4.1.120 PPS10 also indicates that when determining planning applications, local authorities should consider the impact the development could have on the existing local waste infrastructure. Additionally, the statement outlines the advantages of producing a Site Waste Management Plan which does ‘...not require formal approval by planning authorities, but are encouraged to identify the volume and type of material to be demolished and/or excavated, opportunities for the reuse and recovery of materials and to demonstrate how off-site disposal of waste will be minimised and managed.’

4.1.121 The Proposed Development is, by virtue of the CEMP and other measures summarised in Table 2.1 and the Sustainability Considerations Chapter of this ES, in accordance with the principles set out in PPS10 for protect human health and the environment by producing less waste and by using it as a resource wherever possible through sustainable waste management.

4.1.122 In addition, a Site Waste Management Plan has been produced for the Proposed Development, in accordance with PPS10.

4.1.123 The NPPF does not contain specific waste policies, since national waste planning policy will be published alongside the National Waste Management Plan for England. However, local authorities preparing waste plans should have regard to policies in this Framework.

PPS12: Creating Strong Safe and Prosperous Communities Through Local Spatial Planning

4.1.124 In order to aid delivery of sustainable development, the local planning authority may prepare other development plan documents to provide additional detail which would not be suitable in a core strategy and which requires the status of the development plan. It is important to get the right balance between the value added by inclusion in the development plan and the resources and time delay involved in producing additional DPDs. Core Strategies can allocate strategic sites, as explained in paragraph 4.6. If it is necessary to allocate sites which have not already been allocated in the core strategy, a DPD must be used to allocate these sites.

4.1.125 In the case of North West Cambridge Area, due to the scale and nature of the proposals, the Application Site has been subject to the production of an Area Action Plan, This approach accords with the advice at paragraphs 5.4 and 5.6 of PPS12 which states that “*Area action plans should be used when there is a need to provide the planning framework for areas where significant change or conservation is needed. Area action plans should:*

- *deliver planned growth areas;*
- *stimulate regeneration;*
- *protect areas particularly sensitive to change;*
- *resolve conflicting objectives in areas subject to development pressures; or*
- *focus the delivery of area based regeneration initiatives”.*

4.1.126 Paragraph 5.6 advises that “*In areas of change, area action plans should identify the distribution of uses and their inter-relationships, including specific site allocations, and set out as far as practicable the timetable for the implementation of the proposals. In areas of conservation, area action plans should set out the policies and proposals for action to preserve or enhance the area, including defining areas where*

specific conservation measures are proposed and areas which will be subject to specific controls over development.”

4.1.127 Paragraph 7 of the Draft NPPF notes that “for the planning system delivering sustainable development means:

- **an economic role** – building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type, and in the right places, is available to allow growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure
- **a social role** – supporting strong, vibrant and healthy communities, by providing an increased supply of housing to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community’s needs and supports its health, social and cultural well-being; and
- **an environmental role** – contributing to protecting and enhancing our natural, built and historic environment; and as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and to mitigate and adapt to climate change, including moving to a low-carbon economy”.

4.1.128 Paragraph 8 of the NPPF goes on to note that these three roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives of people and communities. Therefore, to achieve sustainable development, economic, social and environmental gains should be sought jointly and simultaneously through the planning system. The planning system should play an active role in guiding development to sustainable solutions”

PPG13 Transport

4.1.129 Revised Planning Policy Guidance 13 was published in January 2011 and has now been replaced by the NPPF. Paragraph 4 notes that the “*objectives of this guidance are to integrate planning and transport at the national, regional, strategic and local level to:*

- 1. promote more sustainable transport choices for both people and for moving freight;*
- 2. promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, and*
- 3. reduce the need to travel, especially by car”*

4.1.130 Paragraph 6 notes that “*In order to deliver the objectives of this guidance, when preparing development plans and considering planning applications, local authorities should:*

- 1. actively manage the pattern of urban growth to make the fullest use of public transport, and focus major generators of travel demand in city, town and district centres and near to major public transport interchanges;*
- 2. locate day to day facilities which need to be near their clients in local centres so that they are accessible by walking and cycling;*
- 3. accommodate housing principally within existing urban areas, planning for increased intensity of development for both housing and other uses at locations which are highly accessible by public transport, walking and cycling;...*
- 8. give priority to people over ease of traffic movement and plan to provide more road space to pedestrians, cyclists and public transport in town centres, local neighbourhoods and other areas with a mixture of land uses;”*

4.1.131 Paragraph 23 requires that in circumstances where developments will have significant transport implications, Transport Assessments should be prepared and submitted alongside the relevant planning applications. For major proposals, the assessment should illustrate accessibility to the site by all modes and the likely modal split of journeys to and from the site. It should also give details of proposed measures to

improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts.

4.1.132 Paragraph 72 states that *“The likely availability and use of public transport is a very important ingredient in determining locational policies designed to reduce the need for travel by car”*. Paragraph 75 notes that walking is the most important mode of travel at the local level *“and offers the greatest potential to replace short car trips, particularly under 2 kilometres. Walking also forms an often forgotten part of all longer journeys by public transport and car”* Paragraph 78 indicates that cycling has the potential *“Cycling also has potential to substitute for short car trips, particularly those under 5km, and to form part of a longer journey by public transport”*.

4.1.133 The location and component elements of the Proposed Development accord with PPS13 and the transport solutions incorporated as part of the Proposed Development also accord with the advice in PPS13 and now the NPPF. The themes in PPS13 having been carried forward into the NPPF.

4.1.134 While the NPPF is to be read as a whole in the context of Transport considerations, the NPPF notes: at paragraph 29 that policies have an important role to play in facilitating sustainable development

Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.:

4.1.135 Paragraph 35 of the NPPF notes that; “Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- accommodate the efficient delivery of goods and supplies;
- give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians;
- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of disabled people by all modes of transport.

4.1.136 Paragraph 36 of the NPPF recognises that a key tool to facilitate this will be a Travel Plan and that all developments which generate significant amounts of movement, as determined by local criteria, should be required to provide a Travel Plan.

4.1.137 Paragraphs 37 and 38 of the Draft NPPF note that planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities and that for larger scale residential developments in particular, planning policies should promote a mix of uses in order to provide opportunities to undertake day-to-day activities including work on site. Where practical, particularly within large-scale developments, key facilities such as primary schools and local shops should be located within walking distance of most properties.

PPS25 Development and Flood Risk

4.1.138 Planning Policy Statement 25 was published in March 2010 and is now replaced by the NPPF albeit the NPPF and the technical guidance accompanying it retains key elements of PPS25. The aims of PPS25 and now the NPPF are to ensure that flood risk is taken into account at all stages in the planning process in

order to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.

4.1.139 Paragraph F1 of PPS25 notes that flooding results both from sources external to the development site and rain falling onto and around the site. The sustainable management of this rainfall is an essential element of reducing future flood risk to both the site and its surroundings. Paragraph F6 indicates that surface water arising from the developed site should as far as practicable be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

4.1.140 Paragraph F7 of PPS25 indicates that the term sustainable drainage systems (SUDS) is frequently used to cover the whole range of sustainable approaches to surface water drainage management including

- source control measures including rainwater recycling and drainage;
- infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities;
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.

4.1.141 As advocated by paragraph F9 of PPS25 Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse effects.

4.1.142 The layout of the Proposed Development has been prepared to comply with the advice in PPS25 and now the NPPF. Among other things, it avoids built development in those areas of highest risk, manages surface water arising from the Proposed Development in a sustainable manner, incorporates a comprehensive Sustainable Urban Drainage Scheme and ensures that any excess surface water can be safely stored on or conveyed from the Application Site without adverse effects. Chapter 15 of this ES explains further the approach to and effects of drainage proposals associated with the Proposed Development.

4.1.143 At paragraph 103 of the NPPF when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development in flood risk areas appropriate where informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and
- development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed; and it gives priority to the use of sustainable drainage systems.
- Paragraph 104 of the NPPF notes that for individual developments on sites allocated in development plans through the Sequential Test, applicants need not apply the sequential test.

The Natural Choice: Securing The Value of Nature ('the White Paper') (June 2011)

4.1.144 The Natural Choice: Securing The Value of Nature ('the White Paper') sets out Government proposals and policy solutions in the realm of the natural environment.

4.1.145 The White Paper states that people cannot flourish without the benefits and services our natural environment provides. A healthy, properly functioning natural environment is the foundation of sustained economic growth, prospering communities and personal wellbeing.

4.1.146 The White Paper is not binding policy or current legislation, but should be read as a material consideration, as some of the proposals may be transposed into legislation or integrated into the National

Planning Policy Framework (NPPF) in the future. The proposals relevant to the Application Site are outlined below:

- No net loss of biodiversity is proposed as a key Government goal. A broad outline of the approach towards planning within the context of this objective and within the broader framework of the NPPF is set out within the White Paper. It proposes a system able to deliver the homes, business, infrastructure and thriving local places while providing communities with the tools to achieve improved and healthy natural environments.
- The White Paper identifies land use change as a major impact on biodiversity outcomes and outlines Government support for the establishment of Nature Improvement Areas (NIAs) to mitigate this. NIAs will be set up as partnerships between local authorities, local communities and landowners in order to restore and connect nature on a significant scale. It is proposed that local planning authorities will be empowered under the National Policy Statements within the framework of the NPPF to support their development.
- A proposed feature of the new NPPF outlined within the White Paper is the use of Biodiversity Offsetting, where developers secure compensatory habitat expansion or restoration to compensate for biodiversity loss brought about due to development. The Government seeks to pilot this approach on a voluntary basis over the next few years.

4.1.147 The Proposed Development will enhance biodiversity through landscaping, protection of existing habitat areas, the creation of new green space and the development of new habitat areas. The existing geological SSSI will be protected. In this way the Proposed Development meets the requirements set out within the White Paper, enhancing and safeguarding the natural environment to ensure sustained economic growth, prospering communities and personal wellbeing.

Policy Overview

Paragraph 7 of PPS1 stated that national policies and regional/local development plans provide the framework for planning for sustainable development. Paragraph 8 of PPS1 contends that this plan-led system *“and the certainty and predictability it aims to provide, is central to planning and plays the key role in integrating sustainable development objectives. Where the development plan contains relevant policies, applications for planning permission should be determined in line with the plan, unless material considerations indicate otherwise”*. This is supported by the NPPF which continues to recognise that the planning system is plan led and that Local Plans (Development Plans), incorporating neighbourhood plans where relevant are the starting point for the determination of any application. The NPPF notes that planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise. It addresses the relationship between the NPPF and existing adopted policies within this context. Within paragraphs 211 to 215 of Annex 1 to the NPPF it is stated that:

- for the purposes of decision making the policies in the Local Plan should not be considered out of date simply because they were adopted prior to the publication of the NPPF;
- the policies contained in the NPPF are material considerations which planning authorities should take into account from the day of its publication;
- for 12 months from the day of publication of the NPPF, decision takers may continue giving full weight to policies adopted since 2004 even if there is a limited degree of conflict with the NPPF;
- in other cases and following the 12 month period, due weight should be given to relevant policies in existing plans according to their degree of consistency with the NPPF and that the closer the policies in the plan are to those within the NPPF the greater the weight that may be given."

4.1.148 The East of England Plan recognises the Cambridge Sub-region as an area which will need to accommodate a significant level of development and Policy CRS1 recognises that land will need to be released from the Green Belt following the policies contained within the Structure Plan, the Cambridge Local Plan and the Development Plan documents being prepared by South Cambridgeshire District Council and

Cambridge City Council. Policy CR3 Green Belt is particularly pertinent as it recognises the importance of the Green Belt but also recognises that it will need to be changed to accommodate growth. In the case of Northwest Cambridge, the Area Action Plan has amended the Green Belt to accommodate the built development. Nonetheless, to maintain the function of the Green Belt, the open space and other appropriate uses are provided within the Green Belt, thereby maintaining its functions as identified by Policy CRS3 i.e. to maintain and enhance the quality of Cambridge's setting and prevent communities of Cambridge from merging into one another and with the city. Paragraph 13.11 and policy CSR2 Employment Generating Development of the EEP both recognise that *"The sub-region has one of the most remarkable concentrations of high technology and research clusters in the UK. These should be fostered in the national interest and to promote further sustainable growth of the local and regional economy"*.

4.1.149 Whilst, the Localism Act provides for the abolition of Regional Spatial Strategies and therefore the weight which can be attached to the EEP will decrease as the powers in the Localism Act are exercised it is clear that this site is underpinned by an adopted area action plan and will meet the requirements of paragraph 6 and 7 of the NPPF by proposing sustainable development which provides for the three dimensions to sustainable development: economic, social and environmental. .

4.1.150 The principles identified in the EEP and the Structure Plan have been taken forward into the relevant Local Plans and Development Plan Documents and ultimately now in the adopted AAP. The planning application has been prepared to accord with the policies in the AAP.

4.1.151 The Proposed Development accords with the development plan, reflecting the content of the Regional Strategy for the East of England, the Cambridgeshire and Peterborough Structure Plan, and, most importantly, the North West Cambridge Area Action Plan DPD. The NPPF and the presumption in favour of sustainable development clearly reinforce this assertion.

4.1.152 The concept of the development at North-West Cambridge accords with the policy framework provided by the development plan regarding the role and growth of Cambridge. Policy CRS1 of the East of England Plan recognises that a significant amount of growth should be concentrated in and immediately adjoining Cambridge by way of sustainable urban extensions.

4.1.153 The East of England Plan continues to seek to develop the Cambridge sub-region to 2021 and beyond as a centre of excellence in higher education and research, fostering the dynamism, prosperity and further expansion of the knowledge based economy spreading outwards from Cambridge. This is a role which is now being supported by both ministerial statements and the draft NPPF.

4.1.154 It is noted that the growth of Cambridge will encompass land beyond the administrative area of Cambridge City Council and it is recognised that the EEP and Structure Plan require development to be concentrated in planned sustainable extensions to the urban area, in conjunction with the release of land from the Green Belt.

4.1.155 The Cambridgeshire and Peterborough Structure Plan 1999-2016 supports the release of the Application Site from the Green Belt, as detailed at Policy P9/2c Location and Phasing of Development Land to be released from the Green Belt.

4.1.156 The North West Cambridge site is identified by both the Cambridge Local Plan 1999-2016 and the South Cambridgeshire Council Local Development Framework and the Site Specific DPD entitled Responding to a Housing Shortfall – Technical Appendix October 2008. The production of the AAP and its adoption in 2009 as part of the Statutory Development Plan has defined the policy framework for this site and the level of development which will be permitted.

4.1.157 The Proposed Development therefore fully accords with the relevant provisions of the new National Planning Policy Framework and with those of Planning Policy Guidance and Planning Policy Statements which it replaces. It accords with the various parts of the Development Plan covering the Application Site and is fully in accordance with the presumption in favour of sustainable development.

1 Introduction and Assessment Approach

2 Application Site Description and Proposed Development

3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

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13 Noise Environment

14 Air Quality

15 Hydrology, Drainage and Flood Risk

16 Utilities and Services

17 Sustainability Considerations

18 Cumulative and Interactive Effects

19 Summary

5 SOCIO-ECONOMIC ASSESSMENT

5.1 Introduction

5.1.1 This chapter of the EIA presents the assessment of likely significant socio-economic effects of Proposed Development. The assessment considers the effects of the Proposed Development, as set out in the description of development (in Chapter 2), on the social and community requirements for delivering sustainable communities. The chapter sets out the assessment methodology, policy context, baseline conditions and assessment of effects and mitigation measures. **Appendix 5.1** provides a more detailed analysis of baseline conditions.

5.2 Assessment Approach

Methodology

5.2.1 This section sets out the assessment methodology and main assumptions underpinning the socio-economic assessment. For all calculations an assessment has been made for 2014 and 2026. For the purposes of the assessment, 2026 figures in the associated tables are cumulative.

Construction

5.2.2 Construction employment has been assessed using standard ratios of construction employment to output, assuming an average annual¹ output per construction worker of £110,170.

5.2.3 Dividing total spend by output per construction worker generates a figure for the total number of people that would be employed for one year over the period of that spending. These are known as 'Man Year Equivalents' (MYEs). Using a standard benchmark that 10 MYEs are equal to 1 Full-Time Equivalent (FTE) job, it is possible to infer the effect on employment.

Population

5.2.4 Population and age profiles have been determined using a demographic model that relates average household sizes to household tenure and type, and estimated child yields generated from the development.

5.2.5 These models are based on research by AECOM, using a wide range of data sources including ONS census data, NOMIS labour market statistics and the University's Housing Needs Survey (2008 and 2009 Update), with additional guidance provided by Cambridgeshire County Council (CCC).

5.2.6 The household size assumptions are set out in **Tables 5.1 and 5.2**.

Housing Mix and Demographics

Key Worker Housing Assumptions

5.2.7 The University staff housing allocation policy will have direct implications on the population and child yields anticipated from the development. These figures, in turn, affect the level of provision for on-site education and community facilities. The University's allocations approach is set out in the Key Worker Housing Statement that accompanies the application.

5.2.8 The analysis of the University staff household survey has enabled assumptions as to average household size and child yield by unit type to be developed. Due to the different characteristics of households moving from areas outside of Cambridge versus from within Cambridge, these have been compared, as illustrated in **Tables 5.1 and 5.2**. As a result, a series of scenario tests have been carried out. The assessment that follows assumes a 50/50 split of key workers originating from housing within and outside of Cambridge, which is a conservative judgement.

¹ AECOM pro-rated cost (2007)

5.2.9 While in 'typical' housing developments key worker housing would usually be assessed as comparable to market housing in terms of population profile, the key worker housing at North West Cambridge has been considered independently due to significant differences in their population characteristics as compared to market housing or social rented housing. These characteristics are reflected in the population modelling process. Please refer to Appendix B for additional information on this methodology, which has been agreed with the County Council.

Table 5.1: University Staff Population and Child Yield Assumptions (Households from Cambridge)

Unit Types		Average Household size	Children per 100 units			
			Early years	Primary	Secondary	16-18 years
	Age		0 to 3	4 to 10	11 to 15	16-18
1 Bed	Single/Couple households	1.46	0	0	0	0
2 Bed	Couples no children	1.76	0	0	0	0
2 Bed	Adult(s) with children	3.4	67	53	7	13
3 Bed	Adult(s) with children	3.67	57	62	17	19
3 Bed	Other Households ²	1.83	0	0	0	0
4 Bed	Adult(s) with children	4.14	38	72	72	17
4 Bed	Other Households ²	2.56	0	0	0	0
4 Bed	Multi-occupied houses with 4 individuals	4.00*	0	0	0	0

* Multi-occupied houses with 4 individuals is manually overridden
Source: AECOM Analysis of Survey of University Staff 2009

Table 5.2: University Staff Population and Child Yield Assumptions (Households from outside Cambridge)

Unit Types		Average Household size	Children per 100 units			
			Early years	Primary	Secondary	16-18 years
	Age		0 to 3	4 to 10	11 to 15	16-18
1 Bed	Single/Couple households	1.53	0	0	0	0
2 Bed	Couples no children	1.88	0	0	0	0
2 Bed	Adult(s) with children	3.48	68	52	0	0
3 Bed	Adult(s) with children	3.63	71	50	24	11
3 Bed	Other Households ²	2.15	0	0	0	0
4 Bed	Adult(s) with children	3.92	69	46	23	15
4 Bed	Other Households ²	2.88	0	0	0	0
4 Bed	Multi-occupied houses with 4 individuals	4.00*	0	0	0	0

* Multi-occupied houses with 4 individuals is manually overridden
Source: AECOM Analysis of Survey of University Staff 2009

5.2.10 As detailed above for certain types of units, the child yields are expected to be zero for development at the Proposed Development. These are unit types for which the allocations policy excludes family occupancy (or where there are no children of school age), despite current child occupancy in the survey results.

Market Housing Assumptions

5.2.11 In addition to key worker housing, the development includes 1,500 market housing units. It is important to look at the combined education requirements from both the proposed University staff housing and the proposed market units. **Table 5.3** below presents the population and child yield assumptions used by Cambridgeshire County Council to assess open market units.

² Other Households include households with "adult children": ie reported dependants over the age of 18. Other Households also include adult sharers.

Table 5.3: Market Housing Population and Child Yield Assumptions

Children per 100 units					
Unit Types	Average Household size	Early years	Primary	Secondary	16-18 years
		0 to 3	4 to 10	11 to 15	16 to 18
1 Bed	1.5	0	0	0	N/A
2 Bed	1.5	0	0	0	N/A
3 Bed	2.55	20	30	20	8
4+ Bed	3.3	30	50	35	14

Source: Cambridge County Council Household Size and Child Yield Assumptions

Housing Mix Assumptions

5.2.12 The planning application for the Proposed Development does not fix the housing mix for the Application Site. For the purposes of this assessment, the indicative housing mix is set out in Table 5.4.

Table 5.4: Indicative Housing Mix

Unit Types	Key Worker Housing	Market Housing
1 Bed	645	240
2 Bed	585	555
3 Bed	190	380
4+ Bed	30	325
4 Bed shared	50	
Total	1,500	1,500

Employment

5.2.13 When assessing the effects on employment, the indicative standard ratios of commercial floorspace to jobs are set out below in Table 5.5.

Table 5.5: Employment Standards

Land Use	Standard	Source
Laboratories	33 m ² per FTE job (GEA)	Creative Places
Workshops	46 m ² per FTE job (GEA)	Creative Places
Offices	14 m ² per FTE job (GEA)	Creative Places
Hotel	40 employees/150 key hotel	GVA Grimley
Food Store	135 employees	GVA Grimley
Small Retail	20 m ² per FTE job (net)	English Partnerships
Local Food Retail	13 m ² per FTE job (GEA)	English Partnerships
Health Facilities	2 FTE per GP	Cambridgeshire PCT
Police Offices	28 officers/300sq.m.	Cambridge City Council
Early Years	1 staff per 13 children	Cambridgeshire County Council
Primary School	45 FTE / 3FE	DCSF
Senior Care	30 staff	GVA Grimley
Student Accommodation	54 staff/491 students	Trinity Hall (Cambridge University)

Defining Geographies

5.2.14 Data has been drawn from official national datasets including the 2001 ONS Census, Index of Multiple Deprivation and NOMIS labour market statistics. Each of these datasets allows for the analysis of small geographic areas and while the Census data was collected at the start of the decade, it remains the most comprehensive and robust source of information for a range of demographic socio-economic indicators for local geographies.

5.2.15 For the purposes of the baseline data examination, AECOM has developed an analysis and comparison across the following geographies:

- National (England)
- Regional (East of England)
- County (Cambridgeshire)
- South Cambridgeshire + Cambridge City (OIA)
- ONS 2001 Output Areas (OAs) (IIA)

5.2.16 Additionally, when analysing the 2010 JSA claimant data, we have used the wards of Girton (South Cambridgeshire) and Castle (Cambridge City) as these are the most relevant geographies in which data was available.

Outer Impact Area (OIA)

5.2.17 Given the high profile nature of Cambridge University, the effects of the University's growth and expansion have the potential to influence economic performance on a regional, even national scale. For the purpose of this assessment of impact the OIA is limited to the geographies of the South Cambridgeshire and Cambridge City local authority boundaries. Further rationale for this is that there is a strong existing relationship between the two local authorities, and that Cambridge City lies almost centrally within the South Cambridgeshire district. Effects (expected to be beneficial) will exist outside of the OIA but are not addressed in this assessment.

5.2.18 The OIA includes committed developments coming forward within these wider geographies, as these developments are certain to have more significant, cumulative demographic, economic and employment effects, than those further afield within the wider region.

5.2.19 **Figure 5.1** below shows the inner and outer impact areas of the Application Site within the wider Cambridgeshire county geography.

Inner Impact Area (IIA)

5.2.20 The IIA surrounds the Application Site. The IIA is derived from a simple estimated 20 minute general walk time buffer. This was calculated by applying the assumption that the average person walks at 6.43km/h (4 mph). This equates to approximately 2,143 metres (2.14km) – which is the circular buffer formed around the Application Site.

5.2.21 The IIA is therefore designated as the output areas (smallest geography at which data can be recorded by the Census) that are intersected by the buffer.

5.2.22 This approach represents a series of reasonable assumptions which can be applied to the area surrounding the Application Site to determine the likely relationships between the new population on the Application Site and the existing population within the hinterland of the Application Site which could seek to use facilities both on and off-site in terms of catchment analysis.

Cumulative Effects

5.2.23 For the purposes of the socio-economic assessment, the cumulative effects of four developments have been considered:

- West Cambridge
- NIAB 1
- NIAB 2
- Northstowe

5.2.24 The assessment reviews the proposals coming forward within the North West Cambridge development and considers their associated effects in conjunction with services and facilities planned in new developments nearby. The Scoping Report identified the need to consider cumulative effects with the four

developments set out above. West Cambridge, NIAB 1 and NIAB 2 are within close proximity to the Application Site (all within 1 km).

5.2.25 Northstowe, a 9,500 dwelling development located approximately 3.5 miles north of the Application Site is outside the IIA. Northstowe and the Proposed Development are each considered to be likely to be established as freestanding communities from the outset. This factor combined with their distances from one another is considered to make it unlikely that they will generate combined community infrastructure needs which are any different from or greater their respective individual needs, which they would each respectively and independently meet.

5.2.26 **Table 5.6** outlines the main services and facilities proposed in the four developments considered for the cumulative effects analysis.

Table 5.6: Summary of main features within cumulative assessment developments

Development	Residential Units	Employment Floorspace (m ²)	Retail Floorspace (m ²)	Community Facilities	Open Spaces
NIAB	1,593	-	18,000	2 FE Primary school (inc. early years provision and a Children's Centre) and can provide community use in the evening time; Local Centre inc. Community Café/Youth and Teen facility; health (4-5 GP practice) and library co-located building ; sports pavilion; NEAP/LEAP children's play provision	27.21 Ha
NIAB 2	1,100	-	-	6FE Secondary school (catchment of NIAB + NWC) and potential for 2FE primary school	-
West Cambridge	200	138,000	18,000	Sports Centre (10,120m ²)	1.08 Ha
Northstowe	9,500	-	-	Education and health facilities, open space including town park and town square, sport and recreation facilities and cemetery/burial ground	

5.2.27 West Cambridge has an existing planning permission, and NIAB 1 has the benefit of a resolution to grant planning permission dating back to July 2010; the information on these developments is based on these established positions. NIAB 2 is at the pre planning application stage and the information detailed above is therefore based on policy direction; proposals for the new town of Northstowe are to be re-launched but again are based on policy direction and the previous planning application.

Significance Criteria

5.2.28 There are no technical significance criteria relating to socio-economic effect other than those that relate to specific effects (e.g. noise, air pollution etc.) which are dealt with elsewhere within the Environmental Statement. Socio-economic effects are considered in the context of local facilities, employment, population and demand for community space, health and education.

5.2.29 The significance of these is considered in the context of the baseline conditions on the immediate surroundings and wider neighbourhoods.

5.2.30 Significance of environmental effects will be assessed on a seven-point scale ranging from 'major beneficial' to 'major adverse'. Explanation of the effects ratings is provided below:

Table 5.7: Significance of Effects

Major Beneficial	<p>Total gain or major/substantial positive alteration to elements/features of the baseline (pre-development) conditions such that the post development composition/attributes will be fundamentally improved from a social and/or economic perspective on a regional, national or international basis.</p> <p>The proposals further national objectives to provide for mixed and balanced communities.</p>
Moderate Beneficial	<p>Alteration or gain to one or more elements/features of the baseline conditions such that post development composition/attributes of the baseline will be materially improved, including significant enhancements to the social and/or economic conditions of the inner and outer impact areas.</p> <p>The proposals further regional objectives to provide for mixed and balanced communities.</p> <p>There is potential to provide a comprehensive level of service provision and balance between housing and employment growth to enhance the existing area or introduce a new character/identity.</p>
Minor Beneficial	<p>A minor shift away from baseline conditions. Change arising from the gain/alteration will be detectable but the underlying character / composition / attributes of the baseline condition will be similar to the pre-development and the proposals meet the needs of the proposed community.</p> <p>The proposals incorporate measures to ensure that the scheme would meet its own needs and not put undue pressure on existing resources, and potentially enhance levels of existing provision, in the IIA.</p>
Negligible	<p>No or very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable.</p> <p>The proposals meet the needs of the proposed community.</p>
Minor Adverse	<p>A minor shift away from baseline conditions. Change arising from the loss/alteration will be detectable but the underlying composition / attributes of the baseline condition will be similar to the pre-development.</p> <p>The proposals are out of scale with the IIA;</p> <p>The proposals incorporate insufficient measures to ensure that the scheme would meet its own needs and not put undue pressure on existing resources. The proposals would potentially worsen levels of existing provision, in the IIA.</p> <p>They cannot be substantially mitigated for because of the scale of the proposal.</p>
Moderate Adverse	<p>Loss or alteration to one or more elements/features of the baseline conditions such that post development composition/attributes of the baseline will be materially changed.</p> <p>Mitigation would not prevent the scheme from affecting on both inner and outer impact areas in the longer term.</p> <p>There would be considerable stress on existing population and facilities in the inner and outer impact areas.</p>
Major Adverse	<p>Total loss or major/substantial alteration to elements/features of the pre-development baseline conditions such that the post-development composition/attributes will be fundamentally changed, including considerable under-provision of services, housing and/or employment in the inner and outer impact areas and wider regional, national and/or international issues.</p>

Scoping Criteria

5.2.31 This chapter of the ES considers the socio economic issues relating to the Proposed Development. Likely effects on social and economic conditions will arise directly from employment and housing opportunities created at the development as well as other proposed supporting land uses.

5.2.32 The methodology takes account of predicted population within the development, its demographic profile and likely pupil yield as a consequence. Assumptions concerning these factors and methodology for calculating them were by the University and discussed with the Local Planning Authorities [via task groups formed for the purpose].

5.2.33 This assessment:

- Reviews land use policy documents including national policy guidance.
- Defines and assemble data on population, the economy, health, and similar matters from relevant sources.

5.2.34 The socio economic effects of the Proposed Development are assessed having regard to:

- Likely implications for the City, sub-region, and region as well as national considerations;
- likely levels of housing requirement in the area, including interaction between University key worker housing and the local housing market;
- the likely effects of the economically active elements of the residential population on the labour market and the prospects for employment; assessing the effect of the development on primarily public services including education, social services, health facilities and blue light services;
- proposals for on site provision and management of open space and recreational facilities;
- the views of stakeholders and service providers including local authorities, health authority, community groups, business representatives, emergency services, consulting and blue light service providers as appropriate.

5.2.35 To gain a clear understanding of the scale and nature of any socio economic effects, published statistical information and bespoke research sources are used to establish existing conditions and indicate where and when the Proposed Development is likely to have any significant effects in the future. Cumulative effects of the Proposed Development with other developments and initiatives are considered as appropriate, particularly as regards the quantum of phasing of new community facilities. This identification of socio economic effects was informed through the outcomes of the Education and Community Facilities Task Group. The Housing Needs Study produced by the University of Cambridge which was used to inform discussions in relation to the AAP have been used in setting the baseline for this topic area.

5.3 Policy Framework

5.3.1 A range of policy initiatives at the national, regional and local level are relevant to the Proposed Development:

National Policy Framework

5.3.2 The Government's commitment to the delivery of sustainable development was reiterated in PPS1, which stated that planning should facilitate and promoted sustainable patterns of development by:

- Making suitable land available in line with objectives to improve the quality of life;
- Contributing to sustainable economic growth;
- Protecting and where possible enhancing the natural and historic environment and existing successful communities;
- Ensuring high quality development through good design;
- Ensuring that development supports existing communities and contributes to the creation of safe, sustainable and liveable communities with good access to key services.

5.3.3 PPS1 promoted development that builds socially inclusive communities. It states that planning should address accessibility to jobs, health, housing, education, shops, leisure and community facilities.

5.3.4 PPS3 set out the Government's objectives in the delivery of housing. PPS3 outlines the following specific outcomes that the planning system should deliver:

- High quality housing that is well designed and built to a high standard;
- A mix of housing, both market and affordable, particularly in terms of tenure and price, to support a wide variety of households in all areas, both urban and rural;
- A sufficient quantity of housing taking into account need and demand and seeking to improve choice;
- Housing development in suitable locations, which offer a good range of community facilities and with good access to jobs, key services and infrastructure.
- A flexible and responsive supply of land – managed in a way that makes efficient and effective use of land, including re-use of previously developed land, where appropriate.

5.3.5 To help achieve sustainable growth, PPS4 set out the following planning objectives:

- build prosperous communities by improving the economic performance of cities, towns, regions, sub-regions and local areas, both urban and rural
- reduce the gap in economic growth rates between regions, promoting regeneration and tackling deprivation
- deliver more sustainable patterns of development, reduce the need to travel, especially by car and respond to climate change
- promote the vitality and viability of town and other centres as important places for communities.
- raise the quality of life and the environment in rural areas by promoting thriving, inclusive and locally distinctive rural communities whilst continuing to protect the open countryside for the benefit of all

5.3.6 PPS4 previously set out the Government's comprehensive policy framework for planning for sustainable economic development in urban and rural areas. Published in December 2009, this replaced PPG4, PPG5, PPS6 and PPS7. The government have outlined six main aims in which prosperous economies are to be delivered. These are as follows:

- Achieve sustainable economic growth;
- Raise overall UK economic growth rates;
- Promote regeneration and tackle deprivation;
- Respond to sustainability/climate change challenges;
- Promote good urban design (good access, alternative means of transport and good design as per PPS 1); and
- Promote social inclusion

The Localism Act

5.3.7 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

National Planning Policy Framework

5.3.8 The NPPF continues with the previous themes of National Planning Policy identified above. While the NPPF is to be read as a whole in the context of socio-economics the NPPF notes the social role of sustainable development in supporting the Government's objective in creating strong, vibrant and healthy communities, by creating a high quality built environment, with accessible local services that reflect

community needs and support its health, social and cultural well-being. Paragraph 69 and 70 of the NPPF note that to achieve this objective the planning system should promote places which promote, among, other things opportunities for meetings among members of the community and policies and decisions should plan positively for the provision and use of shared space community facilities and local services to enhance the sustainability of communities; ensure an integrated approach to considering the location of housing economic issues and community facilities services.

Regional Planning Framework

The East of England Plan (2008)

5.3.9 The adopted East of England Plan 2008 has a vision for the Cambridge Sub-Region to 2021 and beyond, to continue to develop as a centre of excellence and world leader in higher education and research.

5.3.10 The adopted East of England Plan 2008 is the Regional Strategy for the East of England region of which Cambridge forms part. The recently published Localism Bill provides for the abolition of Regional Strategies and is expected to be enacted in November 2011; although the abolition of individual Regional Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, LPAs are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

5.3.11 On abolition of the East of England Plan, Local Plans incorporating neighbourhood plans where relevant, will be the statutory Development Plan for the determination of any planning application. The presumption in favour of sustainable development within the NPPF will require that development proposals that accord with statutory plans should be granted planning consent without delay; and where the plan is absent, silent, indeterminate or where relevant policies are out of date planning permission should still be granted unless the adverse impacts of allowing development would significantly and demonstrably outweigh the benefits, when assessed against the policies in this NPPF taken as a whole. As explained below the local statutory development plan covering the area of the Application Site comprises the North West Cambridge Area Action Plan (AAP), South Cambridgeshire District Council Core Strategy and related local development documents and Cambridge City Local Plan. The Area Action Plan is up to date and is the central policy document in relation to this Proposed Development forming part of the Councils' Local Development Framework.

The East of England Regional Economic Strategy (2008-2031)

5.3.12 The Regional Economic Strategy (RES) is currently a statutory document designed to guide development over the period 2008-2031 within the East of England. Produced in complete synergy with the Regional Spatial Strategy (RSS) it ensures aspirations defined within the RES sit comfortably alongside the planning framework for the East of England.

5.3.13 The Regional Economic Strategy's vision for the East of England is to be:

- internationally competitive with a global reputation for innovation and business growth
- a region that harnesses and develops the talents and creativity of all, and;
- at the forefront of the low-carbon and resource-efficient economy.

5.3.14 The region will also become known for;

- exceptional landscapes, vibrant places and quality of life, and;
- be a confident, outward-looking region with strong leadership, where communities actively shape their future.

5.3.15 The document recognises a number of characteristics within the region that will help to meet this overall vision such as identifying strengths as well as distinctive areas of opportunity. The region's global leadership in science and technology, research and innovation is noted as a significant strength and should be encouraged alongside the sensitive management of growth and development.

Cambridgeshire Horizons Business Plan 2008-2011

5.3.16 The Cambridgeshire Horizons Business Plan, published in 2008, outlines the Cambridge sub-region as an area that has fast become one of the most attractive places to live and work in the UK, and with this, the Government has prioritised the Cambridge sub-region as one of the main areas in need of additional investment to support growth. It then highlights that the sub-region is receiving funding to provide quality new homes and supporting infrastructure, in conjunction with continued economic growth to benefit existing and new communities.

5.3.17 The proposed development at North West Cambridge has been highlighted as a main work stream and identifies a number of milestones for the development up to 2011, with first buyers expected to move in around mid 2011.

The Cambridgeshire and Peterborough Structure Plan (2003)

5.3.18 The adopted Cambridgeshire and Peterborough Structure Plan 2003 has been superseded (with the exception of 13 saved policies) after the approval of the East of England Plan in May 2008, however a few pertinent policies remain relevant to this planning application.

5.3.19 A number of related policies to the current application are outlined below:

- **Policy P2/3** states Strategic employment sites in Cambridgeshire and Peterborough will be provided where there are good transport links, a locally available labour supply and the potential for business or industrial expansion.
- **Policy P6/1** states that development will only be permitted where the additional infrastructure and community requirements generated by the proposals can be secured, which may be by condition or legal agreement or undertaking.
- **Policy P9/8** states that a comprehensive approach will be adopted to secure infrastructure needed to support the development strategy for the Cambridge Sub-Region. Sources of funding and land holdings will be brought together within a co-ordinated infrastructure programme to be delivered by a partnership constituted by the local authorities and other stakeholders.

Local Planning Policy

North West Cambridge Area Action Plan (2009)

5.3.20 Cambridge City Council and South Cambridgeshire District Council have adopted an Area Action Plan for the Application Site. AAP provides specific policies to promote the development included within the outline application, with the following specific policies about social and community infrastructure:

5.3.21 **Policy NW8:** Employment Uses: North West Cambridge will provide employment land for:

- a) Predominantly D1 educational uses, associated sui generis research establishments and academic research institutes where it is in the national interest or where they can show a special need to be located close to the University in order to share staff, equipment or data, and to undertake joint collaborative working;
- b) A mix of commercial research uses within Use Class B1(b) that can demonstrate a special need to be located close to the University.

5.3.22 **Policy NW9:** Employment Uses in the Local Centre: Small-scale local B1 employment uses, under 300m², will be provided within the local centre as demand requires, of an appropriate scale to a generally residential area.

5.3.23 **Policy NW10:** Mix of Uses: Employment and academic development at North West Cambridge will constitute 100,000m² of floorspace as follows:

- a. Approximately 60,000m² of higher education uses, including academic faculty development and a University Conference Centre within Use Class D1; and
- b. Up to 40,000m² of University-related sui generis research institutes and commercial research uses within Use Class B1(b).

5.3.24 **Policy NW20:** Provision of Community Services and Facilities, Arts and Culture.

1. The development will provide an appropriate level and type of high quality services and facilities in suitable locations to serve all phases of development. In order to identify the appropriate level, detailed assessments and strategies will be required to be prepared with key stakeholders prior to granting planning permission;

2. Where appropriate, those services and facilities delivered by the community or voluntary sector will be provided by the development of appropriate serviced land, e.g. faith, social and sporting clubs.

5.3.25 **Policy NW21:** A Local Centre: Where appropriate, all services and facilities will be provided in a single centre at the heart of the development and adjacent to the strategic gap, well served by public transport and a cycle path network, and within reasonable walking distance of all parts of the development.

5.3.26 **Policy NW23:** Open Space and Recreation Provision: Development will provide public open space and sports facilities in accordance with the Open Space and Recreation Standards set out in Appendix 3. Development will also provide improved linkages to the adjacent open countryside.

The South Cambridgeshire District Core Strategy (2007)

5.3.27 The South Cambridgeshire District Core Strategy includes a number of related policies to the outline planning application, which are outlined below:

5.3.28 **Policy ST/2** states that the District Council will make provision for 20,000 new homes in South Cambridgeshire during the period 1999 to 2016 in locations in the following order of preference: On the edge of Cambridge; the provision of affordable housing, including housing for Key Workers, will be sought as part of overall housing provision.

5.3.29 **Policy ST/8** states that policies in Local Development Documents will ensure sufficient employment land is available to enable further development of the high technology clusters and meet local needs. Additional land will be brought forward for employment development at Strategic Employment Locations, including Northwest Cambridge.

Cambridge City Local Plan (2006)

5.3.30 The adopted Cambridge City Local Plan identifies areas of major change and urban extensions which are intended to accommodate a significant proportion of Cambridge's sustainable growth.

5.3.31 The Application Site falls under Local Plan **Policy 9/7** Land between Madingley Road and Huntingdon Road, which is reserved for predominantly University of Cambridge related uses. The policy recognises that the Proposed Development will need to provide a clear need for the land required for collegiate development for staff and student accommodation and University academic faculty development to be released from the Green Belt. The detail of this policy has now been superseded by the North West Cambridge Area Action Plan, which recognises the University's demonstrated need.

Other Considerations

“Cambridge Cluster at 50 The Cambridge economy: retrospect and prospect” Report by SQW (March 2011)

5.3.32 The Cambridge economy: retrospect and prospect’ was commissioned by EEDA and local partners to better understand the state of the economy in and around Cambridge, and the challenges and issues it faces, in order to inform future interventions and policy. The main focus of the report is the high tech cluster, which includes high tech firms, Cambridge University and related research institutions, and specialist services which are located in Cambridge principally to support these core activities. The study also took a broader view of the Cambridge economy, examining five distinct roles that were chosen because of their economic significance;

- Cambridge as a high tech business hub
- Cambridge as a ‘research community’ (focusing on science and technology research)
- Cambridge as a city economy
- Cambridge as a regional centre for public sector

5.3.33 Regard has been had to the SQW Report in terms of the data used to inform that report and checking consistency against the last census data.

Baseline Conditions

5.3.34 To determine the effects of the development, the baseline analysis has reviewed the socio-economic conditions of the Application Site and surrounding area, based on a wide range of comprehensive data sources. The baseline is summarised below. Additional data are set out in **Appendix 5.1**.

Total Population

5.3.35 At the time of the 2001 Census a collective total of 238,971 people lived in the local authorities of Cambridge City and South Cambridgeshire, representing 43.2% of the county population. Of this, 11,000 people lived in the Girton and Castle wards.

Age Profile

5.3.36 Of the 45,958 people living within the IIA, 74.7% are of working age (aged 16-64), compared to 65.8% at the county level, 63.4% regionally and 64% nationally. The proportion of this age group living within the OIA is 68.3%. This higher proportion of the working age population within Cambridge is mainly due to the large student population in the IIA.

5.3.37 The table below highlights the age structure across four age cohorts.

Table 5.8: Percentage age profile breakdown across the geographies

Age Cohort	IIA	OIA	County	Region	England
Under 5	4%	5.40%	5.80%	6.00%	6.00%
Aged 5-15	8.80%	12.30%	13.60%	14.10%	14.20%
Aged 16-64	74.70%	68.30%	65.80%	63.40%	64.00%
Aged 65+	12.50%	14.00%	14.80%	16.50%	15.90%
Total	100%	100%	100%	100%	100%

Source: ONS Census (2001)

5.3.38 The balance of working age population is consistent with the SQW report, *The Cambridge Cluster at 50*.

Economic Activity

5.3.39 **Tables 5.9 and 5.10** below highlight important features of the economic make-up of the area's population. These tables are complementary to one another and should be reviewed together.

5.3.40 Of the 75% IIA working age population aged 16-74, just under half are economically active, with only 30.2% in full time employment, which is significantly lower when compared across the geographies, and almost 13% lower than that of the OIA and over 10% lower than the national average. This is influenced by the number of full-time students in the IIA.

5.3.41 As expected in the Cambridge area, the proportion of full time students across the IIA is 38.9%, which is approximately three times higher than in the OIA and more than seven times higher than the average for England..

5.3.42 An indicator of the area's relative well-being are the IIA benefits from the lowest proportions of home caring and sick or disabled rates. Collectively this amounts to 5.5% in comparison to the national figure of 11.8% (See **Table 5.10**). Unemployment within the IIA and OIA are also the lowest with 1.8% and 1.9% respectively. This can be seen in **Table 5.9**.

Table 5.9: Economic Activity across comparison geographies

England Economic Activity (April 2001)	IIA	OIA	County	Region	England
Employees Part-time	7.7%	11.3%	12.0%	12.5%	11.8%
Employees Full-time	30.2%	42.8%	44.6%	42.6%	40.8%
Self-employed	6.0%	8.8%	9.0%	9.2%	8.3%
Unemployed	1.8%	1.9%	2.1%	2.6%	3.3%
Full-time student	3.7%	3.1%	2.5%	2.3%	2.6%
Total	49.4%	67.9%	70.1%	69.3%	66.9%

Source: ONS Census (2001)

Table 5.10: Economic Inactivity across comparison geographies

England Economic Inactivity (April 2001)	IIA	OIA	County	Region	England
Retired	8.0%	10.5%	12.1%	14.0%	13.5%
Student	35.2%	12.1%	6.7%	3.6%	4.7%
Looking after home / family	3.6%	4.9%	5.7%	6.7%	6.5%
Permanently sick / disabled	1.9%	2.5%	3.1%	3.9%	5.3%
Other	1.9%	2.0%	2.2%	2.5%	3.1%
Total	50.6%	32.0%	29.9%	30.7%	33.1%

Source: ONS Census (2001)

Employment

5.3.43 **Table 5.11** provides a summary of the recorded employment industries of the residents of each area. A high proportion of Cambridge's economically active are educated with semi-professional or professional occupations, often referred to as 'white-collar workers'. This is reflected in the statistics in that 23.6% and 22.1% of the populations within the IIA and OIA respectively work within the finance and real estate industry – a figure higher than the county, regional and national levels.

5.3.44 One third of the working population within the IIA are employed in the education, health and social sectors, of which 24.6% of the population work in education. The dominance of the University within the City

of Cambridge economy is clear, with over 3,000³ student entries per year, almost 12,000 current undergraduates and 5,600⁴ post graduates. It is estimated that over 8,700⁵ staff work at the University.

Table 5.11: Industry of Employment

Industry of Employment	IIA	OIA	County	Region	England
Primary Industry	1.0%	1.8%	2.7%	2.1%	1.7%
Manufacturing, Utilities + Construction	13.1%	18.5%	22.7%	22.7%	22.3%
Wholesale + Retail	10.0%	12.7%	15.1%	17.3%	16.9%
Hotels + Restaurants	4.5%	4.0%	3.6%	4.2%	4.7%
Transport, Storage + Communication	4.4%	5.5%	6.1%	7.4%	7.1%
Finance + Real Estate	23.6%	22.1%	18.5%	19.1%	18.0%
Public Admin, Defence, Social Security	3.8%	4.3%	5.9%	5.2%	5.7%
Health, Education + Social	33.6%	26.3%	20.5%	17.0%	18.4%
Other	6.0%	4.8%	4.8%	5.0%	5.2%
Total	100%	100%	100%	100%	100%

Source: ONS Census (2001)

5.3.45 In summary there are characteristics of the IIA population which could have a bearing on how facilities on the Application Site may be accessed and also the general nature of the population that will surround the Application Site, these are as follows:

- High levels of economic activity in professional sectors with a dominance weighted on education, health and training sectors; this is consistent with the SQW report on the Cambridge economy *Cambridge Cluster at 50*, which indicates a focus on education and health sectors.
- High levels of students and a highly qualified population;
- More than proportionate levels of stable family households, with low levels of worklessness;
- Low levels of elderly residents; and
- Lower than proportionate increases in job seekers as a result of recent economic adjustments

Social Infrastructure

5.3.46 Plans illustrating distribution of these facilities are included in Appendix 5.1.

Education

Primary schools

5.3.47 There are 10 primary schools within the IIA, of which only two have catchment areas that cover the Application Site itself. These are the Girton Glebe and Mayfield Primary schools.

5.3.48 The combined number on roll of pupils within these schools are 570, but with a combined capacity of 630 there remains an existing pupil placement surplus of 60, just under one-third of a single primary school form of entry.

³ Target student entry numbers for 2010-11

Source: http://www.admin.cam.ac.uk/offices/admissions/handbook/section6/6_1.html

⁴ University of Cambridge student roll numbers 2008-2009

Source: <http://www.admin.cam.ac.uk/reporter/2009-10/special/04/studentnumbers0809.pdf>

⁵ University of Cambridge staff numbers

Source: http://www.freebase.com/view/en/university_of_cambridge

Secondary Schools

5.3.49 There are two secondary schools whose catchment areas cover the Application Site. These are the Chesterton Community and the Impington Village Colleges, with the latter having additional capacity for further education (aged 16+).

5.3.50 Within these establishments, there are currently just over 2,300 pupils on roll with a combined capacity of 2,552, resulting in a surplus of 227 pupil places – the equivalent of 1.5 secondary school forms of entry.

Health

GPs

5.3.51 Within the IIA, there are seven National Health Service (NHS) doctors surgeries with a total of 45 GPs. With 80,940 people registered collectively across these surgeries this assumes on average that there is 1 GP per 1,799 people.

Community Facilities

Community Centres

5.3.52 Currently, within Cambridge City district there are seven community centres of which three; the Buchan Street Neighbourhood Centre, Akeman Street Community Room and Meadows Community Centre; are located within the IIA. These are all located to the north of the City district and in the eastern periphery of the IIA.

5.3.53 Within the South Cambridgeshire district, the Madingley Village Hall and Orchard Park Community Centre are sited within the IIA, located west and east of the Application Site respectively. Additionally, the Dry Drayton Hall and St Andrews Church Hall are located in the north-western and north-eastern IIA peripheries. Other community facilities that lie within South Cambridgeshire's IIA are the Coton and Girton Women's Institutes and the Histon Scout Hut.

Libraries

5.3.54 There are currently three libraries within the IIA, consisting of 4,360 m² of library space, accounting for 64.2% of Cambridgeshire's total library space, including Cambridge Central Library. No Library Access Points however are located within the IIA, and are situated in sparser, peripheral locations.

5.3.55 Library Access Points are libraries staffed by volunteers and offer access to most of the services of Cambridgeshire Libraries, although they often have more limited facilities. Library Access Points are a permanent presence in the community, with internet access and study space and are seen as important community facilities.

5.3.56 With regards to the IIA library space provision there is a standard generated of 95 m² of library space per 1,000 people – however, it is important to note that this is significantly skewed by the provision of the Cambridge Central Library, which in itself consists of 3,796 m² that is located within the IIA and clearly provides a service for a much wider geography than its immediate hinterland.

Open Space

5.3.57 There is a total of 586 Ha of protected open space within Cambridge City, of which parks and gardens comprise 214 Ha. Of this, just under half of the district's parks and gardens are situated within the IIA.

5.3.58 Another significant proportion of open space within the Cambridge City District is comprised of outdoor sports space, such as sports playing fields, of which there is 202 Ha. Of this, exactly half of the district total lies within the IIA.

5.3.59 Within South Cambridgeshire District there is a total of 425.5 Ha of open space, with again, outdoor sport space making up a significant proportion of the total open space provision. Outdoor play space belonging to schools and other education institutions comprises just over a quarter of the district's total open space.

5.3.60 There is considerably less open space within the IIA, accounting for under 10% of the South Cambridgeshire district's total. Of this 14.4% of the total outdoor play space and just fewer than 11% of the total outdoor sports space comprise the largest proportions of IIA open space.

5.4 Likely Significant Effects

Introduction

5.4.1 This section considers the likely significant effects of the Proposed Development. The Proposed Development will have a range of socio economic effects, some temporary, some longer-term. The effect analysis has addressed the following issues:

- Construction employment;
- Permanent changes in employment brought about by the development;
- The provision of new homes (market and key worker) relating to population increase; and
- The effect of increased residential population on the requirement for local services and facilities.

Employment Effect

5.4.2 The majority of permanent employment space and jobs created on the Application Site will be in academic research, affiliated with Cambridge University, and commercial research uses. Employment initiatives, particularly for construction, can potentially help increase the proportion of jobs that are taken by local residents.

Construction-related Employment

5.4.3 In addition to the permanent employment associated with the completion of the research floorspace, the capital invested in the infrastructure and construction phase of the development will generate a range of further local employment opportunities.

5.4.4 **Table 5.12** illustrates the proportion of the population working in the construction industry across the five comparison geographies. This highlights, particularly in the IIA, the below average level of construction workers when compared to the OIA, county, regional and national averages. It is more than likely therefore that the construction workers required to develop North West Cambridge would not be sourced from the immediate IIA.

Table 5.12: Proportion of population working in the construction industry

Industry	IIA	OIA	County	Region	England
Construction	3.1%	5.3%	6.5%	7.6%	6.8%

Source: ONS Census 2001

5.4.5 Given the likelihood that the development would utilise construction workers from beyond the IIA, the likely effect of the construction phase on the immediate area will be minimal. Its effect outside of the area however, will be positive as it will result in significant job creation.

Table 5.13: Estimated FTE Construction Employment Calculation

	2014 Lower	2014 Upper	2026 (Cumulative)
Output per Worker (Annual)		£110,170	
Indicative Construction Costs	£81,393,000	£210,213,000	£994,334,000
Construction MYE Generated	740	1,910	8,575
Construction FTE Generated	74	191	858

5.4.6 Based on the forecast costs of construction and figures for average output per employee in the construction industry set out in **Table 5.13** above, it is estimated that the Proposed Development will create around 74-191 FTE construction jobs to 2014 and 858 FTE construction jobs to 2026.

5.4.7 While the estimated number of construction jobs has been calculated, there are complexities in assuming the proportion of these that will benefit the local and surrounding geographies. There is a history that for major construction developments such as North West Cambridge, construction contracts have been typically sourced nationwide and not always pooled from more local areas, indicating potential for leakage from the local and regional economy into the national economy.

Direct Employment

5.4.8 It is estimated that 4,350 gross new jobs will be generated from the Proposed Development (as set out in Table 5.1.3 below), with almost 85% of these jobs coming from the new academic and commercial research floorspace. The predicted new jobs created directly from the research floorspace within the Proposed Development are essential in maintaining the University of Cambridge's global profile as a forerunning research institution.

5.4.9 The types of new jobs likely to come forward from this sector are research positions, with expected contributions to the wider economy in terms of investment and also positioning of Cambridge as global research powerhouse.

5.4.10 Besides the core employment created in the research and development space, the Proposed Development will produce a significant number of jobs through the ancillary land uses including leisure and recreation uses, food store and smaller retail units, senior care facility, hotel student accommodation, Primary School, Primary Care Centre, police touchdown point and community centre.

Table 5.14: Estimated gross direct employment figures at 2014 and 2026 snapshots

Land Use	2014 Floorspace Range (sqm)	2014 Estimated Jobs	2026 Floorspace (sq.m.)	2026 Estimated Jobs
Laboratories/Offices/Workshops	0	0	100,000	3,685
Hotel	0-7,000	0-40	7,000	40
Food Store	2,900	135	2,900	135
Other A Uses	0-2,100	0-125	2,400	135
Community Facilities	0-1,850*	0-95	3,850*	105
Senior Care	0-6,500	0-30	6,500	30
Student Accommodation	0-14,700	0-35	98,000	220
Total	2,900-94,050	135-460	219,150	4,350

*Gross community facilities floor area accounts for Primary Care Centre, police office, three nurseries, a community centre and indoor sports provision (or temporary provision for community and indoor sports at 2014). It does not include primary school and co-located early years facility.

**Assumed net to gross floorspace ratio of 80%, consistent with English Partnership standards

Indirect Employment

5.4.11 In determining the local and regional economic effect of the completed development and the gross jobs to be created, it is important to identify the net employment allowing for a range of factors as follows:

Leakage:	the proportion of gross jobs that may be taken by people outside the geographical area being assessed.
Displacement:	reflecting the potential reduction in activity elsewhere in the area.
Deadweight:	the proportion of employment that may have occurred in the area without the Development Proposals.
Multiplier Effects:	the further economic activity (indirect and induced jobs) generated as a result of the additional direct income and supply chain activity.

5.4.12 National guidance provides a range of factors which can be applied to the gross job calculation for each of element. The assumptions used are based on professional experience and reflecting the socio-economic and market conditions at each geographic level and the anticipated skill demands from the different types of employment opportunities to be created.

Leakage

5.4.13 Generally, the larger the area being assessed the lower the 'leakage' should be as the size of the labour market increases. In positioning the Application Site in the local and regional market place, the occupiers (other than the University itself) attracted to the Application Site will be very focused on the skills available in the workforce and, therefore, anticipate the level of leakage will be low for most activities on the Application Site. A common designated leakage factor reflecting this is 10%.

Displacement

5.4.14 As the research space will be brought forward to match demand, employment uses set out for the Proposed Development would be in addition to, not in lieu of, employment at West Cambridge or other University locations. Alternatively there may be options for agglomerating similar University departments at West Cambridge or North West Cambridge, again indicating a negligible displacement effect. The development is therefore not expected to displace jobs from elsewhere; it is providing net new employment space to accommodate the projected University research growth.

5.4.15 There are however, currently three employment generators located on the Application Site: the University Farm, University Physiology Department and the Agronomy Department. Current employment at the University Farm is limited to part-time employment and as the development comes forward these employees are expected to be relocated to other University Farm sites, resulting in a marginal net job loss to the Application Site but no change overall.

5.4.16 Both Physiology and Agronomy staff may be consolidated into other University facilities or located in academic space developed within the Proposed Development in the future. There is no job loss expected from these moves, though there may be a marginal loss to jobs located on the Application Site. As a result, a 0% 'displacement' factor has been assigned.

Deadweight

5.4.17 The 'deadweight' effects are considered to be low across the local geographies and floorspace types. Comparable existing academic research floorspace exists in the adjacent West Cambridge development; however this development will be completed before the Proposed Development becomes live. In light of this, it is considered unlikely that the range of employment growth which is proposed within the Proposed Development would occur without the Application Site. The 'deadweight' allowance used therefore is 0%.

Multiplier Effects

5.4.18 Taking a high-level overview, an indirect composite multiplier of an additional 10% has been used at the neighbourhood level and 50% at the regional level. Both of these are assumed medium level multiplier effects with average linkages. Outlined in the English Partnerships Additionality Guide, these values are the general ranges expressed at these geographies. The scale of effects however, can vary substantially. The scale and location of the Proposed Development is expected to further stimulate economic growth and investment to the region, maintaining the high national and international profile of the University of Cambridge as a world leading academic institution. The basis for development at North West Cambridge is the University's needs case for growth of its research facilities that cannot be accommodated elsewhere.

Total Employment Effect

5.4.19 The Proposed Development will contribute to direct and indirect employment.

5.4.20 It is estimated that the completed Development could generate FTE employment for 4,310 people at the local level people (excluding construction). With regard to the wider region, there is potential for up to 5,875 jobs being created (excluding construction), delivering very beneficial economic effects as set out in Table 5.14 below.

Table 5.15: Total employment effects on local and regional areas (excluding construction)

Employment Factor (excl. Construction)	2014	2026
Total Jobs (Gross)	135-460	4,350
Minus 10% Leakage	120-415	3,915
Minus 0% Displacement	120-415	3,915
Minus 0% Deadweight	120-415	3,915
Total Direct Jobs	120-415	3,915
+10% Local Multiplier	130-455	4,310
+50% Regional Multiplier	180-620	5,875
Total Local Jobs (Net)	130-455	4,310
Total Regional Jobs (Net)	180-620	5,875

Source: AECOM

5.4.21 In 2014 it is estimated that that 130-455 net jobs will be created locally (including direct and indirect employment), while at the regional level there is potential for creation of approximately 180-620 jobs. The effect of construction employment will be more evident during the 2014 period while the scheme is under construction.

5.4.22 The increase in employment therefore creates a moderate beneficial (positive) effect at local level, and these benefits will extend into the immediate hinterland, for both 2014 and 2026.

5.4.23 Given the nature of the development, a large proportion of the employees are expected to come from the Application Site itself as they are likely to be living in the key worker housing on-site. The majority of other employees will come from the OIA as they are likely to be University commuters who live relatively nearby. This is expected to reduce transport effects and complement the overall sustainability of the Application Site. This is addressed further in the accompanying Transport Statement.

Cumulative effects

5.4.24 No employment displacement is expected as employment floorspace at West Cambridge is assumed to be fully built out before employment space in the Proposed Development is occupied, or otherwise specified for different types of research uses. No alternative employment locations are included in the remaining cumulative analysis (including NIAB 1, NIAB 2 and Northstowe), and therefore given the proximity to these developments the Proposed Development has the potential to provide local employment opportunities for residents of these developments as well. In cumulative terms the effect is, therefore, also expected to be major beneficial.

Population

5.4.25 The Proposed Development includes up to 3,000 homes by 2026, of which 50% (1,500) will be market housing, and up to 1,500 will be key worker housing. The indicative residential phasing suggests that 200-600 units will be developed within 2014, with the 3,000 completed at 2026.

Population Effects

5.4.26 Using the population, housing and child yield assumptions outlined in the previous section, the relative effects at 2014 and 2026 have been estimated.

5.4.27 The outputs from this are presented in **Table 5.16** below.

Table 5.16: Unit and population estimates at 2014 and 2026

Housing Type	2014		2026	
	Units*	Population	Units	Population
Market Housing	50-200	115-455	1,500	3,240
Key Worker Housing	150-400	305-815	1,500	3,250
Student Accommodation	0-300	0-300	2,000	2,000
Senior Care	0-75	0-100	75	100
Total		420-1,670	3,000	8,590

*indicative estimates

Effect on demand for health services

5.4.28 There are no statutory limits on the number of patients per GP, although AECOM has previously applied a standard 1,800 people per doctor which was developed with Cambridgeshire PCT in previous studies.

5.4.29 In the case of the Proposed Development, there are powerful arguments to suggest that numeric drivers would be different due to demographic and social make-up and may not require such heavy provision.

5.4.30 The North West Cambridge development includes a Primary Care Centre (PCC) of up to 700 m² provided on the Application Site, with five general practitioners. This will either be included by 2014 at the higher end of the residential range or in Phase 2. The effect of this is negligible as the health facility will provide a comprehensive service for the development that fully supports the new population's healthcare needs, with floorspace which can be used to provide support services.

Cumulative effects

5.4.31 The cumulative healthcare effect will be negligible as local healthcare provision will be located on both the Proposed Development and NIAB developments.

Effect on Education

5.4.32 The proposed development will increase demand for local schools by attracting families to live in the new market and key worker housing units.

5.4.33 AECOM researched estimated child yields anticipated from the development, as set out in paragraph 5.2.7 above. The following table presents estimated school aged children coming forward within the development in 2014 and 2026.

Table 5.17: Site-wide Child Yield

Combined Child Yield	Early years		Primary		Secondary		16 to 18	
	2014	2026	2014	2026	2014	2026	2014	2026
	0 to 3		4 to 10		11 to 15		16 to 18	
Market Housing	7-28	174	11-44	278	8-30	191	3-12	76
Key Worker Housing	17-47	225	14-38	188	3-7	46	2-6	37
Total	24-75	399	25-82	466	11-37	236	5-18	113
Form Entries			.12-.39	2.22	.07-.25	1.57		

5.4.34 The analysis undertaken suggests that 50% of the Key Worker occupants will be from the Cambridge Area. Therefore, it is likely that a proportion of the key worker children will already be enrolled in local schools and may not generate new school place requirements on the Proposed Development.

Early Years Capacity

5.4.35 The County Council has advised AECOM that childcare requirements in new communities equate to approximately 52% of all children aged 0 to 4, which suggests that the number of places generated by the Proposed Development is approximately 12-39⁶ 0-3 year olds by 2014 and 207⁶ 0-3 year olds by 2026 (in addition to any 4 year olds who may require provision).

5.4.36 For early years, the primary school has plans to provide places for 3-4 year olds. However, there are no statutory limits on class sizes at early years level relating to size and amounts of space available and staff to child ratio, which differ depending on the age of children requiring provision and so there is likely to be a marginal degree of flexibility about final capacity.

5.4.37 To aid servicing this demand, a large day nursery provides 100 places for 0-4 year olds, while a medium size day nursery provides 50 places. A pre-school for 3-4 year olds provides 24 places. This provision supplements the statutory early years provision, addressed in the next paragraph. Nursery provision will be provided by 2014 in the local centre and by 2026 (in two separate additional locations), providing further capacity for 0-4 year olds.

5.4.38 The effects of the proposed early years provision is likely to be negligible as the estimated child population aged 0-3 that require provision coming forward will be sufficiently supported by these services that currently do not exist on the Application Site. The early years facility will be provided alongside the primary school, anticipated 2014, therefore the 2014 effect is also considered to be negligible.

5.4.39 The cumulative effect of development is also considered negligible as each of the cumulative developments will be providing for local early years provision and they do not put additional strain on service provision when considered collectively. Additionally, early years provision will be provided within some of these primary schools within these two developments with NWC providing two additional nurseries and NIAB providing a children's centre.

Primary Education Capacity

5.4.40 The North West Cambridge IIA is currently served by the primary schools of Girton Glebe and Mayfield. Listed in **Table 5.18** are the numbers on the roll and the published admissions numbers of each of the primary schools. The projected yearly intake for the Girton Glebe and Mayfield schools range from between 30 and 60 pupils per annum.

⁶ Reflects 52% of the 0-3 year age bracket in Table 5.16.

Table 5.18: Current primary schools serving the Application Site

Name of School	Location	Age Range	PAN	Catchment Area	Number on Roll	School Capacity	Surplus Capacity
Girton Glebe Primary School	Cambridge Road, Girton, Cambridge, CB3 0PN	5 to 11	30	Girton	200	210	10
Mayfield Primary School	Warwick Road, Cambridge, CB4 3HN	5 to 11	60	See Appendix B	378	420	42

Sources: DfE Edubase [January 2011 School Census Data] & Cambridgeshire Primary School Admissions 2012/13

5.4.41 The Application Site does fall within the catchment areas of the schools outlined in **Table 5.18**. By 2014 it is expected that 25-82 primary school places will be required. It is expected that the first form entry of primary school provision would be made on site by 2014.

5.4.42 By 2026 the Proposed Development will generate a primary education demand of 466 places, which equates to approximately 2.22 forms of entry. There is currently no school provided on the Application Site, although it does fall within the catchment areas of the schools outlined in **Table 5.18**. However, a new primary school is included within the development proposals, establishing sufficient provision for all children aged 4 to 10 residing in the Proposed Development. As a result, no additional pressure will be placed on existing primary schools.

5.4.43 The effect of the proposed primary school is considered negligible at 2014 and 2026. For 2014 the first form entry of the primary school will be provided, and at 2026 the on site primary school will fully provide for the primary school aged pupils from North West Cambridge.

5.4.44 Cumulatively the primary school provision across NWC, NIAB 1 and NIAB 2 is also considered negligible, as the primary provision is being met locally on each of the individual developments.

Secondary Education Capacity

5.4.45 Secondary school pupils generally travel further to school than primary school pupils, due to larger catchment areas. Particularly for secondary school aged children, it is likely that a proportion of the key worker children will already be enrolled in local schools and may not generate new secondary school place requirements for the Proposed Development, though the figures below do not allow for any reduction in provision

5.4.46 By 2014 the Proposed Development is expected to generate 11-37 secondary school aged children (forms seven to eleven inclusive), the equivalent of 0.07-0.25 FE with 236 (1.57 FE) children aged 10-15 at 2026.

5.4.47 The area is currently served by the catchments of the Chesterton Community College and the Impington Village College, where there is currently a collective surplus capacity of 206 places. **Table 5.19** provides additional information on current secondary school provision for the Application Site. It is anticipated, therefore, that early secondary school provision, in advance of completion of the secondary school at NIAB 2, will be met through this existing capacity.

5.4.48 A 7 form entry secondary school is currently planned for NIAB 2, which will meet secondary school demand from the Proposed Development, NIAB, NIAB 2 and additional smaller developments within the area. As a consequence secondary school provision is not planned for the Proposed Development as the longer term secondary school demand will be met at NIAB 2.

Table 5.19: Current secondary schools serving the Application Site

Name of School	Location	Age Range	PAN	Catchment Area	Number on Roll	School Capacity	Surplus Capacity
Chesterton Community College Academy	Gilbert Road, Cambridge CB4 3NY	11 to 16	180	Arbury, Milton Road, Mayfield & St. Luke's primary schools	949	1,060	111
Impington Village College	New Road, Impington, Cambridge, CB24 9LX	11 to 18	210	Dry Drayton, Girton, Histon & Impington, Milton & Oakington primary schools	1,407 [inc. 6 th form]	1,502	95

Sources: DfE Edubase [January 2010-11 School Census Data] & Cambridgeshire Secondary School Admissions 2012/13

5.4.49 By 2014 it is expected that 11-37 secondary school places will be required. There is no secondary school provision planned within the Proposed Development, however, the secondary education requirement for the Proposed Development is intended to be provided via the spare capacity at the existing schools in advance of the secondary school provision at NIAB 2. The effect on secondary school provision is therefore negligible.

At 2026 the effect of the Proposed Development on secondary school provision is negligible. Though there is no secondary school provision planned within the development proposals, the secondary education requirement for the Proposed Development is intended to be provided at the secondary school at NIAB 2.

Cumulative effect

5.4.50 The cumulative effect of the population growth in relation to secondary school provision is considered minor beneficial (positive) as it will fully provide for the secondary school aged pupils expected to come forward from the Proposed Development, NIAB1 and NIAB2. The new school located at NIAB2 will also create additional secondary school capacity for the immediate hinterland of the developments due to its greater catchment area and geographical coverage.

Sixth Form Capacity

5.4.51 The development is estimated to generate 5-18 places for further education at 2014, and 113 places at 2026. Following discussions with the education authorities, the University has been advised that there is capacity in existing sixth form provision in the area and therefore no additional provision is required. The effect is therefore negligible at both 2014 and 2026.

Cumulative effect

5.4.52 The cumulative effect is likely to be negligible as education authorities have advised that there is excess capacity in existing sixth form provision to meet the needs of the Proposed Development, NIAB and NIAB 2.

Effect on Community Facilities

5.4.53 To sustain cohesive and active communities, it is desirable that the development provides sufficient space for community uses to support the new incoming population.

5.4.54 The below presents the demand created for community spaces at 2014 and 2026.

Table 5.20: Demand for community spaces

Community Facilities	Standard	Community Space Demand*	
		2014	2026
Community Space	70 m ² per 1,000 pop (AECOM Study)	29-96	461
Library Space	30 m ² per 1,000 pop (MLA standard)	13-41	198

*Figures are cumulative

5.4.55 The population coming forward from the Proposed Development will generate the need for 29-96m² and 13-41m² of community and library space respectively by 2014. This demand will increase to 461m² and 198 m² at 2026.

5.4.56 It is considered that there will be no demand generated for community space from the student population, as it is assumed that the University and colleges will have access provided for the use of the libraries and social/common facilities. It is also expected that the key worker population will have access to University library facilities, further reducing the level of demand for local library services.

5.4.57 The Development Proposals include a 500m² multi-use community centre, and a library will be provided on the NIAB development, providing access for the populations of both developments.

5.4.58 An interim community facility is likely to be provided by 2014 at the upper end of the residential range, using a temporary local centre retail unit. As the provision would, if the population warranted it, be met by 2014, the likely effect is negligible. At 2026, the effect of the Proposed Development on both community centre and library provision is negligible.

Cumulative effect

5.4.59 In cumulative terms, the effect on both library and community facility provision is expected to be negligible. Community provision is being met through facilities at both the Proposed Development and NIAB 1, and library provision is being made at NIAB 1 to meet the needs of the populations of the Proposed Development, NIAB 1 and NIAB 2.

Effect on Police/Emergency Services

5.4.60 The Proposed Development will generate demand for police provision at 2014 and 2026. The Proposed Development will be providing 200 m² of police space in the form of a touchdown point, which is intended to provide for need generated by the Proposed Development and NIAB developments, as agreed with the Cambridge Constabulary. A temporary facility will be provided in the local centre in the early stages of development, with a final facility provided at 2,000 dwellings. This results in a minor beneficial effect at 2014 and 2026 as no additional pressure is placed on existing provision and the on-site provision will meet a wider need.

Cumulative effect

5.4.61 Cumulatively there is additional demand on police services due to the populations generated on nearby sites. However, the size of the police facility at the Proposed Development has been developed specifically to meet this need, and the cumulative effect is expected to be negligible as this facility will provide emergency service provision to support the populations coming forward from the Proposed Development and both NIAB developments.

Effect on Open Land

Table 5.21: Demand generated for Open Land

Open Land	Standard	Land Uses Included	Open Land Demand*	
			2014	2026
Outdoor Sports	1.2 hectares per 1,000 people	Market and Key Worker Housing	0.50-1.52 ha	7.8 ha
Indoor Sports	1 sports hall for 13,000 people	Market and Key Worker Housing	0.03-0.098 sports hall	0.5 sports hall
	1 swimming pool for 50,000 people		0.01-0.03 swimming pool	0.1 swimming pool
Children & Teenagers	0.3 hectares per 1,000 people	Market and Key Worker Housing	0.13-0.38ha	1.95ha
Informal Open Space	1.8 hectares per 1,000 people	Market and Key Worker Housing, Student Accommodation	0.76-3.01ha	15.45ha
Allotments	0.4 hectares per 1,000 people	Market and Key Worker Housing	0.17-0.51ha	2.59ha

*Figures are cumulative

5.4.62 The above standards have been applied in accordance with the Cambridge City Open Space Strategy.

5.4.63 Provision for outdoor sports, children & teenagers, informal open space and allotments is included within the planning application for provision on-site. With regards to swimming pool provision, as the demand justified by the anticipated population does not warrant provision of an entire facility, it is anticipated that contributions will be made by the University for off-site provision of a City-wide facility, assuming that such a facility is planned. It is expected that indoor sports provision will be provided at the new West Cambridge Sports Centre, to the south of Madingley Road. The planned opening date for the West Cambridge Sports Centre is in time for the 2013 academic year, and therefore the facility will be open and operating in advance of the first completions on the Proposed Development. If the appropriate level and nature of provision cannot be secured at West Cambridge, there is an allowance within the Proposed Development for provision on-site.

5.4.64 The Proposed Development will be phased to enable appropriate quantities of open space provision at completion of each stage. Therefore, the significance of effect of the Proposed Development by 2014 is likely to be negligible, and at 2026 is assessed as moderate beneficial, due to an excess of informal open space provision across the Application Site as well as the wider benefit of opening up considerable amounts of open space for public use that are not currently accessible to the wider public.

Cumulative effect

5.4.65 In cumulative terms, there is a moderate beneficial effect on open space provision as the requirements are being met locally, on-site, across the individual developments.

Effects on Retail Provision

5.4.66 The effects of the development on retail provision are set out in detail in the accompanying Retail Impact Assessment. The proposals for a 2,000 sqm net foodstore combined with other proposed Class A uses are of an appropriate scale for the new local centre and to contribute towards meeting both existing and future shopping needs of local residents of the Proposed Development, to provide facilities and services for nearby communities and to provide the right level of facilities in a sustainable manner to residents within the Proposed Development. They will help form the local centre envisaged by the AAP as well as provide new residents with sustainable access to key local facilities.

5.4.67 The Applicant's proposals will be developed in accordance with the Development Plan and in all material respects within the Centre. They will have a negligible effect on town centre vitality and viability and in-centre trade/turnover; and will have no effect on existing, committed or proposed development

5.5 Measures to avoid or manage adverse effects and to deliver beneficial effects

5.5.1 Most socio-economic effects identified are either positive or negligible, and therefore generally do not require additional mitigation above the measures built into the Proposed Development to accommodate the social infrastructure needs to the Proposed Development, as follows:

- On-site primary school provision
- Nursery school provision, including early years at the primary school and two additional nursery locations
- 500m² community centre
- 700m² primary care centre
- 200m² police touchdown space
- Formal outdoor open space provision
- Informal open space provision
- 450m² indoor sports provision (if provision cannot be secured at West Cambridge)
- Areas for children and teenager recreation
- Allotments.

5.5.2 Additionally, the Applicant would make financial contributions, under a Section 106 legal agreement, toward provision of library facilities at the NIAB development and, if a City wide facility comes forward, towards a swimming pool.

5.6 Summary

5.6.1 This chapter of the ES assesses the likely significant socio-economic effects that may arise as a result of the Proposed Development. The effects of the changes have been assessed for employment and population impacts.

5.6.2 The assessment of the Proposed Development assumes that a range of social and community facilities are provided within the Proposed Development, as set out in the Description of Development.

5.6.3 The Proposed Development will make significant contributions to the local, regional and national economies through creation of approximately 5,875 permanent jobs, principally through the academic and commercial research floorspace. These jobs will largely serve residents of the site and the surrounding area, enabling positive effects on sustainable travel and local employment.

5.6.4 The social and community demands of the anticipated 8,590 person residential population will be met through a range of facilities, including a primary school, early years provision (in three locations), a community centre, primary care facility, police facility, and the full range of formal and informal recreation provision. Secondary school, indoor sports and library provision will be met off-site, and a contribution will be made to swimming pool provision.

5.6.5 The effects of the Proposed Development range from negligible to Major Beneficial, as set out in Table 5.22 below, and there are no adverse effects of the Proposed Development on socio-economic factors are identified.

5.6.6 The effects of the Proposed Development will provide a significant, positive effect on the local and surrounding area through its considerable economic contributions as well as site-specific and wider community resources.

Table 5.22: Summary of Effects

	2014	2026	Cumulative
Employment Effects	Moderate beneficial	Moderate beneficial	Major beneficial
Health Services	Negligible	Negligible	Negligible
Education: Early Years	Negligible	Negligible	Negligible
Education: Primary	Negligible	Negligible	Negligible
Education: Secondary	Negligible	Negligible	Minor Beneficial
Education: Sixth Form	Negligible	Negligible	Negligible
Community Space	Negligible	Negligible	Negligible
Library	Negligible	Negligible	Negligible
Police	Minor beneficial	Minor beneficial	Negligible
Open Land	Negligible	Moderate beneficial	Moderate beneficial

1 Introduction and Assessment Approach

2 Application Site Description and Proposed Development

3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

10 Cultural Heritage

11 Agricultural Circumstances

12 Traffic and Transport

13 Noise Environment

14 Air Quality

15 Hydrology, Drainage and Flood Risk

16 Utilities and Services

17 Sustainability Considerations

18 Cumulative and Interactive Effects

19 Summary

6 LANDSCAPE AND VISUAL ASSESSMENT (INCLUDING THE ASSESSMENT OF ARTIFICIAL LIGHTING)

6.1 Introduction

This chapter of the ES presents an assessment of the likely significant effects of the Proposed Development on landscape character and visual amenity and the likely significant effects of night time artificial lighting.

- **Effects on Landscape Character** associated with a development relate to changes to the fabric, character and quality of the landscape resource and how it is experienced. There are changes to the landscape from the physical form of the proposed development, and its construction, including built phases and the final finished form.
- **Effects on Visual Amenity** concern changes in views and people's response to changes in visual amenity.
- **Effects of Artificial Lighting** concern to the effects on residential properties adjacent to the site, wildlife / habitat on and around the site and two local observatories.

6.1.1 Landscape and visual effects are interrelated but assessed separately. Both landscape and visual effects can be positive (beneficial) or negative (adverse). A development may have no significant visual effects but result in an adverse effect on the landscape character; conversely, a development may have significant visual effects, but insignificant landscape effect.

6.1.2 The Application Site boundary is illustrated in **Figures 6.1** and the development footprint in **Figure 6.2**. The LVA process requires that a baseline study of the Application Site and a wider Study Area is undertaken in order to identify the surrounding landscape character and principal visual receptors. This involved desktop research and site work to record both the landscape character of the site and its surroundings, and the visual character of the area including the extent of visibility of the site. This resulted in the Study Area being drawn at a 2.5 km radius as the receptors that would be likely to experience potentially significant effects arising from the development are contained within this radius.

6.1.3 The effects of artificial lighting are addressed in the same way, by identifying a baseline lighting condition, identifying and assessing the sensitivity of receptors, identifying required lighting provisions for the Proposed Development and assessing and benchmarking the baseline to cumulative lighting condition variance, of the Construction phase and at 2014 and 2026.

6.1.4 Artificial Lighting is addressed in detail in section 6.10, 6.11 and 6.12. These sections address relevant lighting legislation, national good practice planning guidance, identify a baseline lighting condition, assess the sensitivity of receptors, and identify required lighting provisions for the Proposed Development and then assess the potential lighting effects, including the magnitude of change and assumptions and limitations.

6.1.5 The effects of artificial lighting section also focuses on potential night-time exterior lighting effects, including light spill and management, sky glow, Luminaire conspicuity and glare and management, Light levels and illuminances and management Light colour and spectral composition and management. This is followed by significance criteria and interpreting the assessment, baseline conditions and proposed lighting typologies design characteristics and the mitigation that may be required through lighting performance characteristics.

6.1.6 Lastly, the effects of artificial lighting section covers the overall effects of the Proposed Development and a summary and conclusions section.

6.2 Landscape Principles

6.2.1 Consideration of the range of likely landscape and visual effects was taken into account throughout the design development of the Proposed Development. Therefore, mitigation has been addressed to as

great an extent as possible and integrated into the proposals in order to avoid or minimise potential adverse effects. This assessment assumes that these landscape principles have been incorporated to the Proposed Development and describes how these measures provide mitigation. The landscape principles are outlined below and illustrated on **Figure 6.12**, for further detail refer to the Design, Access and Landscape Statement and Chapters 2 and 3.

6.2.2 The intention of the landscape principles is to create a scheme that is functional and that builds on the existing richness and diversity of Cambridge. The landscape principles help mitigate the effect of the Proposed Development by creating a setting that is in keeping with the character of Cambridge and its surrounding undulating topography and farmed landscape.

6.2.3 The Applicant's intent is to retain the University farm or agricultural character for as long as practicable into the development programme, allowing for a progressive change as the new character emerges.

6.2.4 The landscape strategy for the Proposed Development proposes four typical local character areas. These are based on **Figure 2.7** Open Land and Landscape Areas, and defined for the purpose of this assessment as follows:

- Western Edge
- Parkland (the area of the Western Edge adjacent to the built form)
- Landscape fingers
- Girton Gap, Central Open Space and Ridge & Furrow

6.2.5 **Figure 2.14:** Topography sets out the nature of topographical change proposed for the Western Edge.

Western Edge

6.2.6 The Western Edge comprises the western boundary of the Application Site directly adjacent to the motorway. Landforms that seek to balance the cut and fill from across the site will modify the existing topography and in some locations the topography will tilt upwards from the M11 towards the Parkland and the built edge. The intention is to restore the use of the Western Edge to uses compatible with the landscape character, including drainage, formal and informal recreation and allotments, thus contributing to the existing open arable character of other adjacent areas along the motorway.

Parkland

6.2.7 The Parkland is a valley that runs north to south as a narrow band adjacent to the Western Edge. At a lower level to the Western Edge, the Parkland is sheltered and has the function of collecting and distributing the water run-off from the landscape fingers and other immediately adjacent areas. The character of this area is comparable to the 'Fens' in Cambridge, with its extensive grasslands and isolated willows and poplars sitting next to the waterways. A stretch of land towards the eastern boundary of the Parkland will be dedicated to allotment gardens.

Landscape fingers

6.2.8 The landscape fingers run from Huntingdon Road towards the M11, perpendicular to the Parkland, and through the Proposed Development. These 'fingers' connect the development to the Parkland through a series of footpaths and public spaces. Their character is diverse and is directly associated with the building typologies, ranging from neighbourhood pocket parks, to local play areas, and will also include drainage functions.

Girton Gap, Central Open Space and Ridge & Furrow

6.2.9 The Girton Gap, Central Open Space and Ridge & Furrow area comprises a series of existing features including the SSSI, and the distinctive open area to the south of the site. Proposals for this area include the sports fields adjacent to Huntingdon Road and immediately east of the local centre, the SSSI, which will become publicly accessible open space, and the ridge and furrow fields.

6.2.10 In all of the areas of Primary Open Land, as set out in Parameter Plan 02, buildings and structures consistent with the use of the land as open space, including plant and equipment storage, bridges, pavilions, cafes, changing rooms, public toilets and information centres and buildings for housing utility undertakers' apparatus are permitted..

6.2.11 Possible adverse effects upon landscape features, landscape character and views have been addressed and incorporated to the Proposed Development through the following measures (with the loss of agricultural land the only effect upon the landscape resource that cannot be partially or fully mitigated against):

- A central 'green focus' and green corridor which links surrounding development areas and provides sufficient space to act as a wildlife corridor;
- A green corridor running alongside the M11 to provide an appropriate landscape setting to the North Western edge of Cambridge and provide the opportunity for extensive habitat restoration and enhancement;
- A destination and an area for the whole community to enjoy with a range of facilities, high-quality green spaces and good pedestrian and cycle links;
- Retention of existing planting (where practicable) and extensive planting of new woodland, trees and hedgerows;
- Ensuring that the new landform and development platforms are not overly engineered in appearance and tie in smoothly with the adjacent land;
- Retaining/ replacing existing footpaths and providing new connections;
- Relating the heights and densities of the proposals to both the existing housing that currently forms the urban edge to Cambridge and the surrounding landscape;
- Creating a new, well-screened and integrated urban/ rural edge to Cambridge;
- Forming a new network of open spaces that contributes to the new landscape and visual resource and provides recreational opportunities;
- Phasing the implementation of the landscape framework in advance of, or concurrently with, the development as far as practicable; and
- Careful consideration of building layout and orientation to minimise landscape and visual effects.

6.3 Assessment Methodology

Methodology

6.3.1 The landscape and visual assessment has been undertaken in general accordance with the following documents:

- Guidelines for Landscape and Visual Effect Assessment (GLVIA), Second Edition, Landscape Institute and Institute of Environmental Management and Assessment (2002); and
- Landscape Character Assessment, Guidance for Scotland and England, Countryside Agency in conjunction with Scottish Natural Heritage (2002).

6.3.2 The GLVIA acknowledge a relationship between the perception of landscape character and the experience of viewers (referred to as receptors) which include residents, visitors, people in their workplace, users of recreational facilities, people travelling through an area and other groups of viewers.

6.3.3 GLVIA relies on an appreciation of the existing landscape and its visual form, analysis of its scenic quality and an assessment of its sensitivity to change, a thorough understanding of the development proposals, the magnitude of change that would result from the construction and operation of the proposals and the potential to mitigate landscape and visual effect.

6.3.4 There are four stages to the assessment:

- Recording and analysis of the character, quality, value and sensitivity to change of the existing landscape and visual receptors;
- An appreciation of the nature, form and features of the Proposed Development;
- An assessment of the magnitude of change likely to result from the Proposed Development; and
- Evaluation of the significance of the changes identified based on magnitude of change and sensitivity.

Specific Assessment Tasks

6.3.5 The following specific tasks have been undertaken:

- A review of existing and proposed land use data and policies from the Cambridgeshire and Peterborough Structure Plan (2003), The East of England Plan – the revision to the Regional Spatial Strategy for the East of England (2008) and the Cambridge Local Plan (Adopted 2006);
- Review of existing and proposed land use data and policies from the South Cambridgeshire Local Development Framework, including the LDF Core Strategy DPD (Adopted January 2007), the Development Control Policies DPD (Adopted July 2007) and the North West Cambridge Area Action Plan (Adopted October 2009);
- Review of Natural England's Character Map of England;
- Review of the Cambridgeshire Landscape Guidelines (Cambridge City Council, 1991);
- Review of Landscape and Townscape Character Areas and Landscape Character Types within the Cambridge Green Belt Study (Landscape Design Associates, 2002);
- Consultation with statutory and non-statutory consultees including South Cambridgeshire District Council, Cambridge City Council, Joint Development Control Committee and Natural England during the EIA scoping process to seek their opinion on the approach and scope of the landscape and visual assessment and the location of the viewpoints;
- Review of 1:10,000 scale base-mapping and aerial photography;
- Identification of the Zone of Theoretical Visibility (ZTV) for the development (the extent to which the proposed development could potentially affect people's views of the landscape within the wider area surrounding the development). ZTVs for all 12 viewpoints, the scheme building blocks and the flues were run both in 2014 and upon completion (2026);
- Field assessment and analysis of affected receptors. Viewpoints representative of receptors and groups of receptors were visited and surveyed using a standardised checklist to enable visual evaluation of sensitivity and magnitude of change leading to assessment of potential effect;
- Analysis of any change in receptors' views and landscape character and any resultant effect on quality and value related to specific landscape elements and the potential composite change in identity engendered by the Proposed Development;
- Production of photomontages from 8 of the selected viewpoints to represent the change in view during winter year of completion; and
- Site appraisal of the local landscape character, both across the site and the surrounding area identifying notable landscape, ecological and cultural components, determining them and their sensitivity to change. Site recording involved annotation of Ordnance Survey plans supported by a photographic record of the area.

6.3.6 The Application Site and surrounding area have been visited to gain a clear understanding of the likely effects of the Proposed Development. Assessment of landscape and visual effect is based on field studies which were undertaken during periods of clear visibility on the 5 August 2010.

Landscape Resources

Landscape Sensitivity to Change

6.3.7 The sensitivity of a landscape to change varies according to the nature of the existing resource and the nature of the proposed change. The assessment of the landscape sensitivity to change remains specifically related to the Proposed Development. The extent to which the landscape components and landscape character areas would accommodate and tolerate the type of change which would be caused

by the Proposed Development during construction and/or during operation of the Proposed Development is assessed by consideration of the following factors:

- The change proposed;
- The ability of the landscape components which are physically affected to accommodate the change proposed; and
- The ability of the wider landscape and its components to accommodate the change proposed.

6.3.8 GLVIA recommends evaluating quality, value and contribution to landscape character of the key elements or characteristics of the landscape as part of the sensitivity assessment. The assessment of landscape quality or condition should be based on judgements about the 'physical state of the landscape, and about its intactness, from visual, functional and ecological perspectives' (Landscape Character Assessment, Guidance for Scotland and England).

6.3.9 In this assessment professional judgement has been used to determine the extent to which quality or condition influences sensitivity to the development. In this assessment value is determined by the presence or absence of designated landscapes, the effects upon which are assessed separately.

6.3.10 It should be noted, however, that although this assessment may be influenced by landscape value it is not necessarily the case that a highly valued landscape is also a highly sensitive one.

6.3.11 The landscape sensitivity has been evaluated on a relative basis within the Study Area and is described by a 3-point scale, using the following criteria:

Sensitivity	Criteria
High	A landscape of particularly distinctive character susceptible to relatively small changes of the type proposed
Medium	A landscape of moderately valued characteristics reasonably tolerant of change of the type proposed;
Low	A relatively unimportant landscape which is potentially tolerant of substantial change of the type proposed.

Assessment of Magnitude of Change on Landscape Resource

6.3.12 Magnitude is a measure of the degree of change within the landscape, the nature of the effect and the duration. The magnitude of change caused by the development proposals has been assessed using a 4-point scale using the criteria below.

Magnitude of Criteria	Criteria
High	Extensive, noticeable change, affecting many notable characteristics and the experience of the landscape. Introduction of many incongruous elements.
Medium	Noticeable change to a significant proportion of the landscape, affecting some notable characteristics and the experience of the landscape. Introduction of some uncharacteristic elements.
Low	Small change in landscape components, affecting some characteristics and the experience of the landscape to an extent. Introduction of elements that are not uncharacteristic.
Negligible	Little perceptible change.

Landscape Significance of Effect Criteria

6.3.13 The main criteria used to evaluate the effect on landscape character comprise:

- The extent to which existing landscape components and features would be lost or modified by the proposals;

- The existence of similar forms and features to the proposals within the landscape and its current role as a determinant of existing character; and
- The extent to which new or additional development of the type proposed would alter the balance and hence perception of the landscape character of the area development.

6.3.14 Effects on landscape can be detrimental where features or notable characteristics such as established planting, old buildings or structures have to be removed. Alternatively a development can prove beneficial where derelict buildings or poorly maintained landscape features are repaired, replaced and maintained or there is the introduction of new tree planting and a landscape structure where none currently exists.

6.3.15 The assessment takes into account the landscape strategy proposals, including planting and landform, and describes their role in avoiding or managing potentially detrimental effects of the Proposed Development or improving the landscape quality of the area.

6.3.16 The findings are represented using a descriptive scale ranging from major - moderate - minor adverse through negligible to ascending scale of minor - moderate - major beneficial. The degree of significance of potential effects, both negative and positive, is determined from a combined evaluation of the landscape sensitivity and the magnitude of change. Explanation of the effects ratings is provided below:

Magnitude of beneficial effect	Criteria
Major beneficial	<ul style="list-style-type: none">• Major/substantial positive alteration to elements/features of the baseline (pre-development) conditions such that the post development character/attributes will be fundamentally improved, leading to establishment of a fundamentally better and more attractive landscape or urban environment.• The Proposed Development furthers national objectives for landscape and/or urban improvements.
Moderate beneficial	<ul style="list-style-type: none">• Alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially improved.• The Proposed Development notably enhances the form and pattern of the landscape.• It furthers regional objectives for landscape and/or urban improvements.• There is potential to establish a comprehensive landscape design which enhances the existing character of the area or introduces a new attractive character/identity.
Minor beneficial	<ul style="list-style-type: none">• A minor shift away from baseline conditions. Change arising from the alteration will be discernable but the underlying character / attributes of the baseline condition will be similar to the pre-development.• The Proposed Development fits well with the scale, landform and pattern of the landscape and maintain or enhance existing landscape character in an area.• It incorporates measures for mitigation where necessary to ensure they would blend in well with the surrounding landscape or complement, restore or extend partially formed landscape character/ framework.
Negligible	<ul style="list-style-type: none">• No or very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable.• The Proposed Development is well designed to complement the scale, landform and pattern of the landscape.• It incorporates measures for mitigation where necessary to ensure that the scheme would blend in well with surrounding landscape features and elements.
Minor adverse	<ul style="list-style-type: none">• A minor shift away from baseline conditions. Change arising from the alteration will be discernable but the underlying character/ attributes of the

	<p>baseline condition will be similar to the pre-development.</p> <ul style="list-style-type: none"> • The Proposed Development is discernable and partially changes the character of the site without compromising the overall landscape character area. • The Proposed Development can only be partially mitigated for because of the nature of the Proposed Development itself or the character of the wider landscape.
Moderate adverse	<ul style="list-style-type: none"> • Alteration to one or more elements/features of the baseline conditions such that post development character /attributes of the baseline will be materially changed. • The Proposed Development is out of scale with the landscape; • Adversely affects an area of recognised regional landscape quality. • It would have an adverse effect on a landscape of recognised quality or on vulnerable and important characteristic features or elements. • Mitigation would not prevent the scheme from affecting the landscape in the longer term as some features of interest would be partly destroyed or their setting diminished.
Major adverse	<ul style="list-style-type: none"> • Major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character /attributes will be fundamentally worsened. • Notably and adversely affect an area of recognised national landscape quality. • The Proposed Development would be incompatible with the scale and pattern of the local landscape and cannot be adequately mitigated. • It is likely fundamentally to degrade or diminish, or even destroy, the integrity of a range of characteristic features and elements or their setting. • It would be substantially damaging to a high quality or highly vulnerable landscape causing it to change and be considerably diminished in quality.

6.3.17 Landscape effects change over time as mitigation, such as planting and restoration of habitat types included as part of the proposals, establish and mature and existing landscape external to the development evolves. The assessment acknowledges change and reports on the likely significant effects of the Proposed Development as at 2014, as at 2026 and in summer 15 years after completion in 2041.

6.3.18 In terms of ratings for sensitivity, magnitude and effects the thresholds represent points on a continuum. Where appropriate, intermediate ratings are used to indicate effects at the higher or lower end of a particular threshold. For example, low to medium would represent an effect towards the higher end of the lower threshold. Medium to low would represent a rating at the lower end of the medium threshold.

Visual Resources

6.3.19 GLVIA suggest that visual effects are assessed from a clear understanding of the development proposed and any landscape mitigation measures which are being adopted. They further require an understanding of the visual form of the existing landscape, its quality, its sensitivity to change in terms of the development proposed, and the magnitude of the change proposed. In these guidelines visual effects are assessed with regard to their degree of visual intrusion on receptors which are residents, visitors, travellers and other groups of viewers.

6.3.20 The assessment has involved three stages:

- Identification of the Zone of Theoretical Visibility (ZTV);
- Field assessment of affected receptors and ground truthing of ZTV; and
- Visual evaluation and effects assessment, considering magnitude and sensitivity of change.

Zone of Theoretical Visibility

6.3.21 The purpose of identifying the zone of theoretical visibility (ZTV) is to define the effective boundaries within which the proposed development could potentially affect people's views of the landscape within the wider area surrounding the development and is based on the information provided by Parameter Plan 03: Building Heights.

6.3.22 A computer generated ZTV map has been prepared for the development. This was modelled using ESRI ArcGIS software suite, which considers landform and vegetation. This has been used to assist in viewpoint selection and to illustrate the potential influence of the development in the wider landscape.

6.3.23 The overall visibility of the Application Site from each of the viewpoints was identified with the production of ZTVs. The ZTVs take into account the relative screening that existing buildings and features such as trees and vegetation currently provide to the Application Site.

6.3.24 The overall visibility of the development from each of the viewpoints was also appraised through the preparation of a Zone of Theoretical Visibility (ZTV). These ZTVs show the theoretical building block visibility from each of the viewpoints as well as the number of the building blocks that will be visible both at the first phase of construction (2014) and upon completion (2026). The parameter blocks (in their maximum dimensions) have been merged into the digital surface model. The resulting zones of theoretical visibility graphics take into account the relative screening that existing buildings and features such as trees and vegetation may provide to the development. When illustrating ZTVs at particular points in time, where a façade of a proposed building halts visibility of the remainder of the building from a particular viewpoint, only the façade is shown coloured to denote visibility. This colouring appears as a thin line.

6.3.25 The data provided by these maps are qualified by the following constraints:

- The ZTV have been created from NEXTMap Digital Elevation Models, driven on the Digital Surface Model (5m grid product);
- The ZTV mapping is limited by the detail of the digital surface model data used and whilst it takes account of local topographic variations and screening from built form or vegetation some screening elements which will locally screen views are not picked up; and
- The ZTV map does not take account of the likely orientation of the viewer, such as the direction of travel, and there is no allowance for attenuation of visibility with distance, weather or light.

6.3.26 These limitations mean that the ZTV maps tend to overestimate the extent of the visibility, both in terms of the area from which the proposed development is visible and the extent of the development which is visible. The maps should be considered as a tool to assist in assessing the theoretical visibility of the proposal and not a measure of visual effects.

Receptors

6.3.27 For there to be visual effects there is a need for a viewer (receptor). Receptors include residential properties, workplaces, recreational facilities, road users, pedestrians and other outdoor sites used by the public which would be likely to experience a change in existing views as a result of the construction and operation of the proposed development.

6.3.28 The ZTV for the proposed scheme was reviewed to aid identification of potential receptors/viewpoints. Those identified were then validated through site survey, which additionally verified the elements of the proposed scheme which would be visible from the various receptors.

6.3.29 A set of viewpoints has been agreed with both Councils (VPs) to represent visual receptors. Seven VPs were specifically requested by the Councils. A further five VPs were added during site assessment work as it was felt that these more fully represented the range of views experienced of the site. For the purpose of this assessments all twelve viewpoints have been assessed.

Field Assessment of Affected Receptors

- Receptor type and number (dwelling / office / commercial building / footpath / open space / school, etc.);
- Relative height to the proposal;
- Existing view (composition and quality);
- Distance of view;
- Percentage and elements of development potentially visible;
- Angle of view (acute/perpendicular/average);
- Composition of the view (i.e. the arrangement and proportions of features within the available view) and position of the development in the view; and
- Duration of view i.e. Is the receptor continuous such as a house, or transient such as a pedestrian/vehicular traveler.
- Analysis of potential visual effects as at 2014, winter year of scheme completion (2026) and fifteen years on (2041). The analysis relates to each of the receptors and groups of receptors represented in the 12 viewpoints, and concludes with an evaluation of the significance of effects related to each viewpoint.

Visualisations

6.3.30 In consultation with both planning authorities, block renders have been prepared from 8 of the 12 viewpoints, including viewpoints 1, 2, 3, 6, 7, 8, 10 and 11. These visualisations are based on the information provided by the **Figure 2.3** Building Heights, and in combination with the ZTV maps and site visit assessment have informed the visual assessment.

6.3.31 **Figure 2.3** Building Heights, defines the maximum heights of buildings (in metres AOD). This plan also shows the location for one Energy Centre Chimney Flue included within the Proposed Development and one potential reserved location for a future energy centre (contextual information) and provides heights. The height for the Energy Centre chimney flue (Local Centre) will not exceed 72.5m AOD. The height for the Potential Energy Centre chimney flue (Northwest Corner) will not exceed 83.5m AOD (contextual information).

6.3.32 Any additional chimney flues retained within the building height parameters will be perceived as part of the Proposed Development and will not affect the magnitude of change or significance of effects of each of the assessed viewpoints.

6.3.33 Photographs were taken in slightly overcast but dry weather conditions on the 9th of March 2010 from 9 am to 5pm, using a Canon EOS 450 D digital SLR camera. Winter photography of the site is used to demonstrate the greater visual effect of the proposal or worst case scenario. As is the case with the majority of digital cameras, this camera has a picture coverage that is smaller than a 35mm format camera. A standard lens attached to this camera will have a telephoto effect that is equivalent to 1.6 times the lens focal length so that a standard 35mm lens provides photographs that are equivalent to a 56mm lens used on a 35mm format camera. This type of lens has been used for the assessment photography as it provides the closest equivalent to the 50mm focal length that is commonly recommended in guidance for landscape and visual assessment, including GLVIA.

6.3.34 The photographs shown for each viewpoint cover a 90-degree view which is commonly held to reflect the normal human field of vision. The block model photomontages used in the assessment are also prepared to cover a 90-degree view. When reproduced at A3 scale, the 90-degree view photographs and photomontages should be viewed from a distance of around 25cm in order to gain as accurate an impression as possible of the real effect on the views.

6.3.35 The photographs were taken with a 50% overlap between frames and have been digitally joined using Adobe Photoshop software. The series of connected images were then projected in a number of facets that approximate to a cylindrical projection. This process avoids the wide-angle effect that would result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360-degree view but appears essentially as a flat plane.

6.3.36 Computer modelling is used to assist in the assessment process and to illustrate the effects of the development through the block model and block model photomontages. The computer programme used to create the model was 3D Max, based on the terrain model available.

6.3.37 The purpose of the block model photomontages is to illustrate the potential extents of the built development areas. They are not intended to show what the development will be like but the area within which they may occur.

6.3.38 A layout of the proposed development area has been modelled using coloured 'development envelopes' related to the parameter plots within the area. The envelopes are modelled at the maximum heights of the buildings and maximum extent of the building envelopes. Actual heights and extent of the built form is limited by the Description of Development and Development Parameters. These envelopes have been used as the basis for visual modelling in the photomontages and the assessment of effects. Colours are used to illustrate the development envelope heights and are not indicative of the colour of the buildings.

Visual Evaluation and Effects Assessment

6.3.39 The evaluation and assessment of effects has involved consideration of the extent to which the Proposed Development would change the composition of the existing view (magnitude of change) and the sensitivity to change based on the information gathered through site survey and analysis of the Proposed Development. Both criteria are represented utilising thresholds of magnitude or sensitivity: High, Medium, Low and Negligible (magnitude only).

Visual Sensitivity to Change

6.3.40 Visual effects result from the changes in the composition of available views, due to changes to the landscape and to the overall visual amenity. The significance of the effect is determined by the sensitivity of the visual receptor (people experiencing the effect) and the magnitude of the visual effect. The degree to which people are affected by changes within a landscape as a result of a development depends on a number of factors, including:

- receptor activities, such as relaxing at home, taking part in leisure, recreational and sporting activities, travelling or working;
- whether receptors are likely to be stationary or moving and how long they will be exposed to the change at any one time;
- the importance of the location, as reflected by designations, inclusion in guidebooks or the facilities provided for visitors;
- extent of the route or area over which the changes would be visible;
- frequency – whether receptors will be exposed to the change daily, frequently, occasionally or rarely; and
- orientation of receptors in relation to the Proposed Development, whether views are oblique or direct.

6.3.41 In this assessment sensitivity is ranked as follows:

Sensitivity	Criteria
High	Where the changed landscape is a highly important element in the view. Principal views from residential properties and areas of settlement. Users of outdoor recreational facilities, on national cycling or walking routes or in nationally designated landscapes.
Medium	Where the changed landscape is a moderately important element in the view. Secondary views from residential properties, road users, other transportation routes orientated towards the proposed development, likely to be travelling for other purposes than just the view and rights of way within wider recreation and tourist areas. Users of public open space / recreation areas.
Low	Where the changed landscape is a less important element in the view. Users of main roads and other arterial transportation routes. Places of work / industrial zones.

Visual Magnitude of Change

6.3.42 Magnitude of change considers the extent of development visible, the percentage of the existing view newly occupied by the Proposed Development, the influence of the Proposed Development within the view and viewing distance from the receptor to the Proposed Development. In this assessment magnitude is ranked as follows:

Magnitude of Change	Criteria
High	The Proposed Development will cause a considerable change in the existing view; will be striking, sharp, unmistakable and easily seen. The creation/removal of a major visual focus with a substantial proportion of the view affected.
Medium	The Proposed Development will cause a noticeable change to the existing view; will be distinct, clearly visible, well defined. Some elements of the proposed development fit the existing pattern with some of the view affected.
Low	The Proposed Development will cause minor changes to the view but will still be evident. Little change to the focus of the view.
Negligible	The Proposed Development will cause no or a barely discernible change in the existing view.

Visual Significance of Effect Criteria

6.3.43 The degree of significance of potential visual effects, both negative and positive, is determined from a combined evaluation of the landscape sensitivity and the magnitude of change. The findings are represented using a descriptive scale ranging from major - moderate - minor adverse through negligible to ascending scale of minor - moderate - major beneficial. The assessment reports on the effects for each viewpoint during the construction phase as at 2014), overall completion at 2026 and in summer fifteen years after construction has been completed in 2041.

6.3.44 Explanation of the visual effects ratings is provided below:

Magnitude of beneficial effect	Criteria
Major beneficial effect	<ul style="list-style-type: none"> Major/substantial positive alteration to elements/features of the baseline (pre-development) conditions such that the post development character/attributes will be fundamentally improved, including substantially remodelling and enhancing the outlook for a large number of people. This would typically apply where the Proposed Development would cause a very noticeable improvement in the existing view

Moderate beneficial effect	<ul style="list-style-type: none"> Alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially improved. The Proposed Development would cause a notable improvement in the existing view. This would typically apply where the Proposed Development incorporates landscape improvements which would largely reduce the visual effect of the proposals and enhance the outlook for a moderate number of people.
Minor beneficial effect	<ul style="list-style-type: none"> A minor shift away from baseline conditions. Change arising from the alteration will be discernable but the underlying character / attributes of the baseline condition will be similar to the pre-development. This would typically occur where the Proposed Development incorporates landscape improvements which would reduce the visual effect of the proposals and enhance the outlook for a limited number of people.
Negligible	<ul style="list-style-type: none"> Where the Proposed Development would cause no or a barely perceptible change in the existing view. This would typically occur where the receptor is at some distance from the Proposed Development and the Proposed Development would appear in the view but not as a point of principal focus-
Minor adverse effect	<ul style="list-style-type: none"> A minor shift away from baseline conditions. Change arising from the alteration will be discernable but the underlying character / composition / attributes of the baseline condition will be similar to the pre-development. This would typically occur where the receptor is at some distance from the Proposed Development and the Proposed Development newly appear in the view but not as a point of principal focus. It would also occur where the Proposed Development is closely located to the viewpoint but seen at an acute angle and at the extremity of the overall view.
Moderate adverse effect	<ul style="list-style-type: none"> Alteration to one or more elements/features of the baseline conditions such that post development character/attributes of the baseline will be materially changed and cause a notable deterioration in the existing view. This would typically occur where the Proposed Development closes an existing view of local landscape and the Proposed Development would dominate the future view.
Major adverse effect	<ul style="list-style-type: none"> Major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character /attributes will be fundamentally worsened. Where the Proposed Development would cause a very noticeable deterioration in the existing view. This would typically occur where the Proposed Development closes an existing view of landscape of regional or national importance and the Proposed Development would dominate the future view.

6.3.45 In terms of ratings for sensitivity, magnitude and effect, the thresholds represent points on a continuum. Where appropriate, intermediate ratings are used to indicate effects at the higher or lower end of a particular threshold.

6.4 Policy Framework

6.4.1 This section summarises the national, regional and local planning policy guidance and development plan policies that are relevant to the development. This section should be read in conjunction with Chapter 4.

National Planning Policy

6.4.2 National Planning Policy guidance is now continued in the NPPF. This includes reference to the fact that in encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation in relation to the impact of lighting in preparing local development documents).

Regional and Sub-Regional Planning Policy

The East of England Plan – the revision to the Regional Spatial Strategy for the East of England (2008)

6.4.3 The current Regional Spatial Strategy for the region is the East of England Plan, which covers the period 2001 to 2021, which is still part of the Statutory Development Plan. The plan has been prepared and implemented by the East of England Regional Assembly (EERA). The plan sets out policies which address the needs of the region and strategic sub-regions.

Policy SS7: Green Belt

6.4.4 This policy states the need for strategic reviews of green belt boundaries to meet regional development needs. Whilst not identifying the Application Site directly, the policy states that ‘tightly drawn green belt boundaries, while assisting urban concentration, have made it increasingly difficult to meet development needs, particularly for housing...’

Policy SS8: The Urban Fringe

6.4.5 This policy relates to the need for local authorities to work with developers to ‘secure the enhancement, effective management and appropriate use of land in the urban fringe...ensuring that new development in or near the urban fringe contributes to enhancing its character and appearance and its recreational and/or biodiversity value and avoids harm to sites of European and international importance for wildlife in particular.’

Policy ENV2: Landscape Conservation

6.4.6 This policy relates to the requirement for local authorities and other agencies to protect nationally designated landscapes and to ‘protect and enhance the diversity and local distinctiveness of countryside character areas’... by ensuring that ‘all development respects and enhances local landscape character.’

Policy ENV3: Biodiversity and Earth Heritage

6.4.7 Local authorities should ensure that ‘internationally and nationally designated sites are given the strongest level of protection and that development does not have adverse effects on the integrity of sites of European or international importance for nature conservation.’

Policy ENV6: The Historic Environment

6.4.8 Local authorities should ‘identify, protect, conserve and, where appropriate, enhance the historic environment of the region, its archaeology, historic buildings, places and landscapes, including historic parks and gardens and those features and sites (and their settings) especially significant in the East of England.’

CSR 3: Green Belt

6.4.9 This policy relates directly to the Green belt surrounding the Cambridge sub-region. It states that the Green Belt should be maintained to define the extent of urban growth in order to maintain and enhance the character and quality of Cambridge and its environs.

Cambridgeshire and Peterborough Structure Plan (2003)

6.4.10 The Cambridgeshire and Peterborough Structure Plan puts in place a strategic framework for land use planning in Cambridgeshire and Peterborough up to 2016. The Structure Plan provided the framework for the district councils' preparation of detailed Local Development Frameworks or Local Plans. Following the approval of the East of England Plan in May 2008 all but 13 of the policies in the Cambridgeshire and Peterborough Structure Plan have been superseded. Of those 13 policies, the following two are of relevance to the Proposed Development:

Policy P9/2b: Review of Green Belt Boundaries

6.4.11 *'Local Planning Authorities will carry out a review of the Green Belt in their areas to identify the boundaries of land to be released from the Green Belt to serve the long-term development needs of Cambridge...'*

Policy P9/2c: Location and Phasing of Development Land to be Released from the Green Belt

6.4.12 *'Local plans will make provision for housing and mixed-use development on land to be released from the Green Belt in accordance with the principles set out in Policy P9/2b and in the following locations...'* The purpose of this policy is to allow scope for continuing development whilst protecting the historic character and setting of Cambridge. One of these locations is the land between Madingley Road and Huntingdon Road which encompasses the proposed development site boundary. The policy goes on to state that *'land between Madingley Road and Huntingdon Road should be reserved for predominantly University-related uses and only brought forward when the University can show a clear need for the land to be released.'*

Local Planning PolicyCambridge Local Plan (Adopted 2006)

6.4.13 The Cambridge Local Plan sets out policies and proposals for future development and land use up to 2016. The Secretary of State issued a formal direction on 2 July 2009 saving the majority of policies in the Cambridge Local Plan, including those listed below.

Policy 3/2: Setting of the City

6.4.14 This policy states that 'development will only be permitted on the urban edge if it conserves or enhances the setting and special character of Cambridge and the biodiversity, connectivity and amenity of the urban edge is improved.' This applies to both Green Belt and areas not designated as Green Belt. The policy goes on to state that 'proposals should take account of the character of their location by reference to the Historic Landscape Characterisation and the Cambridge Landscape Character Assessment.'

Policy 3/3: Safeguarding Environmental Character

6.4.15 This policy states that 'development will be permitted if it respects and enhances the distinctive character and quality of areas identified in the Cambridge Landscape Character Assessment.' Character Areas are based on the Countryside Commission and English Nature's joint map Character of England: Landscape, Wildlife and Natural Features.

Policy 4/1: Green Belt

6.4.16 This policy states that *'there is a presumption against inappropriate development in the Cambridge Green Belt as defined on the Proposals Map.'* The Green Belt preserves the setting and special character of Cambridge and provides opportunities for sport and recreation. Special circumstances must exist to justify development and proposals that increase public access, improve amenity and enhance biodiversity will be supported.

Policy 4/2: Protection of Open Space

6.4.17 This policy states that *'development will not be permitted which would be harmful to the character of, or lead to the loss of, open space of environmental and/or recreational importance unless the open space uses can be satisfactorily replaced elsewhere and the site is not important for environmental reasons.'* Areas of 'open space' include recreation grounds, Historic Parks and Gardens, sites with nature conservation designation, outdoor sports facilities and semi-natural green spaces. Only proposals which respect landscape, improve amenity, enhance biodiversity, improve sports facilities or increase public access will be supported.

Policy 4/3: Safeguarding Features of Amenity or Nature Conservation Value

6.4.18 This policy states that *'development proposals should seek to enhance features of the landscape which are of importance for amenity or nature conservation. Development resulting in adverse effects on or loss of those features will not be permitted unless this is unavoidable and there are demonstrable and overriding wider public benefits.'* Where unavoidable, the Council will require mitigation, reinstatement or replacement of damaged features.

Policy 4/6: Protection of Sites of Local Nature Conservation Importance

6.4.19 This policy states that *'development will not be permitted if it will have an adverse impact on a Local Nature Reserve (LNR), a County Wildlife Site (CWS), or a City Wildlife Site (CiWS) unless it can be clearly demonstrated that there are reasons for the proposal which outweigh the need to safeguard the substantive nature conservation value of the site.'* This proposal may affect City Wildlife Sites on or in close proximity to the development site boundary. City Wildlife Sites represent areas of local interest of flora and fauna.

Policy 4/9: Scheduled Ancient Monuments / Archaeological Areas

6.4.20 This policy states that *'proposals affecting Scheduled Ancient Monuments or other important archaeological remains and their settings must be accompanied by a full assessment of the nature and importance of the remains and the impact of the proposals on them as part of the application.'* The desirability to preserve ancient monuments and their setting is a material planning consideration.

Policy 4/10: Listed Buildings

6.4.21 This policy states that *'development affecting Listed Buildings and their settings, including changes of use, will not be permitted unless...there is a clear understanding of the building's importance in the national and Cambridge context...the proposed works will not harm any aspects of the building's special interest or the impacts can be mitigated to an acceptable level...'* The desirability to preserve Listed Buildings and their setting is a material planning consideration.

Policy 4/11: Conservation Areas

6.4.22 The desirability to preserve or enhance a Conservation Area's character or appearance is a material planning consideration. This policy states that *'developments within, or which affect the setting of or impact on views into and out of Conservation Areas, will only be permitted if... they retain buildings, spaces, gardens, trees, hedges, boundaries and other site features which contribute positively to the character or appearance of the area.'*

Policy 4/15: Lighting

6.4.23 Development proposals which include new external lighting or changes to existing external lighting must demonstrate that this minimises the impact to residential amenity, wildlife and the landscape, particularly at sites on the edge of the City.

Policy 8/5: Pedestrian and Cycle Network

6.4.24 'New developments will safeguard land along identified routes for the expansion of the walking and cycling network....any existing routes should be retained and improved wherever possible.'

South Cambridgeshire Local Development Framework

6.4.25 The South Cambridgeshire Local Development Framework (LDF) is a suite of documents which together guide development within South Cambridgeshire. The policies contained within the LDF have almost entirely replaced those in the South Cambridgeshire Local Plan (2004). Within the LDF the following documents contain policies and proposals relevant to the proposed development:

- Development Plan Documents (DPDs);
 - LDF Core Strategy DPD (Adopted January 2007).
 - Development Control Policies DPD (Adopted July 2007).
- Area Action Plans (AAP);
 - North West Cambridge Area Action Plan (Adopted October 2009).

LDF Core Strategy (Adopted January 2007)

6.4.26 The LDF Core Strategy DPD sets out the overall approach to development in the South Cambridgeshire district, with the focus on locating new developments in the most sustainable locations. These proposals are developed further in detailed Area Action Plans. The following policy is relevant to the proposed development.

Policy ST/1: Green Belt

6.4.27 This policy reinforces that the purpose of the Green Belt is to keep land open and free from development in order to preserve the special character and setting of Cambridge and to prevent communities in the local area merging into one another and the city. The policy states that Green Belt boundaries are now being revised to serve the long term development needs of Cambridge.

Development Control Policies (Adopted July 2007)

6.4.28 The Development Control Policies DPD will guide decisions on planning applications within South Cambridgeshire and covers a wide range of topics including housing, jobs, travel, the natural environment and the Green Belt. The following policies are relevant to the proposed development.

Policy GB/1: Development in the Green Belt

6.4.29 This policy states that '*there is a presumption against inappropriate development in the Cambridge Green Belt as defined on the Proposals Map.*'

Policy GB/2: Mitigating the Impact of Development in the Green Belt

6.4.30 This policy states that '*any development considered appropriate within the Green Belt must be located and designed so that it does not have an adverse effect on the rural character and openness of the Green Belt.*'

Policy GB/3: Mitigating the Impact of Development Adjoining the Green Belt

6.4.31 This policy states that 'where development proposals are in the vicinity of the Green Belt, account will be taken of any adverse impact on the Green Belt. Development on the edges of settlements which are surrounded by the Green Belt must include careful landscaping and design measures of a high quality in order to protect the purposes of the Green Belt.'

Policy NE/4: Landscape Character Areas

6.4.32 This policy states that 'development will only be permitted where it respects and retains or enhances the local character and distinctiveness of the individual Landscape Character Area in which it is located.' The proposed development is situated in the Bedfordshire and Cambridgeshire Claylands character area. This policy further states that 'special consideration must be given to urban fringe developments, in particular ensuring that there is a clear transition between urban areas and the countryside and ensuring that new developments do not create obtrusive skylines.'

Policy NE/14: Lighting Proposals

6.4.33 Development proposals which include external lighting should ensure that certain criteria are met, including that there are no unacceptable adverse impact on neighbouring or nearby properties or on the surrounding countryside.

Policy CH/1: Historic Landscapes

6.4.34 This policy states that 'planning permission will not be granted for development which would adversely affect or lead to the loss of important areas and features of the historic landscape whether or not they are statutorily protected.' This policy affects parks listed on English Heritage's Register of Parks and Gardens of Special Interest which are of national importance.

Policy CH/4: Development Within the Curtilage or Setting of a Listed Building

6.4.35 This policy states that 'planning permission will not be granted for development which would adversely affect the curtilage or wider setting of a Listed Building.' Planning permission may be refused if the proposal is shown to dominate the Listed Building by scale, form, mass or appearance, or would harm the visual relationship between the building and surrounding landscape.

Policy CH/5: Conservation Areas

6.4.36 Conservation Areas are 'areas of special architectural or historic interest.' This policy relates to development proposals in or affecting Conservation Areas and outlines the criteria against which they will be assessed.

North West Cambridge Area Action Plan (Adopted October 2009)

6.4.37 The North West Cambridge Area Action Plan was prepared jointly by CCC and SCDC to provide planning policy guidance for a specific development site. The Area Action Plan identifies land to be released from the Cambridge Green Belt, to contribute towards meeting the development needs of Cambridge University. It establishes an overall vision and objectives to achieve this and also sets out policies and proposals to guide the development as a whole. The following policies are those which relate to landscape character or visual amenity.

Policy NW1: Vision

6.4.38 The vision is to create a new University quarter which meets the needs of the wider community and embodies best practice in environmental sustainability. Some of the objectives of the Area Action Plan are as follows:

- 'To maintain the purposes of the Green Belt;
- To provide an appropriate landscape setting and high quality edge treatment for Cambridge;

- *To provide appropriate separation between Cambridge and the village of Girton to maintain village character and identity; and*
- *To protect special geological interest, existing wildlife and wildlife corridors and secure a net increase in biodiversity.'*

Policy NW2: Development Principles

6.4.39 This policy outlines the principles that the Proposed Development should follow. It states that 'planning permission will not be granted where the proposed development or associated mitigation measures would have an unacceptable adverse impact on residential amenity...biodiversity, archaeological, historic landscape and geological interests... or on adjacent Conservation Areas and Listed Buildings.'

Landscape Designations

6.4.40 The following section provides an outline of the landscape related designations within the Application Site and wider area (Figure 6.8).

Green Belt

6.4.41 The majority of the Application Site was removed from the Green Belt as part of the North-West Cambridge Area Action Plan (AAP), adopted by Cambridge City Council and South Cambridgeshire District Council in November 2009. Approximately half of the development site is to remain as open space, with 50 ha retained as Green Belt.

6.4.42 The Cambridge Green Belt was established with three main purposes, as set out in the AAP, namely:

- To preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre;
- To maintain and enhance the quality of its setting; and
- To prevent the communities in the environs of Cambridge from merging into one another and with the City.

6.4.43 Although a national designation, Green Belts are reviewed at a local level. Green Belt designation does not relate to landscape quality (indeed, they can often be neglected or of poor environmental quality). It is, rather, a statutory planning instrument to control and manage urban sprawl and, as such, is considered to be a planning rather than a landscape designation and is not considered further here. The issues of coalescence, recreation and town setting are, instead, considered in the landscape character appraisal.

Conservation Areas

6.4.44 Conservation Areas are '*areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.*' Cambridge City currently has 11 designated Conservation Areas, seven of which lie within the study area, namely:

- Central Cambridge Conservation Area;
- West Cambridge Conservation Area (and extension);
- Conduit Head Road Conservation Area;
- Storey's Way Conservation Area;
- De Freville Conservation Area;
- Chesterton Conservation Area; and
- Ferry Lane Conservation Area.

6.4.45 **Central Conservation Area** is the largest conservation area in Cambridge, covering the historic core of the city, open spaces including the college backs, Jesus Green, Midsummer Common and the Botanic Garden, and the housing areas west of the railway line. It was originally designated in 1969 and has been extended several times since then.

6.4.46 **West Cambridge Conservation Area (and extension)** lies to the west of the Central Conservation Area and includes the large houses and colleges from Lady Margaret Road in the north, to Millington Road in the south. The boundary stretches as far west as the Emmanuel Sports Ground on Wilberforce Road. The area was designated in 1972 and extended in 1984. The extension includes the Observatory and Churchill College buildings and their associated grounds in addition to the Fitzwilliam College, Murray Edwards College and St Edmund's College.

6.4.47 **Conduit Head Road Conservation Area** includes the distinctive 1930s buildings in their attractive gardens which stand along Conduit Head Road, and some buildings along Madingley Road. The Conservation Area was designated in 1984 and extended in 2009.

6.4.48 **Storey's Way Conservation Area** covers the turn-of-the-century houses on the south side of Storey's Way and the Trinity Hall sports ground. The area was designated a conservation area in 1984 and the boundary was extended to the east in 2008.

6.4.49 **De Freville Conservation Area** abuts the Central Conservation Area north of the river Cam. It is based on the original De Freville Estate which was laid out in 1890, and includes older streets to the east up to and including part of Victoria Avenue. The conservation area was designated on 3 March 2009.

6.4.50 **Chesterton Conservation Area** covers the old part of Chesterton village around Chapel Lane, Church Street (including the recreation ground) and High Street. The conservation area was designated in 1969 and extended in 2009.

6.4.51 **Ferry Lane Conservation Area** (previously called Water Street Conservation Area) is the smallest of the city's conservation areas. It includes the south west end of Water Street, and stretches south to the river. The area was designated in 1969 and extended in 2009.

6.4.52 Regard has been had in this assessment to designated Conservation Areas. Effects on any areas which are not so designated are only addressed if and to the extent that they contain features of significant landscape importance. Cambridgeshire currently has 84 designated Conservation Areas, five of which lie within the study area, namely:

- Coton Conservation Area;
- Madingley Conservation Area;
- Histon Conservation Area;
- Impington Conservation Area; and
- Oakington Conservation Area.

6.4.53 **Coton Conservation Area** lies within the small village of Coton approximately 3km west of Cambridge. The eastern side of the village and surrounding countryside is a Conservation Area.

6.4.54 **Madingley Conservation Area** comprises most of the small village of Madingley including Madingley Hall and pleasure grounds.

6.4.55 **Histon Conservation Area** comprises the historic nucleus of the village along Station Road/High Street and Bridge Road/Water Lane. It stretches across the village limits to include the site of the medieval church of St Etheldreda and Histon Manor.

6.4.56 **Impington Conservation Area** comprises the historic nucleus of the village centred on the medieval church and Impington Park.

6.4.57 **Oakington Conservation Area** lies within the small village of Oakington to the north of Cambridge. The Conservation Area is centred on a group of historic buildings around the church and along the High Street and was designated in 1989.

Historic Gardens and Designed Landscapes

6.4.58 There are two sites named on English Heritage's 'Register of Historic Parks and Gardens of special historic interest' that lie within the study area. These are:

- Madingley Park; and
- American Military Cemetery.

6.4.59 **Madingley Park** is situated around Madingley Hall, a 16th Century hall now home to Cambridge University's Institute of Continuing Education. The earliest recorded gardens date from the mid 17th Century. The park was enlarged in the 18th Century at the time of landscaping works by Capability Brown which created a more naturalistic parkland landscape. In the early 20th Century the gardens were modified again to a formal design of terraces, hedges and fountains.

6.4.60 The **American Military Cemetery** near Madingley is the only permanent American Second World War Cemetery in Britain. It was designed by Perry, Shaw, Hepburn and Dean, Architects and Olmsted Brothers, landscape architects in the mid 1950s. The 12.5 hectare site is located on the north side of the St Neots Road and to the west by Madingley Wood, an SSSI. The cemetery occupies sloping rural land with extensive views northwards over the surrounding countryside. The Memorial chapel and museum room is a grade II* listed building.

Coton Countryside Reserve

6.4.61 The Coton Countryside Reserve is managed by Cambridge Past Present and Future, a charity whose aim is to champion the sustainable development of the city and its surroundings. The reserve comprises over 120 hectares of agricultural land near the village of Coton, conceived as a wildlife and farm reserve. Phase 1 was completed in summer 2008 and the park contains diverse habitats including woodland, hedgerow, hay meadow and orchard. The reserve is a publicly accessible green space with new footpath, cycleway and bridleway routes and links to the existing path network.

Rights of Way

6.4.62 A Right of Way crosses the Application Site to the northwest and continues to the west of the study area.

6.5 Scope

6.5.1 Viewpoints have been assessed as agreed with the LPAs. Where considered appropriate, additional recommendations have been made to mitigate residual effects arising from the proposed development.

6.5.2 The assessment describes a baseline year at 2010 without the Proposed Development, followed by assessments of the likely significant effects of the Proposed Development as at 2014 and as at the overall completion date of 2026; both phases have been assessed in winter time when the Proposed Development is likely to be screened least by vegetation. Assessment has also been undertaken as at Summer 2041, 15 years from the anticipated final completion date for the Proposed Development, in order to take account of the implications of landscape planting proposed as part of the Proposed Development when largely mature. The report specifically considers the likely significant effects of the Proposed Development cumulatively with those for West Cambridge, NIAB 1 and NIAB 2.

6.5.3 An assessment of the likely lighting proposals for the Proposed Development and the potential effects which may arise from the introduction of night-time illumination in this area is included as a section within this chapter.

6.6 Limitations to the Assessment

6.6.1 The assessment of effects on landscape character has been undertaken by a combination of desk and field survey. The assessment is based on the information contained within Chapter 2 Site Description and Proposed Development.

6.6.2 The selection of the viewpoints was confirmed through the AAP process and following the scoping exercise. The viewpoint selection focused on analysis of the effects of the Proposed Development overall and was not specific to identifying effects of the potential energy centre flues proposed towards the centre and the north west of the Application Site. Therefore the assessment of the effects of the flues is limited to where they are visible in the originally selected viewpoints.

6.7 Baseline Conditions

Landscape Resource

6.7.1 Existing landscape conditions have been recorded in order to gain an understanding of what makes the landscape of the Application Site and its surroundings distinctive, its main components or characteristics and how the area is changing. Although the existing landscape resource and existing visual resource have been described in two separate sections due to the detailed level of information, the two are interrelated. The Landscape and Visual Resource sections should therefore be read as companion baseline appraisals.

6.7.2 The following baseline study of the landscape resource is presented in two sections, which examine it from a broad through to detailed appraisal:

- A review of the overall landscape character that the Application Site and wider study area are located within; and
- A review of the landscape character and features of the Application Site and its immediate surroundings.

6.7.3 The overall landscape context of the Application Site is shown in **Figure 6.1**, with more detailed landscape character information for the study area and the Application Site shown in **Figures 6.2 to 6.9**. In addition, photographs of the Application Site and study area, as used for reference in the overall appraisal of the baseline landscape and visual resource, are illustrated in **Figures 6.10 and 6.11**.

National Landscape Character Areas

Natural England's Character Map of England

6.7.4 The Application Site and study area lie on the eastern extent of National Character Area 88 - Bedfordshire & Cambridgeshire Claylands, as shown on Natural England's Character Map of England, which covers most of East Anglia. The study area extends to a radius of 2.5km from the Howe Farm buildings (University Farm, Huntingdon Road), as informed by the visibility of the Application Site.

6.7.5 The Claylands comprise most of central and northern Bedfordshire and western Cambridgeshire. The Character Area comprises a broad sweep of lowland plateau, dissected by a number of wide shallow valleys, including the rivers Great Ouse and Ivel. This is typically an empty, gently undulating lowland landscape with expansive views of large-scale arable farmland contained either by sparse trimmed hedgerows, shelterbelts, open ditches or streamside vegetation. There are scattered ancient woodlands which tend to be clustered most noticeably in a band to the north of the area. Elsewhere, the woods are more isolated; nonetheless these form important visual and wildlife features within the landscape.

6.7.6 The overall impression is of a mature, peaceful rural landscape that is enhanced by the topography of the east-west ridges. There are some distant views of Cambridge from high points, but the majority of these views are screened by vegetation in the summer months. An important approach into Cambridge from Bedford passes through the Western Claylands. Adjacent to the road is the American Cemetery, a memorable feature within the setting of the wider city. Just beyond the American Cemetery is an elevated view toward Cambridge across the rural landscape.

6.7.7 The area has seen population decline since the medieval period and today it contains only scattered villages and farmsteads. Madingley, to the west, is a particularly attractive and notable village, with its hall, historic gardens and estate cottages.

Regional Landscape Character Areas

Cambridgeshire Landscape Guidelines (Cambridge City Council, 1991)

6.7.8 The Application and study area lie within Area 3 – Western Claylands, as described in the Cambridgeshire Landscape Guidelines.

6.7.9 The Western Claylands character area is a gently undulating landscape subdivided by the shallow Ouse Valley (Landscape Character Area 4). It is a typically arable farmland landscape with large-scale, open fields, often enclosed by sparse trimmed hedgerows. There are scattered woodlands throughout the area but most are concentrated in the south-west. These woodlands include ancient, semi-natural woodlands of great importance to the county.

6.7.10 The settlement pattern typically comprises small villages and hamlets scattered throughout the area, usually in sheltered places and with small grass paddocks on the village edge. Large scale farm storage buildings can be prominent in the landscape. Church towers and spires are evident. Existing and former wartime airfields have a significant effect on the area.

6.7.11 The character area contains several major road corridors including the M11, A14, A428 and the A505.

6.7.12 The Sensitivity to change of this Regional Landscape Character Area is Medium.

Local Landscape Character

Cambridge Green Belt Study (Landscape Design Associates, 2002)

6.7.13 The Cambridge Green Belt Study (2002) was commissioned to assess the contribution that the eastern sector of the Green Belt makes to the overall purposes of the Cambridge Green Belt. For the purposes of this study the Green Belt was categorised into six Landscape Character Types, subdivided into Landscape Character Areas. Landscape Character Types are 'generic types of landscape, which may repeat throughout the country...they contain broadly similar combinations of geology, topography, drainage patterns, land use and vegetation.' Landscape Character Areas are 'geographically distinct parts of a particular landscape type...each has its own character and identity.'

6.7.14 The study area contains three LCAs, namely:

- LCA 2A - Western Fen Edge, part of the wider Fen Edge LCT;
- LCA 4C - Rhee and Bourne Valleys, part of the wider River Valleys LCT; and
- LCA 5A - Western Claylands, part of the wider Claylands LCT.

6.7.15 The Application Site falls mainly within LCA 5A - Western Claylands, which is part of the broader Claylands LCT. The sensitivity of this LCA is considered to be Medium.

6.7.16 The study also assessed Townscape Character Types, subdivided into Townscape Character Areas across Cambridge. Townscape Character Types are 'generic types of townscape, which may repeat in the city studied and may occur in other cities. They contain broadly similar building types and street patterns. In contrast, Townscape Character Areas are geographically distinct parts of the city and may contain a variety of townscape types.'

6.7.17 The study area contains the following Townscape Character Areas namely:

- TCA 1A - Cambridge Historic Core, part of the wider Historic Core type;
- TCA 1B - Chesterton Village, part of the wider Historic Core type;

- TCA 2 - West Cambridge, part of the wider Bespoke Houses and Colleges type;
- TCA 3A - River Cam Corridor, part of the wider Green Spaces and Green Fingers type;
- TCA 4B - Newtown, Mill Road, Barnwell and Romsey Town, part of the wider Victorian/Edwardian Terraced Housing type;
- TCA 5A - Cambridge Science Park and St John's Innovation Park, part of the wider Large Scale Commercial / Industrial / Service Development type;
- TCA 5B - Railway Corridor, part of the wider Large Scale Commercial / Industrial / Service Development type; and
- TCA 7A - Northern Suburban Estates, part of the wider Post-war Suburban Housing type.

6.7.18 A small part of the Application Site falls within the Bespoke Houses and Colleges character type which is considered to be of High sensitivity to change.

Landscape Character and Features of the Application Site and Study Area

Topography and Drainage

6.7.19 The study area lies within a low plateau valley that is typically characteristic of these Western Claylands. The topography is of a gently undulating, lowland landscape. To the west of the Application Site the landform is at its highest point at Crome Lea Business Park (63m AOD). From here the topography falls away gently towards the M11 through Madingley and Madingley Wood, before levelling out at Moor Barns Farm and Wrangling Corner (approximately 15m AOD) in a low plateau that stretches across to the east of the motorway embankment.

6.7.20 To the east, a ridgeline follows the Huntingdon Road (24m AOD) running along the north eastern boundary of the Application Site that connects the A14 road with the city centre. The ridgeline gradually falls away to the west across the Application Site toward the motorway, eventually levelling out to a low plateau at approximately 14m AOD. This runs from Trinity Conduit Head in the south of the site to the Girton – Madingley footpath in the north. The plateau is bisected by the Washpit Brook, a steeply cut man-made channel.

6.7.21 North-easterly, towards the settlements of Girton, Impington, and easterly toward the urban areas of Arbury and King Hedges, the topography falls away more gently than to the west of the Application Site.

6.7.22 North-westerly along the A14 corridor the topography gently rises before levelling out at Bar Hill around the 18m contour. To the south the topography rises slightly at High Cross just south of Madingley Road, before falling away to the 15m contour along the route of the M11. To the south-east, toward the city centre, the landform remains fairly level before dropping away to the River Cam corridor. To the south-west of the M11 the landscape gradually rises up through Coton toward the American Cemetery and Madingley Hall Farm.

6.7.23 A significant feature and drainage ditch (refer to **Figure 6.9**) is the Washpit Brook, which runs from Pheasant Plantation northward along the western AAP boundary edge, adjacent to the M11 embankment, before cutting into the site following the 14m contour, along the low valley bottom and disappearing beneath the A14 dual carriageway. The Brook continues northward to join the Beck Brook west of Girton. In addition to the Washpit Brook, a network of drainage ditches and a number of ponds are evident across the site and wider study area. These vary in quality of water, habitat provision and conservation value.

6.7.24 The drainage ditches generally form or follow the alignment of field boundaries and act as catchment channels for the surface run-off from the agricultural fields, flowing in an easterly direction to ponds or standing water bodies. By and large, the drainage ditches are man-made, deeply cut 'v' channels which are wet in the base, with levels of water fluctuating depending upon weather conditions and rainfall.

Landcover & Vegetation

6.7.25 In the west of the study area woodland plantation, blocks and shelterbelts are common. Two significant areas of woodland are present: the Ancient Woodland adjacent to the American Cemetery known as Madingley Wood which sits on the gentle clay slopes of Madingley Hill, and Ladybush Close plantation that sits in the lower valley bottom, north of Wrangling Corner. Further blocks of broadleaf plantation are found across the low plateau bottom positioned amongst the farmland to provide screening. Closer to the Application Site, the boundaries of larger fields are lined by mature hedgerows containing a variable number and quality of hedgerow trees, and shelterbelt lines of trees have been used to protect the lowland agricultural land.

6.7.26 Within the Application Site occasionally hedgerows have been removed due to modern farming techniques and replaced with timber or wire fences. Those that exist are of varying quality and species richness, sometimes containing stag-headed mature tree specimens, and often appearing sparse and gappy. A prominent, species-rich and mature hedgerow follows the line of the Washpit Brook, exhibiting the typical stag-headed tall trees that are common landscape features of the Western Claylands. An arboricultural survey has been carried out and is included as a technical appendix.

6.7.27 There are two prominent woodland areas on the Application Site. Directly south of the SSSI is a triangular block of mature broadleaf plantation with ruderal scrub, adjacent to the M11 motorway; Pheasant Plantation. This holds a number of mature multi-stem native species. A swamp and open area of standing water are found within the woodland and are heavily populated with Bulrush species. The other is an area of broadleaf plantation woodland one field north of the Madingley Road Park and Ride site, with mature Ash and Pedunculate Oak trees and patchy understorey of Hawthorn and Elder.

6.7.28 A veteran (or 'near veteran') Oak tree is present in the centre of the Application Site, sited on the Parish boundary line between CCC and SCDC (identified as T196 in the Arboricultural Report (included at **Appendix 7.3**). An avenue of mature Horse-chestnut (*Aesculus hippocastanum*) trees leads from Huntingdon Road south-west to the university farm and research buildings found in the eastern portion of the Application Site. To the east of these buildings an area of broad-leaved semi-natural woodland, an abandoned orchard, and dense continuous scrub with some scattered coniferous trees occupy the corner of the site, bounding with Royal Greenwich Observatory. For information regarding trees and the full arboricultural study, refer to Chapter 7 – Ecology and Nature Conservation.

6.7.29 The landscape type of the Application Site is made up of predominantly arable farmland with some improved pastoral grasslands and experimental/ research-based agricultural plots. The structure is a mixture of both organic layouts and rectilinear fields, bounded generally by open drainage ditches, mature hedgerows or modern timber and wire fencing. For information regarding habitats, refer to Chapter 7 – Ecology and Nature Conservation.

Built/ Manmade Elements

6.7.30 Several transport routes cross the study area, influencing the landscape resource. The M11 motorway cuts through the lowland plateau in an elevated position, atop a man-made embankment that runs in a north-south direction bounding the western edge of the Application Site boundary. To the south of the study area, Madingley Road (A1303) runs east to west from the city centre toward Bedford. Huntingdon Road (A1307) runs roughly north-south along the shallow ridgeline just beyond the north-eastern boundary of the site. The A14 transport route runs east-west through the north of the study area, skirting the northern edge of the Cambridge urban area and separating the settlements of Girton and Impington from the City. These, along with other smaller dispersed settlements commonly found in the wider region, typically exhibit raw built edges juxtaposed against the gently undulating lowland landscape and collectively contribute to what are known as the inner necklace villages – a cluster of settlements surrounding the larger urban conurbations and townscapes – typical of the Cambridgeshire Claylands Landscape Character.

6.7.31 In the east of the study area the landscape type is urban in character as fingers of development spread out from city centre following the highway routes. The shallow ridgeline to the immediate north-east of the Application Site carries Huntingdon Road, which hosts a predominantly residential urban area characterised by large, late 19th-Century houses set in large gardens. In addition to the residential

properties in this area, the character is strongly influenced by University and collegiate buildings with associated grounds and playing fields. The Neo-Tudor Girton College built in 1872 is Grade II* listed..

6.7.32 The Conduit Head Road Conservation Area includes distinctive 1930s-1970s properties in attractive gardens located around one of the City Wildlife Sites known as 'Bird Sanctuary, Conduit Head'. Immediately to the west of this is the Madingley Road Park and Ride site, a large surface level car-park facility surrounded by amenity grassland, dense hedgerows and tall tree cover. A large pond occupies the north of the Application Site. To the south, across Madingley Road, are several large University research buildings set in large open grounds.

6.7.33 To the northern edge of the Application Site is located Howe Farm. The modern farm contains a cluster of long cattle sheds and farm buildings, three farm cottages and outbuildings around a large courtyard. To the north-west of the farm, occupying the most northerly point of the site is a cluster of University research buildings. The buildings are of little intrinsic value to the landscape, and are generally two storeys in height except for two tall chimneys protruding from the centre of the Proposed Development, built circa 1960. They have been screened to an extent by two tall mature Leyland Cypresses. A further screening belt of tall Leyland trees exists along the boundary of the development adjacent to Huntingdon Road. The development and vegetation are not characteristic of the Claylands landscape type.

6.7.34 The World Conservation Monitoring Centre (WCMC) is located within the eastern portion of the Application Site adjacent to the Traveller's Rest Pit. It is visible from many areas within the Application Site and the surrounding landscape to the north, south and west, due to its long horizontal façade and roof against the open agricultural landscape. A cluster of research sheds and a late 20th-Century modern university building are also present. Another cluster of brick-built farm buildings, sheds and university research buildings is located in the south east corner of the Application Site with car parking and hard standing.

6.7.35 A public Right of Way crosses the Application Site just north of Howe Farm. This runs between Cambridge Road and Huntingdon Road, crossing beneath the M11 to form the only pedestrian link within the study area, between Girton (north) and Coton (south) and the Harcamlow/ Wimpole/ Whitwell Way (National Trail) via the American Cemetery. There are two other pedestrian footpaths and one bridleway within the study area; however these do not currently connect with the Application Site.

Summary of Site Character

6.7.36 In summary, the general character of the Application Site is that of a gently undulating lowland landscape offering expansive views of large-scale arable farmland, with hedgerows, drainage ditches, scattered mature tree species and mature woodland blocks. Glimpses of built development are possible through the mature vegetation cover. The dominant feature effecting the character of the site is the M11 motorway embankment which defines the western boundary and, due to its physical nature and presence, influences this otherwise rural hinterland. Sensitivity to change is considered to be **Medium**.

Visual Resource

6.7.37 The existing visual conditions have been recorded in order to gain an understanding of what makes the views of the Application Site and its surroundings distinctive, the important components or characteristics of those views, and how the area is changing. The existing visual resource is interrelated with the existing landscape resource, and these two sections should therefore be read as companion baseline appraisals.

6.7.38 The following baseline study of the visual resource is presented in two sections, which examine it from a broad through to detailed appraisal:

- A review of the overall visual characteristics of the Application Site and wider study area; and
- A review of individual viewpoints.

6.7.39 In addition to the photographs of the Application Site and its context shown in **Figures 6.10 and 6.11** and the pre-development ZTVs shown in **Figures 6.15 to 6.25** potential visual receptors are

shown in **Figure 6.13**. The locations of the twelve viewpoints selected for the assessment are shown on **Figure 6.14**.

Visual Characteristics and Principal Visual Receptors

6.7.40 From the west of the study area, views are generally extensive and panoramic across the open agricultural landscape, with linear shelterbelts and hedgerows framing views or helping to form screening of the transport corridor. Long-distance views are possible and offer glimpses of built development along the north-eastern edge of the site, and longer distance views are evident from elevated positions looking toward the historic skyline of Cambridge punctuated by occasional spires and towers.

6.7.41 Views within the urban areas situated north-east and east of the study area are restricted to short distance due to the built form and relatively level lie of the land. Views into Application Site are not possible except when there is a break in the built form. This is only possible at one point along Huntingdon Road. Here views are contained on either side, but unrestricted over the agricultural farmland allowing long distance views toward the open countryside of Coton and Madingley. Similarly in the south, views are restricted into the Application Site due to built form and also by tall vegetation cover.

6.7.42 Within the Application Site views are generally long and open due to the nature of the agricultural landscape and lack of screening vegetation. From the higher topography long distance views are possible to the west beyond the M11; however the transport route is visually obtrusive as the constant movement of vehicles along the route in an elevated position become a prominent focal feature in the otherwise relatively rural landscape.

6.7.43 Along the plateau bottom views are more contained within the Application Site due to the elevated motorway on one side, and the rising topography toward Huntingdon Road on the other. To the south of Pheasant Plantation views are shortened by the greater presence of hedgerow vegetation. Glimpses of roof tops and built facades along Huntingdon Road and within Conduit Road Conservation Area are visible amongst the mature vegetation in their respective gardens that back onto the Application Site.

Viewpoint Selection

Table 6.1 identifies the location of the twelve viewpoints, the types of receptors that they represent, the reasoning behind their selection and their sensitivity to change. The locations of the viewpoints are illustrated in **Figure 6.14** and described in detail in **Appendix 6.1**.

Table 6.1: Viewpoints visited within the Study Area

Viewpoint		Grid Reference	Distance from development	Receptor Groups	Rationale for Selection	Sensitivity to Change
1	Cambridge Road	TL 40270/59929	1,930.7 m (nearest point)	Road users, pedestrians, cyclists & horse riders	Minor road, bridleway & Right of Way. VP located on road at start of bridleway at brow of hill, close to regional Memorial (American Cemetery). View of site to north-east and glimpses of Cambridge's historic core and urban edge from the west.	High
2	Madingley Road approaching Cambridge	TL 41427/59447	956.8 m (nearest point)	Road users, pedestrians and cyclists	B-road on approach to Cambridge from west. VP located at break in shelterbelt screening allowing view across M11 corridor towards Howe Farm and associated farmland of site.	Low
3	Public footpath at Wrangling Corner	TL 41356/60300	828.8 m (nearest point)	Pedestrians	Right of Way which passes through site. VP located on stretch of footpath to west of site that is unscreened by shelterbelt planting. View across M11 & site towards western edge of Cambridge.	High
4	Madingley Road bridge over the M11 motorway	TL 42079/59395	483.2 m (nearest point)	Road users, pedestrians & cyclists	B-road on approach to Cambridge from west. VP located at break in shelterbelt screening allowing view northward along M11 corridor towards Howe Farm and associated farmland of site.	Medium-Low

Viewpoint		Grid Reference	Distance from development	Receptor Groups	Rationale for Selection	Sensitivity to Change
5	M11 motorway looking east	TL 42129/59734	187.8 m (nearest point)	Motorway users	M11 motorway. VP located on embankment looking east across southern part of site towards WCMC and horizon. View framed by existing woodland.	Low
6	M11 motorway looking north/north-east	TL 42123/59924	205.8 m (nearest point)	Motorway users	M11 motorway. VP located on embankment looking north-eastwards across northern part of site towards Howe Farm & Girton College beyond.	Low
7	M11 motorway looking south-east (Same location as VP6)	TL 42123/59924	205.8 m (nearest point)	Motorway users	M11 motorway. VP located on embankment looking south-eastwards across central part of site towards WCMC and horizon line. View framed by existing woodland.	Low
8	M11 motorway looking east/south-east	TL 41820/60791	181.6 m (nearest point)	Motorway users	M11 motorway. VP located on embankment looking east and south-eastwards across length of site with Howe Farm and Huntingdon Road properties in background on skyline.	Low
9	Howe Farm from Washpit Brook	TL 41927/60886	27.9 m (nearest point)	Pedestrians	Right of Way which passes through site. VP located on stretch of footpath to north of site that provides view along length of site and Huntingdon Road horizon line.	High
10	Howe Farm from footpath at Huntingdon Road	TL 42105/61090	4.4 m (nearest point)	Pedestrians	Right of Way and northern access point into site from Huntingdon Road.	High
11	Huntingdon Road looking over Trinity Farm	TL 43019/60392	195.5 m (nearest point)	Road users, pedestrians & cyclists	A-road on approach to north-western edge of Cambridge. VP located at break in built form between southern edge of Girton and Cambridge, looking south-westerly across central part of site.	Low

Viewpoint		Grid Reference	Distance from development	Receptor Groups	Rationale for Selection	Sensitivity to Change
12	Beck Brook Farm, The Avenue	TL 40178/61418	1,605 m (nearest point)	Road users, pedestrians & cyclists	B-road at the most north-western extent of site visibility.	Medium-Low

6.8 Likely Significant Effects

6.8.1 The nature of the effects relating to the landscape and visual resource which might arise as a result of the Proposed Development are:

- physical effect on the fabric of the Application Site;
- effect on the landscape character of the Application Site and study area; and
- effect on views from within the study area.

Potential Landscape Effects

6.8.2 The extent to which the Proposed Development is likely to affect the existing landscape character varies significantly depending on the individual components of the scheme and the capacity of the existing landscape to absorb these components.

6.8.3 The physical effects of the Proposed Development would be restricted to the area within the Application Site boundary and are the direct effects on the fabric of the Application Site. The main existing landscape elements within the Application Site are:

- Agricultural and arable fields;
- Hedgerow field boundaries;
- Watercourses and waterbodies;
- Footpaths;
- Buildings;
- Landform; and
- Tree and woodland features.

6.8.4 The Proposed Development avoids and manages any adverse physical effects by protecting, retaining and enhancing existing landscape elements including the existing brook, ancient trees and selected hedgerows. Any new traffic signals associated with the Madingley Road and Huntingdon Road junctions would add additional street furniture to an already busy urban road, which is taken into account in the baseline assessment.

6.8.5 Effects on landscape character would arise either through the introduction of new elements that alter the distinct and recognisable pattern of elements in a particular type of landscape, or through visibility of the development, which could alter the way in which the pattern of elements is perceived. The main landscape character receptors and issues are:

- The effect on the landscape character of the Bedfordshire & Cambridgeshire Claylands Landscape Character Area;
- The effect on the local landscape character of the Application Site and immediate surrounding area including setting of Cambridge; and
- The effect on designated landscapes.

Effects upon Regional Landscape Character Area*Area 3 – Western Claylands (Cambridgeshire Guidelines (1991))*

6.8.6 The Western Claylands LCA is a gently undulating landscape extending across a large section of south-west Cambridgeshire, subdivided by the shallow Ouse Valley LCA. The Application Site lies to the south-eastern periphery of this LCA and as such the Proposed Development would not be considered to materially affect the overall integrity of this regional character area. This is further supported by the proximity of the Application Site to the north-western urban edge of Cambridge. Whilst the sensitivity to change is considered to be medium the magnitude of change would be low both in 2014 and upon completion of the Proposed Development (2026).

6.8.7 Along the periphery of this LCA there will be a loss of farmland and open space to built development with the urban edge of Cambridge appearing to extend outwards into the edge of this LCA. The landscape principles for the Proposed Development will, however, assist the integration of the built form and urban/rural edge, redefining the north-west urban edge of Cambridge. Resulting effects are considered to be likely to be Minor Adverse and not significant for this regional character area both in 2014 and upon completion in 2026.

Effects upon Local Landscape Character

6.8.8 The local character areas (LCA) and local character types (LCT) identified in the Cambridge Green Belt Study (Landscape Design Associates, 2002) that would be directly affected by the Proposed Development are the following:

- LCA 5A – Western Claylands, part of the wider Claylands LCT
- TCA 2 – West Cambridge, part of the wider Bespoke houses and Colleges type

LCA 5A – Western Claylands

6.8.9 The Application Site lies almost entirely within this LCA which is considered to be of medium sensitivity to change. The Proposed Development up to 2014 would result in a medium magnitude of change becoming high once the scheme has been completed (2026). Resulting effects as at 2014 would be Moderate Adverse becoming Major Adverse once completed and Moderate Adverse once the landscape has established and matured (summer 15 years after completion). Effects are likely to be limited to the more eastern urban/rural interface of this character area.

6.8.10 The development of this area of land in effect re-defines the north western urban edge of Cambridge. The open, farmland will be lost in phases and replaced with built development set within a landscape framework where watercourses, trees, hedgerows are retained and enhanced with new planting, ponds and a network of paths. The Proposed Development retains an open farmland character towards the Western Edge, providing a buffer and functional transition between the Proposed Development and the M11. Whilst it is considered that the Proposed Development will have a significant adverse effect on this existing character area it could also be viewed that this character area will need to be re-defined with the new urban edge providing the new edge to the character area, thereby extending the townscape character area north-westwards with the Western Claylands LCA eastern boundary becoming defined by the boundary of the M11.

TCA 2 – West Cambridge (part of the wider Bespoke Houses and Colleges Townscape Type)

6.8.11 The Application Site boundary extends into a very small peripheral section of this TCA. Whilst the sensitivity to change is considered to be high for the TCA in 2014, there will be no direct effects on this TCA and the magnitude of change would result in a Negligible effect on a peripheral section of this TCA. Upon completion in 2026 the Proposed Development would involve the loss of some farm buildings and a small section of arable farmland contained within the periphery of this TCA which would be replaced with development. The loss of the farmland and buildings are features which are not typical characteristics of this townscape, where bespoke properties and college buildings predominate.

6.8.12 Direct effects would be restricted to a small, contained and peripheral section of the TCA and due to the more inward facing nature of much of this townscape area, the existing mature planting contained within it combined with the proposed boundary reinforcement planting, it is considered that the magnitude of change during summer 15 years after scheme completion would be low. This would result in a localised Minor Adverse effect to this townscape character area.

Effects upon Designated Landscapes

6.8.13 Effects on Conservation Areas are assessed in Chapter 10 Cultural Heritage.

Green Belt

6.8.14 Approximately 50 ha within the Application Site will be retained as Green Belt. The Green Belt will provide a setting for the Proposed Development as well as redefine the new urban edge of Cambridge. The Green Belt will also provide a functional buffer between the Proposed Development and the motorway, while preserving an open and agricultural landscape character.

6.8.15 The Proposed Development has allocated a series of uses within the Green Belt, all of which are permitted and aligned with the purposes of this designation. These uses include community farmland, sports pitches, pavilions, and allotments. As the Proposed Development enhances the functions and features of the Green Belt there will be no direct adverse effects on the Green Belt, and this would result in Negligible effect.

Historic Gardens and Designed Landscapes***Madingley Park***

6.8.16 The site assessment suggests that there will be potential views of the Proposed Development from Madingley Park, particularly from Madingley Hall which is located at a high point and has open views towards the south-east. The effects of the Proposed Development on this designated landscape would be similar to those on Viewpoint 12. However, the views will be distant and the Proposed Development will be seen as part of and in context with Cambridge City edge, resulting in no direct effects on the amenity uses of this designated landscape and the magnitude of change would be negligible. This would result in a Negligible effect on Madingley Park.

American Cemetery

6.8.17 The site assessment suggests that there will be potential views of the Proposed Development from the American Cemetery. These outward views, however, do not form part of the designed experience of visiting this designated landscape, as its character is more inward looking and contained. The effects of the development on this designated landscape would be similar to those on Viewpoint 1. The views will be distant and the development will be seen in context with Cambridge City edge, resulting in no direct effects on this designated landscape as the magnitude of change would be negligible. This would result in a Negligible effect on the American Cemetery.

Coton Countryside Reserve

6.8.18 The site assessment suggests that there will be potential views of the Proposed Development from some of the high points within Coton Countryside Reserve. Upon visiting the reserve, it was concluded that these views would be distant, in some cases partially screened by existing vegetation and perceived as part of the Cambridge City edge. The character and amenity attributes of this reserve will not be directly affected and the magnitude of change would be negligible. This would result in a Negligible effect on the Coton Countryside Reserve.

Table 6.2: Summary of Landscape Effects

Landscape Resource	Sensitivity to Change	Magnitude of Change			Significance of Effects		
		2014	Winter year of Completion (2026)	Summer 15 years after completion	2014	Winter year of Completion (2026)	Summer 15 years after completion
Regional Landscape Character Area <i>Area 3 – Western Claylands</i>	Medium	Low	Low	Low	Minor- Adverse	Minor- Adverse	Minor- Adverse
LCA 5A <i>Western Claylands</i>	Medium	Medium	High	Medium	Moderate-Adverse*	Major-Adverse*	Moderate-Adverse*
TCA 2 <i>West Cambridge</i>	High	Negligible	Low	Low	Neutral	Minor-Adverse	Minor-Adverse
Green Belt	Medium	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Madingley Park	High	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
American Cemetery	Medium	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Coton Countryside Reserve	Medium	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

* It should be noted that these effects are limited to the more eastern urban/rural interface of this character area and do not affect the wider integrity of the Western Claylands LCA

Visual Effects

6.8.19 The following section describes the visual effect in 2014, upon completion (2026) and summer 15 years after completion on the receptors represented in the twelve viewpoints. The viewpoint assessment also demonstrates the differential in the mitigating effect of existing vegetation in winter and summer, when vegetation is in leaf.

6.8.20 These descriptions and evaluations are followed by **Table 6.3** which summaries the sensitivity, magnitude of change, and significance of effect for the interim development phase, upon completion and summer 15 years after completion for the 12 representative viewpoints.

6.8.21 Reference should also be made to the ZTV maps contained in **Figures 6.26 to 6.47** and the Photomontages in **Figures 6.48 to 6.55**.

Construction Effects

6.8.22 As the Proposed Development progresses, residents and other users will take up occupancy and will consequently have the potential as internal receptors to experience views of the ongoing construction works of the remaining development area (under construction from 2014 to 2026). Receptors within the area are likely to experience views of the construction works, plant and machinery for a number of years, as well as phases of the completed development. The extent of work visible for each receptor will be dependent on factors such as the orientation of view and the location of the receptor within the Proposed Development. Some receptors are likely to continue to experience views of the farmed land which will continue to be worked until the phased development extends into this area. Given that the baseline visual experience in 2014 will have changed from the current one described in the Baseline Conditions Section of this Chapter and that construction activity will be visible as elements within their baseline visual experience along with views extending to the wider landscape and townscape of Cambridge, it is considered that receptors within the Proposed Development will not experience significant adverse visual effects.

6.8.23 Visual effects on external receptors may arise from construction operations and associated components such as the installation of visible plant such as tower cranes, temporary site lighting, temporary screening and security fencing, visible security measures, erection of temporary buildings on site, earthworks, bunding and material stockpiling. Measures to avoid and manage any effects will be employed during the construction period and delivered through the Construction and Environmental Management Plan which will limit night time working, stipulate working hours, consider appropriate visual screening of the operations and ensure the careful siting of construction compounds away from the most sensitive visual receptors.

6.8.24 Given the scale and duration of construction activity related to the Application Site, it is predicted that the combination of further construction activity as a result of the NIAB1, NIAB2 and West Cambridge sites would result in a slight increase in magnitude during the construction period. However, cumulative construction activity is not likely to intensify the effects to such a degree that would be considered materially more significant than would be the case for the Proposed Development in isolation.

6.8.25 Visual Effects- Viewpoints**Viewpoint 1 – Cambridge Road (Figures 6.26, 6.37 and 6.48)**

Grid Reference: T L 40270/59929

Direction of View: North-east

Sensitivity: High

Predicted Visibility

6.8.26 **Figure 6.26** indicates that all but three of the building blocks would be theoretically visible from this viewpoint in long, distant views in 2014 with the more northerly and western blocks visible upon completion. These visible blocks would screen the remaining development beyond.

Visibility of Local Centre Energy Centre Flue (72.5m AOD)**Distance from VP: 2,428.4 m**

6.8.27 The flue would appear beyond the height of the development and breaks the skyline, although the photomontage potentially overstates the prominence of this element.

Visibility of NW Corner Potential Energy Centre Flue (83.5m AOD)**Distance from VP: 1,961.1 m**

6.8.28 The flue would be visible from this viewpoint rising above the woodland planting in the mid-ground. The flue is a new vertical element that breaks the skyline and extends the visual interest beyond the existing shelterbelt. From this view, the flue appears to be disassociated with the Proposed Development.

Magnitude of Change

2014: Negligible-Low

Winter year of completion (2026): Low

Summer year 15 after completion (2041): Low

6.8.29 Although the Proposed Development would be visible in the central portion of the view, the Proposed Development would fit into the woodland pattern of the middle ground and follow the existing characteristics of built form being glimpsed through tree planting. The south-eastern portions of the Proposed Development may rise above rather than have a backdrop of existing woodland. The magnitude of change arising from the Proposed Development is considered to be low-negligible as at 2014 and low upon completion (2026). Following the establishment of the landform and planting along the western boundary of the Application Site this magnitude would be reduced in the longer term (2041) to Low-Negligible.

Significance of Effect

2014: Negligible

Winter year of completion (2026): Minor-Adverse

Summer year 15 after completion (2041): Minor-Adverse

6.8.30 At 2014, a very small section of the Proposed Development would be visible from this viewpoint resulting in a Negligible effect.

6.8.31 Upon completion of the Proposed Development (2026) the built development would be glimpsed through the existing woodland in mid-ground views. In the distance, there will be a disruption of the skyline with new vertical elements (Energy Centre Flues) rising above the development and existing planting. The partial disruption of the skyline to the south-east in conjunction with the enhancement of existing planting on the western boundary and the retention of agricultural land in the foreground of the view would result in a Minor Adverse effect both upon completion and in summer 15 years after completion (2041).

Viewpoint 2 – Madingley Road approaching Cambridge (Figures 6.27, 6.38 and 6.49)**Grid Reference:** TL 41427/ 59447**Direction of View:** North-east**Sensitivity:** Low**Predicted Visibility**

6.8.32 **Figure 6.27** indicates that as at 2014, the facades of the building blocks would be theoretically visible in peripheral edges of the view from this location. The majority of the view is centred in the distance on the more north westerly parts of the Application Site (un-developed at this stage of construction). At 2026, upon completion of the Proposed Development the theoretical visibility would extend to encompass the northerly building blocks and the facades of some of the buildings within the more central parts of the Application Site.

Visibility of Local Centre Energy Centre Flue (72.5m AOD)**Distance from VP: 1,305.9 m**

6.8.33 The flue is not visible from this location as it is fully screened by existing vegetation.

Visibility of NW Corner Potential Energy Centre Flue (83.5m AOD)**Distance from VP: 1,765.4 m**

6.8.34 From this viewpoint the flue is barely discernible towards the north as it blends against the vegetation in the skyline and the trees in the mid-ground of this view.

Magnitude of Change

2014: Negligible-low

Winter year of completion (2026): low-medium

Summer year 15 after completion (2041): low

6.8.35 The Proposed Development will be partially screened by the existing hedge, with only glimpses of the Proposed Development exposed during the winter. The magnitude of change arising from the Proposed Development is considered to be negligible-low at 2014. At Development Completion (2026) when this view is revealed, the development would extend across the majority of the extent of the view in the middle ground. The farmland and wooded foreground, woodland backdrop, and the prominent line of the M11 and moving traffic will remain as notable components of the view. The magnitude of change arising from the Proposed Development at 2026 is considered to be low-medium. The retention and enhancement of existing vegetation along the south-western boundary of the Application Site, and the proposed topography to the north-west will further reduce the magnitude of change to low in the long-term (2041).

Significance of Effect

2014: Negligible

Winter year of completion (2026): Minor- Moderate Adverse

Summer year 15 after completion (2041): Minor-Adverse

6.8.36 At 2014, the Proposed Development would be partially visible where there are gaps within the hedge or during winter time, resulting in a Negligible effect.

6.8.37 As the vegetation continues to mature upon completion of the Proposed Development (2026), glimpses of the built development would be revealed through the existing hedge during winter. The enhancement of vegetation along the western boundary of the development, in addition to the retention of agricultural land in the foreground of the view, would result in a Minor-Moderate Adverse effect upon completion and a Minor-Adverse effect in summer 15 years after completion (2041).

Viewpoint 3 – Public footpath at Wrangling Corner (Figures 6.28, 6.39 and 6.50)**Grid Reference:** TL 41356/ 60300**Direction of View:** North-east**Sensitivity:** High**Predicted Visibility**

6.8.38 **Figure 6.28** indicates that at 2014, some building block facades would be theoretically visible from this viewpoint. Upon completion, the building blocks to the north and western sections of the Application Site would be partially visible as existing vegetation provides screening. The blocks beyond would be largely concealed by the intervening buildings.

Visibility of Local Centre Energy Centre Flue (72.5m AOD)**Distance from VP: 1,461.3 m**

6.8.39 The flue would be barely discernible from this viewpoint towards the far south and is not the central focus of this view. Due to its location, the flue would be perceived as part of the development.

Visibility of NW Corner Potential Energy Centre Flue (83.5m AOD)**Distance from VP: 978.1 m**

6.8.40 The flue would be barely discernible from this viewpoint towards the extremity of the viewpoint and is not the central focus of this view. The flue would blend against the existing vegetation in the background and hedge in the foreground. Furthermore trees are often seen against the skyline from this viewpoint and consequently the flue is less visible as a result.

Magnitude of Change

2014: Low

Winter year of completion (2026): Medium-low

Summer year 15 after completion (2041): Medium-low

6.8.41 The magnitude of change arising from the Proposed Development is considered to be low during 2014. The Proposed Development will only affect one direction of the view (north-west) and the enhancement of existing vegetation along the western boundary of the Application Site will result in a medium-low magnitude of change at development completion (2026) and in the long term (2041).

Significance of Effect

2014: Minor-Adverse

Winter year of completion (2026): Minor-Moderate Adverse

Summer year 15 after completion (2041): Minor-Moderate Adverse

6.8.42 At 2014, the Proposed Development would be partially visible towards one end of the view resulting in Minor Adverse effect.

6.8.43 Upon completion of the development (2026) the built development would be visible through the existing woodland, but without major disruption to the existing skyline or the agricultural land in the foreground. The high sensitivity of this viewpoint would result in a Minor-Moderate Adverse effect upon completion and a Minor-Moderate Adverse effect in summer 15 years after completion.

Viewpoint 4 – Madingley Road bridge over the M11 motorway (Figures 6.29 and 6.40)**Grid Reference:** TL 42079/ 59395**Direction of View:** North-east**Sensitivity:** Medium-Low**Predicted Visibility**

6.8.44 **Figure 6.29** indicates that at 2014, none of the Proposed Development would be visible from this viewpoint with the building blocks to the north and western sections of the site theoretically visible at 2026 once development is complete.

Magnitude of Change

2014: No view

Winter year of completion (2026): Low

Summer year 15 after completion (2041): Low

6.8.45 Up to 2014 there will be no view of the Proposed Development. At development completion (2026), both motorway users and pedestrians on the bridge will have a direct view of the site; however it would form a small and relatively distant component. Closer views of the eastern part of the site would be

peripheral to the view and predominantly screened by dense banks of trees. The Proposed Development would only be glimpsed behind the trees to the east, and although forming a new horizon line in the centre of the view, it would essentially replace the existing line of buildings and retain the foreground as open space. Therefore, the magnitude of change at completion (2026) and in the long term (2041) is considered to be low.

Significance of Effect

2014: Negligible

Winter year of completion (2026): Minor-Adverse

Summer year 15 after completion (2041): Minor-Adverse

6.8.46 At 2014, none of the Proposed Development would be visible from this viewpoint, resulting in no effect.

6.8.47 Upon completion of the development (2026) the built development would replace the existing line of buildings in the foreground, this change being more apparent to pedestrians than vehicular passengers who will only experience fleeting views of the development. The enhancement of the existing vegetation would result in a Minor Adverse effect both upon completion and in summer 15 years after completion.

Viewpoint 5 – M11 motorway looking east (Figures 6.30, 6.41)

Grid Reference: TL 42129/ 59734

Direction of View: East

Sensitivity: Low

Predicted Visibility

6.8.48 **Figure 6.30** indicates that the closest building blocks would be theoretically visible from this viewpoint at 2014. Upon completion in 2026, the ZTV suggests that the area of sports pitches and pavilion adjacent to the Maddingley Park and Ride and the facades of the two immediate building blocks would be visible from this viewpoint.

Magnitude of Change

2014: Low-negligible

Winter year of completion (2026): medium

Summer year 15 after completion (2041): Low

6.8.49 At 2014, the magnitude of change arising from the Proposed Development will be low-negligible. At development completion (2026), the Proposed Development would retain the strong hedgerow and wooded elements for the width of the view, including the prominent vertical elements of the hedgerow trees. Glimpses of Proposed Development would be revealed through the hedge during winter time, resulting in a medium magnitude of change at development completion (2026) and low in the longer term (2041).

Significance of Effect

2014: Minor-Adverse

Winter year of completion (2026): Minor-Moderate Adverse

Summer year 15 after completion (2041): Minor-Adverse

6.8.50 At 2014, the Proposed Development would be partially visible through gaps in the hedge during winter time, but the open agricultural foreground retained, resulting in Minor-Adverse effect.

6.8.51 At completion of the Proposed Development (2026) elements related to the proposed sports areas in the foreground, including any associated pavilion, may be visible through the hedge. In addition, new areas of planting and the enhancement of the existing hedge would result in a Minor-Moderate Adverse effect. The low sensitivity on this viewpoint, combined with the fleeting nature of the view, and the maturation of planting in summer 15 years after completion, is likely to result in Minor-Adverse effects on this view.

Viewpoint 6 – M11 motorway looking north/north-east (Figures 6.31, 6.42 and 6.51)

Grid Reference: TL 42123/ 59924

Direction of View: East

Sensitivity: Low

Predicted Visibility

6.8.52 **Figure 6.31** indicates that at 2014 some of the building facades would be visible although the majority of the view of the site would encompass the agricultural land. Upon completion the western edge of the Proposed Development would theoretically be visible along with some of the building blocks beyond.

Magnitude of Change

2014: Low

Winter year of completion (2026): Medium

Summer year 15 after completion (2041): Medium-low

6.8.53 At 2014, the magnitude of change arising from the Proposed Development is considered to be low. At development completion (2026), buildings within the Proposed Development will extend almost the entire breadth of the view in the middle ground. The existing fields of the mid-ground would be replaced by built development, and would rise above and occlude views of the wooded skyline to the east. To the north east, the buildings and parkland trees along Huntingdon Road would be partially screened by buildings within the Proposed Development. The building heights are retained below the skyline, allowing the wooded backdrop to remain as a notable feature. The proposed modifications to landform set out as part of the landscape principles and application parameters, tilting upwards towards the built area within the Proposed Development will help reduce the magnitude by screening the lower levels of the buildings within the Proposed Development, while maintaining the focus of the view on the fields in the foreground. The resulting magnitude of change arising from the development at development completion (2026) is considered to be medium. In the longer term, summer 15 years after completion (2041), the magnitude of change is considered to be medium-low as a result of continued maturation of planting.

Significance of Effect

2014: Minor-Adverse

Winter year of completion (2026): Minor-Moderate-Adverse

Summer year 15 after completion (2041): Minor-Moderate Adverse

6.8.54 At 2014, the Proposed Development would be partially visible in mid ground views resulting in Minor Adverse effect. The proposals suggest that the University Farm will be kept in operation and phased out as the development comes forward. This progressive change over a long period of time can reduce the effects on this viewpoint in the long term.

6.8.55 Upon completion of the Proposed Development (2026) the built development would be the main component of the view in the mid ground, resulting in a Minor-Moderate Adverse effect. The establishment of the landscape proposals and new setting in summer 15 years after completion would reduce the magnitude of change, although the effect would remain Minor-Moderate Adverse.

Viewpoint 7 – M11 motorway looking south-east (Figures 6.31, 6.42 and 6.52)

Grid Reference: TL 42123/ 59924

Direction of View: East/North-east

Sensitivity: Low

Predicted Visibility

6.8.56 **Figure 6.31** indicates that the majority of the view from this viewpoint in 2014 would be focussed on the agricultural land with the some of the building facades visible in the distance. Upon completion

western facades of the building blocks would be visible along with some of the blocks beyond. The south eastern part of the Application Site would not be visible from this viewpoint.

Magnitude of Change

2014: Low

Winter year of completion (2026): Medium

Summer year 15 after completion (2041): Medium-Low

6.8.57 At 2014, the magnitude of change arising from the proposed development is considered to be low. At development completion (2026), the Proposed Development would extend across the entire breadth of the view in the middle ground. The existing fields of the mid-ground would be replaced by built development and would rise above and occlude views of the wooded horizon-line to the south. The proposed building heights remain in a continuous line falling away to the south-east and away from the motorway. The wooded backdrop is occluded by the built form, while in the foreground the existing vegetation and brook will be retained.

6.8.58 The proposed modifications to landform, tilting upwards towards the built development would help reduce the magnitude of change by screening much of the lower levels of the buildings within the Proposed Development with some sections screened to full building height. The focus of the view on the fields in the foreground would be maintained as a result of this screening effect and the proposed maturing landscape would further reduce the magnitude over time. The magnitude of change arising from the Proposed Development is considered to be medium at development completion (2026) and medium-low in the longer term (2041) as a result of continued maturation of planting.

Significance of Effect

2014: Minor-Adverse

Winter year of completion (2026): Minor-Moderate-Adverse

Summer year 15 after completion (2041): Minor-Moderate Adverse

6.8.59 At 2014, the Proposed Development would be partially visible in mid ground views resulting in Minor Adverse effect. The proposals suggest that the University Farm will be kept in operation and phased out as the development comes forward. This progressive change over a long period of time can help reduce the effects on this viewpoint in the long term.

6.8.60 Upon completion of the Proposed Development (2026) the built development would be a notable component of the view in the mid ground, resulting in a Minor-Moderate Adverse effect. The establishment of the landscape proposals and new setting in summer 15 years after completion would reduce the magnitude of change, although the effect would remain Minor-Moderate Adverse effect.

Viewpoint 8 – M11 motorway looking east/south-east (Figures 6.32, 6.43 and 6.53)

Grid Reference: TL 41820/ 60791

Direction of View: East/South-east

Sensitivity: Low

Predicted Visibility

6.8.61 **Figure 6.32** indicates that at 2014 the majority of the view from this viewpoint would be focussed on the agricultural land in the foreground with some of the building block facades visible in the distance. Upon completion in 2026, the building blocks in the immediate foreground view would be visible along with some of the blocks which fringe the Western Edge of the site along with the western landscape band.

Magnitude of Change

2014: Low-negligible

Winter year of completion (2026): Medium-high

Summer year 15 after completion (2041): Medium

6.8.62 At 2014, the magnitude of change arising from the Proposed Development is considered to be low-negligible. At development completion (2026), the buildings within the Proposed Development would extend for the complete breadth of this view in the middle ground. The rising fields of the mid-ground would be replaced by built development and would rise above and occlude much of the wooded skyline. The proposed modifications to landform that intervene and obscure the buildings within the Proposed Development would screen the majority of sections within this view to full building height. The retention of the tree-lined watercourse would allow this to remain as an important feature providing an additional screening element and the foreground of farmland, brook and scattered trees remains free of built development. The resulting magnitude of change arising from the Proposed Development is considered to be Medium-high at development completion (2026) and medium in the longer term (2041).

Significance of Effect

2014: Negligible

Winter year of completion (2026): Moderate-Major Adverse

Summer year 15 after completion (2041): Moderate Adverse

6.8.63 At 2014, the Proposed Development would only be visible in the background resulting in a Negligible effect. The University Farm will be kept in operation and phased out as the development comes forward. This progressive change over a long period of time can help reduce the effects on this viewpoint in the long term.

6.8.64 Upon completion of the Proposed Development (2026) the built development would be visible in mid ground. There will be a disruption of the skyline, but given the fleeting nature of this view and the progressive change, the result is a Moderate-major adverse effect. In summer 15 years after completion, the landscape proposals including the proposed topography, will have matured and defined a new setting for the development, resulting in Moderate adverse effect.

Viewpoint 9 – Howe Farm from Washpit Brook (Figures 6.33 and 6.44)

Grid Reference: TL 41927/ 60886

Direction of View: North-east

Sensitivity: High

Predicted Visibility

6.8.65 **Figure 6.33** indicates that at 2014 the Proposed Development would be visible in distant views from this viewpoint although the existing agricultural land would be prominent in foreground views. Upon completion the immediate building blocks would be visible in view and these would conceal the majority of development beyond other than sections of the facades which line the Western Edge of the built area.

Magnitude of Change

2014: Low-Negligible

Winter year of completion (2026): High

Summer year 15 after completion (2041): High

6.8.66 At 2014, the magnitude of change arising from the proposed development is considered to be low-negligible. Once completed (2026), the Proposed Development will extend for the complete breadth of this view in the middle ground, and occlude and rise above the tree-lined horizon of Huntingdon Road. The immediate foreground of farmland and hedgerows would remain free of built development and would have new planting and landscape features incorporated, reducing this change in the longer term. Although the proposals retain the foreground and the framing trees on each side, they also completely occlude the background and occupy most of the width of the view close to the receptors. The magnitude of change arising from the Proposed Development is therefore considered to be high at development completion (2026) and in the longer term (2041)

Significance of Effect

2014: Negligible

Winter year of completion (2026): Major Adverse

Summer year 15 after completion (2041): Major Adverse

6.8.67 At 2014, the Proposed Development would only be visible in the background resulting in a negligible effect. The University Farm will be kept in operation and phased out as the development comes forward. This progressive change over a long period of time can help mitigate the effects on this viewpoint in the long term.

6.8.68 Upon completion of the Proposed Development (2026) the built development would be immediately visible in the foreground, resulting in a Major adverse effect both upon completion and in summer 15 years after completion.

Viewpoint 10 – Howe Farm from footpath at Huntingdon Road (Figures 6.34, 6.45 and 6.54)

Grid Reference: TL 42105/ 61090

Direction of View: South-west

Sensitivity: High

Predicted Visibility

6.8.69 **Figure 6.34** indicates that at 2014, none of the Proposed Development would be visible from this viewpoint. Upon completion in 2026, the immediate building blocks would be visible in view and these would conceal all other development beyond.

Magnitude of Change

2014: No View

Winter year of completion (2026): High

Summer year 15 after completion (2041): High

6.8.70 At 2014, there will be no view of the Proposed Development. At Development Completion (2026) the Proposed Development would extend across the majority of the view in the foreground completely occluding above and beyond the horizon to the south and southeast. The development stops short of the public footpath maintaining a route and view corridor in a south-westerly direction. The wooded horizon remains visible in the far distance, retaining a connection beyond. The magnitude of change to the view that would arise would be high at development completion (2026) and in the long term (2041).

Significance of Effect

2014: Negligible

Winter year of completion (2026): Major Adverse

Summer year 15 after completion (2041): Major Adverse

6.8.71 At 2014, the Proposed Development would not be visible in mid ground views. The University Farm will be kept in operation and phased out as the development comes forward. This progressive change over a long period of time can help reduce the effects on this viewpoint in the long term.

6.8.72 Upon completion of the Proposed Development (2026) the built development would be immediately visible in the foreground, resulting in a Major adverse effect both upon completion and in summer 15 years after completion.

Viewpoint 11 – Huntingdon Road looking over Trinity Farm (Figures 6.35, 6.46 and 6.55)

Grid Reference: TL 43019/ 60392

Direction of View: South-west

Sensitivity: Low

Predicted Visibility

6.8.73 **Figure 6.35** indicates that at 2014 some of the facades of the Proposed Development would be theoretically visible from this viewpoint. The ZTV however does not take account of a hedgerow which

runs along the road to the back of the footpath which in effect conceals views of the Application Site. The hedgerow is too narrow to be picked up on the digital surface model. Similarly upon scheme completion the ZTV suggests theoretical visibility of a number of the building blocks in the centre of the site along with foreground views of the Girton Gap landscape proposals. Again the hedgerow would screen the majority of views from this viewpoint with only occasional filtered views remaining.

Magnitude of Change

2014: Low

Winter year of completion (2026): Low

Summer year 15 after completion (2041): Low

6.8.74 At 2014, the magnitude of change arising from the proposed development is considered to be low. At development completion (2026), the Proposed Development will occupy the central portion of the mid-to background of this view. The enclosing elements of hedgerow, research buildings and tree lines in gardens that define this open space remain intact, and the open space in the foreground will remain free from development. The backdrop of woodland in the centre of the view will, however, be entirely occluded by built development in both proposals. The magnitude of change arising from the Proposed Development at Development Completion (2026) and in the long term (2041) is considered to be low as most of the view at eye level is blocked by an existing hedge and the experience along this road is strongly framed by planting and focused. The establishment of a new series of open spaces along the northern entrance into the Application Site will reinforce the open space corridor while filtering views of the proposals in the longer term.

Significance of Effect

2014: Minor-Adverse

Winter year of completion (2026): Minor-Adverse

Summer year 15 after completion (2041): Minor-Adverse

6.8.75 At 2014, the Proposed Development including the sports areas and associated infrastructure including flood lights would have been completed. These elements may be partially visible above the hedge and could result in a Minor Adverse effect.

6.8.76 The built development would be glimpsed through the existing hedge during winter in mid-ground views resulting in a Minor Adverse effect both upon completion in 2026 and in summer 15 years after completion.

Viewpoint 12 – Beck Brook Farm, The Avenue (Figures 6.36 and 6.47)

Grid Reference: TL 40178/ 61418

Direction of View: South-east

Sensitivity: Medium-Low

Predicted Visibility

6.8.77 **Figure 6.36** indicates that at 2014, some of the building facades would have been completed and distant views of these would theoretically be visible from this viewpoint. Upon completion in 2026, a number of building blocks across the Application Site would be visible in distant views from this viewpoint.

Magnitude of Change

2014: Negligible

Winter year of completion (2026): Low

Summer year 15 after completion (2041): Negligible

6.8.78 The Proposed Development occupies a small central part of the backdrop to the view, with much being screened by the strong belts of woodland. The magnitude of change would be negligible in 2014, at 2026 it would be low at most and negligible in the long term (2041).

Significance of Effect

2014: Negligible

Winter year of completion (2026): Minor-Adverse

Summer year 15 after completion (2041): Negligible

6.8.79 At 2014, the Proposed Development would only be partially visible in background views resulting in a Negligible effect.

6.8.80 Upon completion of the Proposed Development (2026) the built development would be glimpsed through the existing woodland and shelterbelts. Partial disruption of the skyline would result in a Minor Adverse effect upon completion. Once the landscape proposals begin to mature and provide a new setting for the Proposed Development, the effect would be negligible.

Table 6.3: Summary of Potential Visual Effects

Viewpoint	Sensitivity to Change	Magnitude of Change			Significance of Impacts		
		2014	Winter year of Completion (2026)	Summer 15 years after completion	2014	Winter year of Completion (2026)	Summer 15 years after completion
1	High	Negligible-Low	Low	Low	Negligible	Minor Adverse	Minor Adverse
2	Low	Negligible-Low	Low-Medium	Low	Negligible	Minor-Moderate Adverse	Minor Adverse
3	High	Low	Medium-Low	Medium-Low	Minor Adverse	Minor-Moderate Adverse	Minor-Moderate Adverse
4	Medium-Low	No View	Low	Low	Negligible	Minor Adverse	Minor Adverse
5	Low	Low-Negligible	Medium	Low	Minor- Adverse	Minor-Moderate Adverse	Minor Adverse
6	Low	Low	Medium	Medium-Low	Minor Adverse	Minor-Moderate Adverse	Minor-Moderate Adverse
7	Low	Low	Medium	Medium-Low	Minor adverse	Minor-Moderate Adverse	Minor-Moderate Adverse
8	Low	Low-Negligible	Medium-High	Medium	Negligible	Moderate-Major Adverse	Moderate Adverse
9	High	Negligible	High	High	Negligible	Major Adverse	Major Adverse
10	High	No View	High	High	Negligible	Major Adverse	Major Adverse
11	Low	Low	Low	Low	Minor Adverse	Minor Adverse	Minor Adverse
12	Medium-Low	Negligible	Low	Negligible	Negligible	Minor Adverse	Negligible

6.9 Cumulative Effects

6.9.1 This section considers the cumulative landscape and visual effects of the Proposed Development when considered in tandem with other developments in the vicinity. The three developments which are considered to have the potential to incur cumulative effects on the landscape and visual resource are NIAB1, NIAB2 and West Cambridge. The location of these developments in relation to the Application Site is illustrated in **Figure 6.8**. Northstowe and Orchard Park are not included for the purpose of the Landscape and Visual Assessment due to their distance from the Application Site.

6.9.2 NIAB1 lies to the north-east of the Application Site located on land between Huntingdon Road and Histon Road and comprises a mixed use development of up to 1593 dwellings, primary school, community facilities, retail units and associated infrastructure including vehicular, pedestrian and cycleway accesses, open space and drainage works. The application is resolved to be approved with the S106 under negotiation.

6.9.3 NIAB2 also lies to the north-east of the Application Site, located on land between Huntingdon Road and Histon Road, within the South Cambridgeshire District administrative area. The site has been allocated in the South Cambridgeshire Site Specific Policies DPD for residential development as well as for provision of a secondary school to serve the North West Quadrant. No application has been submitted.

6.9.4 West Cambridge lies to the south of the Application Site. The development is an edge of town University Campus based around research facilities. The first buildings were completed in the 1950s with later additions in the 1970s and recently in the last ten years. The central and northern areas of West Cambridge have been delivered and are currently in operation. The character of this development is of large buildings set in an open landscape framed by wide streetscapes. Other associated uses include car parking and several residential blocks.

Construction

6.9.5 Given the scale and duration of construction activity related to the Application Site, it is predicted that the combination of further construction activity as a result of the NIAB1, NIAB2 and West Cambridge sites would result in a slight increase in magnitude during the construction period. However, cumulative construction activity is not likely to intensify the effects to such a degree that would be considered materially more significant than would be the case for the Proposed Development in isolation.

Landscape Character

6.9.6 NIAB1 and NIAB2 lie within Landscape Character Area 2A Western Fen Edge which is a different LCA to the development site (Western Claylands). It is therefore considered that there will be no direct effect on the landscape character of the Western Claylands LCA as a result of the NIAB1 or NIAB2 development and that consequently no cumulative effects would result.

6.9.7 West Cambridge development lies within Townscape Area 2, West Cambridge (part of the wider Bespoke Houses and Colleges Townscape Type). The Proposed Development is considered to result in a Minor Adverse effect to a small, localised and peripheral part of this TCA and not affect the integrity of it or the principal features and characteristics which define it. When considering the West Cambridge site which is under construction in combination with the proposed site it is not considered likely to result in significant cumulative effects greater than the effects of either of the individual developments.

Visual Amenity

6.9.8 **Figures 6.37, 6.38 and 6.47** represent the theoretical modelled maximum extent to which any part of the Application Site would be visible from within the wider landscape. These figures indicate that there is no theoretical intervisibility between the Application Site and NIAB1, NIAB2 or West Cambridge. These developments would theoretically experience views of parts of the Application Site although they would not be viewed in combination. It is also unlikely that the three developments would be seen in combination due to the intervening urban form.

6.9.9 From reviewing the specific viewpoint ZTVs (**Figures 6.26-6.47**) none of NIAB1, NIAB2 or the West Cambridge development would be visible in combination with the site from any of the 12 viewpoints assessed. It is therefore considered that no significant cumulative effects would be likely.

6.10 Assessment of Night-time Lighting Effects

6.10.1 This section of the LVIA presents an assessment of the likely significant night-time artificial lighting effects of the Proposed Development on residential properties adjacent to the site, wildlife / habitat on and around the site and 2 local observatories.

6.10.2 The assessment addresses the following components:

- baseline lighting conditions;
- sensitivity of receptors;
- Identify required lighting provisions for the Proposed Development:
 - o 2014
 - o 2026
- cumulative lighting condition variance of:
 - o Construction phase
 - o 2014
 - o 2026
- Summary and conclusions.

Planning policy context

6.10.3 This section indicates relevant lighting legislation and good practice guidance.

Legislation :Relevant lighting legislation

6.10.4 Clean Neighbourhoods and Environment Act 2005, Section 102.

6.10.5 Standards informing building regulations

- BS 5489-1:2003 – Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas.
- BS EN 13201-2:2003 – Code of practice for the design of road lighting – Part 2: Performance requirements.
- BS EN 12193:2007 – Code of practice for the design of sports lighting – Light + Lighting – Sport Lighting

National good practice planning guidance : Relevant lighting good practice

6.10.6 Lighting in the Countryside: Towards Good Practice, July 1997. Reference document on exterior lighting and classification as it applies to the British countryside. Includes guidance and recommendations for development limitations based on context.

6.10.7 CIE – Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations. Document referenced by the Clean Neighbourhoods and Environment Act 2005 to inform consideration of artificial lighting.

6.10.8 CIE – Guide to the Lighting of Urban Areas. Document referenced by codes of practice for the design of road lighting Parts 1 and 2.

6.10.9 Guidance Notes for the Reduction of Obtrusive Light, 2005. Reference document published by the Institute of Lighting Engineers covering how to control and reduce light pollution. It includes guidance on suggested controls for exterior lighting dependant on context.

6.10.10 CIBSIE: Code for Lighting 2006. Reference document published by the Chartered Institute of Building Services Engineers covering good practice interior and exterior lighting.

Transportation guidance

6.10.11 The following points indicate relevant transportation lighting good practice requirements

- Design Manual for Roads and Bridges, Volume 8, Section 3 TD 34/07 (DMRB) – Design of road lighting for the strategic motorway and all purpose trunk road network.

Assessment Approach

6.10.12 This section indicates the methodology used in undertaking the study and guidance on interpreting its findings.

Identify a baseline lighting condition

6.10.13 This assessment considers the baseline lighting condition to be that which is experienced by local residents and ecology, and effects to local observatories, with the existing lighting provision in place. The baseline lighting condition has been confirmed by review of current site record photography and site survey information.

6.10.14 The lighting provisions, or sources, of the baseline lighting condition considered in this chapter include:

- Madingley Road Park & Ride
- Motorway / access roads
- Landscape, functional and aesthetic
- Building, perimeter for safe access and egress, aesthetic
- Private Residential, ad hoc for access, security and personalisation
- Existing developments: Cambridge, West Cambridge, Girton, Coton

Identify and assess the sensitivity of receptors

6.10.15 The sensitivity of receptors to the lighting effects has been assessed and given a rating, or benchmarked, using consistent terminology. The receptors considered in this chapter include:

- Residents in housing around the Application Site
- Wildlife and habitat on and around the Application Site
- Local observatories

Identify required lighting provisions for the Proposed Development

6.10.16 The lighting provisions, or sources, of new lighting effects that are considered in this chapter include:

- Exterior car parks / access roads
- Pedestrian and cycle routes
- Landscape, functional
- Landscape, aesthetic (optional)
- Building, perimeter for safe access and egress
- Building, aesthetic (optional)
- Sports Pitch (optional for non-grass pitch areas)
- Private Residential, ad hoc for access, security and personalisation

6.10.17 The lighting design for the Proposed Development will reflect:

- Environmental requirements and good practice guidance

- Technical requirements and good practice guidance
- Appropriate selection of lighting typologies
- Local requirements, which will be secured by planning condition.

6.10.18 The lighting performance characteristics required new lighting typologies that are considered include:

- Technical performance characteristics, required by health and safety legislation, for necessary permanent functional lighting installations.
- Environmental performance characteristics, referred to in clean neighbourhoods and environment legislation, for permanent lighting installations to manage their environmental effect.

Assessment of the lighting effects

6.10.19 This assessment considers the 2014 condition, or partial cumulative lighting condition, to be that which would be experienced with the elements of the baseline lighting provision that are to be retained and the new lighting provisions for the first phase of the Proposed Development in place. This condition is based on the identified lighting provision components listed above.

6.10.20 This assessment considers the post-construction condition, or cumulative lighting condition, to be that which would be experienced with the elements of the baseline lighting provision that are to be retained and all required new lighting provisions for the Proposed Development in place. This condition is based on the identified lighting provision components listed above.

Magnitude of change

6.10.21 The magnitude of change for lighting effects has been assessed and given a rating, or benchmarked, using consistent terminology. The ratings for the magnitude of change for the new lighting provision were made in the context of, and informed by, the district lighting conditions, site specific building and environmental factors, legislation, planning policy, current relevant standards and good practice guidance.

Summary and conclusions

6.10.22 A desk-top based comparison of the baseline to cumulative lighting condition has been undertaken, by independent lighting design specialists, to assess the magnitude of change and likely significant effects of the required lighting condition.

6.10.23 A commentary on the likely significant night-time lighting effects of the Proposed Development has been made and conclusions presented in the context of, and informed by, the district lighting conditions, site specific building and environmental factors, legislation, planning policy, current relevant standards and good practice guidance.

Assumptions and Limitations

6.10.24 Assessment of the wildlife / habitat baseline condition assumes the relocation of wildlife and / or habitat to non-constructed zones.

6.10.25 Assessment is made with the assumption that the University of Cambridge design guidelines will include technical / environmental performance requirements and lighting typologies that adhere to the performance characteristics described within this chapter.

Potential night-time exterior lighting effects

Light spill

6.10.26 Light spill is considered to be 'the spilling of light beyond the boundary of the site on which a light source is located', such that it causes a noticeably adverse effect. More simply, light spill is often termed

as the intrusion of light into homes. It can also have a negative effect on wildlife and ecological systems local to an installation.

Light spill management

6.10.27 Recommended light spill criteria for a new installation can be formulated dependant on context factors. A recommended environmental performance specification can be expressed in the form of lux(max) on a notional working plane.

6.10.28 The appropriate selection of luminaires based on light distribution characteristics and optimal placement can manage light spill.

Sky glow

6.10.29 Sky glow is considered to be 'the brightening of the night sky' above illuminated areas. The brightness created is constantly varying as a function of many parameters such as direct upward-lighting, ground surface reflectance, overhead cloud cover, and the degree of water droplets in the atmosphere - rain, fog/mist, and snow, for example, exacerbate the effect. An acceptable Upward Light Ratio (ULR) for an installation can be formulated dependant on its environmental context.

Sky glow management

6.10.30 Recommended sky glow criteria for a new installation can be formulated dependant on context factors. A recommended environmental performance specification can be expressed in the form of ULR %(max) (upward light ratio).

6.10.31 The appropriate selection of luminaires based on light distribution characteristics and optimal placement can manage upward light spill.

Luminaire conspicuity and glare

6.10.32 The placement of luminaires, their photometric characteristics, and the viewing context contribute to how conspicuous and glaring luminaires appear

Luminaire conspicuity and glare management

6.10.33 Recommended luminaire conspicuity and glare for a new installation can be formulated dependant on context factors. A recommended environmental performance specification can be expressed in the form of I Kcd (max) for source intensity characteristics viewed from beyond the site boundary.

6.10.34 Luminaire conspicuity and glare can be managed through optimal luminaire placement and the specification of luminaires that have appropriate light control characteristics.

Light levels and illuminances

6.10.35 New developments often require or warrant lighting installations for functional safety or aesthetic purposes.

Light levels and illuminances management

6.10.36 Acceptable working plane light levels and surface illuminances for a new installation can be formulated dependant on context factors. An acceptable environmental performance specification can be expressed in the form of lux(max) and lux U(min) for working planes and cd(max) and lux U(min) for conspicuous surfaces.

Light colour and spectral composition

6.10.37 Light colour has the potential to alter an individual's perception of their environment with respect to colour and clarity, as the human eye responds best to whiter light with higher quantities of ultraviolet wavelengths. Various wildlife species may respond differently to spectral composition depending on how reliant they are on darkness; many nocturnal animals continue their social habits and feeding behaviours with increased activity in the area while others may decrease their activity and possibly desert their habitat.

Light colour and spectral composition management

6.10.38 The appropriate selection of lamps based on light colour and spectral composition can ensure a safe environment and reduce the scope for negative effects on neighbouring dwellings and nocturnal wildlife activity.

6.10.39 Areas close to optical astronomical telescopes (approximately 30 – 40 miles for sensitive equipment), the use of low pressure sodium lamp (SOX) are typically recommended and desired for their narrow spectral composition that is more easily screened out of received images.

Significance criteria and interpreting the assessment

6.10.40 Assessment of the sensitivity of identified receptors, magnitude of change experienced by those receptors and their significance has been made in the context of, and informed by, the district lighting conditions, site specific building and environmental factors, legislation, planning policy, current relevant standards and good practice guidance.

6.10.41 Ratings represent a range of conditions, some of which are a combination of two conditions (i.e. medium – low). These combined conditions are intended to mark change at the higher or lower end of a particular threshold.

6.10.42 **Tables 6.4 – 6.7** set out the assessment methodology, tools and terminology for effects.

6.10.43 The sensitivity of a receptor is a measure of how responsive it is to a given lighting condition.

Table 6.4 – Sensitivity terminology and example criteria

Sensitivity	Example Receptor Criteria
Negligible	Industrial buildings
Low	Agricultural buildings and habitats with minimal wildlife
Medium	Residential buildings with baseline exposure to moderate lighting and habitats with moderate light sensitive ecology
High	Residential buildings without baseline exposure to lighting and habitats with high light sensitive ecology

6.10.44 The magnitude of change is a measure of the degree of change for a new lighting condition.

Table 6.5 – Matrix tool for identifying magnitude of change

Magnitude of Change	Example Criteria
Negligible	No perceptible change, barely noticeable
Low	Small change to an existing lighting condition, or new lighting condition creates only a low level of change or new effects to identified receptors
Medium	Noticeable, distinct, but not always intrusive, change to a lighting condition affecting the appearance, characteristics and effects of an installation to identified receptors
High	Extensive, unmistakable, noticeable intrusive change to a lighting condition affecting the appearance, characteristics and effects of an installation to identified receptors

6.10.45 Significance of effects ratings are used to evaluate the likely effects of a lighting condition for identified receptors given their sensitivity to particular lighting conditions and the level of change experienced by them when that condition is altered.

Table 6.6 – Matrix tool for identifying likely significance of effects

Magnitude of Change	Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor to Moderate	Negligible
Low	Moderate	Minor to Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Table 6.7 – Definitions for significance of effects ratings

Magnitude of Effect	Example Criteria
Major beneficial	Lighting conditions that present a highly positive effect. Example: Major noticeable improvements in area safety, appearance or lighting effects resulting from new artificial lighting.
Moderate beneficial	Lighting conditions that present a moderately positive effect. Artificial lighting example: Moderate perceptible improvements in area safety, appearance or lighting effects resulting from new artificial lighting.
Minor beneficial	Lighting conditions that present a small positive effect. Example: Minor improvements in area safety, appearance or lighting effects resulting from new artificial lighting.
Negligible	Lighting conditions that present no significant effect
Minor adverse	Lighting conditions that present a negligible negative effect. Example: Minor deterioration in area safety, appearance or lighting effects resulting from new artificial lighting.

Moderate adverse	Lighting conditions that present a moderately negative effect. Example: Moderate perceptible deterioration in area safety, appearance or lighting effects resulting from new artificial lighting.
Major adverse	Lighting conditions that present a highly negative effect. Example: highly noticeable deterioration in area safety, appearance or lighting effects resulting from new artificial lighting.

6.11 Baseline Conditions

6.11.1 Description of the Application Site pertinent to the lighting assessment

6.11.2 The Application Site is at the urban / rural edge of Cambridge, bound by Huntingdon Road, Madingley Road, the A14 and the M11, and is mainly used for agriculture and agricultural research.

6.11.3 The majority of the Application Site is not developed; land is typically arable and improved grassland with instances of hedgerows, scattered vegetation and areas of historic landscape.

6.11.4 There are seven small building groups within the Application Site: two building groups with potential suitability for bat roosting, Howe Farm, Agronomy Centre Building, Old Field Station, Office buildings and the Genetics Building to the North; former Gravel Hill Farm to the South-east.

6.11.5 Generally, there are no lighting installations within the Application Site.

6.11.6 Some ad hoc safety and perimeter lighting is in use for existing office, academic and farm buildings within the Application Site.

6.11.7 Base condition horizontal and vertical light levels were taken at 10m intervals along the residential boundary of the Application Site, where accessible. At 100m intervals, horizontal and vertical light levels were measured in the North, South, East and West directions. Light levels consistently read 0 lux at this boundary line. **Table 6.15** records these findings.

6.11.8 **Figures 6.57 – 6.62** are images indicating light visible from Viewpoints 1 – 6 used by the landscape Winter Montages.

6.11.9 The Application Site contains three historic landscape features: the Travellers Rest Pit (SSSI – as part of the World Conservation Monitoring Centre; not included for development) to the centre of the Application Site, historic ridge and furrow field patterns to the East and an avenue of oak trees running North / South along Huntingdon Road.

6.11.10 Areas of ecological value within the Application Site are limited to spaces with any mature hedgerows, wooded areas, ponds and channels of water, mature trees, farm building groups and an assortment of badger setts around the Application Site.

6.11.11 Description of the Application Site context and assessment of existing lighting provisions.

6.11.12 The topography of the Application Site and surrounding land is reasonably flat, with minor sloping toward Wash Pit Brook.

6.11.13 **Figures 6.57 – 6.74** are images indicating visible light from locations within the Application Site for views shown in **Figure 6.56**. Sources of light are the M11, Madingley Road and the Park and Ride.

6.11.14 Lighting installed along Huntingdon Road is not measureable, or visible, at the residential boundary between the Application Site and existing properties along Huntingdon Road, indicating that there is effective obstruction from existing structures and established plantings along Huntingdon Road and existing landscape to the rear of residential properties themselves, see **Figures 6.63 -6.65**.

6.11.15 The M11 / A14 junction is lit to motorway standards utilising 10 – 12m columns and is a noticeable, visible feature within the night-time visual envelope.

6.11.16 The Application Site boundary roads, Huntingdon Road and Madingley Road, are illuminated by standard column mounted streetlight style luminaires, typically on 6 – 8m columns. These luminaires are not in high conflict with the surrounding receptors; they present low – mid power output and incorporate reasonable optical control, creating a small negative effect.

6.11.17 **Figures 6.64 – 6.66 and 6.68 - 6.71** are images indicating light contribution to views at locations along the residential boundary line for views shown in **Figure 6.56**.

6.11.18 Access to the Application Site is restricted both entering and navigating the Application Site. Huntingdon Road leads to Howe Farm, the World Conservation Monitoring Centre (to include SSSI) and the former Gravel Hill Farm. Madingley Road leads to Madingley Rise, local residential developments and Madingley Park & Ride.

6.11.19 Application Site access roads are not lit.

6.11.20 Adjacent developed areas have a combination of academic and residential components, such as West Cambridge, Girton College and the residential areas between them.

6.11.21 Existing residential properties are generally lit by ad hoc lighting installations which may include security and decorative lighting. Figure 6.74 illustrates this type of lighting.

6.11.22 Directly to the North of the Application Site are existing residential properties and at a further 4km distance, the village of Girton.

6.11.23 To the North is a parcel of land used by the National Institute of Agricultural Botany (NIAB); this parcel is designated for future residential development.

6.11.24 To the South is a Park & Ride facility, and South-east land split for University and residential use.

6.11.25 The Park & Ride facility is illuminated by column mounted streetlight style luminaires, typically on 6 - 8m columns, interspersed with existing plantings and vegetation. These luminaires are not in high conflict with the surrounding receptors; they present a low – mid-power output and incorporate reasonable optical control, creating a small negative effect.

6.11.26 Lighting does contribute to views for some residential properties near the Park and Ride, **Figures 6.66, 6.70 and 6.71**, but this does not contribute to any light spill at the residential boundary.

6.11.27 South-west of the Application Site, to the North of Madingley Road between the area designated for the Girton Gap and Churchill College is Cambridge Observatory. All telescopes maintained by this facility are optical and used for on-site observation.

6.11.28 Approximately 4.5 miles to the South of the Application Site is Mullard Radio Astronomical Observatory. The majority of telescopes maintained by this facility read radio signal, but one low level brightness telescope has been noted as being in operation.

6.11.29 Areas to the West and far South contain predominantly rural lowland landscape.

6.11.30 Ponds, scattered woodland and plantation on- and off-site create small pockets where some sensitive ecological receptors have been identified, i.e. badger setts, bat commuter paths and vole habitat.

6.11.31 The following sensitive receptors have been identified around the Application Site:

- Residents in housing around the Application Site
- Identified wildlife / habitat areas around the Application Site

- Cambridge Observatory to the South-east of the Application Site
- Mullard Radio Astronomical Observatory to the South of the Application Site
- The following sensitive receptors have been identified on the Application Site:
- Identified wildlife / habitat within the Application Site

Description of residential receptors around the Application Site and assessment of their sensitivity

6.11.32 Residential properties bound the North and South-east. These receptors are subject to existing lighting effects indicated above.

Sensitivity of Residential Receptors	Medium - High
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Residents and sensitivity factors

6.11.33 The sensitivity of light source conspicuity on views is very subjective, dependant on context location and individual perception. Acceptable performance characteristics, derived from empirical research, regarding lighting metrics related to personal disturbance and nuisance caused by lighting installations is available, but this does not cover the more subjective and personal issue of the sensitivity of individuals to effects on views.

Description of the ecology around the Application Site and assessment of its sensitivity

6.11.34 Chapter 7 of this Statement was reviewed at the time of completing this chapter. Several protected and / or rare species were identified in the area, with a balance between those species residing within the Application Site and others local to the Application Site. Not every species identified is known to be sensitive to a permanent static lighting condition.

Sensitivity of Wildlife Receptors on the Application Site

Wildlife Type	Sensitivity	Qualifying Note:
Badger	Medium - High	Throughout Application Site: setts and foraging habitat
Bat	Medium - High	Commuting and foraging across the site, primarily associated with linear features, including the Washpit Brook, hedgerows, woodland edges and the avenue of horse chestnut trees. Most species present are relatively tolerant of lighting, being associated with urban and suburban areas. Small roost sites also present.
Water Vole	Negligible - Low	Present on the Washpit Brook. Water voles are diurnal animals, most active around dawn and dusk, and not considered to be particularly sensitive to lighting effects
Otter	Low	Otters will tend to avoid well-lit areas, but are known to use watercourses in most cities in the UK. No otters recorded using the site, but are likely to commute along the Washpit Brook at some stage in the future
Amphibian	Medium	Great crested newts breeding in off-site ponds, but likely to forage/hibernate within the southern parts of

		the site; large population of common toads present within the pond at the World Conservation Monitoring Centre and likely to forage/hibernate in the surrounding areas
Bird	Low	Barn owls present but no evidence of nesting on site. Other species present unlikely to be particularly sensitive to lighting effects
Brown hare	Low	Present across much of the Application Site. This species is active during daylight hours as well as at night, and are therefore not considered to be particularly sensitive to lighting effects
Invertebrates	Low	Present across the Application Site with many of the species of nature conservation concern being associated with mature trees and hedgerows. None of the species of conservation concern recorded on site are considered to be particularly sensitive to lighting effects

Ecology and sensitivity factors

6.11.35 Appropriately specified and installed exterior lighting can be categorised as a permanent static lighting condition. It has been observed that continuous, low intensity disturbances are able to be integrated into a variety of moderate - low sensitivity habitat without significant detriment and can be acclimated to by other nocturnal wildlife.

Description of non-residential receptors around the Application Site and assessment of their sensitivity

6.11.36 There are two non-residential receptors of note within 5 miles of the Application Site: the Cambridge Observatory and Mullard Radio Astronomical Observatory.

6.11.37 The Cambridge Observatory maintains 4 optical telescopes, used for on-site observation by the University Astronomical Society and on public observation nights

6.11.38 The Mullard Radio Astronomical Observatory maintains 6 telescopes, 1 is a low brightness optical telescope while the rest receive radio signal.

6.11.39 Existing lighting conditions created by the city of Cambridge and the surrounding area have removed the capability for these optical telescopes to be used for 'front rank' research on faint objects.

Observatory	Sensitivity	Qualifying Note
Cambridge	Medium	Optical telescopes currently affected by existing area lighting conditions; reduced viewing functionality
Mullard Radio Astronomical	Low - Medium	Radio telescopes unaffected by area lighting conditions; low brightness telescope currently affected by existing area lighting conditions

Non-Residential receptors and sensitivity factors

6.11.40 Observatories which read radio signal are not adversely affected by exterior lighting installation. Appropriately specified and installed exterior lighting can be categorised as a permanent static lighting

condition. Optical observatories require more carefully shielded lighting and are best served when limiting the colour spectrum emitted in order to filter out erroneous lighting data. It has been observed that continuous, low intensity, narrow-spectrum disturbances are able to be integrated into a variety of moderate – low sensitivity envelopes without significant detriment.

District Classification

District context brightness

6.11.41 The degree to which an artificial lighting installation is likely to impact on an environment is in part dependent on visual context. Lighting installations in areas of low district brightness are likely to have a greater effect on their environment than those in areas of high district brightness. External lighting should be specified with consideration for the environmental context apparent to an installation.

6.11.42 Based on the lighting environmental context, which can be expressed in terms of district brightness, recommended light nuisance characteristics for new external lighting installations can be formulated. These acceptable light nuisance characteristics have been determined by independent imperial research. The research has been ratified and incorporated into good practice guidance and some local planning strategies. Table 6.8 indicates classification categories according to district brightness characteristics. Table 6.9 indicates classification categories for areas around astronomical observatories cross-referenced to environmental zones of district brightness.

Table 6.8 – Classification of district brightness

Classification ref	Environmental Context	Example Areas
E1	Intrinsically Dark Areas	National Parks/Areas of Outstanding Natural Beauty
E2	Low District Brightness	Rural or small village location
E3	Medium District Brightness	Small town centres or urban locations
E4	High District Brightness	Town/City centres with high levels of night activity

Table 6.9 – Classification of astronomical activities and light pollution

Group ref	E Zone	Environmental Context	Example Areas
5	Total Exclusion zone	Low-resolution spectroscopy, wide-field imaging	Very remote rural location where an observatory of national or international standing is used by professional astronomers.
4	E1	Narrow-band imaging, low-resolution spectroscopy, continuum imaging	Remote rural location where an observatory of national or international standing is used by professional astronomers.
3	E2	Intermediate resolution spectroscopy / photometry	Near-rural or rural locations with telescopes in the 50-cm class for amateurs or 1-m for academic work.
2	E3	Infrared spectroscopy, imaging, photometry; high-resolution optical spectroscopy of brighter stars	Urban, suburban and town locations with telescopes in the 50-cm class for amateurs or 1-m for academic work.
1	E3	Casual viewing, eye inspection	Suburban and town residential and recreational environments
0	E4	No astronomical activity	Central urban, recreational, motorway or industrial zone

6.11.43 The suburban areas of Cambridge adjacent to the Application Site are assessed as areas of medium district brightness, lighting environmental zone E3.

6.11.44 The areas through which motorway and roadways bounding the Application Site cut through to the North and West / South-west to be areas of low district brightness, lighting environmental zone E2.

6.11.45 The Green Belt provision outside the Application Site extending south of the M11 is assessed as intrinsically dark, lighting environmental zone E1. The Green Belt outside the Application Site does not influence the district brightness within the Application Site.

6.11.46 The M11 / A14 roundabout at the Western boundary is assessed as an area of low district brightness, lighting environmental zone E2. Note that the existing column height and nature of lighting for this type of junction increases noticeable effects to residential and non-residential receptors including conspicuity and glare.

6.11.47 The Green Belt provision within the Application Site boundary is assessed as an area of low district brightness, lighting environmental zone E2.

6.11.48 Boundary lighting conditions between the motorways and city of Cambridge, lighting environmental zones E2 and E3, respectively, form the local area lighting condition extents.

6.11.49 The neighbouring villages and towns (Girton, Coton, Madingley) are assessed as areas of low district brightness, lighting environmental zone E2.

6.11.50 The Cambridge Observatory is assessed as generally of Group 3 (Table 6.9); current existing lighting conditions and proximity to the city of Cambridge may consider an overlapping inclusion into Group 2. This implies that the observatory and environs to be an area of low district brightness, lighting environmental zone E2.

6.11.51 The Mullard Radio Astronomical Observatory is generally assessed as Group 2 (Table 6.9), but within the classification of Group 3 in relation to its optical telescope for low brightness observations. This implies that the observatory and environs to be an area of low district brightness, lighting environmental zone E2.

6.11.52 Guidance documentation recommends that in cases where an area lies between two boundaries, the more rigorous zone is to be employed.

6.11.53 The Application Site is classified as environmental zone E2. The following criteria are applied to the Environmental requirements and recommended / good practice lighting performance section.

Proposed Development

Description of the post-construction Proposed Development

6.11.54 The development assessed as the Proposed Development as outlined within Chapter 2.

6.11.55 The topography of the Application Site and surrounding land will remain reasonably flat, with minor sloping toward Wash Pit Brook.

6.11.56 Existing historic landscape features will be retained.

6.11.57 A North – South portion of the Application Site will be set aside to remain undeveloped Green Belt. This area has been observed to contain badger setts and evidence of commuting by bats, otters and water voles.

6.11.58 The Western edge of the Application Site bordering the M11 is also retained as Green Belt and will remain as open land, creating an additional buffer between the Green Belt to the West of the M11 and more heavily populated areas such as Cambridge or Girton, with portions designated for habitat, arable farm land and recreational use.

6.11.59 Proposed residential buildings will abut existing residential buildings, back garden to back garden. The Proposed Development will create long back gardens at a distance of 20m minimum to create an additional buffering zone.

6.11.60 The majority of new buildings that will be introduced range from maximum building heights of 10-15m (consistent with Parameter Plan 05). A limited number of buildings in specific areas may have heights up to 18-20m.

6.11.61 Tree plantings generally line all boundaries of the Application Site.

6.11.62 Ponds, scattered woodland and plantation on-and off-site create small pockets where some sensitive ecological receptors have been identified, i.e. badger setts, bat commuter paths and vole habitat.

6.11.63 Grass sport pitch areas will not be lit.

2014 Lighting Condition

6.11.64 New lighting installation is required as part of the Local Centre and residential development for safe access / egress and space use during the hours of darkness.

6.11.65 Sport provisions will not be developed until after the first phase completion.

2026 Post-Construction Lighting Condition

6.11.66 New lighting installation is required along open roads within development areas and the local centre for safe access / egress and space use during the hours of darkness.

6.11.67 Lighting of non-grass sport pitch areas within the Application Site to the South, West of the Park & Ride, may be included.

Proposed Lighting Typologies Design Characteristics

6.11.68 The following lighting typologies are capable of satisfying the lighting performance requirements and are anticipated across the Proposed Development.

Car park / Access roads lighting

6.11.69 The use of streetlight style full horizontal cut-off luminaires installed at 0° tilt with flat glass lenses, back reflectors and internal baffles designed to limit views of the lamp and glare and direct light in a controlled pattern. This will help to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. Column height will be kept within the range of 4m to 6m maximum in most cases.

Pedestrian and cycle route lighting

6.11.70 The use of streetlight style or decorative post top luminaires with full horizontal cut-off luminaires installed at 0° tilt with flat glass lenses, back reflectors and internal baffles designed to limit views of the lamp and glare and direct light in a controlled pattern. Where columns are likely to be visible to adjacent sensitive receptors, the use of shielding may be appropriate. This will help to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. Column height will be kept within the range of 4m to 6m maximum in most cases. Alternatively, or in combination with the above, full horizontal cut-off luminaires, light poles and/or bollards may be utilised providing they are appropriately aimed and shielded.

Landscape lighting, functional

6.11.71 The use of streetlight style or decorative post top luminaires with full horizontal cut-off luminaires installed at 0° tilt with flat glass lenses, back reflectors and internal baffles designed to limit views of the

lamp and glare and direct light in a controlled pattern. Where columns are likely to be visible to adjacent sensitive receptors, the use of shielding may be appropriate. This will help to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. Column height will be kept within the range of 4m to 6m maximum in most cases. Alternatively, or in combination with the above, full horizontal cut-off light poles, bollards and low level lighting in the form of LED strips and light scoops may be utilised providing they are appropriately aimed and shielded.

Landscape lighting, aesthetic

6.11.72 Specific aesthetic / decorative landscape lighting strategies / typologies designed cohesively with the architecture and landscape architecture of buildings and their context. Aesthetic landscape lighting is intended to ensure only immediate landscape feature elements are illuminated, avoiding adverse lighting effects.

Building lighting, aesthetic

6.11.73 Specific aesthetic / decorative building lighting strategies / typologies designed cohesively with the architecture and landscape architecture of buildings and their context. Aesthetic building lighting is intended to ensure only immediate feature building elements are illuminated, avoiding adverse lighting effects.

Building lighting, perimeter

6.11.74 The use of decorative wall mounted luminaires with full horizontal cut-off luminaires installed at 0° tilt with back reflectors and internal baffles designed to limit views of the lamp and glare and direct light in a controlled pattern. This will help to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. Mounting height should be kept to a minimum. Alternatively or in combination with the above full horizontal cut-off light poles, bollards and low level lighting in the form of LED strips and light scoops may be utilised providing they are appropriately aimed and shielded.

Sports pitch flood lighting

6.11.75 The use of specialised sports floodlighting projects with full horizontal cut-off sports lighting luminaires installed at as near to 0° tilt as is practicable, with flat glass lenses, back reflectors and internal baffles designed to limit glare, house the lamp within the luminaire and direct the beam into a controlled pattern. Where columns are likely to be visible to adjacent sensitive receptors, the use of shielding may be appropriate. This will help to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. Column height will be kept within a comparable range to other column mounted lighting of 6m to 8m maximum.

Private residential lighting, ad hoc

6.11.76 Functional and decorative lighting on private residential properties, post sale or lease, is not under the direct authority of the University and will be difficult to control unless restrictions are specified within lease contracts and property deeds. It is recommended that lighting on private residential properties is required to adhere to requirements made within the exterior Design Guidelines expected to be conditioned as part of this application and recommendations listed in the Clean Neighbourhoods and Environment Act, 2005.

Proposed Lamps

6.11.77 New generation LED, metal halide (MH) or hybrid (CosmoPolis) lamps, or lamps with similar characteristics, will be used for new external lighting. Lamp wattages will achieve required light levels without over-lighting.

Avoiding, reducing and managing any effects through required lighting performance characteristicsGeneral measures

6.11.78 Adopt a daylight only construction schedule to minimise adverse lighting effects as different phases are complete. It is unavoidable that construction phase may require work during the hours of darkness in consideration of shorter daylight availability during winter months.

6.11.79 Mitigation techniques will be employed during the construction period through the Construction and Environmental Management Plan which will limit night time working, stipulate working hours, and ensure the careful siting of construction compounds away from the most sensitive visual receptors.

6.11.80 Obtrusive lighting at the residential boundary should be avoided where lighting is not required for the purposes of function and safety. Should obtrusive light contribution from public realm lighting be unavoidable, an appropriate selection of lighting equipment is required to minimise potential effects.

6.11.81 Residential lighting has potential to contribute visible lighting to views from existing residential properties. Existing distances between the existing properties and Application Site boundary line, in combination with a minimum 20m back garden design for proposed residential properties and the requirement for new installations to adhere to Exterior Design Guidelines and best practice by deed reduces potential contribution to obtrusive light. A 0 lux light level requirement at the residential boundary resulting from a proposed residential lighting installation is beneficial to control installations which may be desired in close proximity to the property line.

6.11.82 Lighting applications are not required throughout all hours of darkness. Lighting equipment with the capability of dimming is to be used, or lighting is to be switched off, in accordance with good practice guidance.

6.11.83 In areas where lighting is required throughout the night, utilise equipment with the capability of dimming for times when the Cambridge Observatory is participating in public observation nights or there is planned observation by the University Astronomical Society.

6.11.84 Leave the sport pitch areas that fall within areas of open land identified as 1, 2 and 3 on Parameter Plan 02, and, where practicable for sport pitch areas throughout the Application Site, free of lighting to reduce or remove potential contributions to glare, sky glow, light spill and visual intrusion.

Environmental requirements and good practice lighting performance

6.11.85 This assessment derives the following environmental lighting performance criteria from the available development information and good practice guidance for new lighting installed as part of the Proposed Development.

Light spill limit

6.11.86 Relevant guidance document - CIE 150:2003 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations

6.11.87 Light spill beyond the Application Site to surrounding windows and land should not exceed 5 lux prior to 23.00 and 1 lux after.

Sky glow limit

6.11.88 Relevant guidance document - CIE 150:2003 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations

6.11.89 The maximum percentage of direct upward light from a new installation should not exceed 2.5%

Luminaire Conspicuity and Glare

6.11.90 Relevant guidance document - CIE 150:2003 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations

6.11.91 A new installation should have no light sources mounted in a potentially intrusive direction that exceed 7.5 kcd prior to 23.00 and 0.5 kcd after, as viewed from the potentially intrusive direction, during the hours of darkness.

Light Colour and Spectral Composition

6.11.92 It is desirable for light quality, safety and wildlife effect limitation purposes to use new generation high pressure discharge lamps. New generation metal halide and metal halide / high pressure sodium hybrid lamps, such as the CosmoPolis, present good working efficacy, a smaller light emitting area which is good for light control and spectral compositions which are less disturbing to nocturnal wildlife than UV rich sources such as high pressure mercury discharge lamps.

6.11.93 In areas that are close to astronomical optical telescopes, the use of low pressure sodium lamp (SOX) are typically recommended and desired for screening. The proximity of the Cambridge Observatory and Mullard Radio Astronomical Observatory to the city of Cambridge as well as Mullard's primary use of radio telescope equipment allow the flexibility of other lamp types.

Technical requirements and good practice lighting conditions

6.11.94 This assessment derives the following technical lighting performance criteria, from the available development information and good practice guidance, for the following lighting application areas:

Maximum light level requirements for car parks with heavy traffic

6.11.95 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 – School car parks. If traffic volume is confirmed as low, maximum light level requirements for car parks with medium traffic may be applied.

BS EN 13201-2:2003, BS 5489-1:2003 School Car Park Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	20 lux
Average uniformity (Uo min)	0.25 minimum

6.11.96 Maximum light level requirements for car parks with medium traffic

6.11.97 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 – Office and commercial car parks

BS EN 13201-2:2003, BS 5489-1:2003 Car Park Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	10 lux
Average uniformity (Uo min)	0.25 minimum

Lighting level requirements for residential streets for

6.11.98 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 Residential Street Lighting Performance Requirements.

CIBSE Lighting Guide 1 Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	7.5 lux
Average uniformity (Uo min)	0.20 minimum, 0.4 target

6.11.99 General lighting level requirements for traffic areas for vehicles (maximum 30 - 40mph)

6.11.100 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 – Rural and Urban roadways

BS EN 13201-2:2003, BS 5489-1:2003 ME3 / ME4 Roadway Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	10 lux
Average uniformity (Uo min)	0.40

6.11.101 Maximum light level requirements for pedestrian and cycle routes sharing roads serving vehicles

6.11.102 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 – Zone E2 combined surface

BS EN 13201-2:2003, BS 5489-1:2003 Pedestrian and Cycle Route Lighting Performance Requirements

1.1 Average horizontal illuminance of the principal area (E)	1.2 10 lux
1.3 Average uniformity (Uo min)	1.4 0.30 minimum

6.11.103 Maximum light level requirements for pedestrian and cycle routes

6.11.104 Relevant guidance document - BS EN 13201-2:2003, BS 5489-1:2003 – Separate Path Pedestrian and Cycle Routes

BS EN 13201-2:2003, BS 5489-1:2003 Pedestrian and Cycle Route Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	5 lux
Average uniformity (Uo min)	0.30 minimum

6.11.105 Lighting level requirements for sports pitches

6.11.106 Relevant guidance document; CIBSE Lighting Guide 4 Sports Lighting, 2006 - Section, Football; BS EN 12193:1999

CIBSE Lighting Guide 4 Lighting Performance Requirements

Average horizontal illuminance of the principal area (E)	75 lux
Average uniformity (Uo min)	0.50

6.11.107 Lighting level requirements for gateways

6.11.108 Relevant guidance document, CIE Guide to the Lighting of Urban Areas – Section, Lighting Levels for Urban Areas

6.11.109 Main entrances, or those that serve as designated gateways into the proposed North West Cambridge, may have different lighting requirements to draw focus to these transition points. Maximum recommended below.

Average horizontal illuminance of the principal area (E)	20 lux
Average uniformity (Uo min)	0.40

Likely Significant Construction Effects

6.11.110 The Proposed Development will, where practicable, include a daylight only construction schedule to minimise adverse lighting effects as different phases are complete. It is unavoidable that construction phase may require work during the hours of darkness in consideration of shorter daylight availability during winter months. Construction effects are transient, therefore limiting nighttime lighting impacts and lowering the effect rating.

6.11.111 **Table 6.10** indicates the assessment of the cumulative effects that are like to result from construction phase lighting provisions. Note that the non-permanent / temporary nature of this type of effect lowers the significance of effects by one level as derived from matrix tools.

Table 6.10 – Construction effects of the Proposed Development

Receptor	Sensitivity to Change	Magnitude of Change	Significance of Effect
Residential	High	Low - Medium	Moderate – Minor Adverse
Wildlife / Habitat	High	Low - Medium	Moderate – Minor Adverse
Observatories	High	Low - Medium	Moderate – Minor Adverse

Likely Significant Cumulative Effects

6.11.112 **Tables 6.11 – 6.13** indicate the assessment of the cumulative effects that are like to result from the required lighting provisions on the identified sensitive receptors, based on an understanding of the general lighting typologies, strategy and approach as set out above.

Table 6.11– Likely significant effects on identified existing residential receptors

Receptor	Lighting Typology	Effect Type	Sensitivity to Change	2014			2026		
				Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects	Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects
Residential properties around the Application Site	Above Ground Car Parks	Light spill	High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
	Access Roads	Sky glow	Medium	Low	Yes	Moderate - Minor Adverse	Low	Yes	Moderate - Minor Adverse
	Pedestrian and Cycle Routes	Luminaire conspicuity and glare mitigation	Medium - High	Low	Yes	Moderate - Minor Adverse	Low	Yes	Moderate - Minor Adverse
	Building, perimeter	Light levels and illuminances	Medium-High	Low	Yes	Moderate - Minor Adverse	Low	Yes	Moderate - Minor Adverse
	Landscape, functional	Light colour and spectral composition	Medium	Low	Yes	Moderate - Minor Adverse	Low	Yes	Moderate - Minor Adverse
	Building, aesthetic	Light spill	Subjective receptive response and requires further design development to quantify	Low	Possible	Moderate – Minor Adverse	Low	Possible	Moderate – Minor Adverse
		Sky glow		Low	Possible	Minor Adverse	Low	Possible	Minor Adverse
	Landscape, aesthetic	Luminaire conspicuity and glare mitigation		Low	Possible	Moderate – Minor Adverse	Low	Possible	Moderate – Minor Adverse

		Light levels and illuminances		Low	Possible	Minor Adverse	Low	Possible	Minor Adverse
		Light colour and spectral composition		Low	Possible	Minor Adverse	Low	Possible	Minor Adverse
	Sports Pitch (non-grass)	Light spill	High	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Sky glow	Medium	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
		Luminaire conspicuity and glare mitigation	Medium - High	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	Medium - High	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
		Light colour and spectral composition	Medium	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
	Private Residential	Light spill	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Sky glow	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Luminaire conspicuity and glare mitigation	Medium-High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	Medium-High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light colour and spectral composition	Medium	Low	Yes	Moderate – Minor Adverse	Low h	Yes	Moderate – Minor Adverse

Table 6.12 –Likely significant effects identified wildlife and habitat receptors

Receptor	Lighting Typology	Effect Type	Sensitivity to Change	2014			2026		
				Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects	Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects
Wildlife and Habitat Receptors	Above Ground Car Parks	Light spill	High	Low	Yes	Moderate Adverse	Medium - Low	Yes	Major - Moderate Adverse
	Access Roads	Sky glow	Medium-High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
	Pedestrian and Cycle Routes	Luminaire conspicuity and glare mitigation	Medium-High	Low	Yes	Moderate – Minor Adverse	Medium – Low	Yes	Moderate Adverse
	Building, perimeter	Light levels and illuminances	High	Low	Yes	Moderate Adverse	Low	Yes	Moderate Adverse
	Landscape, functional	Light colour and spectral composition	Medium	Low	Yes	Moderate – Minor Adverse	Medium – Low	Yes	Moderate – Minor Adverse
	Building, aesthetic	Light spill	High	Low	Yes	Moderate Adverse	Low	Yes	Moderate Adverse
	Landscape, aesthetic	Sky glow	Medium - High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Luminaire conspicuity and glare mitigation	Medium-High	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	High	Low	Yes	Moderate Adverse	Low	Yes	Moderate Adverse

		Light colour and spectral composition	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
	Sports Pitch (non-grass)	Light Spill	High	Negligible	Yes	Negligible	Low	Yes	Moderate Adverse
		Sky glow	Medium-High	Negligible	Yes	Negligible	Medium - Low	Yes	Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium-High	Negligible	Yes	Negligible	Medium – Low	Yes	Moderate Adverse
		Light levels and illuminances	High	Negligible	Yes	Negligible	Low	Yes	Moderate Adverse
		Light colour and spectral composition	Medium	Negligible	Yes	Negligible	Medium – Low	Yes	Moderate – Minor Adverse
	Private Residential	Light spill	High	Low	Yes	Moderate Adverse	Medium - Low	Yes	Major - Moderate Adverse
		Sky glow	Medium - High	Low	Yes	Moderate – Minor Adverse	Medium - Low	Yes	Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium - High	Low	Yes	Moderate – Minor Adverse	Medium – Low	Yes	Moderate Adverse
		Light levels and illuminances	High	Low	Yes	Moderate Adverse	Medium – Low	Yes	Major - Moderate Adverse
		Light colour and spectral composition	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse

Table 6.13 – Likely significant effects on non-residential receptors, Local Observatories

Receptor	Lighting Typology	Effect Type	Sensitivity to Change	2014			2026		
				Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects	Magnitude of Change	In line with good practice guidance (yes/no)	Significance of Effects
Local Observatories: Mullard Radio Astronomical and Cambridge	Above Ground Car Parks Access Roads Pedestrian and Cycle Route Building, perimeter Landscape, functional	Light spill	Medium	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Sky glow	High	Low	Yes	Moderate Adverse	Low	Yes	Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Light levels and illuminances	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light colour and spectral composition	High	Low	Yes	Moderate Adverse	Low	Yes	Moderate Adverse
	Building, aesthetic Landscape, aesthetic	Light spill	Medium	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Sky glow	High	Low	Yes	Moderate Adverse	Medium – Low	Yes	Major - Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse

		Light colour and spectral composition	High	Low	Yes	Moderate Adverse	Medium - Low	Yes	Major - Moderate Adverse
	Sports Pitch (non-grass)	Light spill	Medium	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Sky glow	High	Negligible	Yes	Negligible	Low	Yes	Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	Medium	Negligible	Yes	Negligible	Low	Yes	Moderate – Minor Adverse
		Light colour and spectral composition	High	Negligible	Yes	Negligible	Low	Yes	Moderate Adverse
	Private Residential	Light spill	Medium	Negligible	Yes	Negligible	Negligible	Yes	Negligible
		Sky glow	High	Low	Yes	Moderate Adverse	Medium - Low	Yes	Major - Moderate Adverse
		Luminaire conspicuity and glare mitigation	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light levels and illuminances	Medium	Low	Yes	Moderate – Minor Adverse	Low	Yes	Moderate – Minor Adverse
		Light colour and spectral composition	High	Low	Yes	Moderate Adverse	Medium – Low	Yes	Major - Moderate Adverse

Overall effects of lighting provision on receptors within the Proposed Development

6.11.113 **Table 6.14** indicates the assessment of the cumulative effects that result from the required lighting provisions at local, regional and national levels.

Table 6.14 – Overall effects of the Proposed Development

Scale	Sensitivity to Change	2014		2026	
		Magnitude of Change	Significance of Impacts	Magnitude of Change	Significance of Impacts
Local	Medium - Low	Low	Minor - Moderate Adverse	Medium	Minor - Moderate Adverse
Regional	Low	Negligible	Negligible	Negligible	Negligible
National	Negligible	Negligible	Negligible	Negligible	Negligible

Note that sensitivity to change at the local level is combined from the likely small scale effects to residential, wildlife and habitat, and non-residential receptors.

Summary and Conclusions of lighting effects

6.11.114 Legislation and good practice guidance indicates the Proposed Development requires new exterior lighting for purposes of vehicular and pedestrian safety and development function.

6.11.115 The Proposed Development design intent indicates and warrants additional new decorative exterior lighting for the purposes of enhancement and continuity of character areas.

6.11.116 The assessment of the likely significant effects from new lighting indicates effective management of required lighting provisions can be achieved in this context.

Construction Phase

6.11.117 Likely significant lighting effects from construction phase are non-permanent and temporary in nature.

6.11.118 Construction effects are considered generally moderate - minor adverse to all identified receptors.

2014

6.11.119 With regard to existing street lighting along Huntingdon Road, Madingley Road the M11 and Storey's Way, no significant increase of effect as the result of new access roads is likely.

6.11.120 The analysis indicates the likely significant effects from new lighting for the first phase of the Proposed Development on the majority of sensitive residential receptors would be moderate to minor adverse.

6.11.121 The analysis indicates the likely significant effects from new lighting for the first phase of the Proposed Development on the majority of wildlife and habitat receptors would be moderate - minor adverse. This effect will generally be realised where habitat and commuting areas are located and would not apply to the full Application Site.

6.11.122 The analysis indicates the likely significant effects from new lighting for the first phase of the Proposed Development on the local observatories would be negligible.

2026

6.11.123 The analysis indicates the likely significant effects from new lighting for the post-construction phase for the Proposed Development on the majority of sensitive residential receptors would be moderate to minor adverse.

6.11.124 The analysis indicates the likely significant effects from new lighting for the Proposed Development on the majority of wildlife and habitat receptors would be moderate adverse. This effect will be realised where habitat and commuting areas are located and would not apply to the full Application Site. Relocation of habitat to non-constructed zones and avoidance of lighting along verified commuting paths may further reduce the relative effect of the Application Site to minor adverse.

6.11.125 The analysis indicates the likely significant effects from new lighting for the Proposed Development on the local observatories would be moderate to minor adverse. In the context of the potential effect to the optical telescopes used by the observatories, which could be affected by any lighting within a 30-40 mile radius and are currently affected by existing lighting conditions, the relative effect is expected to be negligible.

6.11.126 With regard to works along Huntingdon Road, Madingley Road the M11 and Storey's Way, allowing for existing street lighting, there would be no significant difference from the existing situation and no material night-time effects.

6.11.127 The analysis indicates the likely significant effects from new lighting for the Proposed Development on identified sensitive local receptors around the Application Site varies due to size and content.

Cumulative Effects

6.11.128 The analysis indicates the cumulative effect of the required lighting provisions for the Proposed Development is minor – moderate adverse and is local to the Application Site, having a negligible effect at regional and national levels.

6.11.129 Views from the residential boundary incorporate light from Madingley Road, the M11 and the Park and Ride which form part of the visual night-scape. Lighting from Huntingdon Road and Storey's Way is not directly visible from the residential boundary but does contribute to the area effect sky glow. New lighting is likely to increase the instances of light that may be seen but do not introduce new light into an intrinsically dark view.

6.11.130 The assessment of overall likely significant effects from new lighting for the Proposed Development in conjunction with existing and consented development, with consideration of site layout, indicates sky glow as having the most variable potential effect to identified receptors.

6.11.131 The assessment of the overall effects that would result from new lighting for the Proposed Development would satisfy technical and environmental good practice guidance and be considered minor – moderate adverse.

6.12 Summary

6.12.1 This chapter of the ES assesses the likely significant effects that may arise in the Landscape, Townscape and Visual Environment, including assessing the effects of artificial lighting, as a result of the Proposed Development. The effects of the changes have been assessed for main receptors within the Study Area.

6.12.2 The assessment of the Proposed Development assumes that the Landscape Principles will be applied. The intention of the Landscape Principles is to create a scheme that is functional and that builds on the existing richness and diversity of Cambridge. The Landscape Principles aim to create a setting that is in keeping with the character of Cambridge's urban edge and its surrounding agricultural landscape and retain and enhance the principal landscape and ecological features within the site.

6.12.3 The assessment identifies twelve viewpoints which were agreed with both CCC and SCDC. These reflect notable visual receptors, including footpaths and public rights of way, roads, and viewpoints along the M11 motorway. The assessment also considers landscape designations and relevant landscape receptors, including the Western Claylands character area (identified in the Cambridgeshire Landscape Guidelines and the Cambridge Green Belt Study), where the Application Site lies, and relevant townscape character areas adjacent to and falling partially within the Application Site such as West Cambridge (TCA2), part of the wider Bespoke Houses and Colleges type.

6.12.4 The Proposed Development design intent indicates and warrants additional new decorative exterior lighting for the purposes of enhancement and continuity of character areas.

6.12.5 The Application Site contains a section of the Green Belt, and the Landscape Principles address this relationship by enhancing the connectivity and permeability between the green spaces and the built form. The Proposed Development provides an opportunity to enhance the use and access to the Green Belt by making the area more accessible for leisure and recreational purposes, and to redefine the urban edge of Cambridge while enhancing the interface between its rich urban and rural character.

6.12.6 The process of change that is proposed on the Application Site will lead to both temporary and permanent effects in how the Application Site is seen and experienced by people who live, work, visit and travel through the surrounding landscape and townscape. The Proposed Development will extend the existing urban character of Cambridge and will integrate it with the existing agricultural character of the Application Site. In most long distance views, the Proposed Development will be seen as an extension of Cambridge's urban edge. It will not result in adverse disruption to the existing views nor will it become the focus.

6.12.7 The assessment identifies and categorises the significance of effects that may arise as result of the Proposed Development at three distinct points in time: 2014; Development Completion (2026) and Summer 15 years after Development Completion.

6.12.8 The effects of artificial lighting are addressed in the same way as the Landscape, Townscape and Visual Environment effects are assessed, by identifying a baseline lighting condition, identifying and assessing the sensitivity of receptors, identifying required lighting provisions for the Proposed Development and assessing and benchmarking the baseline to cumulative lighting condition variance, of the Construction phase and at 2014 and 2026.

6.12.9 In terms of landscape effects, at 2014, the Proposed Development is likely to result in minor adverse effects at a regional level with moderate adverse effects on the more local Western Claylands character area. The likely effect on other character areas would be of negligible effect. At Development Completion, the effects are likely to result in minor adverse and not significant effects on the regional landscape character and on a localised part of the West Cambridge townscape. Moderate adverse effects are likely on a localised part of the Western Claylands Character Area. Whilst this effect will be significant, it is limited to the more eastern urban/ rural interface of this character area and is unlikely to affect the wider integrity of this character area. Indeed the Western Claylands could arguably be redefined with the new urban edge of the Application Site providing the new boundary to this character area.

6.12.10 Effects of the Proposed Development at 2014 and at 2026 on the landscape designations (Green Belt, Madingley Park, American Cemetery and Coton Countryside Reserve) considered within the study area are likely to be Negligible.

6.12.11 When viewed from each of the twelve viewpoints assessed, taking account of construction and operational effects associated with the Proposed Development and both of these effects cumulatively with the effects of the NIAB and West Cambridge developments so far as under construction and/or in operation. The Proposed Development is considered likely to have only negligible to minor adverse effects at 2014. After Development Completion at 2026, two of the twelve viewpoints are considered to result in significant adverse effects due to their proximity to the Application Site and the focus which the development will newly have in their immediate views. Three viewpoints with significant adverse effects represent users of footpaths and drivers along the M11, who are temporary and transitory in their use thereby limiting the duration of the adverse visual effects experienced. The remaining viewpoints will not result in significant effects.

6.12.12 The analysis indicates the likely significant effects from new lighting for the first phase of the Proposed Development (2014) (taking account of construction and operational effects associated with the Proposed Development and both of these effects cumulatively with the effects of the NIAB and West Cambridge developments so far as under construction and/or in operation) on the majority of sensitive residential receptors would be moderate to minor adverse.

6.12.13 The analysis indicates the likely significant effects from new lighting for the post-construction phase for the Proposed Development (taking account of the effects of the Proposed Development and those of the NIAB and West Cambridge developments) on the majority of sensitive residential receptors would be moderate to minor adverse.

6.12.14 The analysis indicates the likely significant effects from new lighting for the Proposed Development on the majority of wildlife and habitat receptors would be moderate adverse. This effect will be realised where habitat and commuting areas are located and would not apply to the full Application Site. Relocation of habitat to non-constructed zones and avoidance of lighting along verified commuting paths may further reduce the relative effect of the Application Site to minor adverse.

6.12.15 The analysis indicates the likely significant effects from new lighting for the Proposed Development on the local observatories would be moderate to minor adverse. In the context of the potential effect to the optical telescopes used by the observatories, which could be affected by any lighting within a 30-40 mile radius and are currently affected by existing lighting conditions, the relative effect is expected to be negligible.

6.12.16 The analysis indicates the cumulative effect of the required lighting provisions for the Proposed Development is minor – moderate adverse and is local to the Application Site, having a negligible effect at regional and national levels.

6.12.17 The assessment of overall likely significant effects from new lighting for the Proposed Development in conjunction with existing and consented development, with consideration of site layout, indicates sky glow as having the most variable potential effect to identified receptors.

6.12.18 The assessment of the overall effects that would result from new lighting for the Proposed Development would satisfy technical and environmental good practice guidance and be considered minor – moderate adverse.

6.12.19 The Proposed Development lies in close proximity to the West Cambridge and NIAB1 and NIAB2 developments, however, it is unlikely that the three developments would be viewed in combination due to the intervening urban form. Given its location and existing localised screening, the cumulative landscape and visual effects of the Proposed Development in combination with those of the NIAB and West Cambridge developments are assessed not to be likely to be materially greater than those of Proposed Development in isolation.

6.12.20 Overall the Proposed Development and its inherent Landscape Principles will enable the Proposed Development to be effectively integrated into the north western urban edge of Cambridge with the wider landscape character and visual amenity remaining unaffected.

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7 ECOLOGY AND NATURE CONSERVATION

7.1 Introduction

7.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of Ecology and Nature Conservation.

7.1.2 The purpose of this assessment is to identify the likely significant environmental effects of the Proposed Development from the perspective of ecology and nature conservation. The assessment has been undertaken in accordance with the guidance set out in the Institute of Ecology and Environmental Management's (IEEM) Guidelines for Ecological Impact Assessment (2006) (known as 'the IEEM Guidelines').

7.1.3 This chapter addresses the effects associated with the construction phase and the completed development, or 'operational' phase. As described in Chapter 3, the construction of the development will take place over several phases over a period of 15 years, with completion of individual phases between 2014 and 2026. This assessment therefore takes account of the likely future baseline conditions at the time of construction and / or completion. This chapter considers all 'operational' effects, including the effects of an increased population in this location, and traffic effects (as set-out in Chapter 12).

7.1.4 Consultation has been undertaken with Natural England, SCDC, CCC, the Environment Agency and the Wildlife Trust (for Bedfordshire, Cambridgeshire, Northamptonshire and Peterborough) with regard to the Proposed Development and the mitigation measures to be implemented.

7.2 Legislation and Planning Policy Context

Nature Conservation Legislation

The Conservation of Habitats and Species Regulations 2010

7.2.1 The Conservation of Habitats and Species Regulations 2010 constitute the UK Government's implementation of the Habitats Directive in England and Wales. The Regulations provide for the designation of both Special Protection Areas (SPAs) (first established under the Birds Directive, 1979) and Special Areas for Conservation (SACs) as part of the Natura 2000 network of protected areas across the European Union. There are no such designated sites within or adjacent to the development area.

7.2.2 For European Protected Species (EPS) the 2010 Regulations give protection from deliberate capture, killing or disturbance (where disturbance affects the ability of the EPS to survive, breed or reproduce, to rear or nurture their young, to hibernate or migrate, or significantly affects the local distribution or abundance of the EPS). It is also an absolute offence to destroy or damage the resting site or breeding site of an EPS. EPS recorded within the study area and included within this assessment are great crested newts and bats.

The Wildlife and Countryside Act (1981), as amended

7.2.3 The Wildlife and Countryside Act (1981) and subsequent amendments, as amended and strengthened by the Countryside and Rights of Way Act (2000), is the principal legislative mechanism for the protection of wildlife in Great Britain. The Act established a statutory framework for the protection of wildlife. It provides for the designation of Sites of Special Scientific Interest (SSSI), which are selected as the best national examples of habitat types, sites with notable species and sites of geological importance. There is one SSSI within the Application Site boundary (Traveller's Rest Pit, designated for its geological interest), and a further two SSSIs within 2km of the Application Site (Histon Road, also designated for its geological interest, and Madingley Wood, an area of woodland). The likely significant effects of the Proposed Development upon the Traveller's Rest Pit are considered at Chapter 8 of this ES.

7.2.4 Schedules 1-4 of the Wildlife and Countryside Act (and amendments) deal with the protection of wild birds. Schedule 5 of the Act details protection of other animal species. Full protection is given under Section 9 of the Act to certain animals listed on Schedule 5, including water voles, which are present within the Application Site. Partial protection under Section 9 is given to certain other species, including

all common species of reptile (none have been recorded within the Application Site) and EPS (which receive the majority of their protection under the Conservation of Habitats and Species Regulations 2010). Badgers are present on site; they are listed on Schedule 6 of the Act which outlaws certain methods of taking or killing animals, where necessary. Schedule 8 of the Wildlife and Countryside Act details protection for plants and fungi; no protected plant or fungi species have been recorded within the Application Site.

Countryside and Rights of Way Act (2000)

7.2.5 The Countryside and Rights of Way Act (2000) gives greater protection to SSSIs and strengthens wildlife enforcement legislation by the introduction of the offence of 'reckless disturbance'. The Act also required Government Departments to have regard to biodiversity and conservation; Section 74 of the Act required lists of habitats and species of principal importance to be produced, for which conservation steps should be taken or promoted. The requirement to prepare such lists of habitats and species has been extended by the Natural Environment and Rural Communities (NERC) Act 2006 (see below).

Natural Environment and Rural Communities (NERC) Act (2006)

7.2.6 The NERC Act places a duty upon public bodies to consider enhancement of biodiversity within all of their actions. In addition, this Act provides for those species identified within the UK Biodiversity Action Plan (UK BAP) and the relevant Local Biodiversity Action Plans (LBAPs) to be considered as biodiversity conservation priorities. The species identified as conservation priorities which are relevant to the Application Site are identified under 'United Kingdom Biodiversity Action Plan' and 'Local Biodiversity Action Plan' below.

Protection of Badgers Act (1992)

7.2.7 Badgers are extensively protected by the Protection of Badgers Act (1992) which consolidates the legislation specific to badgers. The Act makes it an offence to wilfully take, kill, injure or ill-treat a badger; to obstruct, destroy, or damage in any part, a badger's sett; or to disturb badgers within a sett.

The Hedgerows Regulations (1997)

7.2.8 The Hedgerows Regulations (1997) have been designed to protect 'important' hedgerows for which replanting is no substitute. The 'importance' of a hedgerow depends upon a number of archaeological, wildlife and landscape criteria. There are 23 hedgerows within the study area, of which two would be considered to be 'important' under the wildlife and landscape criteria.

Nature Conservation Policies

Planning Policy Statement 9: Biodiversity and Geological Conservation (2005)

7.2.9 The statutory planning process requires that full account is taken of biodiversity, in accordance with international and national law. These requirements were set out in Planning Policy Statement (PPS 9) Biological and Geological Conservation (ODPM, 2005). The key principles in PPS 9 required that planning policies and decisions not only avoid, mitigate, or compensate for harm but seek ways to enhance and restore biodiversity. The policies of PPS 9 which were most relevant to the Application Site included the following:

- up-to-date information on environmental characteristics (such as that contained within this ES) should be used in decision making;
- the loss or deterioration of ancient woodland and aged or 'veteran' trees through development should be avoided;
- networks of natural habitats should be protected from development, and, where possible, strengthened by or integrated within it;

- opportunities for building-in beneficial biodiversity features as part of good design should be maximised in and around developments;
- important natural habitat types identified in the Countryside and Rights of Way (CROW) Act (2000) Section 74 list should be conserved and enhanced; and
- species identified as being of principal importance for conservation of biodiversity in England by Section 74 of the CROW Act (2000) should be protected from the adverse effects of development.

7.2.10 PPS 9 stated: *'where planning permission would result in significant harm to those [biodiversity] interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm.'*

In the absence of any such alternatives, *'if that significant harm cannot be prevented, adequately mitigated against or compensated for, then planning permission should be refused.'*

The National Planning Policy Framework ("the NPPF")

7.2.11 The themes of PPS9 have been carried through into the NPPF. While the NPPF is to be read as a whole in the context of ecological considerations the NPPF states at paragraph 118 that when determining planning applications local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused.
- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted.
- Opportunities to incorporate biodiversity in and around developments should be encouraged.
- Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss.
- The following wildlife sites should be given the same protection as European sites:
 - potential Special Protection Areas and possible Special Areas of Conservation;
 - listed or proposed Ramsar sites; and
 - sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.
- Paragraph 119 of the NPPF states that development likely to have a significant effect on sites protected under the Birds and Habitats Directives would not be sustainable under the terms of the presumption in favour of sustainable development.

Regional/Local Planning Policy

7.2.12 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan

unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

7.2.13 The following regional / local planning policies are of relevance to the Proposed Development:

- East of England Plan (May 2008);
- Cambridgeshire and Peterborough County Structure Plan 1999-2016;
- South Cambridgeshire District Council Local Development Framework;
- Cambridge Local Plan (adopted in 2006); and
- North West Cambridge Area Action Plan DPD (adopted October 2009).

East of England Plan

7.2.14 Policy ENV3 of the East of England Plan requires planning authorities to ensure protection of biodiversity through (amongst other things):

- *'ensuring new development minimises damage to biodiversity and earth heritage resources by avoiding harm to local wildlife sites and, wherever possible, achieving new environmental gains in development sites through retention of existing assets, enhancement measures, and new habitat creation;*
- *promoting the conservation, enhancement, restoration, re-establishment and good management of habitats and species populations in accordance with East of England regional biodiversity targets and the priorities in the East of England Regional Biodiversity Map;*
- *ensuring the appropriate management and further expansion of wildlife corridors important for the migration and dispersal of wildlife;*
- *establishing networks of green infrastructure, maximising their biodiversity value, as provided for under Policy ENV1.'*

7.2.15 The East of England regional biodiversity targets of relevance to the Proposed Development are 'hedges'. The plan has a target of no loss of the existing overall resource, and for 100% of hedgerows to be under sympathetic management.

Cambridgeshire and Peterborough County Structure Plan

7.2.16 None of the 'saved' policies of the Structure Plan are of particular relevance to this assessment.

South Cambridgeshire District Council Local Development Framework

7.2.17 South Cambridgeshire District Council's Local Development Framework Core Strategy (2007) includes Objective ST/i:

'To ensure that any new development results in appropriate provision for the protection and enhancement of native biodiversity in order to contribute towards biodiversity gain, whilst having regard to the site's current biodiversity value. Opportunities for increased access to the countryside and enjoyment of biodiversity should be viewed as integral aspects of new development.'

Cambridge Local Plan

7.2.18 Policy 4/3 of the Cambridge Local Plan states: *'Development proposals should seek to enhance features of the landscape which are of importance for amenity or conservation. Development resulting in adverse effects on or loss of those features will not be permitted unless this is unavoidable and there are*

demonstrable and overriding wider public benefits. Where damaging development is permitted, the Council will require:

- a. Mitigation measures to minimise the adverse effects;*
- b. Reinstatement or equivalent replacement of the feature affected; and*
- c. Proposals for long-term management.'*

7.2.19 Policy 4/5 states: 'Development will not be permitted if it will have an adverse impact upon a Site of Special Scientific Interest (SSSI) identified on the proposals map.'

7.2.20 Policy 4/6 states: 'Development will not be permitted if it will have an adverse impact on a Local Nature Reserve (LNR), a County Wildlife Site (CWS), or a City Wildlife Site (CiWS) unless it can be clearly demonstrated that there are reasons for the proposal which outweigh the need to safeguard the substantive nature conservation value of the site. Where development is permitted, proposals should include measures to minimise harm, to secure suitable mitigation and/or compensatory measures, and where possible enhance the nature conservation value of the site affected through habitat creation and management.'

7.2.21 Policy 4/7 states: 'Sites, including buildings, which support species protected by English or European law, will be safeguarded from development proposals which would destroy or adversely affect them. Planning permission for the development of such sites will not normally be granted unless there is an overriding need for the development. If development is allowed, planning conditions and/or obligations will be imposed to:

- a. Facilitate the survival of individual members of the species;*
- b. Reduce disturbance to a minimum; and*
- c. Provide adequate alternative habitats to sustain at least the current levels of populations of the species.'*

7.2.22 Policy 4/8 states: 'Rare or vulnerable habitats identified in Cambridgeshire's Local Biodiversity Action Plan, and habitats which support species identified in those Plans, will be protected from harmful development. Such development will not be permitted unless the need for it outweighs the harmful effects. Where such development is permitted, proposals should include measures to minimise harm and mitigate the harmful impacts.'

North West Cambridge Area Action Plan DPD

7.2.23 Policy NW24 of the North West Cambridge Area Action Plan DPD includes a requirement for development to have 'no adverse impact on the water environment and biodiversity as a result of the implementation and management of water conservation measures'.

United Kingdom Biodiversity Action Plan (UKBAP)

7.2.24 The UKBAP is the UK Government's response to the Convention on Biological Diversity (CBD) signed in 1992. It describes the UK's biological resources and commits a detailed plan for the protection of these resources. A large number of habitat types and species are listed within the UKBAP with specific targets for their conservation. Following a recent review (undertaken in 2007), the UKBAP now includes 1149 priority species and 65 priority habitats. Species Action Plans (SAPs) have been produced for a number of these species. The Action Plans and Targets from the UKBAP which are relevant to the Application Site include: ponds; arable field margins; hedgerows; brown hare; great crested newts; noctule bat; soprano pipistrelle bat; white-letter hairstreak; and a number of bird species, including skylark, linnet, yellowhammer, reed bunting, yellow wagtail, house sparrow, dunnock, common bullfinch, common starling and song thrush.

The Natural Choice

7.2.25 The UK Government published a white paper '*The Natural Choice: securing the value of nature*' in June 2011. This document sets out a series of commitments relating, in particular, to the protection and improvement of the natural environment, the development of a green economy, and strengthening the connection between people and nature. Many of the commitments and principles identified in the white paper are of particular relevance to this proposed development:

- The establishment of coherent ecological networks;
- The use of biodiversity offsets where developments would result in biodiversity losses (biodiversity offsets are defined as conservation activities designed to deliver biodiversity benefits in compensation for losses in a measurable way);
- The creation / use of urban green infrastructure to complete the links in the ecological networks, with green spaces managed to provide a diverse range of functions, benefitting people and wildlife, by delivering ecosystem services;
- Re-connecting people to nature through education, by providing neighbourhood access to nature and the countryside, and encouraging voluntary participation in nature conservation activities.

National Ecosystem Assessment

7.2.26 The UK National Ecosystem Assessment (UK NEA) provides an overview of the state of the UK's natural environment, as well as providing a new approach to valuing natural resources, which requires ecosystem services to be considered in decision-making. The UK NEA does not contain specific policies of relevance to this assessment, but its approach to valuing resources is linked to the delivery of ecosystem services proposed by the Government in their white paper '*The Natural Choice: securing the value of nature*', and is considered in relation to the commitments set-out in 7.2.24 above.

Local Biodiversity Action Plan

7.2.27 The Cambridgeshire and Peterborough Local Biodiversity Action Plan identifies Habitat Action Plans (HAPs) for arable land, hedgerows, rivers and streams, and ponds, and SAPs for brown hare, great crested newt, pipistrelle bat, skylark and song thrush.

7.3 Assessment Approach**Methodology***Desk Study*

7.3.1 A desk study was carried out to obtain existing ecological information relating to the Application Site and its surroundings. Ecological records were collated for the Application Site and up to 2km from the boundary of the Application Site (depending upon the species concerned). The desk study information was initially collected in 2004, and was updated in 2007, 2009 and 2011. The following organisations were contacted in 2011:

- Cambridgeshire and Peterborough Biological Records Centre (CPBRC);
- The Environment Agency;
- Cambridgeshire Bird Recorder;
- Amphibian and Reptile Conservation Trust (previously the Herpetological Conservation Trust); and
- Cambridgeshire Natural History Society.

7.3.2 The local bat group was contacted in 2004 and 2007; however, the CPBRC confirmed that they hold local bat group records and therefore additional information was not required from the bat group for the 2011 desk study update.

7.3.3 The results of the desk study are presented in **Appendix 7.1**.

Field Survey

7.3.4 The following field surveys have been undertaken:

- Multi-disciplinary walkover survey comprising Phase 1 habitat survey (JNCC, 2010), protected species walkover survey and Hedgerows Regulations assessment – undertaken initially in 2004/5, and updated in 2007, 2009 and 2011. **(See Figure 7.3)**
- Phase 2 botanical survey to identify arable weeds – undertaken in July 2011.
- Aquatic invertebrate survey of the Washpit Brook using a standard kick-sampling approach – undertaken in June 2011. **(See Figure 7.4)**
- Terrestrial invertebrate survey of the Application Site using a variety of standard techniques (as recommended in Drake *et al.* (2007) and targeted surveys for white-letter hairstreak and purple hairstreak butterflies – undertaken in July 2011.
- Great crested newt surveys of six ponds and three ditches within/adjacent to the Application Site following Natural England's guidelines (English Nature, 2001) – undertaken initially in 2004 and 2005, and updated in 2007, 2009 and 2011.
- Toad surveys of ponds within and adjacent to the Application Site – undertaken in March 2011.
- Reptile surveys of areas of suitable habitat using artificial refuges – undertaken initially in 2005 and an additional area surveyed in 2009.
- Breeding bird surveys following the British Trust for Ornithology's Common Bird Census methodology were undertaken during 2004 (late-season surveys in June and July) and 2005 (early season surveys in April and May). These surveys were updated in 2009 and 2011 with four survey visits between April and June in both years of survey.
- Winter bird surveys of the Application Site undertaken during March 2011.
- External inspections of all buildings and trees within the Application Site were carried out to identify structures suitable for roosting bats. Where necessary, internal inspections of suitable buildings and tree climbing inspections of suitable trees were carried out in 2005 and updated in 2009 and 2011. Emergence surveys of trees and buildings were undertaken during 2009 and 2011.
- Bat activity surveys along the stream corridor and boundary features suitable for foraging/commuting bats were carried out once per month in May, June and July 2009, following the Bat Conservation Trust's survey guidelines (BCT, 2007) and repeated in May and June 2011.
- Water vole and otter surveys of the Washpit Brook were undertaken in 2004, and repeated in 2005, 2007, 2009 and 2011. The surveys were undertaken following standard survey techniques (Strachan and Moorhouse, 2006; Chanin, 2003).
- Brown hare survey – undertaken during March 2011.
- A badger survey of the Application Site was undertaken in 2004, and updated in 2007, 2009 and 2010, to map sett locations and determine their status following standard methods. A bait marking study, to determine the status and 'ownership' of setts was carried out in 2007.

7.3.5 Detailed survey methodologies can be found in **Appendix 7.1**.

7.3.6 In addition, a walkover survey was undertaken of those parts of the Application Site on which highways improvements and utility works would be carried out to determine whether there are any ecological constraints to the proposed highways and utilities works, as far as access allowed. The walkover survey was undertaken in August 2011 and followed the same approach as the multi-disciplinary walkover survey identified above and detailed in **Appendix 7.1**. A targeted bat survey of mature trees that would be affected by the construction of an access onto Madingley Road was undertaken in January 2012 (further details are provided in **Appendix 7.5**).

Limitations

7.3.7 The baseline conditions in relation to the majority of the potential ecological receptors have been described based on surveys carried out between 2004 and 2011, with most surveys having been updated at least once during this period. Given the length of time over which the surveys have been undertaken, and the number of occasions on which they have been repeated, they are considered to provide a robust indication of current and future baseline ecological conditions.

Assessment Methodology

Determining the value of ecological resources

7.3.8 In accordance with the IEEM Guidelines (IEEM, 2006) this assessment focuses on those activities that could potentially generate significant effects on Key Ecological Receptors. In order to determine the likelihood of a significant effect, it is first necessary to identify whether a receptor is sufficiently valuable for a significant effect upon it to be material in decision-making. The following geographic frame of reference has been used to determine the value of ecological receptors:

- International;
- UK / National;
- Regional (Eastern England);
- County (Cambridgeshire);
- District/Borough (Cambridge City / South Cambridgeshire District); and
- Local (Parish/Neighbourhood).

7.3.9 Those sites, habitats and/or species classified at Local level and above are considered to be sufficiently valuable for a significant effect upon them to be material in decision-making.

Effect Characterisation

7.3.10 In accordance with the IEEM Guidelines, the potential effects of the Proposed Development have been characterised according to the following parameters:

- Magnitude;
- Complexity;
- Extent;
- Duration;
- Reversibility;
- Timing; and

- Frequency.

Design and mitigation

7.3.11 The scheme that is taken through the detailed assessment process has already been subject to mitigation through design, layout of its physical form and its construction programme and method. Efforts have been made to retain the most valuable ecological features as part of the Proposed Development. Those measures taken to avoid, minimize or off-set ecological effects that form part of the design and construction methods of the Proposed Development have not been described as mitigation methods in this assessment. Additional mitigation measures have been developed once specific effects on Key Ecological Receptors have been identified that need addressing and are described as such in Section 7.9.

Assessment of Significance

7.3.12 The significance of an effect has been determined on the basis of an analysis of the factors that characterise the effect, irrespective of the value of the receptor.

7.3.13 Once a significant effect has been identified (i.e. it is considered likely to affect the integrity/favourable conservation status of a Key Ecological Receptor), the value of the receptor has been used to help determine the geographical scale at which the effect is significant. Thus, any negative effect which significantly affects the integrity of a receptor of, for example, national value has been identified as being a nationally significant effect. Where a significant effect on integrity / favourable conservation status is not predicted for a given geographical level, consideration has been given to whether an effect may be significant at lower geographical levels.

7.3.14 The approach to determining significance described above is in accordance with the IEEM guidelines. It differs from the approach used for other environmental disciplines in this ES, where the significance of an effect is based on a combination of the magnitude of the change and the sensitivity of the receptor. Therefore, in order to allow the ecological impact assessment to follow the scale of significance used throughout the remainder of the ES, a further step has been taken to align the output of this assessment with the seven-point scale described in Chapter 1. The levels of significance derived from the IEEM guidelines and the equivalent scale of significance using the seven-point scale have been set-out in **Table 7.1**, below.

Table 7.1: Significance of ecological effects

Significance following the IEEM guidelines	Equivalent significance using the seven-point scale
Significant at the International level	Major (adverse or beneficial)
Significant at the National level	Major (adverse or beneficial)
Significant at the Regional level	Moderate (adverse or beneficial)
Significant at the County level	Moderate (adverse or beneficial)
Significant at the District / Borough level	Minor (adverse or beneficial)
Significant at the Local level	Minor (adverse or beneficial)
Not significant	Negligible

7.4 Scoping & Valuation**Initial Scoping**

7.4.1 In order to determine the appropriate approach to ecological survey and assessment work for the Application Site, a list of potential receptors was identified, on the basis of:

- The statutory and non-statutory designated sites present in the Cambridge area, and their associated species;
- Habitats and species of conservation concern, including those listed as a priority for conservation in the UK Biodiversity Action Plan (UKBAP), the Local Biodiversity Action Plan (LBAP), which may be present on the Application Site or in the surrounding area; and
- The local distribution of protected species in the area, for which the Application Site may support suitable habitat.

7.4.2 This process identified the following potential ecological receptors:

- Madingley Wood SSSI (Traveller's Rest Pit SSSI and Histon Road SSSI are not considered as ecological receptors as they are designated in relation to their geological interest);
- non-statutory designated nature conservation sites (County Wildlife Sites (CWS) and City Wildlife Sites (CiWS)) within 2km of the Application Site or other sites of nature conservation value;
- valuable habitats, as listed on the UKBAP or LBAP (rivers and streams, ponds, hedgerows, arable land, arable field margins, and veteran trees);
- aquatic and terrestrial invertebrates;
- amphibians, including great crested newts;
- 'common' reptile species (slow-worms, common lizards and grass snakes);
- breeding birds, particularly farmland birds such as skylark;
- roosting, commuting and foraging bats;
- brown hare;
- water voles;
- otters; and
- badgers.

7.4.3 The list of potential receptors was reviewed and revised following receipt of desk study information and during, and upon completion of, each of the targeted field surveys.

Setting the Zone of Influence

7.4.4 The zone of influence (Zol) of the Proposed Development describes the area over which the activities associated with the Proposed Development could influence ecological resources in the area. It is considered likely that the Proposed Development would, for the most part, only affect the species and habitats within, or immediately adjacent to, the Application Site. In particular, the Proposed Development may affect great crested newts during the terrestrial phase of their life-cycle, which are associated with ponds outside the Application Site (at the Park and Ride and the Bird Sanctuary). The Zol therefore includes the Park and Ride pond and the Bird Sanctuary ponds in relation to the great crested newt population they support.

7.4.5 In determining the Zone of Influence, consideration was given to the potential for other off-site features to be affected. The scheme includes measures to avoid pollution associated with either the construction or operational phases, which would have the potential to affect downstream habitats within the Washpit Brook. Given the inclusion of these measures it is determined that off-site downstream habitats would not be affected and are therefore not included within the Zol.

7.4.6 The Proposed Development includes the provision of a large area of open land within the Application Site, and there are no sites of nature conservation value located sufficiently close to the Proposed Development, where public access is permitted, which would be expected to experience a significant increase in visitor pressure other than the Coton Countryside Reserve. Therefore the Coton Countryside Reserve has been included within the Zol for the Proposed Development.

Scoping Report

7.4.7 In November 2009 a Scoping Report was produced which presented the initial list of Key Ecological Receptors. It defined the Applicant's proposed scope for the Ecology and Nature Conservation assessment within this ES, on the basis of the initial desk study and survey work summarised in Section 7.3, above.

7.4.8 Subsequently, CCC and SCDC issued a Scoping Opinion (December 2009), which provided their formal response to the Scoping Report confirming that the appropriate significant ecological and nature conservation issues for the Application Site have been identified. The response also confirmed the requirement for further surveys as part of the construction process to aid the monitoring of protected species (such as great crested newt and badgers).

7.4.9 Based on the survey results presented in **Appendix 7.1**, the Proposed Development and the scoping response and comments on the draft ES chapter, potential 'Key Ecological Receptors' have been identified, as set-out in **Table 7.2** and **Appendix 7.2**. Badgers and the Coton Countryside Reserve have been added as Key Ecological Receptors at the request of the consultees. Brown hares have also been added as a Key Ecological Receptor as a result of their nature conservation status. Terrestrial invertebrates have been added as a Key Ecological Receptor based on the results of the 2011 surveys.

Table 7.2: Key Ecological Receptors and their conservation value

Ecological Receptor	Nature Conservation value
The Washpit Brook and associated species including aquatic invertebrates, otters and water voles.	District/ Borough
Coton Countryside Reserve	District/Borough
Mature, veteran and specimen trees	County/Regional
Hedgerows	District/ Borough
Amphibians, including great crested newts (and therefore including Bird Sanctuary, Conduit Head CiWS and Adams Road Sanctuary CiWS)	District/ Borough
Terrestrial invertebrates	County/Regional
Breeding birds (including farmland species such as skylark, yellowhammer, linnet and yellow wagtail)	District/ Borough
Badgers	Local
Bats	District/ Borough
Brown hare	District/ Borough

7.4.10 At the scoping stage it was determined that other 'potential' ecological receptors should be scoped out of the assessment, either because these receptors would not be measurably affected by the Proposed Development, or because the receptors are not considered sufficiently valuable to be a material

consideration in decision-making. The other receptors considered, and the reasons for scoping them out, are set-out in **Table 7.3**.

Table 7.3: Ecological receptors scoped out of the assessment

Ecological Receptor	Reasons for scoping the receptor out of the assessment
Madingley Wood SSSI	Given the reasons for its designation (as described in Appendix 7.1) and that the SSSI is located approximately 1.5km to the west of the Application Site on the opposite side of the M11, it is considered to be outside the Zol and would not be affected by the Proposed Development.
River Cam CWS; Bin Brook CiWS; and Drain at Garrett Hostel Lane CiWS;	All of these watercourses are located over 1km to the south of the Application Site and are not hydrologically linked to the Application Site. They are all, therefore, considered to be outside the Zol and would not be affected by the Proposed Development.
Barton Road Pool CWS	This site is located approximately 2km to the south of the Application Site and is designated for its invertebrate assemblage. There are no hydrological links between it and the Application Site. It is therefore considered to be outside the Zol and would not be affected by the Proposed Development.
Scrub east of M11 verge CiWS; Cotton Path Hedgerow CWS; and Hedgerows east of M11 CWS	These sites are located between 500m and 750m to the south of the Application Site. Given this and the reasons for their designations (as described in Appendix 7.1) they are considered to be outside the Zol and would not be affected by the Proposed Development.
Ascension Parish Burial Ground CiWS	Although this site is located adjacent to the Application Site's eastern boundary it would not be expected to experience any direct effects as a result of the Proposed Development, nor indirect effects such as increased visitor pressure, as there would be no direct public access to the CiWS from the Application Site. It is therefore considered to be outside of the Zol and would not be affected by the Proposed Development.
Meadow and Ditch Opposite Kings College CiWS	Located approximately 1.5km to the south-east of the Application Site with limited public access, this CiWS is considered to be outside the Zone of Influence and would not be affected by the Proposed Development.
Midsummer Common CiWS	An area of the River Cam's floodplain located 1.5km to the east of the Application Site in Central Cambridge. No significant increase in visitor pressure is predicted and no hydrological links exist. This site is therefore considered to be outside of the Zol and would not be affected by the Proposed Development.
Madingley Brick Pits CWS	Located approximately 1km to the north-west of the Application Site and designated for its invertebrate assemblage, this CWS is considered to be outside the Zol and would not be affected by the Proposed Development.
Trinity Meadow CiWS	This area of valuable grassland is located approximately 1.5km to the south-east of the Application Site in central Cambridge. Given its distance from the site and its location, it is considered to be outside of the Zol and would not be affected by the Proposed Development.
Sheep's Green CWS	Given the reasons for its designation (as described in Appendix 7.1) and that the CWS is located approximately 2km to the south of the Application Site in central Cambridge, it is considered to be outside the Zol and would not be affected by the Proposed Development.
Arable land	The arable land is subject to an intensive management regime

Ecological Receptor	Reasons for scoping the receptor out of the assessment
	and as such is considered to be of limited intrinsic nature conservation value. The field margins are not deliberately managed for wildlife and therefore are not classified as arable field margins in relation to the UK BAP priority habitat-type or East of England Plan regional biodiversity target habitats. As a result the arable land is considered to be of less than Local (Parish/Neighbourhood) value for nature conservation and is therefore not sufficiently valuable for effects upon it to be material in decision-making.
Ponds	The two ponds that may be directly affected by the Proposed Development are in poor condition. Despite being a UK and Local BAP priority habitat, in their current condition they are considered to be of less than Local (Parish/Neighbourhood) value for nature conservation. Ponds are therefore not considered further in this assessment (although the great crested newt and toad populations using the Application Site are considered separately as Key Ecological Receptors).
Woodland and scrub	The small areas of woodland within the Application Site boundaries will be largely retained and protected. In any case these features are small in size and would not be considered to be of particular nature conservation value. Given this and that their most valuable features 'mature, veteran and specimen trees' and 'terrestrial invertebrates' are being treated as Key Ecological Receptors, it is not considered necessary to assess the effects on woodland and scrub separately.
Orchards	There are two small former orchards located within the Application Site of relatively low nature conservation value (less than Local (Parish/Neighbourhood) value), both of which will be retained. Therefore orchards are not considered further in the assessment.
Grassland	The areas of grassland within the Application Site boundaries are agriculturally-improved and of relatively low nature conservation value (less than Local (Parish/Neighbourhood) value) and therefore are not considered further in the assessment.
Reptiles	No reptiles have been recorded during surveys of suitable habitat within the Application Site. The Application Site is therefore likely to support, at most, very small numbers of common species, and the reptile assemblage would not be considered to be of Local (Parish/Neighbourhood) value. Reptiles are therefore not considered further in this assessment.
Wintering birds	The habitats within the Application Site are considered likely to be of relatively low value for wintering birds in comparison with the areas of farmland in the wider countryside to the north and west. No features or habitats of particular value for wintering birds are present. Wintering birds are therefore not considered further in this assessment.

7.4.11 The assessment has been undertaken in relation to two assessment years, as described in Chapter 1 of this ES: 2014, as the proposed completion date for the first phase of the development, and 2026, as the proposed overall completion date.

7.5 Baseline Conditions**Washpit Brook**

7.5.1 The Washpit Brook flows adjacent to the M11 on the western boundary of the Application Site and through the centre of the north-western corner (as shown on **Figure 7.1**). A small number of common wetland plants are present within the Brook including Fool's Water-cress, Water-cress, a water-starwort species, and Common Duckweed.

7.5.2 The aquatic macro-invertebrate communities at both sample sites on the Washpit Brook were found to comprise a low diversity of common species, representative of such small ditches, with intermittent flow. The sample site at the northern end of the Application Site was significantly more diverse than that within the section of the brook adjacent to the M11. However, its diversity was still low and the communities at both sites were assessed as being of 'low' conservation interest.

7.5.3 A small population of water voles is considered to be present on the Washpit Brook, in the channel directly adjacent to the M11 (as shown on **Figure 7.1**). This section of the brook has a good bankside structure and plenty of in-channel vegetation, making it particularly suitable for water voles. Field signs of water voles were recorded in this section in 2005, 2007 and 2009, but no evidence of water voles was recorded during the most recent survey in May 2011. In 2005, evidence of the presence of water voles was also recorded further north on the Washpit Brook within a section which also comprised habitat suitable for this species, although water voles were absent from this part of the Brook in 2009 (see **Figure 7.1**). The remaining sections of the brook and associated ditch system within the survey area are considered to be less suitable for water voles, with hedges and tall bankside trees shading and suppressing in-stream vegetation that generally provides more valuable habitat for water voles. In addition, the watercourse is relatively shallow and prone to dry out in places, particularly in the southern section, as well as being poached by grazing animals, despite the presence of stock-proof fencing. It is therefore of relatively low value for water voles overall, and likely to support only a small population, which is likely to be declining and may have already disappeared from this section of the brook.

7.5.4 For the purposes of this assessment it has been assumed that water voles are still present on the Washpit Brook within the Application Site and will continue to be so in 2014 and beyond. It is unlikely that the water vole population would increase in size and a small population, at most, is therefore predicted to be present during this period, although it is possible that irrespective of the Proposed Development water voles will be lost from the Application Site at some stage by 2026 (as they may have been already).

7.5.5 Although otters may use the Washpit Brook occasionally, to commute between larger watercourses, no signs of otter activity have been recorded during any of the survey visits. The Washpit Brook is considered likely to be of negligible importance to the local otter population. No potentially suitable resting sites were identified during the surveys. As otter populations in the region continue to expand it is possible that otters will start to utilize the Washpit Brook regularly by 2014, but more likely that they might do so by 2026. Given the size of the watercourse it is unlikely that it would provide a foraging resource, but may be used by animals commuting between land to the west of the M11 and land to the north of the A14. It is unlikely that the watercourse would provide resting sites for otters, given the age and type of the vegetation present.

7.5.6 Maintaining and improving riverine habitats is listed as a target on both the UKBAP and LBAP. In addition, water voles are a priority species on the UKBAP and the LBAP. Although the Washpit Brook does not support a particularly diverse or valuable flora it is a priority habitat type and supports a priority species; it is also likely to function as a valuable corridor for wildlife, possibly including otters in the future. On this basis the Washpit Brook is considered to be of District/Borough nature conservation importance. Although the water vole population supported by the Washpit Brook is vulnerable, and may (if not already), irrespective of the Proposed Development be lost by 2014, it is likely that otters, another priority species for conservation, may start to utilize the watercourse regularly, albeit unlikely that it will represent a particularly critical feature for this species. The nature conservation value of the Washpit Brook is

therefore considered to remain as District/Borough nature conservation importance in future assessment years (2014 and 2026).

Coton Countryside Reserve

7.5.7 The Coton Countryside Reserve is located approximately 1km to the south-west of the southern tip of the Application Site. It is an area of farmland managed by Cambridge Past, Present and Future (CPPF), a local charity and membership group, to enhance the landscape, benefit wildlife and provide quiet recreational opportunities for local people. According to CPPF the reserve has annual visitor numbers of 15,000-20,000, with most visitors living or working within a 3 mile radius, although dog walkers visit from further afield. The majority of visitors are lecturers or students from the West Cambridge site, who visit at lunchtimes or in the evenings. Access to the reserve is generally using sustainable modes of transport (including walking and cycling) although there is also a car park. The Coton Countryside Reserve is considered to be of District/Borough nature conservation importance and this is unlikely to change by 2014. Habitat management at the Reserve would be expected to result in an increase in the nature conservation importance of the Reserve in the future. This increase is difficult to predict; however, on a precautionary basis the Reserve would be considered to be of County nature conservation importance by 2026.

Mature, veteran and specimen trees

7.5.8 A number of mature and semi-mature trees are present, the majority of which are located within hedgerows in the southern and western parts of the Application Site. An avenue of mature horse-chestnut trees is present in the eastern part of the Application Site, and a number of mature oak trees are present on the Application Site's southern boundary (adjacent to Madingley Road and the Park and Ride site – see 7.7.2, below). Only one tree within the Application Site boundaries would be considered to be 'veteran' (or 'near veteran'), an oak tree identified as T196 in the Arboricultural Report (included at **Appendix 7.3**) as shown on **Figure 7.1**, although a number of other mature trees are relatively old and contain dead wood, making them also of ecological value. Tree T196 is of considerable age, supports a valuable assemblage of terrestrial invertebrates and is located on the boundary between South Cambridgeshire District and the City of Cambridge; although assessed as being 'near veteran' in the Arboricultural Report it is considered to represent a 'veteran' tree for the purposes of the ecological assessment. There are two mature oak trees on property boundaries on Huntingdon Road, identified as trees T229 and T230 in the Arboricultural Report (**Appendix 7.3**) which are located in close proximity to the 'zone of installation' for new utility apparatus. Both trees are of particular ecological value.

7.5.9 Veteran trees are listed on the Local BAP, and a proportion of the trees on site have been shown to support a valuable terrestrial invertebrate assemblage (see also 'Terrestrial invertebrates', below); as such these trees are considered to be of at least County and possibly Regional nature conservation value. The Scoping Report highlighted the presence of native Black Poplar trees within the Application Site boundaries. However, upon re-inspection in 2010 these trees were identified as hybrid Black Poplars, the majority of which are located outside of the Application Site boundary, along the northern edge of the Application Site (within groups G7 and G31), and on the verge of the M11 (within group G136). The only Black Poplar trees located within the Application Site boundaries are located in the south-east corner of the Application Site (off Storey's Way, tree T153 and a tree within group G93) and adjacent to the WCMC (within group G59). Given that these trees are hybrid rather than native Black Poplars, they are not considered to be of particular nature conservation value. The baseline conditions in relation to mature, veteran and specimen trees are unlikely to change in future assessment years (2014 and 2026).

Hedgerows

7.5.10 The majority of the hedgerows on the Application Site are species-poor, both in terms of the woody species present and their ground flora. However, seven hedgerows are species-rich (comprising five or more woody species) and two of these would be classified as 'important' under the Hedgerows

Regulations (1997), using the Wildlife and Landscape criteria. These hedgerows, and the species-poor hedgerows, are shown on **Figure 7.1**. The shrub species most commonly recorded in the hedgerows include hawthorn, blackthorn, elder, field-rose and dog-rose. A number of the hedgerows also support English elm trees, a large number of which are dead, and are of value for terrestrial invertebrates (see also 'Terrestrial invertebrates', below).

7.5.11 Given the current and likely future management of the Application Site it is considered unlikely that there would be significant changes to the status of the hedgerows, and therefore their nature conservation value, by future assessment years (2014 and 2026). Hedgerows have been identified as a priority habitat within the UKBAP and are listed in the LBAP. The Application Site's hedgerow network is considered to be of District/Borough nature conservation value.

Terrestrial invertebrates

7.5.12 The results of the terrestrial invertebrate surveys identified the Application Site as being of importance for an assemblage of wood-decay (saproxylic) invertebrates associated with the mature trees and 'veteran' tree present. These trees are concentrated in three areas: the main group of older hedgerows in the south-western part of the Application Site, with mainly mature pedunculate oaks; a line of mature willow trees along the Washpit Brook; and the avenue of horse-chestnut trees. The invertebrate fauna includes several scarce and/or declining species of wood-decay beetles and a nationally scarce species of tree-nesting ant (*Lasius brunneus*) (further details are provided in **Appendix 7.1**).

7.5.13 In addition, the uncommon white-letter hairstreak butterfly (a UK BAP priority species) is also present, which is associated with Elm trees. There are also desk study records of purple hairstreak butterflies in the area, from the Park and Ride site, which could also be present, associated with oak trees, although none were recorded during the survey (further details are provided in **Appendix 7.1**).

7.5.14 A small number of other uncommon species were also found along the hedgerows and in the fields, including one further nationally scarce species (a lace hopper bug, *Reptalus panzeri*) which was found to be widely present around the arable fields on clayey soils. Records of this species are primarily from situations with bare clayey ground which dries out periodically and cracks in the summer months, including rye grass leys and arable ground; the key conditions appear to be an open sward and drought-prone soils. It has a restricted range across southern and eastern counties in Britain (the National Biodiversity Network currently shows populations along the Lower Thames and Severn Basins, but nowhere else) although suitable habitat is present across much of Eastern England. This may be the first Cambridgeshire population to be identified, although this may be due to the species being under-recorded given that suitable habitat is present across much of Eastern England.

7.5.15 Overall the terrestrial invertebrate fauna is considered to be of at least County, and potentially Regional, nature conservation value. Given the current and likely future management of the Application Site it is considered unlikely that there would be significant changes to the status of the invertebrate fauna, and therefore its nature conservation value, by future assessment years (2014 and 2026).

Amphibians

7.5.16 A population of great crested newts is present within ponds adjacent to the Application Site boundaries, at the Park and Ride site and the Bird Sanctuary at Conduit Head Road CiWS (**Figure 7.1**). None of the ponds and ditches within the Application Site boundary were found to support breeding great crested newts during the targeted surveys, although other species of amphibians were recorded, including common frog, common toad and smooth newt. Great crested newts can move between ponds in different years, although the surveys have confirmed the absence of this species from the ponds within the Application Site in 2005, 2009 and 2011 (as well as 2007 in some cases), which suggests that it is highly unlikely that they will be colonized during future assessment years (2014 and 2026).

7.5.17 The Park and Ride pond and the Bird Sanctuary ponds are located approximately 250m apart, with few barriers to dispersal between them, and newts associated with them are therefore considered likely to form part of a single meta-population. Given the maximum counts of great crested newts recorded during the targeted surveys, the meta-population associated with the two ponds would be classed as 'medium' following Natural England's guidelines (English Nature, 2001). The difference in numbers of newts between 2007, 2009 and 2011 is likely to reflect differences in the effectiveness of survey methods (torchlight surveys will record greater or lesser numbers of animals dependent upon factors such as water clarity, ambient temperature, density of vegetation at the pond edge). It is therefore difficult to determine whether the great crested newt population is increasing or decreasing, although the presence of eggs in both ponds in 2009 demonstrates that the species is breeding. In any case, given the maximum counts of great crested newts in these features in 2007 (14), 2009 (34) and 2011 (21), the population is considered unlikely to increase sufficiently to fall into the higher size class estimate (i.e. 'large', which would require a maximum count of 100 animals).

7.5.18 It is likely that great crested newts associated with these off-site ponds utilise habitats and features within the southern part of the Application Site for foraging; the Application Site may also provide refuges and hibernation sites. The areas of grassland, hedgerows, ditches and small woodlands within up to 500m of the ponds may be of particular value to the great crested newt population. The arable fields also provide suitable habitat for foraging and hibernating great crested newts, but are likely to be of less importance to the population than the other habitats and features, given their intensive management and low species diversity. Given the management of the Application Site it is unlikely that the availability of terrestrial habitat for great crested newts would change significantly in future assessment years (2014 and 2026) in the absence of the Proposed Development.

7.5.19 The most valuable terrestrial habitat for great crested newts is generally considered to be that within 50m of a breeding pond (the 'immediate' terrestrial habitat). The habitat located 50-250m from a breeding pond is of lower value (the 'intermediate' terrestrial habitat), and the habitat located more than 250m from the pond of lower value still (the 'distant' terrestrial habitat). None of the 'immediate' terrestrial habitat associated with the Bird Sanctuary ponds is located within the Application Site boundary, although a small proportion of the Park and Ride pond's 'immediate' terrestrial habitat is located within the Application Site. Approximately 20ha of the population's 'intermediate' terrestrial habitat and 36ha of its 'distant' terrestrial habitat are located within the Application Site (as shown on **Figure 7.2**).

7.5.20 The pond at the WCMC (Pond 4, as shown on **Figure 7.2**) and the Park and Ride pond (Pond 1, as shown on **Figure 7.2**) support large populations of common toads. Over 300 animals were observed in Pond 4 on a survey visit in March 2005 and a maximum count of 100 observed during three survey visits in March 2011. A maximum count of 200 was recorded in the Park and Ride pond in March 2011. Common toads are likely to utilise other ponds within the Application Site (besides Ponds 1 and 4), but have not been recorded doing so in significant numbers. They will also forage within the habitats surrounding Ponds 1 and 4.

7.5.21 Great crested newts and common toads are priority species for conservation in the UKBAP and LBAP. The great crested newt population associated with the Application Site is considered to be of at least District/Borough importance. The Application Site's population of common toads is considered to be of Local importance. It is considered unlikely that the nature conservation value of either the great crested newt or common toad populations would change in future assessment years (2014 and 2026). Other species of amphibians present within the Application Site (common frog, smooth newt and palmate newt) are common and not of nature conservation concern; these species will therefore not be considered further in this assessment.

Badgers

7.5.22 One 'main sett complex' (which comprises two setts which appear to function together as a main sett), three 'subsidiary setts' and two 'outlying setts' are present within the Application Site boundary. The status of each of the setts (other than the 'main sett complex') has changed over the course of the study

period (2004-2010) and is likely to change further in future assessment years. Some of the setts present during the initial surveys had become disused by the 2009 and 2010 update surveys, and conversely some new outlying setts were recorded in these later years of the study period. This change in status of subsidiary and outlying setts is typical of badgers, particularly in dynamic situations such as this, where intensity of farming from year to year can determine sett usage, and the status of a sett therefore often varies between years.

7.5.23 The bait-marking study confirmed the status of the setts, and showed that the Application Site appears to be used by one social group of badgers. The territory boundaries of the resident social group of badgers appear to extend beyond the site boundaries, to the west and north-west, although clearly defined boundaries are not present, probably due to the lack of adjacent social groups of badgers. In this part of the UK, badger social groups are often fragmented, with suitable sett locations being the limiting factor as to the area occupied by badgers. Badger social group territory sizes in this habitat are likely to be in the region of 50-60ha, but can extend up to 100ha, depending on the proportion of less productive arable habitat.

7.5.24 The location of the setts and further details in relation to their status, as well as the results of the bait-marking study, are provided in a confidential badger survey and mitigation report.

7.5.25 Although protected, badgers are not a species of conservation concern. The badger 'population' present on the Application Site is considered to be of Local nature conservation value. Although the status and location of individual setts is likely to vary in future assessment years, the nature conservation value of the badger population would be expected to remain the same.

Breeding birds

7.5.26 The Application Site supports a farmland breeding bird assemblage, which includes a number of species of nature conservation concern. Skylark (up to 12 pairs in 2009, but 8 and 10 pairs in 2011 and 2005 respectively), yellow wagtail (up to two pairs in 2005, but fewer in other survey years), song thrush (up to four pairs in 2011), starling, house sparrow, dunnoek, linnet (up to five pairs in 2004, but fewer in other survey years), bullfinch, yellowhammer (at least one pair) and reed bunting (one pair) are all listed as priority species for conservation on the UKBAP or LBAP, and/or are listed on the RSPB's 'Red' list of bird species of conservation concern (RSPB, 2009). In addition, whitethroat and willow warbler are listed on the RSPB's 'Amber' list as species of conservation concern (RSPB, 2009) and have also been recorded breeding within the Application Site. The surveys estimated that up to 12 pairs of skylark may breed within the arable fields, although the number of pairs of skylark present is likely to vary in relation to the crop rotation, as certain crop types are likely to support a greater density of skylarks. On average it is assumed that the Application Site supports approximately 10 pairs of skylark each year. The Application Site's network of hedgerows and small woodland areas, and farm buildings, are likely to support smaller numbers of the other species listed above, given the limited opportunities for nesting that they provide, and the number of pairs recorded also varies between years due to variation in crop type and treatment. However, the Application Site may support reasonable numbers of foraging birds which nest in the adjacent residential areas (such as starling, house sparrow, dunnoek and blackbird). There is some evidence that the Application Site may be used by foraging barn owls (small numbers of old pellets at Hales Farm), although there was no evidence of this species breeding on the Application Site in any of the suitable trees or buildings.

7.5.27 The Application Site's breeding bird assemblage is considered to be of District/Borough nature conservation importance. Although the species (and numbers of each species) using the Application Site are likely to vary between years dependent on crop types present in any given year, the nature conservation value of the bird assemblage is unlikely to change significantly in future assessment years (2014 and 2026).

Bats

7.5.28 The loft space of the farm house associated with the Gravel Hill Farm complex supports a maternity roost of brown long-eared bats, although only a single bat was recorded re-entering the building during the bat surveys of this feature (see **Figure 7.1**). The porch of this building has also been found to be used as an occasional roost by pipistrelle bats (one common pipistrelle was recorded using this feature during the 2009 surveys). No other bat roosts were identified in any of the remaining buildings within the Application Site boundary, the majority of which are considered to be largely unsuitable for use by roosting bats. A small number of trees within the Application Site boundary provide suitable roost sites for bats, although no evidence of use by bats was recorded in any of these features.

7.5.29 Up to five species of bats were recorded commuting and foraging across the Application Site during the activity surveys, including noctule, common pipistrelle, soprano pipistrelle, Daubenton's bat and serotine. The greatest level of activity was recorded at the southern end of the Application Site, in fields adjacent to houses and woodland. Noctule and pipistrelle bats were recorded foraging and commuting over open fields, but the majority of bats were recorded commuting along linear features, primarily hedgerows and woodland edges. In addition, common pipistrelle bats were observed commuting along the avenue of horse-chestnut trees, although the surveys confirmed the absence of roosts from these trees. Common pipistrelles were also recorded commuting through the culvert under the M11, at the northern end of the Application Site during May 2011. Overall, the level of bat activity recorded during the transect surveys was relatively low, probably due to low insect biomass over the majority of the Application Site.

7.5.30 Noctule, brown long-eared and soprano pipistrelle bats are listed as priority species on the UKBAP. The Application Site's assemblage of bats is considered to be of District/Borough importance. Given the low number of bats roosting on the Application Site, and the intensively farmed nature of the habitats present, the nature conservation value of the bat assemblage using the Application Site is unlikely to change significantly in future assessment years (2014 and 2026).

Brown hare

7.5.31 The Application Site supports a population of brown hares, with a peak count of 35 hares recorded during the 2011 surveys. This is indicative of the Application Site supporting a population of hares at a high density, which is comparable with other areas of farmland in this part of the UK. Brown hares are listed as a priority species on the UKBAP and LBAP. The brown hare population is considered to be of District/Borough importance; this is unlikely to change in future assessment years (2014 and 2026).

7.6 Likely Significant Effects**Washpit Brook***Construction Phase Effects*

7.6.1 The Washpit Brook will be retained, with some modifications to bank profile to allow a second stage channel to be provided for floodwater storage. An additional 'low flow channel' will be created, resulting in an overall increase in the length of watercourse within the Application Site from 1km to more than 1.5km (an approximate increase of more than 50%). The new 'low flow channel' will be created with a meandering course to form backwaters and linear ponds. The sections of the watercourse which support wetland plants will be retained intact; their banks will be largely unaffected by the modifications. In addition, the modifications have been designed to allow the retention of the majority of the hedgerows and trees adjacent to the downstream half of the watercourse. A proportion of the land within the Washpit Brook corridor will be lowered to provide flood storage; this will create seasonally flooded grassland, which will also be of ecological value. Further details are provided in the Flood Risk Assessment Addendum (15.2) and the Biodiversity Strategy (**Appendix 7.4**). Given the relatively poor habitat provided by the Washpit Brook at present, due to significant lengths drying out in summer and trampling

and grazing of the banks by cattle, and the proposed increase in the quantity of wetland habitat, the modifications associated with the Proposed Development will have an overall beneficial effect.

7.6.2 Measures will be implemented to avoid pollution or increased turbidity in the ditches and the Washpit Brook during construction operations and the watercourse modifications, to protect adjacent and downstream habitats. The retained and new sections of the brook will be protected within an appropriate buffer zone within which construction activities will not take place (other than those required for the modifications to the brook and provision of flow control structures and maintenance access). Construction site drainage will be designed to include treatment and attenuation of run-off from infrastructure roads and hard surfaces through the use of balancing and pollution control mechanisms. These measures will form part of the Construction Environmental Management Plan (CEMP) for the Proposed Development.

7.6.3 It is possible that a small population of water voles will be present within the affected sections of the Washpit Brook during the modification works. The most valuable habitat for water voles will be retained unaffected (over a length of between 250 and 300m). This length of channel would be sufficient to support a population of the size likely to be present (even assuming a worst-case scenario) and is the location where water voles are likely to be present at the time of the works; it is considered likely that water voles will be absent from the affected sections. Bank modifications in this section will be designed to ensure that the banks are not over-topped regularly, thereby ensuring an island of habitat remains during flood events. A pre-construction water vole survey will be undertaken to confirm the presence or absence of water voles along the length of the brook within the Application Site. In the unlikely event that modification works need to take place in an area occupied by water voles, the animals will be relocated in advance of works commencing through 'displacement' by strimming the vegetation and undertaking a careful destructive search, in accordance with current best practice guidance (Strachan and Moorhouse, 2006; Natural England, 2008). Any water voles present will be displaced into the retained section of watercourse. It is not considered likely to be necessary to capture and relocate water voles in advance of the works.

7.6.4 Given that otters could start to utilize the Washpit Brook in future years, it would also be appropriate for any sections of brook affected to be re-surveyed to confirm the continued absence of otter resting sites, although it is considered highly unlikely that any would be present.

7.6.5 The new sections of watercourse and linear ponds will be designed to provide valuable habitat for water voles as well as other wetland species associated with the brook, and will be managed to maximise their suitability for these species. The ponds will provide valuable habitat for amphibians, including great crested newts and common toads. A steep bank (45°) will be created on one side of the new channels and linear ponds, with a 30cm wide shelf below normal water level which will be planted with marginal vegetation. The area of new habitat being created is significantly more extensive than any minor losses that could adversely affect the water vole population, and would therefore be expected to more than offset any adverse effects. An increased plant diversity and a beneficial effect on aquatic invertebrates and water voles would be expected in the short-term (2-3 years). The new drainage and attenuation system would be expected to allow water levels to be maintained in the brook more effectively, and the lack of grazing animals on the Application Site will allow bankside vegetation to develop to provide a more valuable habitat for water voles. These measures would address the main factors considered likely to be limiting the suitability of the habitat for water voles at present and therefore increase the value of the habitat for water voles. They would also be likely to lead to the brook supporting an increased diversity of aquatic invertebrates.

7.6.6 In addition, two artificial otter holts will be constructed within the open land provision along the brook. These features will be appropriately designed and located in areas where public access is discouraged, through the planting of thorny scrub around them. Given the lack of suitable resting sites for otters on the brook, the provision of artificial holts would be expected to deliver an enhancement for this

species. Four artificial kingfisher nest chambers and tunnels will also be provided in appropriate sections of locally steepened bank.

7.6.7 Overall, a minor beneficial effect would be expected by 2026, which would be significant at the District/Borough level.

Operational Phase Effects

7.6.8 Drainage for the Proposed Development has been designed to ensure that run-off from the Application Site will be attenuated and treated prior to discharge to the Washpit Brook. As stated under 'Construction Phase Effects' (above), modifications to bank profile will be designed to ensure that sections of the watercourse of particular value for water voles are not submerged by floodwater on a frequent basis. As such, no adverse operational effects on the Washpit Brook are anticipated. It is likely that water quality within the brook would improve in the long-term as a result of the pollution control measures included as part of the Proposed Development and the implementation of the management objectives set-out in the Biodiversity Strategy (**Appendix 7.4**).

7.6.9 Overall, a minor beneficial effect would be expected by 2026, which would be significant at the District/Borough level.

Cumulative Effects

7.6.10 None of the additional developments which have been identified in Chapter 1 as having the potential to have cumulative effects would be likely to give rise to cumulative effects on the Washpit Brook, given their locations and lack of direct hydrological connectivity with the Washpit Brook. In any case, adverse effects are not predicted to result from the Proposed Development and therefore cumulative effects would not be anticipated.

Overall Assessment

7.6.11 Given the proposed modifications to the Washpit Brook and the implementation of mitigation (if necessary) and enhancement measures described above, it is likely that there would be a beneficial effect upon this receptor and its associated species, which would be significant at the District/Borough level. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Minor Beneficial significance by 2026. Minor beneficial effects would be expected by 2014, although it is difficult to determine whether or not these would be significant and have therefore been assessed to be negligible on a precautionary basis.

Coton Countryside Reserve

Construction Phase Effects

7.6.12 No construction phase effects would be anticipated.

Operational Phase Effects

7.6.13 Residential properties and employment areas associated with the Proposed Development will be located within approximately 1.5km of the Coton Countryside Reserve, and therefore within the 3 mile radius in which the majority of its visitors live and work. There is therefore the potential for the Proposed Development to result in increased visitor numbers at the reserve, and therefore potential degradation of the habitats. Currently the reserve receives 20,000 visitors annually. The 2009 population estimates suggest that there are 126,329 people living within 3 miles of the reserve. The Proposed Development will result in an increased population within 3 miles of the reserve, by approximately 5% and is therefore expected to give rise to, at most, a similar percentage increase in visitor numbers (an additional 1,000 visitors per annum). Given the amount of Open Land being created within the Application Site, and the distance of the reserve from the Application Site, it is considered likely that a smaller increase in visitor numbers than this would be realised. In any case, given that the reserve has an existing infrastructure of

waymarked paths it is considered unlikely that an additional 1,000 visitors per annum (worst-case scenario) would represent a significant adverse effect, and would therefore be negligible.

Cumulative Effects

7.6.14 The development of the NIAB and West Cambridge sites would further increase the number of people living and working within a 3 mile radius of the Coton Countryside Reserve, and the potential therefore exists for a cumulative effect to occur. The West Cambridge site is located in relatively close proximity to the reserve and an increase in visitor numbers from workers at the site would be expected as a result of this development (although current visitor numbers already include visitors from this area). The NIAB development is located to the north of Huntingdon Road at some distance from the reserve, and closer to other areas of countryside and recreational facilities (including those that will be created within the Application Site). It is therefore unlikely that the NIAB development would give rise to significant increases in visitor numbers to the reserve.

7.6.15 Given the likely increases in visitor numbers at the reserve that would be expected to arise as a result of these developments, a significant cumulative effect would not be anticipated.

Overall Assessment

7.6.16 No significant effects are expected on this Key Ecological Receptor. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Negligible significance.

Mature, veteran and specimen trees

Construction Phase Effects

7.6.17 The veteran oak tree (T196) will be retained within the Proposed Development. The utilities works on Huntingdon Road will be undertaken in a manner which ensures the retention of the valuable mature oak trees associated with adjacent properties (T229 and T230). The likely effects, in terms of tree health, of development close to these trees and other mature trees will be reviewed, with measures implemented to avoid possible effects arising from physical damage (accidental or through excavation in close proximity to the roots), soil compaction, pollution and airborne dust. Remedial tree surgery will be undertaken as necessary to promote the long-term survival of retained mature trees close to the footprint of the development. These measures will form part of the CEMP for the Proposed Development. No significant adverse effects on veteran trees are predicted. A small number of mature trees of Local nature conservation value will be lost as a result of the Proposed Development, including several oak trees along Madingley Road (see 7.7.2, below). However, these trees will be replaced with newly planted standard trees as part of the landscaping scheme for the Proposed Development. The new trees are unlikely to have matured to a stage where they will fully replace those lost by 2026. However, given the low nature conservation value of these trees, and that a large proportion of mature trees within the Application Site will be retained, this would not be considered to represent a significant adverse effect, and would therefore be negligible.

Operational Phase Effects

7.6.18 No additional adverse effects on mature, veteran or specimen trees are predicted as a result of the Proposed Development in either year of the assessment. Long-term management of the retained trees within the Application Site will seek to promote the longevity of mature trees and therefore encourage the development of veteran trees in the future (as described in the Biodiversity Strategy (**Appendix 7.4**)). This beneficial effect would not be considered to represent a significant benefit in comparison with the likely status of veteran trees in the future in the absence of the Proposed Development, and would therefore be negligible.

Cumulative Effects

7.6.19 The NIAB and West Cambridge developments were not predicted to result in significant adverse effects on mature, veteran or specimen trees. In addition, given that veteran trees will not be adversely affected, and that the losses of mature trees will be confined to the Application Site, no cumulative effects in relation to the other sites identified in Chapter 1 on mature, veteran or specimen trees are anticipated.

Overall Assessment

7.6.20 The most ecologically valuable trees within the Application Site (including the veteran oak tree (T196) and valuable oak trees on Huntingdon Road (T229 and T230)) will be retained within the Proposed Development and new tree planting is proposed within the linear parkland to off-set unavoidable losses (including the trees along Madingley Road that will be lost to allow the construction of a new access to the site). No significant effects are expected on this Key Ecological Receptor. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Negligible significance.

Hedgerows*Construction Phase Effects*

7.6.21 None of the species-rich hedgerows, including those which would be considered 'Important' under the Wildlife and Landscape criteria of the Hedgerows Regulations 1997, will be lost as a result of the Proposed Development. However, the species-rich hedgerow adjacent to the Washpit Brook will suffer the loss of two short sections (c.50m each) to allow the re-alignment of the watercourse. The majority of this hedgerow will be retained intact on its current alignment, and the short sections lost will be replanted. The majority of species-poor hedgerows will also be retained, although the Proposed Development will result in the loss of approximately 700m of species-poor hedgerow. Appropriate buffer zones (approximately 5m wide) will be maintained alongside the retained hedgerows to ensure their protection in the long-term. Protective fencing will be installed during construction, where necessary, to safeguard retained vegetation from accidental damage. These measures will form part of the CEMP for the Proposed Development. At least 700m of new hedgerow will be planted within the area of open land along the Application Site's western edge, and the retained hedgerows will be managed to maximize their nature conservation value. Given the time taken for new hedgerows to mature and for management to result in a beneficial effect, an adverse effect would be expected in 2026, which would be off-set within approximately 30-50 years.

Operational Phase Effects

7.6.22 The retained and new hedgerows will be managed in accordance with the management objectives set-out in the Biodiversity Strategy (**Appendix 7.4**) to maximise their nature conservation value. No adverse operational phase effects on hedgerows are predicted.

Cumulative Effects

7.6.23 The NIAB development will result in losses of short sections of hedgerow; the West Cambridge development will provide improved wildlife corridors and, therefore, have a potentially beneficial effect on hedgerows. Given this and the relatively small-scale losses of hedgerow habitat within the Application Site, that the hedgerows affected are species-poor, that any losses would be replaced with new hedgerows, significant effects on hedgerows cumulatively with the other developments as listed in Chapter 1 would not be expected.

Overall Assessment

7.6.24 Overall the Proposed Development will be expected to deliver an increase in the length of hedgerow present on the Application Site, as well as an enhancement through the replacement of species-poor hedgerows with species-rich planting, and the management of retained hedgerows to

maximize their biodiversity value. This beneficial effect is likely to be realised in the long-term (more than 30 years beyond 2026). In the short-term there will be a loss of hedgerow habitat which would be considered to be significant at the local level. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Minor Adverse significance at 2014 and at 2026. In the long-term (by 2056) a beneficial effect of local significance is predicted which, following the approach set-out in **Table 7.1**, would be considered to be an effect of Minor Beneficial significance.

Terrestrial invertebrates

Construction Phase Effects

7.6.25 The most valuable habitat features for dead-wood invertebrates will be retained as part of the Proposed Development, including the veteran oak tree, the avenue of horse-chestnut trees, the trees along the Washpit Brook, and the majority of the mature trees associated with hedgerows in the southern and south-western parts of the Application Site. There will also be only minor losses of elm and oak trees associated with the Proposed Development, and therefore little effect on white-letter hairstreak and purple hairstreak butterflies (if present). The more valuable habitat features for both species will be retained, although small areas of habitat will be removed to allow the construction of a new access off Madingley Road, adjacent to the Park and Ride at High Cross. This loss will be mitigated through the creation of new habitats of value for white-letter hairstreak and purple hairstreak butterflies within the Western Edge. Some of the terrestrial invertebrate species associated with arable farmland are likely to be lost from the Application Site as a result of the Proposed Development, potentially including a nationally scarce species of lace hopper bug. The ecology of this species is poorly known, although it is thought to require soil cracking caused by summer droughts on land prone to winter flooding. These conditions will be created within the open land along the Application Site's western edge by virtue of the flood storage being provided along the Washpit Brook (see 7.6.1, above).

7.6.26 In addition, the off-site mitigation measures proposed in relation to breeding birds (see below) includes the creation of 'skylark plots' and valuable field margins on farmland in the surrounding area. These measures would be likely to provide suitable habitat for this species, which requires a short sward and areas of bare ground that dry out in summer. In any case, it should be noted that this species is likely to be present in farmland habitat in the wider area but under-recorded, and its loss would therefore not be expected to have a significant adverse effect on the County's invertebrate fauna. Overall, there would be expected to be a short-term adverse effect at the Local level until new habitats mature to offset the effect (by 2026).

Operational Phase Effects

7.6.27 The retained and new habitat features will be managed in accordance with the management objectives set-out in the Biodiversity Strategy (see **Appendix 7.4**) to maximise their nature conservation value. No adverse operational phase effects on terrestrial invertebrates are predicted. The creation of new habitats of value for terrestrial invertebrates within the Western Edge will increase the available habitat for important species, including white-letter hairstreak and purple hairstreak butterflies and the nationally scarce species of lace hopper bug. Beneficial effects would be expected to occur as the Proposed Development progresses, although measurable benefits may not be realized until 2026. Although some minor beneficial effects would be expected by 2014 in relation to some species, these would be considered to be negligible.

Cumulative Effects

7.6.28 Effects on the terrestrial invertebrate species of particular value within the Application Site are not predicted in relation to either the West Cambridge or the NIAB developments, and therefore cumulative effects on this receptor would not be anticipated.

Overall Assessment

7.6.29 Given the retention of the most valuable habitat features for terrestrial invertebrates, significant adverse effects are not predicted at the County/Regional level. However, in the short-term (2014 to 2026) there would be a loss of habitat until new planting matures, and off-site mitigation measures deliver a measurable benefit. This would be expected to be significant at the Local level. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Minor Adverse significance at 2014. In the medium-term (by 2026) a beneficial effect could be realized for some of the species associated with the assemblage, which would be considered to be significant at the Local level. Following the approach set-out in **Table 7.1**, this would be considered to be an effect of Minor Beneficial significance at 2026.

Great crested newts*Construction Phase Effects*

7.6.30 None of the ponds used by breeding great crested newts will be affected by the Proposed Development. However, the Proposed Development will result in the loss of suitable terrestrial habitat which may be used by the great crested newt population associated with the Park and Ride pond and the Bird Sanctuary ponds. The most valuable terrestrial habitat for the newt population (the 'immediate' terrestrial habitat, i.e. that located within 50m of the ponds) will be retained unaffected. In the case of the Park and Ride pond the immediate terrestrial habitat within the Application Site boundary comprises a hedgerow, a dry ditch and part of an arable field. This area will form part of the 'Open Land' provision and the arable field will be replaced with grassland, which will be managed to be of particular value for foraging newts; the ditch and hedgerow will be retained.

7.6.31 The newt population associated with the off-site ponds will lose approximately 11ha of arable land, of relatively low value for foraging newts, and a section of species-poor hedgerow within 250m of the ponds (the intermediate terrestrial habitat). An additional 19ha of arable land and 2ha of improved grassland will be lost at a distance of 250-500m from the ponds (the distant terrestrial habitat). Partial losses of intermediate and distant terrestrial habitat are classed as 'low' impacts (on a scale of low, medium or high) by Natural England (English Nature, 2001). The areas of improved grassland and plantation woodland within 250m of the ponds (a total area of 9ha) will be enhanced for foraging newts, through the creation of new wetland features to the west of the Park and Ride pond, and implementation of appropriate management. Similarly, new wetland features and grassland, suitable for use by foraging newts, will be created within the extensive area of open land along the western edge of the Application Site, as part of the drainage and attenuation scheme, and associated landscaping, associated with the Washpit Brook (see 7.6.1, above).

7.6.32 Overall, the Proposed Development will result in short-term losses of foraging habitat of relatively low value to the great crested newt population. In the long-term, the provision of new ponds within open land along the western edge of the Application Site will increase the availability of breeding sites (which is likely to be a limiting factor in terms of the current status of the local great crested newt population). This will encourage great crested newts to utilise the areas of open land along the western edge of the Application Site which are currently located more than 250m from the Park and Ride pond, and are therefore likely to be infrequently used. This would be expected to deliver a beneficial effect on the local great crested newt population in the long-term (20-30 years), and to negate any adverse effects by 2026, as habitat creation and improvement work will take place in the early phases of the Proposed Development.

7.6.33 To avoid the incidental mortality of great crested newts during the construction phase, site clearance operations within 500m of the Park and Ride and Bird Sanctuary ponds will take place under licence to Natural England. Temporary one-way amphibian-proof fencing will be installed around the construction site in this location, and newts captured from the affected areas using a combination of methods (pitfall trapping, drift fencing, and artificial refuges). Animals captured during this process will be relocated into the off-site ponds. Works during the period when newts are hibernating

(October/November to March) would ideally need to be avoided. These measures will form part of the CEMP for the Proposed Development.

7.6.34 Dependent upon the timing of the works in the southern part of the Application Site, it may be appropriate to update the newt surveys to inform the licence application (to ensure that newt survey data are no more than two years old).

7.6.35 Common species of amphibians (including common toads – see below), although not specially protected, will be relocated from on-site ponds that will be lost as a result of the proposals. These animals will be captured using appropriate methods and relocated into new or retained ponds within the Application Site. These measures will be detailed within the CEMP for the Proposed Development. Where necessary, vegetation and invertebrates will be relocated with the amphibians to ensure that suitable habitat exists within the new and retained ponds.

Operational Phase Effects

7.6.36 The retained and new ponds, and the habitat within the open land, will be managed in accordance with the management objectives set-out in the Biodiversity Strategy (**see Appendix 7.4**) to ensure that these features continue to provide suitable habitat for breeding and foraging great crested newts. The construction of an access route to link the Application Site with Madingley Road will bisect the two off-site ponds which support the breeding population of great crested newts. An amphibian tunnel will be provided under the access road in an appropriate location to link these two features. Amphibian-proof fencing will be provided to guide the animals into the tunnels and reduce the likelihood that they will be at risk of mortality on the new road (either due to traffic-related mortality, or mortality in drainage structures, such as gully pots). The tunnel and associated fencing will be constructed prior to the opening of the southern access road to traffic, and will form part of the CEMP for the Proposed Development.

Cumulative Effects

7.6.37 The NIAB and West Cambridge developments were not predicted to result in adverse effects on great crested newts. In addition, given the locations of the ponds adjacent to the sites which support great crested newts, surrounded by already developed land (as well as the Application Site), it is not considered likely that any of the additional developments as identified in Chapter 1 could give rise to cumulative effects. Cumulative effects on the local great crested newt population are therefore not expected.

Overall Assessment

7.6.38 Overall the Proposed Development will be expected to increase the quality of foraging habitat available for the great crested newt population associated with the off-site ponds, as well as increasing the availability of breeding habitat, in the long-term. This is likely to deliver a significant beneficial effect for the local great crested newt population, both in terms of size and extent, which would be realised in the long-term (20-30 years), and would be significant at the District/Borough level. In the short-term, the loss of terrestrial habitat would be expected to give rise to a significant adverse effect at the District/Borough level. The short-term adverse effect would be reduced to not significant by 2026. Following the approach set-out in **Table 7.1**, the effects on great crested newts would be considered to be of Minor Adverse significance in the short-term (up to 2026), Negligible in the medium-term (2026-2036), and Minor Beneficial in the long-term (post-2036).

Common toads

Construction Phase Effects

7.6.39 The pond at the WCMC (Pond 4) will be retained as part of the Proposed Development within an extensive area of open land, along with a proportion of the habitat likely to be used by foraging and hibernating animals during the terrestrial phase of their life-cycle. The Proposed Development will result

in areas of intensively managed farmland being converted to residential areas with associated gardens. The loss of foraging habitat is therefore unlikely to give rise to a significant adverse effect. Refuges and hibernation sites could be lost as a result of site clearance for the Proposed Development. However, the construction of artificial refuge / hibernation sites within the area of open land along the Application Site's western edge, and in the open land within which Pond 4 is located (area 1, as shown on the Landscape Parameter Plan), will off-set this effect. These measures will be detailed within the CEMP for the Proposed Development. A large population of toads is also associated with the pond within the Park and Ride site. The measures described above in relation to great crested newts would be expected to safeguard this population, through avoiding incidental mortality of animals during site clearance and habitat loss/fragmentation effects.

7.6.40 The Proposed Development will also result in the loss of a small number of other wetland features that toads may use (although not in significant numbers). Toads may be encountered during site clearance operations of these features, or removal of features such as hedgerows or scrub. Toads will be captured from the ponds in advance of site clearance and moved into Pond 4, as well as being captured from the southern part of the Application Site in parallel with the measures described above in relation to great crested newts. In addition, site clearance works outside of the area where great crested newt mitigation is required, but in proximity to Pond 4, will be overseen by a suitably experienced ecologist. Any toads captured during this process will be released into the artificial refuge / hibernation sites. Works affecting toads during the hibernation period will be avoided wherever possible. Relocating a proportion of the toad population to the Application Site's western edge would encourage the establishment of this species in this area, connecting these features with the population associated with the Park and Ride pond, and therefore result in the population extending its distribution within the Application Site boundary. Given that this part of the Application Site will provide a green corridor linking the areas to the north and south of the Application Site, this will also deliver improvements in connectivity for the local toad population.

Operational Phase Effects

7.6.41 The construction of residential areas and associated infrastructure in the areas around Pond 4 would be likely to result in toads crossing site roads during the operational phases of the Proposed Development, and this will put them at risk of increased mortality. An amphibian tunnel will be constructed beneath the road located to the north of the WCMC (as shown on the Access Parameter Plan), to allow toads to access the northern parts of the Application Site. A second tunnel will be constructed beneath the road to the south of this area of open land (also shown on the **Figure 2.1**), to allow access for toads to the southern part of the Application Site, and to provide a link with the new habitats being created along the western edge and the Park and Ride pond. The amphibian tunnel under the southern access road link (described above under 'great crested newts' will also allow toad access to and from the Park and Ride pond). Appropriate fencing will be used to guide the animals to the tunnels and reduce the risk of road-related mortality. These measures will form part of the CEMP for the Proposed Development.

Cumulative Effects

7.6.42 The NIAB and West Cambridge developments were not predicted to result in significant adverse effects on common toads. In addition, given the location of the pond supporting common toads, and that no adverse effects on toads are predicted as a result of the Proposed Development, it is considered unlikely that any cumulative effects will arise as a result of the additional developments identified in Chapter 1. Cumulative effects on the local common toad population are therefore not expected.

Overall Assessment

7.6.43 Overall the Proposed Development would be expected to deliver a beneficial effect for common toads in the medium-term (likely to be realized by 2026) of local significance. Significant short-term adverse effects are not predicted. Following the approach set-out in **Table 7.1**, the effects on common

toads would be considered to be of Negligible significance in the short-term (up to 2026) and Minor Beneficial in the medium-term (post-2026).

Badgers

Construction Phase Effects

7.6.44 The main sett complex will be largely retained within open land. It is likely that a small number of entrances at the northern end of one of the setts that make up the main sett complex will need to be closed due to the edge of built development being located within close proximity. However, given that the majority of this sett (and the other sett which forms part of the main sett complex) will be retained, this is unlikely to have a significant effect on the functioning of this sett complex.

7.6.45 The other setts currently functioning as subsidiary setts will either be retained within areas of open land or are located off-site and will not be affected. One outlying sett will also need to be closed. It may be necessary to close a number of the former outlying setts which are currently disused. The closure of these setts would not be expected to have a significant effect on the resident social group of badgers.

7.6.46 The closure of the northern end of the main sett complex, and any outlying setts in use by badgers at the time of site clearance, will be carried out under licence to Natural England. In addition, other operations involving heavy machinery within 30 metres of any retained setts may also need to proceed under licence to Natural England. A pre-construction badger survey will be undertaken immediately prior to each phase of site clearance to determine whether any new setts are present, which will be detailed within the CEMP for the Proposed Development.

7.6.47 Overall the resident social group of badgers is likely to lose approximately 90ha of arable land, although the majority of the more valuable grassland habitat will be retained. New areas of grassland will be created within open land (including the extensive area along the site's western edge) that will provide a more valuable foraging resource. The amount of grassland habitat available to foraging badgers in the long-term will be approximately 40ha. Badger social groups in areas of the UK where pasture land is dominant within the landscape occupy territories of approximately 30-40ha. The open land provision of the Proposed Development is therefore like to be sufficient to support a social group of badgers in the long-term, provided that its value for foraging badgers can be maximised. The new gardens associated with the Proposed Development will also provide a foraging resource for badgers. However, access for badgers to all gardens will not be available and this assessment has therefore been based on an assumption that the gardens will not be available as a foraging resource.

7.6.48 In order to help ensure that a viable social group will be able to survive post-development, areas of open land and landscape planting will be designed to maximise the value of these parts of the site for foraging badgers. Some areas of amenity grassland closest to the main sett complex and a new artificial sett (see below) will be kept mown short to create optimal foraging conditions for badgers, and a high proportion of fruit-bearing trees and shrubs will be incorporated in new landscape planting.

7.6.49 The reduction in area of foraging habitat will be progressive over the various phases of the development, allowing time for the resident social group of badgers to adjust to any losses through changes in foraging patterns and (if necessary) a gradual reduction in social group size. The reduction in area of foraging habitat associated with the Proposed Development is therefore not considered to be significant.

Operational Phase Effects

7.6.50 There is an existing low level of public recreational use of the area around the main sett complex. It is possible that increased public use of this area as a result of the Proposed Development could cause badgers to abandon the main sett complex. An artificial sett will be provided within the area of open land along the Application Site's western edge. The sett and its immediate surrounds will be fenced off and planted with thorny scrub to reduce public interference. This will provide suitable alternative shelter for

the badgers should they be disturbed from the current main sett complex. Given the likely levels of use of the site's road network and speed restrictions, the Proposed Development is considered unlikely to give rise to significant levels of road-related badger mortality.

Cumulative Effects

7.6.51 Given that the territory associated with the resident social group of badgers is likely to be approximately the same as the Application Site boundary, albeit that it may extend off-site in some locations, no significant cumulative effects associated with the other developments identified in Chapter 1 are likely to arise. Cumulative effects on badgers are therefore not expected.

Overall Assessment

7.6.52 Given the apparently fragmented nature of badger populations in the area, and their use of the Application Site, it is considered likely that the resident group of badgers would be able to survive the reduction in area of foraging habitat associated with the development proposals, and would be expected to remain as a viable social group post-development. Significant direct effects on setts are also not anticipated and an artificial sett will provide alternative shelter in a part of the site where it will be fenced off from public interference. It is therefore considered that the Proposed Development will not have a significant effect upon badgers. Following the approach set-out in **Table 7.1**, the effects on badgers at both 2014 and at 2026 would be considered to be of Negligible significance.

Breeding birds

Construction Phase Effects

7.6.53 The Proposed Development would result in the loss of an area of farmland of value to a range of species, including several which are considered to be of conservation concern, such as skylark, linnet and yellowhammer. The Proposed Development is likely to result in a shift in the species dynamics from agricultural to garden species. Species such as song thrush, dunnoek, starling and house sparrow will take readily to landscaped areas including native shrub and tree plantings around buildings, new parks and gardens associated with the Proposed Development, and the open land on the Application Site's western edge. The open land and drainage / attenuation ponds associated with the Washpit Brook will provide suitable habitat for species such as yellow wagtail, reed bunting and willow warbler. Certain species will therefore not be adversely affected by the Proposed Development and some would be expected to increase in number in the medium- to long-term (15-30 years), as the new habitats mature, providing additional foraging habitat and nesting sites.

7.6.54 The provision of additional habitat for these species will progress according to the phases of the Proposed Development and any beneficial effects would likely be realized between 2026 and 2050. Given the nature conservation status of the species that would be likely to benefit from the Proposed Development, the beneficial effects would be considered to be of only local significance. Following the approach set-out in **Table 7.1**, the effects on breeding birds (not including specialist farmland species) would be considered to be of Minor Beneficial significance in the long-term.

7.6.55 Certain farmland bird species (particularly skylark, linnet and yellowhammer) are likely to be lost from the Application Site altogether. These species will lose approximately 125ha of farmland habitat, although the existing areas of grassland (approximately 35ha) are unlikely to support significant numbers of birds. The habitat loss for farmland bird species is therefore approximately 90ha, with wheat, barley, beans and potatoes grown in rotation. Although the Proposed Development will be phased over a period of approximately 15 years it is likely that this part of the Cambridge University Farm will cease to be farmed at some stage during the construction, as it becomes unviable. For the purposes of this assessment a conservative approach has been taken and it is therefore assumed that all farmland habitat will be lost to farmland birds from 2014 onwards (although this is unlikely actually to be the case). The farmland species listed above are all considered to be common in Cambridgeshire and are therefore

likely to be present across the County. There are 238,500ha of arable land in Cambridgeshire, of which approximately one-third is likely to fall within South Cambridgeshire District (c.80,000ha). The loss of approximately 90ha of arable land is therefore likely to result in a reduction in the availability of habitat for farmland specialist bird species in South Cambridgeshire of approximately 0.11%. This will result in an adverse effect which would not be considered significant at the District / Borough level, but would be considered significant at the Local level. Following the approach set-out in **Table 7.1**, the effects on specialist farmland bird species would be considered to be of Minor Adverse significance. However, it should be noted that the loss of habitat is relatively small in comparison with that available in the wider area.

7.6.56 The loss of habitat for farmland birds could readily be mitigated through the 'enhancement' of arable farmland outwith the Application Site. The project will provide a financial contribution to delivering such measures on third party land. This will be secured through a S106 agreement with South Cambridgeshire District Council.

7.6.57 The funding made available by the Applicant should be targeted by the local planning authority towards a combination of the following measures:

- Skylark plots - areas of undrilled patches within wheat crops, measuring approximately 4m x 4m. At a density of 2/ha skylark plots have been shown to increase breeding success of skylarks by 49% (SAFFIE, 2007). Skylarks nest at a density of up to 0.4/ha in winter wheat (Eraud and Boutin, 2002) and therefore the provision of skylark plots within 50ha of arable farmland sown as winter wheat, or similar, would be expected to increase breeding success to a level which offsets the effects of loss of breeding habitat from within the Application Site.
- Valuable habitat features for nesting linnets and yellowhammers. The planting of scrub and/or hedgerows would increase the availability of nesting habitat for these species. The planting of at least 200m of dense, species-rich hedgerow, would be expected to offset the loss of the limited nest sites for this species that will be lost as a result of the Proposed Development.
- Additional foraging habitat for all three species, by increasing the availability of seeds and invertebrates. This could readily be created in field corners and in strips adjacent to ditches (straightening field edges where there are 'meanders' in a ditch), by managing field corners as grassy areas, creating uncropped cultivated areas, providing beetle banks, or sowing wild bird seed mix; approximately 2ha of habitat created in this way would offset loss of habitat from within the Application Site.
- Other measures which increase the availability of nesting and foraging habitat for the species affected could also be considered as alternatives to those described above.

7.6.58 These measures should follow the methods set-out in Natural England's Entry Level Stewardship Handbook (EF8 – skylark plots; EF1 – management of field corners; EF2 – wild bird seed mixture; EF7 – beetle banks; and EF13 – uncropped, cultivated areas for ground-nesting birds on arable land) (Natural England, 2010). The combination of measures selected should include the provision of permanent habitat features, as well as temporary measures that will need to change location annually in response to crop rotation patterns.

7.6.59 The approach to mitigation in relation to farmland birds described above follows the general approach of biodiversity offsetting, as recommended in the UK Government's white paper '*The Natural Choice: securing the value of nature*'.

7.6.60 As an enhancement measure, features suitable for nesting birds will be incorporated into the design of a proportion of the new buildings within the Proposed Development to increase the availability of nest sites for species such as house sparrows, swifts, starlings and blue tit or great tit. Further details are provided in the Biodiversity Strategy (**Appendix 7.4**). This will be secured through a S106 agreement.

7.6.61 The potential also exists for the damage or destruction of nests during site clearance, as well as disturbance of breeding birds during the construction phase of the Proposed Development. Wherever it is unavoidable that trees have to be felled or hedgerows have to be removed, this should be undertaken outside the bird breeding season (that is, not between end-February and mid-August). Similarly, topsoil stripping should be undertaken outside of the bird breeding season where suitable habitat for ground-nesting species exists. Where works in this season are unavoidable, the relevant construction site should be cleared during the preceding winter if at all possible. If these time periods cannot be avoided, surveys should be undertaken to confirm the absence of nesting birds prior to any vegetation removal and/ or soil stripping. Similarly, surveys should be carried out to confirm the absence of nesting birds from any buildings which may be demolished during the bird breeding season. Should active bird nests be identified, a suitably adequate buffer zone would be put in place between any active nests and construction works in order to avoid disturbance to nesting birds until the chicks have fledged. These measures will be detailed within the CEMP for the Proposed Development.

7.6.62 Although no barn owl nest sites have been recorded within trees or existing buildings on the Application Site, it will be appropriate to re-survey suitable features to confirm the continued absence of this species prior to site clearance.

Operational Phase Effects

7.6.63 No additional adverse effects to those identified in the construction phase on breeding birds are predicted as a result of the Proposed Development in either year of assessment.

Cumulative Effects

7.6.64 The assessment has concluded that specialist farmland bird species will be lost from the Application Site, giving rise to a significant effect on the local populations. The NIAB development will also result in habitat losses for specialist farmland species, although the Environmental Statement for the scheme predicted a negligible residual effect given the provision of off-site mitigation, particularly for skylarks. The West Cambridge development is also likely to have an adverse effect on specialist farmland species but a beneficial effect for other species; the Environmental Statement did not assess the gains and losses for individual species separately. Given the location of the Application Site on the edge of Cambridge and the availability of substantial areas of farmland habitat to the north and west of the Application Site it is considered unlikely that the significance of the effect would be increased when losses associated with other developments (as set-out in Chapter 1) are considered. Cumulative effects in excess of those likely in connection with the Proposed Development itself are therefore not considered likely.

Overall Assessment

7.6.65 The Proposed Development will give rise to an adverse effect on specialist farmland bird species, which would be considered to be significant at the Local level. The measures set-out above to avoid or manage any adverse effects would be expected to reduce this effect to a level which would not be considered to be significant. Following the approach set-out in **Table 7.1**, the effects on specialist farmland bird species would be considered to be of Negligible significance once mitigation has been applied both at 2014 and at 2026. In the long-term (by 2026); the Proposed Development will give rise to beneficial effects for other species, particularly garden species, of local significance. Following the approach set-out in **Table 7.1**, the effects on breeding birds (not including specialist farmland species) would be considered to be of Minor Beneficial significance in the long-term (by 2026).

Bats

Construction Phase Effects

7.6.66 The surveys undertaken to date have confirmed the absence of roosting bats from all but one of the buildings (see **Figure 7.1**). This building will be demolished, resulting in the loss of a small brown

long-eared bat maternity roost and an occasionally used pipistrelle bat roost (used by small numbers of bats). Given the status of the roosts, their loss is considered unlikely to have a significant effect on the local bat population provided that alternative roost sites can be provided. The building should be re-surveyed prior to its demolition; works are likely to need to proceed under licence to Natural England and should avoid periods when bats are present. A proportion of the new buildings on site will be designed to incorporate features suitable for use by roosting bats, by allowing bats access into roofspaces (such as through raised tiles or cavities at roof apexes, and provision of bat bricks). Such features will be provided in communal buildings, where human access to the roofspace can be appropriately controlled. Dedicated 'bat lofts' will be provided in at least two such buildings in close proximity to the site of the farmhouse; the creation of 'bat lofts' in each building should follow the guidance set out in Natural England's 'Bat Mitigation Guidelines' (Natural England, 2004). Further details are provided in the Biodiversity Strategy (**Appendix 7.4**). The surveys have not identified roosting bats within any trees within the Application Site. Overall there would therefore be an increase in the number of potential roost sites present on site. This will be secured through a S106 agreement.

7.6.67 It will be appropriate to repeat the surveys of all suitable trees and buildings prior to each phase of site clearance to confirm the continued absence of roosting bats from these features. In the unlikely event that bats are present in features other than the farmhouse, works may need to take place under licence to Natural England and may be seasonally constrained.

7.6.68 Bat boxes will be provided on retained mature trees to further increase the availability of roost sites. Further details are provided in the Biodiversity Strategy (**Appendix 7.4**). This will be secured through a S106 agreement.

7.6.69 Given the low level of bat activity recorded on site during the surveys, and the retention of the most valuable features (the Washpit Brook, species-rich hedgerows, and the avenue of horse-chestnut trees), significant losses of foraging habitat and/or commuting routes are not predicted. The creation of wetlands and mosaics of grassland within the open land on the western edge of the Application Site will provide an additional foraging resource for bats, which will offset the losses of arable fields and small areas of trees, scrub and hedgerows, which are considered to be of relatively low value for foraging bats. Low-level directional street lighting will be used to minimise light spillage and any effects on wildlife, in particular commuting bats. The underpass under the M11 will not be lit and the western edge of the Application Site will be largely unlit (with the possible exception of the sports pitches close to the Park and Ride site), to ensure that there are areas of relative darkness within the areas of more valuable foraging habitat for bats. This could be secured by way of planning condition.

Operational Phase Effects

7.6.70 No additional effects on bats to those identified for the construction phase are predicted as a result of the Proposed Development.

Cumulative Effects

7.6.71 The NIAB development is predicted to give rise to beneficial effects on bats. The West Cambridge development may also give rise to beneficial effects, as a result of the strengthening of wildlife corridors. Therefore no adverse effects on bats which are cumulative with the other developments identified in Chapter 1 of this ES are likely to arise and beneficial effects may be realized, although these are considered unlikely to be significant.

Overall Assessment

7.6.72 Overall, significant adverse effects on bats are not predicted; some minor beneficial effects may occur, although these are unlikely to be significant. Following the approach set-out in **Table 7.1**, the effects on bats would therefore be considered to be of Negligible significance.

Brown hare*Construction Phase Effects*

7.6.73 The Proposed Development will result in the loss of 125ha of farmland habitat used by brown hares. It is likely that brown hares will be lost from the Application Site altogether, as the areas of open land are unlikely to provide habitat of particular value for this species. Brown hares are relatively common in Cambridgeshire and are therefore likely to be present across the County. There are 238,500ha of arable land in Cambridgeshire, of which approximately one-third is likely to fall within South Cambridgeshire District (c.80,000ha). The loss of approximately 90ha of arable land is therefore likely to result in a reduction in the availability of habitat for brown hares in South Cambridgeshire of approximately 0.11%. It is recognized that brown hares will use other habitat types, although the proportion of loss of arable land is considered likely to reflect the overall habitat losses. The loss of habitat will result in an adverse effect which would not be considered significant at the District / Borough level but would be significant at the Local level. Following the approach set-out in **Table 7.1**, the effects on brown hares would be considered to be of Minor Adverse significance. However, it should be noted that the loss of habitat is relatively small in comparison with that available in the wider area. The approach to offsetting the effects on farmland birds through off-site 'enhancement' of farmland (as described under 'breeding birds', above) would also be appropriate in delivering increased habitat for brown hare to offset the losses associated with the Proposed Development. The package of measures used to offset the effects on farmland birds should include those likely to also be beneficial for this species, such as providing uncropped, cultivated areas for ground-nesting birds within arable fields (EF13 in Natural England's ELS Handbook).

Operational Phase Effects

7.6.74 No additional effects on brown hares to those identified at the construction phase are predicted as a result of the Proposed Development.

Cumulative Effects

7.6.75 The NIAB development will result in habitat losses for brown hare, although the Environmental Statement for the scheme predicted a negligible residual effect. The West Cambridge development is also likely to have an adverse effect on brown hares. Given the location of the Application Site on the edge of Cambridge and the availability of substantial areas of farmland habitat to the north and west of the Application Site it is considered unlikely that the significance of the effect would be increased when losses associated with other developments (as set-out in Chapter 1) are considered. Cumulative effects in excess of those likely in connection with the Proposed Development itself are therefore not considered likely.

Overall Assessment

7.6.76 The Proposed Development will give rise to an adverse effect on brown hare which would be considered to be significant at the Local level. The off-site enhancement referred to above would be expected to reduce this effect to a level which would not be considered to be significant. Once mitigation has been applied, the effects on brown hare would be considered to be of Negligible significance.

7.7 Effects of Highways and Utility Works**Huntingdon Road**

7.7.1 The red line boundary for the Application Site extends some distance along Huntingdon Road to allow for the construction of two access locations, as well as to allow for the installation of new utility apparatus and ancillary highway works. The removal of vegetation associated with the construction of two new access locations would not be considered significant, as the vegetation in these locations comprises existing landscape planting and species-poor hedgerows which are not of particular ecological

value, the loss of which would be mitigated by new landscape planting associated with the Proposed Development. There are no protected species constraints in either location. The remaining works are located within hard surfaces or regularly mown verges and, in general, would therefore not give rise to significant adverse ecological effects. However, two mature oak trees are located on the southern side of the road on property boundaries (identified as trees T229 and T230 in the Arboricultural Report (**Appendix 7.3**)); these trees are of particular ecological value. It will be important that the works are undertaken in a manner which ensures the retention of these trees and avoids damage to their roots (as described under 'Mature, veteran and specimen trees', above).

Madingley Road

7.7.2 The red line boundary for the Application Site extends some distance along Madingley Road to allow for the construction of a new access at High Cross, as well as to allow for the installation of new utility apparatus and ancillary highway works. The construction of the new access, adjacent to the Park and Ride, would require the removal of some mature oak trees as well as areas of hawthorn and elm dominated scrub. These habitat losses would be mitigated by new landscape planting associated with the Proposed Development. There are no protected species constraints in this location (the trees have been inspected for bat roosts and none were identified (see **Appendix 7.5** for further details); no badger setts have been identified). However, the trees do provide suitable habitat for white-letter hairstreak and purple hairstreak butterflies. The loss of the small areas of habitat affected would be mitigated by the creation of valuable habitat for these species within the Western Edge (see 'Terrestrial invertebrates', above). The remaining works are located within hard surfaces or regularly mown verges and would therefore not give rise to significant adverse ecological effects.

Potable water main extension routes

7.7.3 There are two possible route options for the off-site 450mm diameter water main extension. Option 1 would require installation across third party land; option 2 would install the extension along existing streets, thereby avoiding potential ecological effects.

7.7.4 To the north of the Application Site the possible route for option 1 would be along Whitehouse Lane and the line of a public footpath heading north-east to a connection with an existing 18 inch water main below Kings Hedges Road. The majority of the route follows an existing track, which is surfaced in places, and the water main extension could be installed adjacent to the track in mown grass verges or arable fields of limited ecological value. A section of the route is located within a double hedgerow; both hedgerows are relatively species-rich. The main extension could be installed beneath the track or in the grass verge either side of it, with care taken to avoid effects on the root systems of hedgerow trees; some trimming of the hedgerows is likely to be required. At its northern end the route would need to cross a hedgerow and landscape planting associated with Cambridge Road (B1049), but could do so utilizing existing gaps in these features to avoid further ecological effects. There are no other ecological constraints to the installation works to the north of the Application Site and it is therefore considered unlikely that the works would give rise to significant adverse ecological effects.

7.7.5 To the south of the Application Site the possible route for option 1 would be through the West Cambridge development and then across farmland to the south to connect with an existing 18 inch water main located adjacent to A603 Barton Road. Small watercourses and hedgerows would need to be crossed. The exact route would need to be determined and could be selected to minimize the ecological effects and avoid valuable features and/or protected species, following detailed surveys. In any case, it is considered unlikely that the works would give rise to significant adverse ecological effects.

7.7.6 The proposed works would need to follow the mitigation measures described above in relation to avoiding effects on nesting birds and, in a small number of locations, reptiles (as detailed in the CEMP), to ensure compliance with current legislation.

Overall Assessment

7.7.7 It is considered that the highway and utility works are unlikely to give rise to significant adverse effects on valuable habitats, or valuable and / or protected species.

7.8 Ecological effects associated with traffic

7.8.1 The changes to traffic flows on the existing road network (as set-out in Chapter 12) would not be expected to give rise to any additional significant ecological effects.

7.8.2 The creation of new roads within the Application Site may lead to increased mortality of amphibians (great crested newts and common toads) and badgers. The consideration of these effects has been dealt with in the relevant parts of Section 7.6, above.

7.9 Measures to avoid, reduce or manage effects

7.9.1 As described in Section 7.6, in order to mitigate the loss of habitat as a result of the proposals for certain farmland bird species and brown hares, appropriate levels of funding will be contributed to relevant biodiversity projects, to enhance areas of farmland for these species. Whilst this would represent a mitigation / compensation measure for these species, it would also be expected to deliver an enhancement for other species of farmland birds. This approach to mitigation / compensation follows the general approach of biodiversity offsetting, as recommended in the UK Government's white paper '*The Natural Choice: securing the value of nature*'. These measures would also be expected to mitigate, to some extent, the effect of habitat loss for a nationally scarce species of lace hopper bug, associated with the field margins within the Application Site.

7.9.2 Measures relating to the protection of biodiversity features are described in the draft CEMP, where appropriate, and / or the Biodiversity Strategy document for the Proposed Development (see (**Appendix 7.4**)).

7.9.3 As set-out in Section 7.6, the Proposed Development and its associated landscaping and drainage provision would be expected to provide additional habitats of nature conservation value, which are not currently present on site, or are present in a degraded state. In particular, the drainage design will provide new wetland features, increasing the habitat available for water voles, aquatic invertebrates, foraging bats and amphibians, including great crested newts. The creation of an extensive area of open land along the western edge of the Application Site will provide valuable grassland habitats as well as areas of scrub and new hedgerows, increasing the availability of habitat for foraging bats, foraging amphibians (including great crested newts and toads), certain species of birds, and reptiles. The management objectives for this area are described in the Biodiversity Strategy (**Appendix 7.4**). Detailed landscape and nature conservation management prescriptions will need to be agreed, which can be secured by way of a planning condition.

7.9.4 The provision of attenuation and pollution control features as part of the new drainage scheme would be expected to improve water quality within the Washpit Brook and deliver an ecological enhancement in relation to this watercourse.

7.9.5 New ponds will be constructed to provide increased habitat for great crested newts. These ponds will be designed to be of particular value for breeding newts and, given that no breeding ponds are being lost as a result of the proposals, this would be expected to deliver an enhancement for this species in the long-term. It will also deliver an enhancement through the provision of a valuable habitat-type (and one specifically highlighted in the UK Government's white paper '*The Natural Choice: securing the value of nature*').

7.9.6 A proportion of the new buildings within the Proposed Development will incorporate features suitable for use by roosting bats (which will be created within communal buildings). These measures have been incorporated into the Proposed Development to mitigate the loss of a small bat roost.

However, given the low value of the roost being lost, and the number of new features that will be created, this represents an enhancement for roosting bats.

7.9.7 In addition, the following features will be incorporated as enhancement measures:

- Nest sites for swifts, starlings, house sparrows and blue tits/great tits will be incorporated into the design of new buildings;
- Bat boxes will be installed on retained trees;
- Artificial otter holts and kingfisher nesting sites will be provided along the Washpit Brook.

7.9.8 These enhancement proposals will ensure compliance with the NPPF, Policy ENV3 of the East of England Plan, Objective ST/i of South Cambridgeshire District Council's Local Development Framework Core Strategy (2007), and Policy 4/3 of Cambridge City Council's Cambridge Local Plan (2006).

7.9.9 The creation of a large area of valuable habitat for wildlife along the Western Edge, including the Washpit Brook, as well, as a network of other green spaces, will help to establish an area of green infrastructure on the edge of Cambridge, linking areas of countryside to the north and west. These areas will have a range of functions, including providing valuable habitats for wildlife as well as quiet recreational opportunities for people, and delivering a number of ecosystem services. This will help to deliver some of the beneficial effects described in the UK Government's white paper '*The Natural Choice: securing the value of nature*'.

Monitoring

7.9.10 A monitoring programme will be implemented to determine whether the mitigation and enhancement measures are successful and to identify remedial measures where required. Further details are provided in the Biodiversity Strategy within **Appendix 7.4**.

7.10 Summary

7.10.1 This ES chapter has assessed the likely significant ecological and nature conservation effects of the Proposed Development during both the construction and operational phases of the Proposed Development at both 2014 and at 2026. Habitat loss as a result of the Proposed Development is considered not to be significant as the majority of the area to be lost is arable land of low nature conservation value. The most valuable habitats such as the species-rich hedgerows and veteran trees will be retained and managed to preserve and enhance their nature conservation value. The creation of new habitats within the area of open land along the western edge of the Application Site will incorporate the Washpit Brook. In addition, the new low flow, backwater channels and linear ponds will increase the wetland resource available to invertebrates, water voles and otters. New ponds will be created to provide suitable habitat for breeding great crested newts and common toads.

7.10.2 The Proposed Development will help to deliver some of the beneficial effects described in the UK Government's white paper '*The Natural Choice: securing the value of nature*' (as identified in 7.2.23, above). The large area of habitat creation along the Application Site's western edge, along with the creation of other areas of open land, will create green infrastructure, linking areas of farmland to the north and west of the Application Site allowing the creation of an ecological network on the north-western edge of Cambridge. The areas of open land will have a diverse range of functions, particularly the area along the western edge of the Application Site, which will deliver a number of ecosystem services, including improvements to water quality, filtering air and noise pollution, providing a recreational facility, and contributing towards food production. This area of open land will also provide an ideal opportunity to re-connect people to nature, by providing and encouraging access to the countryside; this would be supported by delivering nature-related education and encouraging voluntary participation in nature conservation activities, as identified in the Biodiversity Strategy.

7.10.3 Minor adverse effects on hedgerows and great crested newts are predicted in the short-term (up to 2026), although these would be expected to reverse to significant beneficial effects in the long-term (post-2036 in the case of great crested newts, post-2056 in the case of hedgerows).

7.10.4 Although specialist farmland bird species and brown hare will be lost from the Application Site as a result of the Proposed Development, after mitigation has been applied through off-site measures to 'enhance' the habitat on areas of farmland to improve their value for these species, the effects would be negligible. It is considered that the highway and utility works are unlikely to give rise to significant adverse effects on protected species or habitats.

7.10.5 **Table 7.3**, below, summarises the assessment process discussed above.

Table 7.3: Summary of the assessment process

Ecological Receptor	Associated Species	Value	Mitigation	Cumulative effects	Significance of Effects	
					IEEM guidelines	Following Table 7.1
Washpit Brook	Water voles; otters; invertebrates	District/Borough	Not applicable	None	Significant beneficial effect at the District/Borough level	Minor Beneficial
Coton Countryside Reserve	Various species associated with farmland	District/Borough, possibly increasing to County by 2026	Not applicable	West Cambridge development will also increase visitor numbers, but not to a level which would give rise to a significant effect	No significant effect	Negligible
Mature veteran and specimen trees	Bats; breeding birds; dead-wood beetles; white-letter hairstreak and purple hairstreak; nationally scarce tree-nesting ants	County/Regional	Not applicable	None	No significant effect	Negligible
Hedgerows	White-letter hairstreak and purple hairstreak; nesting birds; commuting bats	District/Borough	Not applicable	NIAB development will have an adverse effect on hedgerows; West Cambridge will have a beneficial effect. Overall significant cumulative effects are not likely	Short-term (up to 2026): significant adverse at the local level Medium-term (2026-2056): Not significant Long-term (post-2056): significant beneficial at the local level	Short-term (up to 2026): Minor Adverse Medium-term (2026-2056): Negligible Long-term (post-2056): Minor Beneficial
Terrestrial invertebrates	Particularly dead-wood beetles; white-letter and purple hairstreak; nationally scarce tree-nesting ants; and lace hopper bug	County/Regional	Enhancement of off-site farmland to increase its value for farmland birds may also mitigate effects on the lace hopper bug	None	Short-term (at 2014): significant adverse at the local level Medium-term (at 2026): significant beneficial at the Local level	Short-term (at 2014): Minor Adverse Medium-term (at 2026): Minor Beneficial
Great crested newts		District/Borough	Not applicable	None	Short-term (up to 2026): significant adverse at the District/Borough level Medium-term (2026-2036): Not significant Long-term (post-2036): significant beneficial at the District/Borough level	Short-term (up to 2026): Minor Adverse Medium-term (2026-2036): Negligible Long-term (post-2036): Minor Beneficial
Common toads		Local	Not applicable	None	Short-term (up to 2026): Not significant Medium-term (post-2026): significant beneficial at the local level	Short-term (up to 2026): Negligible Medium-term (post-2026): Minor Beneficial

ENVIRONMENTAL STATEMENT

Ecology and Nature Conservation

Ecological Receptor	Associated Species	Value	Mitigation	Cumulative effects	Significance of Effects	
					IEEM guidelines	Following Table 7.1
Badgers		Local	Not applicable	None	No significant effect	Negligible
Breeding birds		District/ Borough	Enhancement of off-site farmland to increase its value for farmland birds.	West Cambridge development may have adverse effect; the effect of the NIAB development is mitigated to negligible levels. Cumulative effects in excess of those predicted for the Proposed Development itself are not considered likely.	Farmland specialist species Not significant Other species Short-term (up to 2026): Not significant Medium- to long-term (post-2026): significant beneficial at the District/Borough level	Farmland specialist species Negligible Other species Short-term (up to 2026): Negligible Medium- to long-term (post-2026): Minor Beneficial
Bats		District/ Borough	Not applicable	NIAB and West Cambridge developments may have beneficial effects for bats but the cumulative effect is unlikely to be significantly beneficial (nor adverse)	Not significant	Negligible
Brown hare		District/ Borough	Enhancement of off-site farmland to increase its value for farmland birds will also provide habitat of increased value for brown hare	West Cambridge development may have adverse effect; the effect of the NIAB development is mitigated to negligible levels. Cumulative effects in excess of those predicted for the Proposed Development itself are not considered likely.	Not significant	Negligible

1 Introduction and Assessment Approach

2 Application Site Description and Proposed Development

3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

10 Cultural Heritage

11 Agricultural Circumstances

12 Traffic and Transport

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19 Summary

8 SOILS AND GEOLOGY

8.1 Introduction

8.1.1 This chapter is formed of three parts. Part 1 provides an assessment of the likely significant effects associated with the Proposed Development arising from any existing contamination of soil or groundwater or the presence of ground-gas. Geotechnical information has been included but is generally presented in qualitative terms only to indicate the potential effect on the Proposed Development.

8.1.2 Part 2 of this chapter relates to an area within the Application Site which is designated a Mineral Safeguarding Area in the Cambridgeshire and Peterborough Minerals and Waste Plan.

8.1.3 Part 3 of the chapter relates to an area within the Application Site which is designated as a Site of Special Scientific Interest (SSSI); the Traveller's Rest Pit. This area has been notified as a SSSI due to the presence of nationally important geology. A copy of the most recent notification issued in 2010 is provided in **Appendix 8.6**.

8.1.4 In respect of all three parts, the likely significant effects with respect to both the construction and operational phases of the Proposed Development have been considered as at both 2014, when Phase 1 of the Proposed Development will be completed and at 2026 when the Proposed Development will be completed. More detail about the proposed phasing is included in Chapter 3 of this ES.

8.1.5 For this chapter the following reports have been referred to throughout:

- Scott Wilson: 'North West Cambridge Geo-environmental Ground Conditions Report' August 2011 which includes the Landmark Envirocheck Report (Reference 31572446_1_1 dated 16th June 2010 and 35805182_1_1 dated 18 August 2011) (included in **Appendix 8.1**)
- Scott Wilson 'North West Cambridge Geotechnical Report' (included in **Appendix 8.2**)
- Brownfield Solutions: Geo-Environmental Factual Report dated October 2010 (**Appendix 8.3**)
- Scott Wilson: 'Mineral Safeguarding Area' Report (included in **Appendix 8.4**)
- Evans and Newman: 'Northwest Cambridge, University of Cambridge: Archaeological Evaluation Fieldwork. Cambridge Archaeological Unit Report No. 921 dated 2010

8.1.6 The Scott Wilson geo-environmental report (**Appendix 8.1**) included relevant data from existing information that was made available for the development area. This included:

- Peter Brett Associates (PBA): 'North-West Cambridge – Preliminary Geotechnical and Geo-environmental Baseline Condition Study' (March 2007)
- Traveller's Rest Pit, SSSI Report – UoC/NWC/AAP/B8
- Cambridge Archaeological Unit: 'North West Cambridge, An Archaeological Desk Based Assessment Report 455' (2001)
- Cambridge Archaeological Unit: 'Gravel Hill Farm, North West Cambridge, An Archaeological Evaluation Report 513' (2002)

PART 1 – GEO-ENVIRONMENTAL CONSIDERATIONS

8.1.7 The sections below firstly consider the methodologies that have been used for defining the effects of the Proposed Development associated with land contamination. The assessment has been made assuming appropriate design and construction methodologies, inherent in a development such as this, will be incorporated in both the design and construction of the Proposed Development. This chapter also provides a summary of the baseline conditions, which form the basis of the assessment of contamination risks.

8.1.8 Review of historical data and assessment findings of the Scott Wilson Geo-environmental report, confirms a general absence of significant contamination at the Application Site. This is largely to be expected given that the Application Site has predominantly been used for agricultural purposes.

8.1.9 The assessment assumes that current construction industry best practice as articulated in Chapter 2 will be adopted during the pre-construction planning and construction phases to include waste and material management, environmental monitoring and control and adherence to health and safety legislation. The assessment also considers mitigation inherent in the design, which would be addressed by planning conditions.

Legislation and Policy Framework

8.1.10 The following legislation/policy applies to contamination and contamination issues associated with waste management at the national, regional and local levels:

Legislation

- Environment Act 1995;
- Environmental Protection Act 1990 Part II (as amended);
- Waste Management Licensing Regulations 1994 (as amended);
- Control of Pollution (amendment) Act 1989;
- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 (as amended);
- Controlled Waste Regulations 1992;
- Hazardous Waste (England and Wales) Regulations 2005; and
- Environmental Protection (Duty of Care) Regulations 1991 (as amended).

National Policy

The previous National Planning Policies were:

- Planning Policy Statement 23: Planning and Pollution Control 2005;
- Planning Policy Statement 10: Planning for Sustainable Waste Management;

“The National Planning Policy Framework (“the NPPF”)

8.1.11 While the NPPF is to be read as a whole in the context of soils and geology the NPPF states at paragraph 120 71 that to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that:

- new development is appropriate for its location. The effects of pollution on health, the natural environment or general amenity, the potential sensitivity of the area or proposed development to adverse effects from pollution should be taken into account; and
- the site is suitable for its new use taking account of ground conditions, land instability and pollution arising from previous uses and any proposals for mitigation including land remediation.

Regional Policy

- East of England Plan (May 2008)

8.1.12 Within the East of England Plan, Policy ENV4, WM1 and WM6 were noted to be applicable to the discipline of contaminated land. Policy ENV4 encouraged the sustainable use of soil resources and, where soil and land have been degraded, maximisation of opportunities for restoration to beneficial after uses. Policy WM1 encouraged the view that waste is a resource that should be maximised for re-use. Within the context of contaminated land this is relevant as excavated soil is considered to be a waste. In addition, Policy WM6 refers to the sustainable management of waste materials.

8.1.13 **The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies;** although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material

considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

Local Policy

- Cambridge City Council and South Cambridgeshire District Council Joint Area Action Plan (2009).

8.1.14 Within the Joint Area Action Plan, Policy NW2 states that planning permission would not be granted where a proposed development would have unacceptable adverse effects on quality of ground or surface water and geological resources. Policy NW28 promotes recycling of construction waste and maximisation of material re-use during construction.

Scoping Criteria

8.1.15 In accordance with the Scoping Opinion received from CCC (incorporating comments from SCDC and CCC), the baseline conditions for the site with respect to the potential for contaminated land and ground hazards have been established. This has been done by desk study review of existing reports and environmental information for the Application Site. The data has then been used to develop an initial Conceptual Site Model (CSM) which has been supplemented by limited intrusive surveys. Subsequent detailed quantitative risk assessment has been carried out to define the significance and magnitude of any land contamination.

8.1.16 The Scoping Opinion has specified that the assessment methodology to be adopted should seek to identify and evaluate any likely significant land contamination effects on the Proposed Development as well as the Proposed Development on land contamination during both the construction and operational phases.

8.1.17 In addition it was stated that recommendations should be provided for mitigation over and above those assumed to be standard as part of the Proposed Development.

8.2 Assessment Approach

Methodology

8.2.1 For contamination to present a significant effect, it must be demonstrated that there is an identifiable source of contamination (be it an on site or off site source), potential sensitive receptors and potential pathways through which the former may affect the latter. This methodology is consistent with the risk-based framework adopted in the Environment Agency document *Model Procedures for the Management of Land Contamination – CLR11* (Environment Agency, 2004).

8.2.2 The Conceptual Site Model (CSM) for the site is reported in Scott Wilson's Geo-environmental Ground Conditions report (included in **Appendix 8.1**).

8.2.3 The assessment considers both the existing land quality on the Application Site, and the potential for the Proposed Development to in turn affect land quality.

Hazard Source Identification

8.2.4 Potential and actual sources of contamination associated with the Application Site have been identified by consideration of:

- Current and previous land use from a study of existing desktop study reports, current and historic maps, photos, local history sources, environmental database information, a site inspection covering both the Application Site itself and the surrounding area; and
- Site investigation data as reported in Scott Wilson's Geo-environmental Ground Conditions report (included in **Appendix 8.1**).

8.2.5 Once potential sources were defined, a review of the ground conditions and laboratory test data against generic and site-specific screening criteria was undertaken, as detailed in the Scott Wilson Geo-environmental report. This revealed a general absence of significant contamination associated with the potential contamination sources identified at the Application Site. Of particular note was the minimal presence of Made Ground at the Application Site. The report also concluded that there was no conceivable significant risk from groundwater sampled to the defined receptors.

8.2.6 As a precaution, it is anticipated that standard contamination planning conditions may be applied to the proposed planning permission and implemented as the Scheme develops. Examples of this are summarised below and further detail can be found in **Appendix 8.1**.

- Additional ground investigation will be undertaken as part of the detailed design and would focus on recovering additional samples of Made Ground (where present) to further quantify any risk from identified benzo(a)pyrene, together with samples of the Gault Clay to confirm the absence of significant pyrite potential.
- Where residential development with private gardens is planned it is anticipated that the sampling frequency will be increased given the higher sensitivity of these receptors. Any additional investigation will also consider cut and fill requirements for the Proposed Development and will target sampling as required.
- Further ground gas monitoring is to be undertaken to confirm the ground gas conditions and the need for any ground gas mitigation. Ground gas mitigation will be specified as required as part of the detailed design.
- The potential effect of any proposed foundation solution will be considered, e.g. if piling is required, a methodology and risk assessment will be prepared to account for any perceived groundwater risks. Building loads will be designed so as not to require a piled solution that could penetrate any sensitive groundwater resources. Where this is unavoidable, piling would be designed and undertaken in accordance with Environment Agency guidance.

8.2.7 It is assumed that standards of environmental management will be incorporated into the Proposed Development once operational, and designed to avoid the likelihood of any future contamination arising as a result of the Proposed Development.

Receptor Identification

8.2.8 The presence and sensitivity of receptors at risk from potential land contamination are identified by consideration of the following:

- Surrounding land uses, based on mapping and site visits and existing planning designations;
- Proposed end-use, based on the nature of the Proposed Development;
- Type of construction operations that will be necessary as part of the Proposed Development;
- Surrounding sites of nature conservation importance; and
- Geology, hydrogeology and hydrology of the Application Site and surrounding area.

8.2.9 The sensitivity of potential receptors can then be described qualitatively according to the categories shown in **Table 8.1**.

Likely Significant Effects

8.2.10 Where a significant source has been identified and potential sensitive receptors are present, then the potential effects can be determined by considering the pathways through which the source/hazard may affect the receptors. **Table 8.2** indicates the most likely significant effects that may occur for different classes of receptor. The magnitude of effect has been determined on the basis of the criteria shown in **Table 8.3**.

8.2.11 The significance of the effect (**Table 8.4**) also needs to take account of the strength of pathway between a source and a receptor. The strength of pathway is a function of distance between the two and the ease or otherwise of the migration pathway. If the pathway is considered weak, then the significance has been reduced by a category.

Table 8.1 Descriptive Scale for Sensitivity of Receptors to Contaminated Land.

Sensitivity	Receptors Susceptible to Land Contamination Effects (Assuming a Plausible Pathway)
High	<ul style="list-style-type: none"> • Future site users (residents) • Residential areas (residents) within 50 m of construction works • Schools and playing fields/areas (site users) within 50 m of construction works • Allotments, arable farmland, livestock, market gardens • Construction workers involved in extensive, below ground and demolition work • Water features deemed to be of high value • Ecological features deemed to be of high value
Medium	<ul style="list-style-type: none"> • Future site users (commercial) • Residential areas (residents) within 50 to 200 m of construction works • Schools and playing fields/areas (site users) within 50m and 200 m of construction works • Commercial developments located within 50 m of construction works • Construction workers involved in limited and above ground works • Water features deemed to be of moderate value • Ecological features deemed to be of moderate value
Low	<ul style="list-style-type: none"> • Future site users (industrial areas, car parks, highways and railways) • Residential areas located between 200 m and 500 m of construction works • Commercial development located between 50 m and 200 m of construction works • Forestry areas, ornamental plant nurseries • Buildings including services and foundations • Water features deemed to be of low value • Ecological features deemed to be of low value
Negligible	<ul style="list-style-type: none"> • Residential areas located >500 m of construction works • Commercial development located between 200 m and 500 m of construction works • Areas where there are no built structures, no crops, timber, livestock, etc. • Ecological features and proposed planting deemed to be of negligible value

(Criteria developed in-house by Scott Wilson)

Table 8.2 Potential Effects on Sensitive Receptors if Significant Land Contamination were Encountered

Residential End Users	Commercial End Users	Surrounding Land Users	Construction Workers	Ecological Sites	Built Environment
Direct or indirect ingestion of contaminated soil (including via home-grown vegetables) <i>(causing long-term effect)</i>	Direct or indirect ingestion of contaminated soil <i>(causing long-term effect)</i>	Inhalation or deposition of wind-borne dust <i>(causing short-term effect)</i>	Direct or indirect ingestion of contaminated soil <i>(causing short-term effect)</i>	Phytotoxic effects on plant species <i>(causing long-term effect)</i>	Chemical attack of buried concrete structures <i>(causing long-term effect)</i>
Concentration of flammable or asphyxiating gases in enclosed spaces <i>(causing long-term effect)</i>	Concentration of flammable or asphyxiating gases in enclosed spaces <i>(causing long-term effect)</i>	Migration of contamination in sub-surface strata (including gases) <i>(causing long-term effect)</i>	Concentration of flammable or asphyxiating gases in confined spaces <i>(causing short-term effect)</i>	Direct ingestion, inhalation or dermal contact by fauna <i>(causing long-term effect)</i>	Permeation of water supply pipelines <i>(causing long-term effect)</i>
Inhalation of harmful vapours/dust indoors and outdoors <i>(causing long-term effect)</i>	Inhalation of harmful vapours/dust indoors and outdoors <i>(causing long-term effect)</i>	Inhalation of harmful vapours indoors and outdoors (from subject site) <i>(causing long-term effect)</i>	Inhalation of asbestos during building demolition, and dust/contaminant vapour <i>(causing short-term effect)</i>	Indirect effects via contamination of water resources <i>(causing long-term effect)</i>	-
Dermal contact with contaminated soil <i>(causing long-term effect)</i>	Dermal contact with contaminated soil <i>(causing long-term effect)</i>	-	Dermal contact with contaminated soil <i>(causing short-term effect)</i>	-	-

Table 8.3 Criteria for Assessing the Magnitude of Change on Receptors Susceptible to Land Contamination Effects if Land Contamination Encountered

Magnitude	Potential Effect on Sensitive Receptors				
	Human Health	Controlled Waters	Ecology	Built Environment	Planting and livestock
High	Acute effects to human health	Substantial acute pollution or long-term degradation of sensitive water resources (Principal aquifers within source protection zones or surface water courses of very good or good quality*)	Significant change to the number of one or more species or ecosystems	Catastrophic damage to buildings, structures or the environment	Substantial loss in value of livestock/ crops results from death, disease or physical damage.
Medium	Chronic (long-term) effects to human health	Pollution of non-sensitive water resources or small-scale pollution of sensitive water resources (Principal/ Secondary A aquifers or water courses of fair quality or below*)	Change to population densities of non-sensitive species	Damage to sensitive buildings, structures or the environment	Disease or physical damage which results in a significant reduction in value.
Low	Slight, reversible short term effects to human health	Slight pollution of non-sensitive water resources (Secondary B aquifers or water courses of fair quality or below*)	Some change to population densities of non-sensitive species with no negative effects on the function of the ecosystem	Easily repairable effects of damage to buildings or structures	Slight or short term health effects which result in slight reduction in value.
Negligible	No or very limited measurable effects on humans	No or insubstantial pollution to non-sensitive water resource	No or very limited significant changes to population densities in the environment or in any ecosystem	No or very slight non-structural damage or cosmetic harm to buildings or structures	No or no significant reduction in landscape value
Beneficial	Removal or treatment of contaminated soil, which reduces adverse effects or the potential for adverse effects on sensitive receptors in the area.				

(Criteria developed in-house by Scott Wilson)

(* according to the Environmental Agency General Quality Assessment classification scheme)

8.2.12 For each of the potential effects assessed to be likely, a qualitative assessment can be made on the significance of the effect to the receptor using **Table 8.4**. The significance of effect is based on a seven-point scale:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible
- Minor beneficial
- Moderate beneficial
- Major beneficial

Table 8.4 Criteria for Assessing the Significance of Effects

Magnitude of Effect	Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor to Moderate	Negligible
Low	Moderate	Minor to Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

8.2.13 If significant adverse effects are assessed to be likely due to the presence of contaminated ground, measures can be proposed to mitigate these effects. The assessment reports only significance after measures to avoid or manage any adverse effects included as part of the scheme and anticipated to be secured by planning condition or Section 106 obligation have been applied.

8.3 Geo-environmental Baseline Conditions

Site Description and Context

8.3.1 The baseline conditions, against which the likely significant effects of the Proposed Development have been assessed, are those conditions, which currently exist at the Application Site. The baseline survey presented here is set out in full within **Appendix 8.1**.

Baseline Survey Information

8.3.2 According to the British Geological Survey (BGS) 1:50 000 scale geological map of the area, Sheet 188 (Cambridge) the Application Site is underlain in part by Head Gravels and Observatory Gravels, which form a low ridge running north to south across the eastern part of the Application site. These overlie the Lower Beds (Chalk Marl) of the Lower Chalk and the Gault Clay Formation with the Lower Greensand at depth. The Chalk Marl has been largely eroded and is only shown on the eastern part of the Application Site (see **Figure 8.4**).

8.3.3 Although not shown on the geological map it is possible that Recent Alluvial Deposits are present along the line of Washpit Brook that flows north across the western part of the Application Site. In addition, it is anticipated that the Gault Clay is overlain by Head Deposits associated with reworking of the underlying strata by natural geomorphological processes whilst some Made Ground is also likely to be present at the Application Site associated with the historical and existing developments.

8.3.4 An intrusive ground investigation took place between the 11th and 26th August 2010. The investigation comprised a mixture of trial pits, cable percussion boreholes and window sample boreholes and was undertaken in two phases. A summary of the ground conditions encountered is presented in **Table 8.5**.

Table 8.5 Summary of Ground Conditions

Strata	General Description	General Distribution	Depth to Top of Strata (mbgl)	Thickness of Strata (m)
Topsoil	Brown locally clayey/silty sandy Topsoil	Site wide	0.0	0.2 – 1.3
Made Ground	Variable brown silty sand/sand and gravel and soft to stiff brown and white sandy clay including fragments of flint, cement, brick, coal and plastic.	Limited to south eastern corner	0.0 – 0.3	0.9 – 3.2
	Yellow brown silty sand and gravel. Gravel/fragments included black ash and clinker	North (Cambridge University Farm)	0.15	0.25
Head Gravels and Observatory Gravels (1)	Dense (locally loose, medium dense and very dense) orange/brown locally silty gravelly sand, clayey sandy gravel or clayey/silty sand and gravel (gravel of chalk, flint)	North east	0.2 – 3.4	0.1 – 4.0 (NFP)
Head Deposits	Firm to stiff (locally very stiff) orange/brown/grey locally sandy, gravelly clay. Gravel is flint and chalk	Variable and intermittent	0.2 – 6.1	0.2 – 3.8
Chalk Marl	Light grey locally clayey and sandy weathered Chalk	Eastern corner(2)	0.4 – 0.5	0.7 – 3.25
Gault Clay	Stiff to very stiff (becoming hard) grey/brown occasionally mottled orange brown desiccated clay with occasional calcareous nodules and locally occasional shell fragments	Generally site-wide	0.2 – 6.5	25 m (maximum proven depth and NFP)

NFP – Not Fully Penetrated

(1) The Head Gravels and Observatory Gravels could not be distinguished from borehole log information, and hence were described as one unit.

(2) Although the Chalk is considered to be naturally present in this area of the site, there is evidence to suggest that the Chalk might be backfilled (i.e. reworked materials) – based on the absence of Coprolite Beds beneath the Chalk.

8.3.5 According to the Envirocheck report (**Appendix 8.1**), the Application Site lies within a Radon affected area, as between 1 and 3% of homes are reported to be above the action level.

8.3.6 Mineral extraction and mining (Coprolite) has taken place. Further discussion is provided within the site history below.

Hydrogeology

8.3.7 According to the Environment Agency (EA) website, the eastern corner of the Application Site lies on a Principal Aquifer. This relates to the Chalk Marl. Principal Aquifers are defined as layers of rock or drift deposits that have high permeability meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic level. The thickness of the aquifer in this part of the Application Site is quite limited.

8.3.8 A significant proportion of the northern and eastern parts of the Application Site are classified by the EA as a Secondary Undifferentiated Aquifer. This relates to the overlying Head Gravels and Observatory Gravels. This classification is assigned by the EA in cases where it has not been possible to attribute either category A or B to a rock type.

8.3.9 The remaining areas of the Application Site are classified as Unproductive Strata and relate to the Gault Clay Bedrock. Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

8.3.10 The deep Lower Greensand Formation is classed a Principal Aquifer, but this is confined by the Gault Clay.

8.3.11 The Soil Classification of the Application Site has been determined using the EA's Groundwater Vulnerability map for the Application Site presented in the Envirocheck Report (**Appendix 8.1**). The soil classification in relation to the vast majority of the Principal Aquifer (Chalk Marl) at the site is 'High Leaching Potential (H3)'. This applies to coarse textured or moderately shallow soils which readily transmit non-absorbed pollutants and liquid discharges but which have some ability to attenuate absorbed pollutants because of their large clay or organic matter contents.

8.3.12 Soil Classification in relation to the Secondary Undifferentiated Aquifer is 'Intermediate Leaching Potential (I1)' which applies to soils which can possibly transmit a wide range of pollutants. Soils are not classified in relation to Unproductive Strata.

8.3.13 South eastern parts of the Application Site are suggested by historical map data to have been quarried and backfilled with imported material that might have different leaching properties.

8.3.14 According to the Environment Agency website, the Application Site is not located within a groundwater Source Protection Zone (SPZ).

8.3.15 During the intrusive investigation groundwater or damp conditions were observed in seven exploratory holes during drilling. In five of these instances, this was between approximately 0.90 m bgl and 3.80 m bgl within the Head Gravels and Observatory Gravels (often within the lower part). Groundwater was only encountered within the Gault Clay on one occasion at 19.45 m bgl, rising to 17.95 m bgl, in BH101, whilst it was recorded at approximately 2.00 m bgl in the Chalk Marl in WS220.

8.3.16 Subsequent post survey monitoring revealed that only three installations contained groundwater, with two being indicative of a perched water unit above the Gault Clay within the gravels and one of a unit within the Gault Clay. However, in this latter case it was also acknowledged that in this location the data may be misleading due to the presence of an intermittent and variable water table throughout the monitoring period, and the possibility that the installation is acting as a sump collecting perched water from above the Gault Clay.

8.3.17 In the remaining borehole installations, the inconsistent presence of shallow groundwater and variation in relative levels across the site, suggest that encountered groundwater is largely indicative of perched water above the Gault Clay, and strongly influenced by seasonal fluctuations in rainfall and in the shorter term, can be affected by antecedent weather conditions.

8.3.18 There are no active groundwater abstractions present within 500 m of the Application Site.

Surface Water Features

8.3.19 The closest surface water feature of note is the Washpit Brook (a tributary of the River Great Ouse), which flows north across the western part of the site from a small area of woodland named Pheasant Plantation. No River Quality Data is available via the Environment Agency website for the brook. Several ditches are present in the fields on site which drain into the Washpit Brook whilst Pellow's Pond is located in the east of the site.

8.3.20 Trinity Head Conduit (to the south east of the Application Site) flows south west. This is believed to form the origin for the water supply for the fountain at Trinity Hall.

8.3.21 There are no active surface water abstractions present within 500 m of the Application Site.

Current/Recent Land Use (Development Site and Surrounds)

8.3.22 The majority of the Application Site comprises open farm land, which is used for the growing of crops, primarily wheat and barley. Portions of the Application Site also comprise grass and fallow areas and a proportion of the farming area located within the central northern part of the Application Site is used for potato research/growing. Small hedgerow and wooded areas are located within the southern part of the Application Site.

8.3.23 University buildings incorporating hardstanding for car parking are located in the north western portion of the Application Site. This includes the main administration building and animal research station buildings. Recently constructed buildings are located in the approximate centre of the Application Site and additional farm buildings are located at the southern end of the Application Site.

8.3.24 No significant evidence of field contamination was identified during the site walkover in 2010. Minor staining most likely associated with hydrocarbon was noted on the hardstanding at the base of the above ground storage tank in the north-western part of the Application Site. This hard standing is approximately 3 m² in area.

8.3.25 Extensive disruption of the Application Site, in the area of the potato farm had occurred at the time of the site walkover, but this was associated with planting activities only. Additionally, disturbed land was noted towards the south-eastern portion of the Application Site, although this was associated with archaeological investigations in this area.

8.3.26 The Envirocheck Data Report (**Appendix 8.1**) lists one potentially active contaminative industry within 250 m of the site. This relates to Pace Petroleum Ltd 168 m north-east of the Application Site. This relates to a vehicle refuelling station that is regulated under Local Authority Pollution Prevention and Control (PG1/14 Petrol filling station).

8.3.27 The closest active Registered Radio Active Substances licensed site is currently reported to be 162 m south of the Application Site at the University of Cambridge's waste stores.

8.3.28 The Traveller's Rest Pit located on the eastern part of the Application Site is a designated SSSI. This is addressed in Part 3 of this chapter.

Historical Land Use (Development Site and Surrounds)

8.3.29 Around 1888 to 1904 the Application Site was undeveloped and appeared to be used primarily for agriculture. Within the surrounding area noteworthy features included a cemetery and gravel pit immediately beyond the eastern and south eastern site boundaries, a cemetery located next to Girton College and a gravel pit 50 m and 100 m north east of the Application Site, respectively.

8.3.30 By 1927 a gravel pit (later referred to as Traveller's Rest Pit) was indicated on the eastern part of the site. Between 1938 and 1973 an Animal Research Station was developed in the north-west corner of the Application Site and the aforementioned Travellers Rest Pit expanded further east up until 1960. By 1970 the pit had been partly infilled and laboratories had been developed.

8.3.31 By 1983 the M11 motorway had been constructed and the Washpit Brook was re-aligned to run alongside.

8.3.32 The 2000 to 2003 maps indicate that many of the laboratory buildings on the Application Site of the former gravel pit were by this time no longer present and facilities for the Agronomy Centre and World Conservation Monitoring Centre as well as a pond (denoted Pellow's Pond) had instead been created. Laboratories were labelled in the southern corner of the Application Site.

8.3.33 Coprolite was historically mined for on-site. According to the PBA report referred to within Scott Wilson's Geo-environmental report (Appendix 8.1), this is expected to relate to the working of the Cretaceous 'Cambridge Greensand'. This comprises a 0.25 m thick bed of rolled phosphatic nodules (the Coprolite) and fossils in a glauconitic chalky matrix resting between the Chalk Marl and Gault Clay.

8.3.34 Coprolite diggings were a major industry in the Cambridge area during the late 1800s, being used for agriculture, and briefly, by the explosives industry. **Figure 8.3** delineates the area of Coprolite mining and the extent of the identified gravel workings whilst also outlining the extent of other possible Coprolite workings.

8.3.35 There is a Local Authority recorded landfill known as University Farm Cambridge present on Application Site. This received inert excavated natural material between 1984 and 1986. There is also historical evidence of local extraction of clay for brick making in the north west of the Application Site.

Potential Sources of Contamination

8.3.36 Whether there is potential for significant sources of land contamination to exist on the Application Site has been considered, including historic and current activities in the immediate vicinity. For the purposes of the assessment relevant activities within 100 m of the site boundary were considered. Due to the potential for ground gas migration from landfill sources across greater distances, any landfill activities within 250 m of the Application Site were also considered.

Ground Investigation (2010)

8.3.37 This ground investigation did not identify any significant contamination risks to potential receptors associated with the proposed development. A summary of this assessment is provided as follows.

Contamination Risks to Human Health

8.3.38 A total of 33 samples were considered in the assessment and these comprised 13 samples of Topsoil, 4 samples of Made Ground and 16 samples of natural strata (sand and gravel, sandy clay, Gault Clay or Chalk).

8.3.39 Given the vertical and lateral distribution of samples it was considered appropriate to undertake a statistical assessment on the Topsoil and natural samples separately. Made Ground was found to be only very localised. In this instance a simple comparison of the maximum value against the respective contaminant screening criteria was undertaken.

8.3.40 Initially a generic level of assessment against CLEA vs.1.06 derived generic assessment criteria was undertaken. Where a contaminant failed the generic level of screening, site specific assessment criteria were derived using actual measurements of Soil Organic Matter in the CLEA vs.1.06 software. The exposure scenario adopted in the assessment was a residential end use without plant uptake (private gardens).

8.3.41 The generic level of assessment undertaken has confirmed the absence of a significant risk from the soils sampled to human health with exception to mercury in Topsoil and Made Ground, and benzo(a)pyrene in Made Ground.

8.3.42 Mercury failed because analysis for total mercury was undertaken (as a screening tool), yet guideline comparison was conservatively undertaken, assuming all mercury was in the elemental (the most toxic) form. In reality, it would be reasonable to expect a significant proportion of this total to be the less toxic

inorganic and methyl forms of mercury. However, best practice recommends that conservativeness is built into the early stages of environmental assessment.

8.3.43 A detailed quantitative assessment was undertaken for mercury and benzo(a)pyrene. This level of assessment involved the generation of a site-specific screening values using data specific to the site. The assessment undertaken confirmed the absence of a significant risk from mercury within the Topsoil and Made Ground sampled.

8.3.44 Benzo(a)pyrene was found to have failed the assessment in one sample although it was acknowledged that it was unlikely to be representative of the site as a whole. Made Ground did not appear to be widespread across the site and was predominantly located in the eastern area.

Contamination Risks to Controlled Waters

8.3.45 Groundwater samples were recovered on one occasion from three cable percussion boreholes (BH102, BH106 and BH109). Groundwater was interpreted to be perched above the Gault Clay or within the upper, weathered Gault Clay in BH102 and BH109.

8.3.46 In terms of BH106 it was acknowledged that the groundwater encountered here possibly originates from a more permeable layer at depth within the Gault Clay as occasional gravel was noted at approximately 18 mbgl corresponding to a groundwater strike recorded during drilling. However, groundwater recorded in this installation in September may be indicative of perched water infiltrating into the base of the installation, rather than groundwater within the Gault Clay.

8.3.47 Chalk Marl was encountered in the vicinity of this borehole overlying the Gault Clay and is classified as a Principal Aquifer. Although these deposits are classed as a Principal Aquifer, there is an absence of groundwater abstractions from the strata within the vicinity of the Application Site. However, there is also evidence to suggest that the Chalk might be backfilled (i.e. reworked materials) based on the absence of Coprolite Beds beneath the Chalk.

8.3.48 BH102 and BH109 are situated in the north west of the Application Site. These are located approximately 400 m from the Washpit Brook (a tributary of the River Great Ouse) which flows north across the western part of the Application Site. The principal receptor to any soil leachate is groundwater, which in turn would provide a potential mechanism to transport contaminants to surface water features if groundwater is in hydraulic continuity. In the north west area of the site, the surface water feature is deemed to be the critical receptor and it is plausible that this could be in continuity with groundwater.

8.3.49 To assess the risks to controlled waters a tiered methodology was adopted. Tier 1 involved the comparison of the maximum concentration recorded in groundwater against published limits. Where any contaminants exceeded the tier 1 screen then further more detailed risk assessment (tier 2) was undertaken. Tier 2 was carried out using the 'Remedial Targets Worksheets, Release 3.1' (Environment Agency, 2006) and the Environment Agency (EA) 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources' (Research and Development Publication 20, 1999).

8.3.50 The groundwater interpreted to be perched (in BH102 and BH109) was assessed separately to the groundwater encountered in BH106. For BH106, two assessments were undertaken; one assumed the groundwater to be of deeper origin and the other assumed the groundwater to be perched. Each assessment considered the critical receptor only.

8.3.51 The risk assessment undertaken for perched groundwater in BH102 and BH109 to the Washpit Brook did not indicate any failures of the maximum concentration against the tier 1 and tier 2 screening criteria adopted for any of the determinants assessed.

8.3.52 The risk assessment undertaken to the Chalk Marl aquifer, assuming the groundwater sampled in BH106 is perched did not indicate any failures of the maximum concentration against the tier 1 and tier 2 screening criteria adopted for any of the determinants assessed.

8.3.53 The risk assessment undertaken to the Chalk Marl aquifer, assuming the groundwater sampled in BH106 is representative of deep groundwater, only identified a risk for nitrate. The site is within a nitrate vulnerable zone which suggests that nitrate would be elevated in groundwater across the wider area. It

should be noted that with an absence of pathway for deep groundwater only a tier 1 screen was carried out. Deep groundwater would not realistically effect a more sensitive aquifer above, nor is it expected to be in hydraulic continuity with the nearest surface water feature of significance located 700 m away.

Contamination Risks to Landscaping and Planting

8.3.54 An assessment of the laboratory results was undertaken to confirm the suitability of the soils sampled in terms of risk to areas of landscaping. A statistical assessment of the data has been undertaken against maximum permissible concentrations published in BS 3882 'Specification for Topsoil and Requirements for Use', dated 2007. No significantly elevated phytotoxic contaminant concentrations were recorded within each soil type assessed, therefore there was not perceived to be a significant risk to current or proposed areas of landscaping and planting.

Contamination Risks to Infrastructure (Chemical Attack on Buried Concrete)

8.3.55 In accordance with BRE Special Digest 1 (2005) sulphate assessment was undertaken on selected soil samples. The assessment identified the likely requirement for below ground concrete structures to be designed taking into account potentially aggressive ground conditions at the site.

8.3.56 This assessment also took the potential for pyrite into consideration. BRE Special Digest 1 (2005) gives a list of geological formations in the UK known to contain pyrite; this includes the Gault Clay.

8.3.57 Five soil samples had been tested for total sulphate and total sulphur which are both required to calculate the potential for pyrite. In accordance, with BRE Special Digest 1, the total potential sulphate content and amount of oxidisable sulphides were calculated. This revealed that Gault Clay was likely to contain pyrite

8.3.58 Further ground investigation assessment at the detailed design stage would be used to determine the concrete classification for below ground structures within the Gault Clay Formation.

Risks from Ground Gas

8.3.59 Based on the concentrations and flow rates of the gases recorded during the first two monitoring visits, the Application Site falls into the category of a Characteristic Situation 1 (CS1). The Characteristic Situation is used to classify the ground gas risk and the level of ground gas mitigation required. Under CS1 no specific ground gas protection measures would be required.

8.3.60 Further monitoring undertaken as a planning condition would confirm the Characteristic Situation of the Application Site, and determine any requirement for special precautions/gas protective measures in buildings.

Geotechnical Considerations

8.3.61 The ground profile encountered during the current GI generally confirmed the anticipated geology as inferred from the BGS map and historical borehole data showing Cretaceous Gault Clay (in the eastern part of the site) underlying the site under a cover of Quaternary superficial deposits (Head and 'Head Gravel and Observatory Gravels'). The Head Gravel and Observatory Gravels were predominantly encountered in the central and northern part of the Application Site to a maximum depth of 5.0m (BH306). It is suggested that these deposits are part of a channel feature which is aligned northwest / southeast of which parts are designated as a Mineral Safeguarding Area (MSA).

8.3.62 Materials derived from the Chalk were encountered in the eastern part of the Application Site and are considered to be backfilled material associated with the former mining activities and might therefore have variable geotechnical characteristics.

8.3.63 Materials of adverse geotechnical characteristics might locally be encountered in the areas of former quarry activities. However, no significantly adverse conditions have been identified during the ground investigations.

8.3.64 The natural strata shown above are considered to be suitable for foundations supporting low loads. For heavier building loads where piled foundations might be required the Gault Clay is considered to be an

appropriate bearing stratum. Determination of the interface between the Gault Clay and Lower Greensand Formation at the detailed design stage if deep piles are required would confirm this.

8.3.65 Based on the available groundwater data it is considered that water will only locally be encountered in granular Made Ground and superficial deposits perched on the Gault Clay, with no evidence of groundwater within the identified Chalk backfill during GI works. Some seepage would be anticipated within the Gault Clay associated with slightly more sandy and silty pockets within this stratum. Since only limited ground water monitoring data was available at the time of report writing this should be reviewed following analysis of the ongoing groundwater monitoring in the future months.

8.3.66 The deposits encountered over the majority of the site were predominantly of cohesive nature (Gault Clay and Head) and therefore it is unlikely that soakaways will be a cost effective drainage solution as supported by the results of soakaway tests.

8.3.67 The cohesive deposits encountered at the Application Site are potentially frost susceptible and based on the modified plasticity index the Gault Clay has a high volume change potential. This will need to be taken into consideration in the design.

8.4 Likely Significant Effects

Construction Phase

8.4.1 The Construction Environmental Management Plan (CEMP) outlines the measures necessary:

- to avoid harm to soils and geology as a consequence of the Proposed Development;
- to manage any unexpected contamination found on the Application Site during development;
- to identify how materials are to be treated and re-used on site wherever practicable; and
- To ensure compliance with relevant legislation.

8.4.2 These measures include:

- The adoption of spill management procedures and the use of well maintained plant to minimise the potential for leakage incidents and impacts to soils;
- Identification of procedures to be followed in the event that unexpected contamination is subsequently found on site
- Adoption and development of the Site Waste Management Plan;
- Adherence to the use of designated haul roads to minimise compaction/degradation of soils;
- Adoption of dust and emission control measures; and
- Surveying and recording the geology in the SSSI to avoid the potential loss of localised areas of the Observatory Gravels.

8.4.3 A robust Site Waste Management Plan and Sustainability Strategy will commit the project to sustainability through appropriate management of the excavation, demolition and construction phase.

8.4.4 It is apparent that the previous and recent land use has resulted in only very low levels of contamination present on the Application Site in either soil or groundwater. Hence in accordance with the assessment methodology it is assessed that there are unlikely to be any significant effects from any likely sources of contamination identified.

8.4.5 Significant quantities of surplus soils are unlikely to be generated as part of the Proposed Development, based on the chemical results of the ground investigation, and therefore there is unlikely to be a significant effect associated with this e.g. use of landfill void space. The contamination assessment has indicated only low levels of contaminant concentrations present on the Application Site and therefore the potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high. Where Demolition materials are generated, these would be re-used on site wherever practicable, thus avoiding or minimising any need to export these materials from the Application Site.

Operational Phase

8.4.6 Since there are not considered to be any significant areas of contamination present on the Application Site there are not assessed to be any likely significant land contamination effects once the Proposed Development is operational either at 2014 or at 2026.

8.4.7 There is not expected to be any change between the 2014 assessment year and the 2026 finished development assessment year as the Application Site has been sampled in locations that represent the entire Application Site area and activities are not expected to take place that could result in a significant change to current land quality.

Effects of Highway and Utility Works**Construction Phase**

8.4.8 In respect of the highway and utility works that are to be undertaken in the highway and road verges along Huntingdon Road and Madingley Road, these will also be undertaken in accordance with the CEMP and the Site Waste Management Plan and Sustainability Strategy.

8.4.9 It is apparent that the previous and recent land use on the main Application Site has resulted in only very low levels of contamination present in soil or groundwater. A qualitative assessment to determine the potential for contamination to have been caused from historical and current land use along the sections of Madingley Road and Huntingdon Road has been carried out. The extent of any contamination is expected to be similar to those defined on parts of the Application Site with these areas historically being used as a road corridor with a mix of agricultural, residential and commercial premises on either side. Hence in accordance with the assessment methodology it is assessed that there are unlikely to be any significant effects from any likely sources of contamination identified.

8.4.10 An exception would concern the small quantity of road planings/sub-base materials that would be excavated as part of the development. However, given the scale of the highway and utility works quantities of surplus soils will be small and therefore there is unlikely to be a significant effect associated with the generation of large volumes of materials requiring off site disposal and the use of landfill void space. Given that only low contaminant concentrations are expected to be present in the areas of these works the potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high. The proposed re-use of road planings will be subject to further assessment to ensure the absence of a significant effect once placed.

8.4.11 It is considered, therefore, that the highway and utility works in Huntingdon Road and Madingley Road will not give rise to significant adverse effects.

8.4.12 In relation to the potable water main extension works, there are two possible route options for the off-site 450mm diameter water main extension. Option 1 would require installation across third party land; Option 2 would install the extension along existing roads.

8.4.13 A qualitative assessment to determine the potential for contamination to have been caused from historical and current land use along the northern and southern alignments of Option 1, either side of the Application Site, has been carried out. There is a low potential for contamination to be encountered along this section and hence the potential for excavated materials to be chemically acceptable for re-use, both on and off site is considered high. Option 1 to the south of the Application Site crosses predominantly agricultural land except for a former developed plot of land 200 m south of Madingley Road. This site is recorded to have historically had at least four above ground bulk storage tanks on the site, one of which appears in the approximate proposed alignment. Further assessment will be undertaken to further quantify the potential for contamination to be present in this area.

8.4.14 In terms of Option 2 there is also a low potential for contamination to be encountered, although consideration will need to be given to the re-use of road materials given that the alignment is entirely confined to the existing road network.

8.4.15 Both Option 1 and 2 pass adjacent to a current and former petrol station and the potential for these sites to have impacted the soils within the proposed working areas would need to be considered, together

with contingency options in the event of contamination being encountered. The potential for residual herbicides and pesticides within agricultural soils would also need to be considered during the detailed design

8.4.16 Given the scale of the utility works quantities of surplus soils are likely to be small and they will be re-used where possible to minimise any significant effect associated with off site disposal. Given that generally only low levels of contaminant concentrations are expected to be present in the areas of these works the potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high.

Operation Phase

8.4.17 Since there are not considered to be any significant areas of contamination present on the Application Site there are not assessed to be any likely significant land contamination effects once the highway and utility works are operational either at 2014 or at 2026. Moreover activities are not expected to take place that could result in a significant change to current land quality.

Assessment of Cumulative Effects

8.4.18 Cumulative effects are not anticipated with regards contamination as the ground investigation identified no site derived significant soil, groundwater or ground gas contamination. Hence there are no likely significant effects to add to those of any other. The investigations have also demonstrated that there is no off-site contamination that will affect the Application Site.

Measures to Avoid, Reduce or Manage Effects

8.4.19 No significant mitigation and enhancement requirements have been identified, over and above the design and construction methodology measures contained in the CEMP and the Site Waste Management Plan, or those which can be conditioned as part of the planning permission for the Proposed Development.

Conclusions

8.4.20 The assessment has confirmed a general absence of significant contamination at the Application Site which reflects its former site use status. Consequently there have been no significant effects identified and hence the effect of soil quality on the Proposed Development, and of the Proposed Development on geology and soil quality, is assessed as negligible.

8.4.21 There is not expected to be any change between the 2014 assessment year and the 2026 finished development assessment year as the Application Site has been sampled in locations that represent the entire Application Site area (taking into account the periods up to and after 2014). Activities are not expected to take place that could result in a significant change to soil quality from a land contamination perspective.

8.4.22 The assessment in this chapter assumes that current construction industry best practice will be adopted during the pre-construction planning and construction phases to include waste and material management, environmental monitoring and control and adherence to health and safety legislation. The assessment also considers mitigation inherent in the design such as, for example, the provision of hard standing as a physical barrier to soil exposure.

Summary

Geology and Ground Conditions

8.4.23 According to the British Geological Survey (BGS) 1:50 000 scale geological map of the area, Sheet 188 (Cambridge) the Application Site is underlain in part by gravels (Head and Observatory). These overlie the Chalk Marl and clay (Gault Clay). A formation called the Lower Greensand is present beneath the clay at depth. The Chalk Marl is only shown on the eastern part of the Application Site.

8.4.24 A ground investigation broadly confirmed the published geology, although the gravels were shown to have been on the whole excavated from across the northern and eastern parts of the site.

Groundwater and Surface Water

8.4.25 According to the Environment Agency (EA) website, the eastern corner of the Application Site lies on a highly sensitive aquifer. This relates to the Chalk Marl.

8.4.26 A significant proportion of the northern and eastern parts of the Application Site are classified by the EA as a moderately sensitive aquifer although this relates to the overlying gravels, much of which has been extracted.

8.4.27 The remaining areas of the Application Site have a low groundwater sensitivity and this relates to the clay Bedrock.

8.4.28 The deep Lower Greensand Formation is also a highly sensitive aquifer, but due to the high clay content over it there would be protection from any contaminant movement to the deep groundwater.

8.4.29 There are no active groundwater abstractions present within 500 m of the Application Site.

8.4.30 The closest surface water feature of note is the Washpit Brook (a tributary of the River Great Ouse), which flows north across the western part of the Application Site from a small area of woodland named Pheasant Plantation. There are no surface water abstractions present within 500 m of the Application Site.

Potentially Contaminating Activities

8.4.31 No significant evidence of contamination was identified during the site walkover undertaken as part of the survey. Some staining, most likely associated with oils, was noted on the hardstanding at the base of the above ground storage tank in the north-western part of the Application Site. This area of hard standing was approximately 3 m² in area.

8.4.32 Historically the Application Site was predominantly used for agricultural purposes. The gravel pit that has since become known as the Traveller's Rest Pit was indicated on the eastern part of the Application Site by 1927 and continued to expand up until 1960. Partial infilling had occurred by 1970.

8.4.33 Coprolite was historically mined at the Application Site and in the immediate surrounds. Coprolite diggings were a major industry in the Cambridge area during the late 1800's being used for agriculture, and briefly by the explosives industry. Previous studies report coprolite workings are present across the east of the Application Site. Former gravel extraction has resulted in limited landfill activity at the Application Site and the University Farm Cambridge landfill is recorded within local Authority records. This reportedly received excavated natural materials between 1984 and 1986.

Ground Investigation (2010)Contamination Risk to Human Health

8.4.34 Generic and detailed levels of risk assessment were undertaken in accordance with UK guidelines on the assessment of risk from potentially contaminated land.

8.4.35 Benzo(a)pyrene was found to have failed the assessment in one sample although it was acknowledged that it was unlikely to be representative of the site as a whole. Made Ground did not appear to be widespread across the site and was predominantly located in the eastern area.

8.4.36 For all other determinants tested there were no significantly elevated contaminant concentrations identified.

Contamination Risk to Controlled Waters

8.4.37 A tiered assessment of risk from groundwater, considering both deep groundwater and perched groundwater, and considering plausible pathways in which groundwater might effect on the Washpit Brook or more sensitive groundwater units (Chalk Marl) was undertaken.

8.4.38 This did not identify a significant effect. Elevated nitrate concentrations in what was perceived likely to be deep groundwater within the Gault Clay were encountered. This was concluded to be pervasive and more attributable to a wider effect from agricultural land in the area. This is supported by the Application Site being within a nitrate vulnerable zone.

Contamination Risk to Landscaping and Planting

8.4.39 An assessment of risk to landscaping and planting was undertaken against screening criteria presented in BS 3882 'Specification for Topsoil and Requirements for Use' (2007).

8.4.40 No significantly elevated phytotoxic contaminant concentrations were recorded within each soil type assessed, therefore there was not perceived to be a significant risk to current or proposed areas of landscaping.

Contamination Risk to Infrastructure (Chemical Attack on Buried Infrastructure)

8.4.41 In accordance with BRE Special Digest 1 (2005) sulphate assessment was undertaken on selected soil samples

8.4.42 This revealed that one of the five samples would be considered to potentially contain significant pyrite. This sample was taken within the Gault Clay towards the northern part of the site.

8.4.43 Further ground investigation assessment at the detailed design stage would be used to determine the concrete classification for below ground structures within the Gault Clay Formation.

Risks from Ground Gas

8.4.44 Based on the concentrations and flow rates of the gases recorded during the first two monitoring visits undertaken during Ground Investigation works in 2010, the Application Site falls into the category of a Characteristic Situation 1 (CS1). Under CS1 no specific ground gas protection measures would be required.

Geotechnical Constraints

8.4.45 Based on the data obtained from the ground investigation and historical information only minor potential geotechnical constraints have been identified. It is considered that the ground and groundwater conditions to be encountered will not have a significantly adverse effect on the development. Depending on final loads of the structures, the depth of the Greensand Formation underlying the Gault Clay at depth might need to be determined in order to ensure adequate pile design.

Likely Significant Effects

Construction Phase

8.4.46 The Construction Environmental Management Plan (CEMP) outlines the measures necessary:

- to avoid harm to soils and geology as a consequence of the Proposed Development;
- to manage any contamination found on the Application Site during development;
- to identify how materials are to be treated and re-used on site wherever practicable; and
- To ensure compliance with relevant legislation.

8.4.47 A robust site waste management plan and Sustainability Strategy will commit the project to sustainability through appropriate management of the excavation, demolition and construction phase.

8.4.48 It is apparent that the previous and recent land use has resulted in only very low levels of contamination present on the Application Site in either soil or groundwater and hence in accordance with the assessment methodology it is assessed that there are unlikely to be any significant effects from any likely sources of contamination identified.

8.4.49 Significant quantities of surplus soils are unlikely to be generated as part of the Proposed Development, therefore there is unlikely to be a significant effect associated with this e.g. use of landfill void

space. The contamination assessment has indicated only low levels of contaminant concentrations present on the Application Site and therefore the potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high. Where demolition materials are generated, these would be re-used on site wherever practicable, thus avoiding or minimising any need to export these materials from the Application Site.

Operational Phase

8.4.50 Since there are not considered to any significant areas of contamination present on the Application Site there are not assessed to be any likely significant land contamination effects once the Proposed Development is operational either at 2014 or at 2026.

8.4.51 There is not expected to be any change between the 2014 assessment year and the 2026 finished development assessment year as the site has been sampled in locations that represent the entire site area and activities are not expected to take place that could result in a significant change to current land quality.

Effects of Highway and Utility Works**Construction Phase**

8.4.52 It is considered that the highway and utility works are unlikely to give rise to significant adverse effects as all works will be undertaken in accordance with the CEMP.

8.4.53 A qualitative assessment to determine the potential for contamination to have been caused from historical and current land use along the sections of Madingley Road and Huntingdon Road has been carried out. The extent of any contamination is expected to be similar to those defined on parts of the Application site. Hence in accordance with the assessment methodology it is assessed that there are unlikely to be any significant effects from any likely sources of contamination identified.

8.4.54 An exception would concern the small quantity of road planings/sub-base materials that would be excavated as part of the development. However, given the scale of the highway and utility works quantities of surplus soils will be small and therefore there is unlikely to be a significant effect associated with the generation of large volumes of materials requiring off site disposal and the use of landfill void space. The proposed re-use of road planings will be subject to further assessment to ensure the absence of a significant effect once placed.

8.4.55 It is considered, therefore, that the highway and utility works in Huntingdon Road and Madingley Road will not give rise to significant adverse effects.

8.4.56 In relation to the potable water main extension works, there are two possible route options for the off-site 450mm diameter water main extension. Option 1 would require installation across third party land; Option 2 would install the extension along existing roads.

8.4.57 For Option 1 it has been assessed that there is a low potential for contamination to be encountered along this section and hence the potential for excavated materials to be chemically acceptable for re-use, both on and off site is considered high. Option 1 to the south of the Application Site crosses predominantly agricultural land except for a former developed plot of land 200 m south of Madingley Road. This site is recorded to have historically had at least four above ground bulk storage tanks on the site, one of which appears in the approximate proposed alignment. Further assessment will be undertaken to further quantify the potential for contamination to be present in this area.

8.4.58 In terms of Option 2 there is also a low potential for contamination to be encountered, although consideration will need to be given to the re-use of road materials given that the alignment is entirely confined to the existing road network.

8.4.59 Both Option 1 and 2 pass adjacent to a current and former petrol station and the potential for these sites to have impacted the soils within the proposed working areas would need to be considered, together with contingency options in the event of contamination being encountered. For Option 1 the potential for residual herbicides and pesticides within agricultural soils would also need to be considered during the detailed design

8.4.60 Given the scale of the utility works quantities of surplus soils are likely to be small and they will be re-used where possible to minimise any significant effect associated with off site disposal. Given that generally only low levels of contaminant concentrations are expected to be present in the areas of these works the potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high.

Operational Phase

8.4.61 Since there are not considered to be any significant areas of contamination present on the Application Site there are not assessed to be any likely significant land contamination effects once the highway and utility works are operational either at 2014 or at 2026. Moreover activities are not expected to take place that could result in a significant change to current land quality.

Assessment of Cumulative Effects

8.4.62 Cumulative effects are not anticipated with regards contamination as the ground investigation identified no site derived significant soil, groundwater or ground gas contamination. Hence there are no likely significant effects to add to those of any other. The investigations have also demonstrated that there is no off-site contamination that will affect the Application Site.

Measures to Avoid Reduce or Manage Effects

8.4.63 No significant mitigation and enhancement requirements have been identified, over and above the design and construction methodology measures comprised in the CEMP and the Site Waste Management Plan, or those which can be conditioned as part of the planning permission for the Proposed Development.

Conclusions

8.4.64 The assessment has confirmed a general absence of significant contamination at the site which reflects its former site use status. Consequently there have been no significant effects identified and hence the effect of soil quality on the Proposed Development, and the Proposed Development on geology and soil quality, is assessed as negligible.

8.4.65 There is not expected to be any change between the 2014 assessment year and the 2026 finished development assessment year as the Application Site has been sampled in locations that represent the entire Application Site area (taking into account the periods up to and after 2014). Activities are not expected to take place that could result in a significant change to soil quality from a land contamination perspective.

8.4.66 The assessment in this chapter assumes that current construction industry best practice will be adopted during the pre-construction planning and construction phases to include waste and material management, environmental monitoring and control and adherence to health and safety legislation. The assessment also considers mitigation inherent in the design such as, for example, the provision of hard standing as a physical barrier to soil exposure.

Part 2 Mineral Safeguarding Area (MSA)

8.5 Introduction

8.5.1 The Cambridgeshire and Peterborough Minerals and Waste Plan, includes an MSA within the Application Site. The MSA covers an area of approximately 15.9 hectares.

8.5.2 The assessment considers the likely significant effects of the Proposed Development on the Mineral Safeguarding Area. It identifies the quantity and quality of mineral resource available in the MSA and makes an assessment of the economic viability of this mineral resource.

Legislation and Policy Framework

8.5.3 The following legislation, policies and guidance notes are considered applicable to Mineral Safeguarding:

Legislation

- Local Government, Planning and Land Act (1980)
- Town and Country Planning Act (1990)
- Planning and Compulsory Purchase Act (2004)

National Policy

- Previously Minerals Policy Statement 1 (2006) now the NPPF.

Local Policy

- Cambridgeshire Aggregates (Minerals) Local Plan (1991)
- Cambridgeshire and Peterborough Waste Local Plan (2003)
-
- Cambridgeshire and Peterborough Minerals and Waste Core Strategy (July 2011)

Guidance

- A Guide to Mineral Safeguarding in England, report CR/07/060 (2007)
- Cambridgeshire and Peterborough Waste Partnership (RECAP) : Waste Management Design Guide Draft Supplementary Planning Document (2010)

8.6 Assessment Approach**Methodology**

8.6.1 As part of the aforementioned ground investigation, selected boreholes and trial pits/trenches were undertaken specifically within the MSA and along its boundaries to enable an assessment to be made of the volume and quality (economic viability) of the mineral resource present. The exploratory hole locations within the MSA are shown on **Figure 8.5**.

8.6.2 The British Geological Survey report for the area and archaeological evidence for historic mining were also examined.

Determining Significance Effects

8.6.3 Significance reflects the relationship between two factors:

- The magnitude or severity of an effect (i.e. the actual change taking place to the environment); and
- The sensitivity, importance or value of the resource or receptor.

8.6.4 The MSA is based on a sand and gravel resource which is located within agricultural land and has little ability to absorb change without fundamentally altering its present character. The sensitivity of this receptor is considered to be high.

8.6.5 The magnitude of change to the sand and gravel in the MSA has been determined using the seven point scale shown in **Table 8.6**.

Table 8.6: Criteria for Assessing Significance of effect by reference to Magnitude of Changes to the MSA

Significance of effect	Definition
Major Adverse	Built development over the entire MSA without any prior exploitation of resources, thereby sterilising the entire safeguarded resource.
Moderate Adverse	Built development over more than half of the MSA without any prior exploitation.
Minor Adverse	Built development over less than half the MSA without any prior exploitation
Negligible	No Built development or exploitation of the mineral resources
Minor Beneficial	Delay built development over less than half of the MSA until mineral resources have been extracted and levels restored by landfill.
Moderate Beneficial	Delay built development over more than half of the MSA until mineral resources have been extracted and levels restored by landfill.
Major Beneficial	Delay built development until mineral resources have been extracted from the entire MSA and levels restored by landfill.

8.6.6 The effects of the Proposed Development on the MSA have been considered for the 2014 and 2026 years of assessment using the phasing for the Proposed Development described in chapter 3.

8.6.7 An assessment was also made of the likely economic viability of the resource.

8.6.8 The impact of planning policy for the North West Cambridge area on the MSA was examined in the assessment.

8.7 MSA Baseline Information

8.7.1 The British Geological Survey (formerly Institute of Geological Sciences) Mineral Assessment Report 53, TL46 and 47 Cottenham, Cambridgeshire, (1980) identifies an area of sand and gravel with an uncertain boundary along the north western and south western sides. This broadly corresponds to the MSA.

8.7.2 The Evans and Newman report titled 'Northwest Cambridge, University of Cambridge: Archaeological Evaluation Fieldwork Cambridge Archaeological Unit Report No. 921' dated 2010, referred to in the Scott Wilson Geo-environmental report suggests that intensive strip quarrying had taken place over the majority of the north western half of the MSA, with less intensive localised strip quarrying in the south eastern half of the MSA.

8.7.3 The minerals encountered during the ground investigation were described as orange brown to brown, clayey or silty fine to coarse gravelly sand varying to sandy gravel. Thirteen particle size distribution tests were undertaken which revealed an average fines content of 18%, average sand content of 42% and average gravel content of 39%. Of the samples tested there were two which varied from the general grading given above; one indicating a fines content of 41% and one indicating a sand content of 94% and these were not included in the average figures for the general grading given above.

8.7.4 The investigation concluded that the thicker deposits are generally along the north eastern side of the MSA with the thickness decreasing from 4m at the north eastern margin to around 0.7m thick at the north western end. Furthermore, the MSA appears to occupy an area on the edge of a channel with the north eastern margin being closer to the centre of the channel and the south western margin being on the outer edge of the channel.

8.8 Assessment of Significance**Quantity and Quality**

8.8.1 Using the historical and site investigation evidence the MSA was broken down into four blocks as illustrated on **Figure 8.5**. The volume of mineral resource based on these blocks was estimated at 240,000m³, (about 385,000 tonnes) which is approximately 65% of the estimated volume using information from the Mineral Assessment Report 53.

8.8.2 Mineral resources, if extracted at this location, would require the fines content to be removed/reduced if it was to meet the granular material requirements of BS EN 12620: 2002 Aggregates for Concrete, BS 882: 1992 Specification for aggregates from natural sources for concrete (superseded but quoted in some Building Regulations) and the Highway Agency Specification for Highway Works.

Significance of Built Development

8.8.3 The location of the Proposed Development in relation to the MSA is shown on **Figure 8.5**. This indicates that the resource within the MSA will be sterilised by the development and will not be available for extraction after the Proposed Development is completed.

8.8.4 The Applicant will consider exploitation for use as fill material where there are excavations within the MSA as part of the Proposed Development. No basements are envisaged to residential properties in the area of the MSA so excavations will mainly be for foundations and utilities.

8.8.5 An estimate has been made of the likely volume of sands and gravels (Head Gravel and Observatory Gravels) that might be excavated during the construction of strip foundations for load bearing external walls to residential properties within the area of the MSA. Assuming that strip foundations are 0.75m deep and 0.75m wide, and the upper 0.5m is topsoil, the anticipated foundation excavations may yield some 2,000m³ of the mineral resource. A similar volume could arise from excavation of services trenches and installations resulting in perhaps 4,000 to 5,000m³ in total. Depending on its suitability, material arising from excavations within the MSA will be reused in the works, together with other such excavated subsoil. In view of the volumes and nature of the arisings, it is likely that the reuse will be mainly as general fill.

8.8.6 In view of the relatively deep topsoil found at the site it is unlikely that excavations related to road construction will yield significant amounts of mineral resources and such volumes as do arise are likely to be reused as road fill to maintain levels.

8.8.7 The Proposed Development will have a Major Adverse effect on the MSA.

Economic Viability

8.8.8 The Mineral & Waste Core Strategy Development Plan (2011) indicates in Appendix D Methodology for Defining Mineral Safeguarding Areas that 'isolated or truncated sand and gravel resources where deposits are less than 25 hectares in area' are 'unlikely to be economically viable as stand alone operations.' The MSA within the Proposed Development has an area of 15.9 hectares within the boundary defined on the Mineral & Waste Core Strategy Development Plan (2011) Proposals Maps (Map C: Minerals Safeguarding Areas Document Map 178). An area of 14.3 hectares has been established using the ground investigation data.

8.8.9 The Cambridgeshire Aggregates (Minerals) Local Plan (1991) presents the assessment procedure used to identify future mineral working areas before it was superseded by the Mineral & Waste Core Strategy Development Plan (2011). Although the procedure has not been reproduced in the more recent policy document it is useful as an initial assessment of the economic viability of a mineral resource. The procedure outlines five Resource Factors used to identify Preferred Areas with potential resources. The mineral resource in the MSA meets the criteria for particle grading and overburden to deposit ratio. A large proportion of the MSA has a deposit thickness less than the criterion of 2m minimum thickness. Although the gross yield may produce an average of 25,000 tonnes per hectare it is unlikely that after removing/reducing fines to meet the standard specifications referred to above, the net saleable yield per hectare will meet this criterion.

8.8.10 The Cambridgeshire Aggregates (Minerals) Local Plan (1991) assessment procedure also indicates that for new workings resources of less than 1 million tonnes are unlikely to attract investment and that 'minimum potential reserves in the order of 2 million tonnes are considered more realistic.' The MSA has a resource of about 0.4 million tonnes.

8.8.11 The resource does not appear to be of sufficient quantity to be economically viable and would probably require treatment for most end uses except general fill.

8.8.12 Were the mineral resource to be extracted for treatment off site to remove fines and thereby improve the resource quality there is likely to be significant environmental impact on local transportation networks and residential areas due to lorry movements during extraction. Similar impacts would arise if the excavation was subsequently backfilled (with landfill) and capped.

8.9 Planning Policy Effects

8.9.1 The Government's Department for Communities and Local Government Minerals Policy Statement 1 (2006) states that there is 'no presumption that resources defined in MSAs will be worked'.

8.9.2 The Cambridgeshire and Peterborough Mineral and Waste Core Strategy Development Plan (2011) discusses MSAs in Section 9 and contains Policy 'CS26 Mineral Safe Guarding Areas' which outlines criteria for consideration of proposed major developments by the Mineral Planning Authority.

8.9.3 Examination hearings for the proposed Core Strategy were held in late 2010. The University of Cambridge made submissions to this hearing in relation to the MSA on the site. The following were concluded and are referred to in the Planning Inspectorate's 'Report to Cambridgeshire County Council and Peterborough City Council' (2011).

- The MSA designation needs to remain in place to safeguard the gravel resource
- The presence of the MSA should not be allowed to slow down the planning process for Development
- Policy CS26 allows development to proceed at an MSA where 'there is overriding need for the development and prior extraction cannot reasonably be undertaken'. It was considered that this criterion should apply to the Proposed Development.
- The Planning Policy Context section of Chapter 4 of this ES establishes the overriding need for the Proposed Development in the context of the development of Cambridge.
- Correspondence with Cambridgeshire County Council (e-mail 27 June 2011 between Emma Fitch and Scott Wilson see Appendix 8.4) after the Core Strategy Examination hearings, resulted in the following guidance from the Council: 'Taking account of the ground investigation data supplied, information submitted on the MSA as part of the Core Strategy Examination and Drawing No. D127313-SK-045, the Council is content the University has examined the use of the material within the MSA as part of its development. Subject to all materials being used sustainably onsite and considered as part of the ongoing Masterplanning process the Council is happy Policy CS26 in the Core Strategy has been met.' Drawing No. D127313-SK-045 shows an overlay of the illustrative Masterplan on the MSA.
- With reference to the sustainable use of the MSA resource the Council guidance was to 'make use of the excavated material onsite as part of the emerging scheme, albeit only in relation to a small percentage of the material onsite.'
- Policy CS26 also states that 'applications for development on land which is allocated in other adopted local development plan documents' are excluded from the need to consult the Mineral Planning Authority. The North West Cambridge Area Action Plan Development Plan Document was adopted by the Local Planning Authorities in October 2009. The Northwest Cambridge AAP forms part of the Cambridge Local Development Framework (LDF) and the South

Cambridgeshire LDF, and replaces part of the existing Cambridge Local Plan 2006. It forms a part of the Statutory Development Plan.

Operational Phase

- During operation and on-going construction in the 2014 year of assessment, the phasing strategy outlined in Chapter 3, indicates that development will have taken place at the south eastern end of the MSA site. This development will sterilise the mineral resource in this area.
- For the 2026 year of assessment the Proposed Development will have been completed and will have covered the MSA sterilising all the mineral resource.

8.10 Summary

8.10.1 A MSA is indicated within the Application Site covering an area of approximately 15.9 hectares.

8.10.2 As part of the ground investigation, selected boreholes and trial pits/trenches were undertaken specifically within the MSA and along its boundaries. Following an interpretation of the findings the volume of mineral resource was estimated at 239,434m³, which is approximately 65% of the estimated volume estimated using information from the Mineral Assessment Report 53.

8.10.3 The assessment indicates that the mineral resource is of insufficient quantity to classify the MSA as economically viable.

8.10.4 The Proposed Development will sterilise the mineral resource.

8.10.5 The overriding need for the Proposed Development and the allocation of the Application Site for development in adopted local development plans removes any restriction on the Proposed Development that the MSA designation might impose.

8.10.6 The Applicant will re-use onsite any resource excavated as a consequence of the Proposed Development within the MSA.

8.10.7 It is estimated the likely volume of sands and gravels (Head Gravel and Observatory Gravels) that might be excavated and be available for reuse on site during the construction may be of the order of 4,000 to 5,000m³.

8.10.8 Cambridgeshire County Council acknowledge that planning requirement override the MSA designation and that the Applicant will sustainably use onsite any mineral resource excavated as a consequence of the Proposed Development.

PART 3 – Traveller's Rest Pit SSSI**8.11 Introduction**

8.11.1 The assessment considers the likely significant effects of the Proposed Development on the Traveller's Rest Pit SSSI. The assessment has been made assuming appropriate design and construction methodologies, inherent in a development such as this, will be incorporated in both the design and construction of the Proposed Development and the content of the Management Plan discussed with Natural England.

Legal and Policy Framework**Legislation**

8.11.2 The Traveller's Rest Pit site is designated as a SSSI as a result of its nationally important geology. The site was originally designated in 1959 under the National Park and Access to Countryside Act 1949. It was first notified in 1983 under Section 28A of the Wildlife and Countryside Act 1981. The 1983 notification was varied by Natural England in July 2010 under Section 28B of the Wildlife and Countryside Act 1981, as

inserted by Schedule 9 to the Countryside and Rights of Way Act 2000 and amended by Section 56 of the Natural Environment and Rural Communities Act 2006.

8.11.3 The Traveller's Rest Pit SSSI notification contains a list of operations which cannot take place at the site without the consent of Natural England (See **Appendix 8.5**).

National Policy

8.11.4 The Government's position on the conservation and enhancement of geological sites was given in Planning Policy Statement 9 (PPS9). PPS9 outlined the Government's objectives in relation to national planning policies with regard to biodiversity and the conservation of geology and was taken into account by local planning authorities when preparing regional or local development plans. The main aim in relation to geology is to ensure the conservation and enhancement of geological diversity by making it an integral part of social, environmental and economic development. This theme has continued into the NPPF.

8.11.5 The SSSI has been selected by the Joint Nature Conservation Committee (JNCC) as a Geological Conservation Review Site (GCR no. 1315).

8.11.6 Guidance on the conservation of geologically important sites is given by Natural England in their publication 'Geological Conservation, a Guide to Good Practice'. This includes suggested methods for conserving and enhancing a range of geological sites and several case studies.

Regional Policy

East of England Plan

POLICY ENV2: Landscape Conservation

In their plans, policies, programmes and proposals planning authorities and other agencies should, in accordance with statutory requirements, afford the highest level of protection to the East of England's nationally designated landscapes (Figure 5) – the Norfolk and Suffolk Broads, the Chilterns, Norfolk Coast, Dedham Vale, and Suffolk Coast and Heaths Areas of Outstanding Natural Beauty (AONBs), and the North Norfolk and Suffolk Heritage Coasts. Within the Broads priority should be given to conserving and enhancing the natural beauty, wildlife and cultural heritage of the area, promoting public enjoyment and the interests of navigation. Within the AONBs priority over other considerations should be given to conserving the natural beauty, wildlife and cultural heritage of each area.

Planning authorities and other agencies should recognise and aim to protect and enhance the diversity and local distinctiveness of the countryside character areas identified on Figure 6 by:

- *developing area-wide strategies, based on landscape character assessments, setting long-term goals for landscape change, targeting planning and land management tools and resources to influence that change, and giving priority to those areas subject to most growth and change;*
- *developing criteria-based policies, informed by the area-wide strategies and landscape character assessments, to ensure all development respects and enhances local landscape character; and*
- *securing mitigation measures where, in exceptional circumstances, damage to local landscape character is unavoidable.*

8.8 *This is a region of contrasts. Its landscape varies in character from the long, low-lying coastline, with beaches, dunes, saltmarsh and estuaries, to the large scale open fen landscapes, the Norfolk and Suffolk heaths, and the rolling farmland with woodland and hedgerows characteristic of much of the rest of the region.*

8.9 *Some 7.5% of the land area is designated as nationally important landscape: the Norfolk and Suffolk Broads, which has equivalent status to a National Park, and the four areas of outstanding natural beauty (only part of the Chilterns AONB is within the East of England). The Broads Management Plan and AONB Management Plans set out the visions for these areas and provide more detailed context for Local Development Documents. The character of the Broads has implications for decision makers beyond the Broads Authority's boundaries and local authorities should be aware of the requirement to take account of the statutory purposes of the Broads, particularly in planning for adjacent areas. Figure 5 shows the main landscape and nature conservation areas designated in the region.*

8.10 National policy for sustainable development in rural areas in PPS7 emphasises the continuing need to protect the countryside for the sake of its intrinsic character and beauty. Countryside character areas have been mapped and described by Natural England, see Figure 6. Many local authorities have also published landscape strategies, supported by character assessments and related studies that provide a finer level of analysis and these should inform Local Development Document preparation. Further work is proposed, aimed at developing a regional landscape strategy to inform the next RSS review.

Local Policy

8.11.7 The site is mentioned in Cambridge City Council's Local Development Framework North West Cambridge Area Action Plan (2009) as requiring protection.

Policy NW2: Development Principles

1. North West Cambridge will be planned and developed:
 - a) As an attractive and distinctive mixed-use development well integrated with the City and connected to surrounding communities and the countryside;
 - b) To a high level of design quality for all parts of the community to create accessible developments and neighbourhoods with their own character and legibility;
 - c) As a balanced, viable and socially inclusive community where people can live in a healthy and safe environment;
 - d) To a flexible design which will be energy efficient, and built to be an exemplar of sustainable living with low carbon and greenhouse gas emissions and able to accommodate the impacts of climate change;
 - e) To avoid the necessity for noise and air quality mitigation measures that would detract from the landscape setting of Cambridge.
2. Development proposals should, as appropriate to their nature, location, scale and economic viability:
 - f) Protect and enhance the geodiversity and biodiversity of the site and incorporate historic landscape and geological features;
 - g) Provide a high quality landscape framework for the development and its immediate setting;
 - h) Provide safe and convenient access for all to public buildings and spaces, and to public transport, including those with limited mobility or those with other impairment such as of sight or hearing;
 - i) Have a design and layout that minimises opportunities for crime;
 - j) Provide integrated refuse and recycling facilities and reduce the amount of waste produced through good design.
3. Planning permission will not be granted where the proposed development or associated mitigation measures would have an unacceptable adverse impact:
 - k) On residential amenity;
 - l) On the quality of the urban edge;
 - m) On air quality;
 - n) On biodiversity, archaeological, historic landscape and geological interests;
 - o) On flooding and flood risk;
 - p) On quality of ground or surface water;
 - q) On local traffic movement;
 - r) On adjacent Conservation Areas and Listed Buildings; or
 - s) On protected trees and trees of significance.
4. Planning permission will not be granted where a development would be exposed to levels of noise, vibration, air pollution, lighting and other forms of pollution that are unacceptable in relation to the nature of that development.

2.10 Consideration will need to be given as to how to protect the special geological importance of the Traveller's Rest Pit SSSI which provides a unique exposure of fossiliferous cold stage gravels, sands and silts of a high-level terrace (Observatory Gravels) of the River Cam. Recent studies confirm that the special geological interest is located on the southern part of the existing SSSI and on land to its south and west, while the northern part of the existing SSSI no longer has any special geological importance. Natural England has carried out a review of the scientific information from surveys by Boreham (2008a, b & c) and Green (2008). In the light of this it appears that additional land is eligible for notification. The Local Team therefore intends to develop a case for reviewing the

SSSI boundary (including additional land to the south and west and removing land to the north), although no definite timescale for this has been agreed at present. Development proposals will need to take into account advice from Natural England that a 10m buffer around the SSSI will be required during the masterplanning and planning applications stages to ensure that the scientific value of the site is not compromised by the development of North West Cambridge.

Policy NW28: Construction Process

Where practicable the development will:

- a. Recycle construction waste;
- b. Accommodate construction spoil within the development, taking account of the local urban and landscape character and avoiding creation of features alien to the topography;
- c. Maximise the reuse and recycling of any suitable raw materials currently available on site during construction, such as redundant buildings or infrastructure;
- d. Avoid disruption to adjacent parts of the City and Girton.

10.4 The development of North West Cambridge will take place over a number of years and the construction process can have implications for amenity, public safety, and the landscape setting of Cambridge and Girton if not properly planned. The construction process will therefore need careful management in order to avoid or minimise disruption to the adjacent parts of the City and Girton as well as parts of North West Cambridge which have already been built. Realistically, it will not be possible to avoid any impact when development is being undertaken immediately adjoining existing areas but measures should be undertaken to reduce the impact as far as possible. It will also be important to ensure that there is no adverse impact on the Traveller's Rest Pit Site of Special Scientific Interest (SSSI).

Development Assumptions

8.11.8 The assessment considers the likely significant effects of the Proposed Development on the Traveller's Rest Pit SSSI. It identifies reasons to protect and enhance the geological resource and suggests mitigating measures where necessary, building on discussions had with Natural England. The assessment has been made assuming appropriate design and construction methodologies, inherent in a development such as this, will be incorporated in both the design and construction of the Proposed Development.

8.11.9 The assessment has been based on the information contained within the Parameter Plans, which shows the Traveller's Rest Pit SSSI will be left as primary open land.

8.11.10 The Parameter Plans which form part of the planning application for the Proposed Development will identify the use of this area as recreational space and any reserved matters applications will come forward in accordance with the approved parameters.

8.12 Assessment Approach

Methodology

8.12.1 SSSI status is assigned to the Traveller's Rest Pit. The sensitivity of this receptor is considered to be high.

8.12.2 The magnitude of change to the Traveller's Rest Pit SSSI has been determined using the seven point scale shown in

Table 8.7.

Table 8.7: Criteria for Assessing Significance of Effect by Reference to Magnitude of Changes to Geological SSSI

Significance of effect	Definition
Major Adverse	Complete disturbance or destruction/ removal of the Observatory Gravels over a large area of the SSSI. Limiting the access to the geology for research purposes over an extensive area of the SSSI.
Moderate Adverse	Significant disturbance or destruction /removal of the Observatory Gravels in localised areas of the SSSI. Significant changes to the groundwater regime within the SSSI resulting in degradation of the Observatory Gravels. Limiting access to the geology for research in substantial localised areas.
Minor Adverse	Minor changes/disturbance to strata and groundwater regime resulting in degradation of the Observatory Gravels. Limiting access to the geology for research in small localised areas.
Negligible	Changes or disturbance to the Observatory Gravels or groundwater of insufficient magnitude to affect the use or integrity of the SSSI. No material change to access for future research. No material positive or negative effects on the site.
Minor Beneficial	Limited positive effects such as small scale measures to increase public awareness of the site. No change in accessibility. Preservation of the resource in its current state.
Moderate Beneficial	Measures implemented to increase public awareness of the importance of the Observatory Gravels. Some increase in accessibility of the Observatory Gravels for research purposes. Significant scale measures adopted to improve the state and preservation of the Observatory Gravels.
Major Beneficial	Major positive effects in terms of improving access to the Observatory Gravels for research and improving public awareness. Measures implemented to significantly enhance the current state and preservation of the Observatory Gravels.

8.12.3 The effects of the Proposed Development on the Traveller's Rest Pit SSSI have been considered for the 2014 and 2026 years of assessment using the phasing for the Proposed Development described in chapter 3.

8.12.4 Natural England has produced an advice note (10th November 2009) that outlines its position with regard to the effects of certain aspects of development on the Traveller's Rest Pit SSSI. This is discussed further in Section 8.13.

8.13 SSSI Baseline Conditions

Site Description and Context

8.13.1 The Traveller's Rest Pit SSSI is located in the south-eastern part of the Application Site centred around grid reference TL 429598, immediately south of the World Conservation Monitoring Centre. The location of the SSSI is shown in **Figure 8.1**.

8.13.2 The Traveller's Rest Pit SSSI covers an area of disused gravel pit and an area of adjacent undisturbed ground to the southwest and west of the gravel pit.

8.13.3 Part of the Traveller's Rest Pit SSSI included in the 1983 notification was denotified in 2010 following surveys conducted by Cambridge University in 2008 which indicated that the geology of interest had been removed from part of the site during the original quarrying works (see the Supporting Information to the SSSI notification document by Natural England, 2010). The total area of the Traveller's Rest Pit SSSI is now 2.25 hectares (Appendix 8.6).

8.13.4 Natural England has completed the process to denotify the area outside the new site boundary. As part of this process, Natural England has published the papers necessary to confirm the List of Operations requiring their consent. This chapter considers the Traveller's Rest Pit SSSI within the 2010 notified SSSI boundaries as indicated on **Figure 8.1**.

8.13.5 The larger part of the Traveller's Rest Pit SSSI is composed of a level grassed area surrounded on three sides to the northwest, southwest and southeast by steeply sloping degraded quarry faces. The surrounding ground around the disused quarry is gently sloping to the northeast.

8.13.6 The steep slopes around the quarry edges are between 3.3 and 3.8m high and have gradients of between 1v:2h and 1v:3h.

8.13.7 The base of the disused quarry has been laid to pasture and the higher ground around the quarry to arable use. The quarry slopes are generally overgrown with long grass, stinging nettles, shrubs and small trees. In places there is evidence of extensive animal burrowing within the slopes. To the southwest of the quarry a concrete single track road is present running parallel with the edge of the quarry leading to University Farm.

8.13.8 Further details are given in the Scott Wilson Traveller's Rest Pit Baseline Report (February 2011) given in **Appendix 8.5**. This document was produced to inform the re-notification and has been included for information. The current notification is included in **Appendix 8.6**.

Baseline Survey Information

8.13.9 Within the Traveller's Rest Pit SSSI are Observatory Gravels containing non-marine cold water mollusc fossils and ice wedge casts, both of which indicate deposition under cold climatic conditions. The gravels have also yielded fossil remains of large vertebrates (red deer and horse) and Palaeolithic worked flints.

8.13.10 Beneath the Observatory Gravels across much of the site is the Gault Clay bedrock. This is generally described as firm to very stiff clay.

8.13.11 The 2008 surveys by Cambridge University indicate the presence of deeper superficial deposits between the Observatory Gravels and the Gault Clay. These deposits are not present in all areas and geophysical survey sections suggest these materials are infilling channel features cut into the Gault Clay. The Observatory Gravels generally consist of sand and gravel composed of flint and chalk with silt and clay present in the top metre of the deposit. It has been postulated that these deposits represent 'tunnel valley' sediments – i.e. they were deposited from a subglacial river that carved a valley into the Gault Clay beneath the ice sheets that covered this part of the country, possibly during the Anglian period glaciation (see Boreham, S. (2008) A Short Report on Ground Conditions at Traveller's Rest Pit, Girton, Cambridgeshire). Further information can be found in **Appendix 8.5**.

8.14 Measures to avoid, manage or reduce effects

8.14.1 All the built development is indicated outside the 10m buffer zone around the Traveller's Rest Pit SSSI. Moreover no construction activities (e.g. storage of materials, access for movement of construction traffic) will take place in the Traveller's Rest Pit SSSI without the consent of Natural England.

8.14.2 The Development contractor will be required by the CEMP to avoid and prevent damage or disturbance of the Traveller's Rest Pit SSSI. If the contractor considers it necessary, in order to meet this

obligation, the Traveller's Rest Pit SSSI will be securely fenced at the start of construction and limited access only will be allowed during Development for enhancement works and research purposes. Therefore likely effects on the Traveller's Rest Pit SSSI will not be directly related to the creation of buildings and roads to be constructed as part of the Proposed Development.

8.14.3 Within the SSSI, any necessary paths will preferentially be located on ground not underlain by Observatory Gravels. Where it is necessary for paths to cross areas underlain by Observatory Gravels, the form of path chosen should enable it to be moveable and/or demountable ('roll-up') to allow future access for research. Paths shall be raised to ensure that they do not introduce a requirement for the Observatory Gravels to be removed during their construction. Concrete or bituminous paths will not be permitted as they would effectively sterilise the ground below and thereby preclude future research.

- Street lighting, litter bins, benches, signs and other street furniture will not be placed within the Traveller's Rest Pit SSSI. The path will therefore be unlit and signs will be erected outside the Traveller's Rest Pit SSSI boundary to warn the general public that access is only suitable during daylight hours.
- As much as possible access will be made in areas outside the 2010 notified SSSI boundary. Ramps for disabled access will be formed outside the 2010 notified SSSI boundary.
- The design of any steps down the quarry slopes, within the Traveller's Rest Pit SSSI boundary, will be discussed and agreed with local planning authorities and relevant consultees, including Natural England, at the detailed planning stage. The use of steps formed by cutting into the slope will not be permitted as they could potentially destroy the local geology. Natural England will not permit Observatory Gravels to be re-used. Before the steps are installed, mitigation measures will be required, including a survey of the geology.
- Deep rooting shrubs, plants and trees will not be permitted as roots penetrating into the Observatory Gravels could have the potential to disturb the sedimentary structures within the geological sequence and toppling trees could significantly disturb the sequence of strata within the root zone.
- Structures will not be located within the Traveller's Rest Pit SSSI as their foundations would have the potential to disturb the geology in localised areas or to restrict access to underlying areas.
- Children's play areas and hard surface sports facilities will not be located within the Traveller's Rest Pit SSSI boundary as they would effectively sterilise an area of ground by preventing future access for research and the reinstatement of the surfacing following intrusive investigation would be difficult and expensive.
- Formal turf sports facilities, such as football or cricket pitches, will not be laid out or constructed within the Traveller's Rest Pit SSSI. Informal turf sports may take place and are considered compatible with the conservation of the geology by Natural England. Levelling of the ground surface within the Traveller's Rest Pit SSSI should not be undertaken.
- If investigatory pits or boreholes are required, the proposals and reinstatement will be agreed with Natural England.
- Ponds will not be located within the Traveller's Rest Pit SSSI as they have a high probability of disturbing or destroying the geological resource and are likely to restrict access to significant areas of the resource for future research.
- A control strategy will be implemented to actively manage access to the Traveller's Rest Pit SSSI for study and research purposes (**Appendix 8.7**).
- Drainage pipes and buried services will not be laid through the Traveller's Rest Pit SSSI, as they have the potential to damage the geological resource during the trenching operation.

8.14.4 Natural England's advice note, dated 10th November 2009, related to effects on the Traveller's Rest Pit SSSI from the development of the Application Site that includes the following operations. These operations can only take place with consent from Natural England and may require a method statement to be submitted by whoever undertakes the works.

- Cultivation, including ploughing, rotovating, harrowing, and re-seeding.

- Dumping, spreading or discharging of any materials.
- Tree and/or woodland management and alterations to tree and/or woodland management (including planting, felling, pruning and tree surgery, thinning, coppicing, changes in species composition, removal of fallen timber).
- Draining (including the use of mole, tile, tunnel or other artificial drains).
- Infilling or digging of ditches, dykes, drains, ponds or pits.
- Extraction of minerals, including hard rock, sand, gravel, silt, clay, topsoil, subsoil, chalk and spoil.
- Destruction, construction, removal, rerouting or regarding of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, including soil and soft rock exposures or the laying, maintenance or removal of pipelines and cables, above or below ground.
- Storage of materials.
- Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
- Modification of natural or man-made features, (including cave entrances) and clearance of boulders, large stones, loose rock or scree,
- Battering, buttressing or grading of geological exposures and cuttings (rock and soil) and infilling of pits and quarries.
- Removal of geological specimens, including rock samples, minerals and fossils,
- Recreational or other activities likely to damage or disturb the features of special interest.

8.14.5 Natural England may not give consent if the operations are likely to damage the geological feature of interest.

8.14.6 A Geological Site Management Plan has been prepared (**Appendix 8.7**). This assessment assumes that the measures included within the plan will also be implemented.

8.15 Likely Significant Effects

Construction Effects

8.15.1 The Proposed Development is shown on **Figures 2.1 to 2.5** which are the parameter plans for the Proposed Development. A summary of the main elements of the Proposed Development, as it affects the Traveller's Rest Pit SSSI, is shown in **Figure 8.2**.

8.15.2 **Figure 8.2** indicates that the entire area of the 2010 SSSI notified areas of the Traveller's Rest Pit SSSI and a 10m wide buffer zone around the boundary will be occupied by primary open land. Additional land to the north, east and southwest will also be utilised as primary open land. The existing buildings to the north (including the World Conservation Monitoring Centre) will remain.

8.15.3 Dual purpose foot/cycle routes are proposed to run along the southwest and northwest boundaries of the Traveller's Rest Pit SSSI.

8.15.4 Zones containing residential properties are proposed to the north and east of the area of open land, these lie over 60m from the 2010 boundary.

8.15.5 An area designated for academic and research facilities is proposed to the south. This zone may be as close to the southern corner of the Traveller's Rest Pit SSSI as the edge of the 10m wide buffer zone. Where possible, soft development such as open space/landscaping will be included within the Proposed Development, adjacent to the buffer zone.

8.15.6 A zone containing residential and complementary mixed use properties is proposed to the southwest. This will be separated from the Traveller's Rest Pit SSSI by more than 30m of open green land.

8.15.7 A school is proposed to the west and northwest. A triangular piece of school-related open land will lie between the Traveller's Rest Pit SSSI and the zone containing the school buildings. Entrances/fencing to the school will be designed in a way which does not encourage access across the Traveller's Rest Pit SSSI

8.15.8 **Figures 2.1 to 2.5** show the Traveller's Rest Pit SSSI will be left as primary open land. Some or all of the following changes to the Traveller's Rest Pit SSSI may be anticipated (where such changes are anticipated the measures to avoid, manage or reduce effects described in section 8.14 will be applicable):

- Creation of an unlit footpath.
- Creation of steps or a ramp to take the footpath down the steep slopes of the disused quarry.
- Planting of flowers and grass.
- Installation of information points adjacent to the Traveller's Rest Pit SSSI.

Operational Phase

8.15.9 During operation and on-going construction in the 2014 year of assessment, the phasing strategy outlined in Chapter 3, indicates that no development will have taken place on the Traveller's Rest Pit SSSI. With the measures described above there will be negligible effects up to and including this year of assessment.

8.15.10 For the 2026 year of assessment the Traveller's Rest Pit SSSI geological resource will have been enhanced as part of the Proposed Development. This will be achieved by implementing measures that improve the condition of the resource, and also by improving public awareness of the importance of the site and improving access to the Traveller's Rest Pit SSSI for study. Enhancement measures, that will need to be agreed with Natural England, and may need formal consent specific to the Traveller's Rest Pit SSSI in relation to the Proposed Development (see Table 8.7 for Significance Criteria) include:

Major Beneficial

- Existing fencing and gates will be removed from the edges of the Traveller's Rest Pit. The boundary of the Traveller's Rest Pit SSSI will be marked by appropriate boundary posts, located outside the Traveller's Rest Pit SSSI.
- The farm access track and storage area outside the pit, but within the Traveller's Rest Pit SSSI, will be removed. The area within the Traveller's Rest Pit SSSI currently occupied by the road, storage area and farmland will be reinstated as grassland.
- Vegetation within the Traveller's Rest Pit SSSI will be managed, in particular by removal of trees and shrubs in poor condition from the degraded quarry slopes and regular maintenance of grass height and trees/shrubs to ensure that the geological resource is not damaged. Trees that need to be removed will be cut down to leave the roots and a stump. Full removal is not required as this could destabilise the pit faces and potentially damage the geological interest. Tree stumps will be treated to prevent re-growth. Exposed gravels on the slopes will be covered with topsoil and seeded to reduce erosion and help stabilise the slopes. This work will be carried out in accordance with guidance provided in the Biodiversity Strategy and any planting and landscaping in the Traveller's Rest Pit SSSI or the SSSI buffer will be agreed with Natural England.
- Ongoing maintenance will be required to maintain the grassed surface.
- The impact and extent of animal burrowing on the slopes will be monitored in conjunction with Natural England during the Development. A disturbance threshold, if required, may be set at some time in the future in consultation with Natural England.
- If deemed necessary public access to the most sensitive areas, such as the slopes, could be controlled or discouraged by designating accesses and routes and by use of barriers or planting. This will be agreed with Natural England.
- Surveying and recording the geology prior to, or during, construction in order to mitigate potential loss of localised areas of the Observatory Gravels, or locally reduced accessibility for future research.

Moderate Beneficial

- To facilitate access by the general public, students and researchers, an unlit path will be provided within the Traveller's Rest Pit SSSI. This path will be designed so that it can be relocated to facilitate future research.
- Installing public information points outside of the Traveller's Rest Pit SSSI that explain the importance of the geology in its regional and national context.

8.15.11 Natural England, in its publication *Geological Conservation – A Guide to Good Practice*, suggests that a method to enhance historic quarry sites is to open up a fresh face that exposes part of the geology that is of special interest. As the main stratum of importance at this site (the Observatory Gravel) is an unconsolidated gravel deposit, any exposure will require regular trimming as it will degrade rapidly through wash out and slumping to its natural angle of repose. Furthermore, as the gravels are of limited extent, regular trimming would significantly erode the resource over time. In consultation with Natural England it has been agreed that preservation of the deposit by retaining the soil cover is more appropriate than attempting to provide permanent exposures of the geology for public observation.

8.15.12 The main effect that the Proposed Development will have on the Traveller's Rest Pit SSSI will be related to the increase in the number of people likely to visit the site and improvements in the enhancement and level of maintenance of the Traveller's Rest Pit SSSI (to be agreed with Natural England). The changes to the site brought about by the Proposed Development are therefore likely to be moderate beneficial to major beneficial.

Effects of Highway and Utility Works

8.15.13 The highway and utility works on Huntingdon Road and Madingley Road and the potable water main extension are to be undertaken on land outside the Traveller's Rest Pit SSSI boundary and the buffer zone and therefore, no likely significant effects on the Traveller's Rest Pit SSSI will arise.

Overview

8.15.14 All the built development is indicated outside the 10m buffer zone around the Traveller's Rest Pit SSSI. Therefore likely effects on the Traveller's Rest Pit SSSI will not be directly related to the creation of buildings and roads. The main effect that the Proposed Development will have on the Traveller's Rest Pit SSSI will be related to the increase in the number of people likely to visit the Traveller's Rest Pit SSSI and improvements in the level of maintenance of the Traveller's Rest Pit SSSI.

8.16 Cumulative Effects

8.16.1 The Traveller's Rest Pit SSSI is situated towards the centre of the Proposed Development and will not be affected by any of the other developments in the vicinity of the Application Site which are identified in Chapter 1 of this ES either at 2014 or at 2026. There would not therefore be any effects from other developments on the Traveller's Rest Pit SSSI, with which to accumulate those of the Proposed Development.

8.17 Summary**Introduction**

8.17.1 Within the Application Site a disused gravel quarry known as the Traveller's Rest Pit SSSI is an area designated as a Site of Special Scientific Interest (SSSI). This area includes a nationally important sequence of fossiliferous gravels, known as the Observatory Gravels.

8.17.2 This chapter has identified potential effects on the Traveller's Rest Pit SSSI from the Proposed Development.

Baseline Conditions

8.17.3 The Traveller's Rest Pit SSSI is located in the southeastern part of the Application Site, immediately south of the World Conservation Monitoring Centre. The Traveller's Rest Pit SSSI covers an area of

disused gravel pit and an area of adjacent undisturbed ground to the southwest and west of the gravel pit. The total area is 2.25 hectares.

8.17.4 The 2010 notification has amended the area previously notified in 1983 as surveys conducted in 2008 concluded that the Observatory Gravels are not present under part of the site. The process of denotification has been completed and the figures referenced in this chapter refer to the final boundaries for the Traveller's Rest Pit SSSI.

8.17.5 The Traveller's Rest Pit SSSI consists of a large level area, the former quarry floor, surrounded on three sides to the northwest, southwest and southeast by steeply sloping degraded quarry faces. The surrounding ground around the disused quarry is gently sloping to the northeast.

8.17.6 The base of the disused quarry has been laid to pasture and the higher ground around the quarry to arable use. The quarry slopes are generally overgrown with long grass, stinging nettles, shrubs and small trees. In places there is evidence of extensive animal burrowing within the slopes.

8.17.7 Observatory Gravels are present within the SSSI. These contain non-marine cold water mollusc fossils and ice wedge casts, both of which indicate deposition under cold climatic conditions. The gravels have also yielded fossil remains of large vertebrates (red deer and horse) and Palaeolithic worked flints.

Measures to avoid, reduce or manage any adverse effects and enhance any beneficial effects

8.17.8 The following measures have been assumed to have been included as part of the scheme that has been assessed:-

- Removal of existing fences and concrete surfaces.
- Demarcation of the Traveller's Rest Pit SSSI with boundary posts.
- Removal of trees and shrubs in poor condition from the degraded pit slopes. Where it is necessary to remove trees the roots and a stump will be left in place so that the Observatory Gravels are not disturbed. Stumps will be treated to prevent re-growth. Topsoiling and grassing over exposed areas of gravel and where farmland and concrete surfaces are currently present. Maintenance to encourage grass growth and discourage the return of trees, shrubs and undergrowth.
- Monitoring of burrowing animals in accordance with guidance provided in the Biodiversity Strategy.
- Improved access to the public by installing a path which can be easily removed to facilitate access to the strata for research purposes.
- The details of any steps or ramp proposed would be discussed and agreed with local planning authorities and relevant consultees, including Natural England, at the detailed planning stage.
- Improved public awareness of the importance of the site and its geology through installation of public information points outside of the Traveller's Rest Pit SSSI.
- Where there is potential for the geology to be disturbed by the Development activities, for example at the proposed location of steps on the disused quarry slope, these areas must be surveyed in advance by a specialist to identify and record geology of particular interest. A watching brief of excavations can also be implemented.

Likely Significant Effects

8.17.9 The Proposed Development includes the Traveller's Rest Pit SSSI, a 10m buffer zone and areas beyond the Traveller's Rest Pit SSSI boundary as primary open land.

8.17.10 The Traveller's Rest Pit SSSI will be left as primary open land. Some or all of the following changes to the Traveller's Rest Pit SSSI may be anticipated (where such changes are anticipated the measures to avoid, manage or reduce effects described in section 8.14 will be applicable):

- Creation of an unlit footpath.
- Creation of access down the steep disused quarry slopes, in association with the footpath.

- Planting of shallow rooting plants.
- Installation of information points adjacent to the Traveller's Rest Pit SSSI.

8.17.11 The following activities are not considered appropriate within the Traveller's Rest Pit SSSI boundary or within a 10m wide buffer zone around the Traveller's Rest Pit SSSI as they would result in unacceptable damage to, or restriction of access to, the underlying geology. The Proposed Development will come forward in accordance with the Parameter Plans to make sure these activities are not carried out.

- Construction of small structures such as toilet facilities, sheds for gardening equipment and shelters.
- Installation of street furniture such as litter bins and benches.
- Provision of formal turf sports facilities for football or athletics etc.
- Creation of children's play areas.
- Installation of street lighting with associated cable runs.
- Formation of hard surfaced sports facilities such as tennis or basket ball courts and five-a-side football pitches.
- Ponds and landscaping.
- Installation of drainage for hard standing areas and toilet facilities.
- Installation of water pipes and other services for sheds, toilets, ponds and plant watering.
- Service routes, such as cabling, drainage and water crossing the SSSI to service adjacent areas of development

Conclusions

8.17.12 The Traveller's Rest Pit SSSI is designated as a Site of Special Scientific Interest and it is protected under law. Any development should not significantly affect the geology of special interest, or suitable mitigation measures should be put in place where a development does affect the Traveller's Rest Pit SSSI.

8.17.13 Parameter plans have been produced to define appropriate land uses within the Proposed Development, which indicate that the Traveller's Rest Pit SSSI will be left as primary open land. Use of the site as an informal playing field / football field etc is satisfactory, provided no levelling is carried out and no other works are undertaken such as the installation of goal posts.

8.17.14 Developments that enhance the protected geology and facilitate public awareness of the importance of the site while maintaining access for scientific research are beneficial. These developments typically include vegetation management to remove unwanted deep rooted vegetation and prevent its return, allowing public access to the site and provision of information points outside of the Traveller's Rest Pit SSSI.

8.17.15 During operation in the 2014 year of assessment, the phasing strategy outlined in Chapter 3, indicates that no development will have taken place on the Traveller's Rest Pit SSSI. With the mitigation described above there will be no effect in this year of assessment. During construction of the remainder of the Proposed Development, the mitigation measures will remain in place, resulting in no effect on the Traveller's Rest Pit SSSI.

8.17.16 Appropriate measures to avoid or manage any adverse effects on the Traveller's Rest Pit SSSI and to enhance any beneficial effects have been identified and are included as part of the scheme that has been assessed. The assessment of overall significant effects in the 2026 year of assessment indicates that the Proposed Development is likely to have negligible to minor beneficial effect on the Traveller's Rest Pit SSSI. Where localised damage to the geology is anticipated, an application to Natural England will be required - suitable mitigation could include surveying and recording the geology before or during excavation.

8.17.17 The Traveller's Rest Pit SSSI is situated towards the centre of the Proposed Development and will not be affected by any of the other developments in the vicinity of the Application Site which are identified in Chapter 1 of this ES either at 2014 or at 2026.

- 1 Introduction and Assessment Approach
- 2 Application Site Description and Proposed Development
- 3 Phasing and Implementation
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9 ARCHAEOLOGY

9.1 Introduction

9.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Development upon one particular type of heritage asset, buried archaeological remains.

9.1.2 Other heritage assets are described and assessed in Chapter 10 of this ES.

9.2 Assessment Approach

Methodology

9.2.1 The Practice Guide accompanying the previous National Planning Policy applicable to Archaeology Planning Policy Statement 5 (PPS5): Planning for the Historic Environment highlights three main points in the process of assessing the significance of a heritage asset:

- Understanding the nature of the significance
- Understanding the extent of the fabric that holds that significance
- Understanding the level of importance of that significance

9.2.2 This has been achieved using a variety of methods including desk-based assessment (including aerial photographic, historical maps and Historic Environment Record appraisal) and on-site evaluation (including geophysical survey, fieldwalking and trial trenching).

9.2.3 Solely for the purposes of this assessment the term 'importance' 'of the heritage asset has been adopted rather than 'significance'. This departure from the now adopted National Planning Policy Framework and PPS5 (in terminology only) will allow the commonly adopted seven point scale of the 'significance of effect' to be adopted without duplicating terms.

9.2.4 This chapter deals exclusively with one type of heritage asset, buried archaeological remains with no surface expression. The nature of these types of assets dictates that their importance is solely expressed in their archaeological interest and historic interest (i.e. in their current form they do not possess any architectural or artistic interest).

9.2.5 The archaeological interest of the assets lies within the potential to expertly investigate the buried remains at some point in the future and that this investigation would make a valuable contribution to the understanding of past human activity. Therefore, the loss or partial loss of these physical remains would adversely affect the asset's importance.

9.2.6 The historical interest of buried archaeological remains is embodied in their physical fabric and their setting; representing the 'illustrative value' of the place as the site of former activity (whether it is a funerary monument, settlement or other type of activity). (**Table 9.1**)

Table 9.1: Establishing the importance of heritage assets

Sensitivity of receptor / Importance	Example of archaeological remains (demonstrating archaeological or historic interest)
High	Scheduled monuments or remains of schedulable quality.
Medium	Remains not qualifying under the scheduling criteria; however, they possess particular archaeological interest such that their potential future investigation would make a valuable contribution to national research agendas. The site of activity or an event that played a key role in the historical development of area.
Low	Remains possessing some archaeological interest such that their potential future investigation would make a valuable contribution to regional or local research agendas.
Negligible	Buried remains possessing no archaeological interest i.e. their potential future investigation would not contribute to research agendas.

9.2.7 PPS5 and its supporting documents and the NPPF provide no firm guidance on quantifying a scalar approach that describes the magnitude of change that can occur to a heritage asset. For the purposes of this assessment and to allow a consistent approach of reporting across the environmental topics a four point magnitude scale has been adopted (Table 9.2).

Table 9.2: Establishing the magnitude of change

Magnitude of change	Description of change
High	The development would result in a total loss of the fabric that possesses the archaeological or historic interest of the asset.
Medium	The partial loss of the fabric such that potential for future investigation is comprised but some archaeological or historic interest remains.
Low	The loss of part of the fabric of the asset, however, the potential for future investigation is not overly comprised and the key archaeological or historic interest remains.
Negligible	No effect on the archaeological or historic interest of the asset.

9.2.8 As with the magnitude of change, PPS5 and its supporting documents and the NPPF provide no firm guidance on quantifying the significance of effects of development on heritage assets. For the purposes of this assessment and to allow a consistent approach of reporting across the environmental topics a matrix has been developed that relates the importance of the heritage asset with the magnitude of change (Table 9.3).

Table 9.3: Establishing the significance of effect

Magnitude of change	Sensitivity of Receptor / Importance			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor to Moderate	Negligible
Low	Moderate	Minor to Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

9.2.9 In summary, the sources consulted for the preparation of this assessment include the following:

- Cambridgeshire Historic Environment Record (CHER)
- Cambridgeshire Records Office
- The Cambridgeshire Collection and local museums (University of Cambridge)
- Cartographic and historic sources
- University of Cambridge Unit for Landscape Modelling (previously the Cambridge University Committee for Aerial Photography [CUCAP]) archives

- Previous archaeological work in the vicinity of the PDA
- Gazetteer of the City of Cambridge (Browne 1974).

9.2.10 The Cambridgeshire HER was consulted as a means of identifying the location of associated sites and find-spots. In general, the HER constitutes only a partial record for the study area. While archaeological fieldwork has been carried-out in the wider landscape, these have until recently (see **Appendix 9.3**) been small-scale interventions, with a significant proportion of the sites being merely find spots of chance finds.

9.2.11 A search of the archives of the local Archaeology and Anthropology Museum and Sedgwick Museum, University of Cambridge, in conjunction with a review of secondary studies of the region and a search of relevant local journals was carried out. In the case of the latter, this was to determine the nature of the archival and Palaeolithic assemblage recovered from the area.

9.2.12 A range of historical and cartographic sources have been examined, including the major published histories of the region, as well as published Ordnance Survey, Inclosure Award and geological maps. Useful maps, with regard to scale and landscape detail, are really only available from the 19th century and demonstrate the area has been primarily agricultural in nature until recently following the westward expansion of Cambridge and the construction of the M11 and A14.

9.2.13 The plotting and interpretation of aerial photographic coverage has considerable potential for revealing elements of early settlement and land use patterns (**Figure 9.2**). To extract the full potential of these valuable resources, existing surveys of the study area were examined, as well as published reports. Additionally, a new study of available coverage was commissioned from the Air Photo Services (see **Appendix 9.4**).

9.2.14 To support the desk-based assessment several phases of field surveys have been undertaken. The methodology adopted is summarised in **Appendix 9.3**. In summary:

- In 2002, evaluation fieldwork occurred across the south-easternmost c. 15ha of the area (**Figure 9.2**; Mackay et al. 2002)
- In the autumn of 2008 trial trenching was undertaken (largely to target major cropmarks) across the gravel-ridge fields (**Figure 9.2**; Armour 2008)
- In December 2008 a fieldwalking survey over available fields was commissioned, with the CAU conducting a subsequent intense 10m-grid collection upon two identified sites (**Figure 9.2**; Anderson & Hall 2009).
- In the spring of 2009, trial trenching took place across the remaining area of the Application Site, except the south-easternmost 15ha completed in 2002 (Evans & Newman 2010) (**Figure 9.3**).

9.3 Policy Framework

9.3.1 In March 2010 national planning guidance (PPG16 dealing with archaeology and PPG15 dealing with built heritage) was replaced by a new planning statement in the form of Planning Policy Statement 5 (PPS5): Planning for the Historic Environment and an associated guide. One of the key aims of this heritage protection reform was to unify the separate legislation protecting archaeology and the historic environment, simplifying the system. A new term was introduced to encompass historic buildings, monuments and other features, the 'heritage asset'.

9.3.2 The heritage section of the NPPF incorporates this term. The NPPF streamlines the previous policies contained in PPS5. It does not alter those policies or create new ones.

9.3.3 A 'heritage asset' is defined in PPS5 and the NPPF as: A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are the valued components of the historic environment. They include designated heritage assets (as defined in the PPS) and assets identified by the local planning authority during the process of decision-making or through the plan-making process (including local listing).

9.3.4 PPS5 2010, Annexe 2: 13 In PPS5 the term 'significance' is defined as "The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological,

architectural, artistic or historic (PPS5 2010, Annexe 2: 14). Listed buildings and scheduled monuments are now 'designated heritage assets', designated as such under existing legislation. The levels of protection that apply to each of these remain unchanged, since the relevant acts of parliament remain the same

9.3.5 Policy HE9 relates to the protection for 'designated heritage assets', which includes archaeological sites and listed buildings:

HE9.1

There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. [...] Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, including scheduled monuments, protected wreck sites, battlefields, grade I and II listed buildings and grade I and II* registered parks and gardens, World Heritage Sites, should be wholly exceptional.*

HE9.2

Where the application will lead to substantial harm to or total loss of significance local planning authorities should refuse consent unless it can be demonstrated that:

- (i) the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that harm or loss; or*
- (ii) (a) the nature of the heritage asset prevents all reasonable uses of the site; and*
 - (b) no viable use of the heritage asset itself can be found in the medium term that will enable its conservation; and*
 - (c) conservation through grant-funding or some form of charitable or public ownership is not possible; and*
 - (d) the harm to or loss of the heritage asset is outweighed by the benefits of bringing the site back into use.*

HE9.6

*There are many heritage assets with **archaeological interest** that are not currently designated as scheduled monuments, but which are demonstrably of equivalent significance. These include heritage assets:*

- that have yet to be formally assessed for designation*
- that have been assessed as being designatable, but which the Secretary of State has decided not to designate; or*
- that are incapable of being designated by virtue of being outside the scope of the Ancient Monuments and Archaeological Areas Act 1979.*

The absence of designation for such heritage assets does not indicate lower significance and they should be considered subject to the policies in HE9.1 to HE9.4 and HE10.

9.3.6 The historic environment is an essential source of evidence for furthering the understanding of our past. If there is a belief that investigating an asset further might reveal more about our past, it is said to have an archaeological interest. Archaeological interest is defined in PPS5 as:

'An interest in carrying out an expert investigation at some point in the future into the evidence a heritage asset may hold of past human activity. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them. These heritage assets are part of a record of the past that begins with traces of early humans and continues to be created and destroyed.' (PPS5 2010, Annexe 2: 13)

9.3.7 Where preservation in situ is impracticable or unwarranted preservation by record is required as outlined in Policy HE12.3 to a level appropriate to the asset's significance:

HE12.3

Where the loss of the whole or a material part of a heritage asset's significance is justified, local planning authorities should require the developer to record and advance understanding of the significance of the heritage asset before it is lost, using planning conditions or obligations as appropriate. The extent of the requirement should be proportionate to the nature and level of the asset's significance. Developers should publish this evidence and deposit copies of the reports with the relevant historic environment record. Local planning authorities should require any archive generated to be deposited with a local museum or other public depository willing to receive it. Local planning authorities should impose planning conditions or obligations to ensure such work is carried out in a timely manner and that the completion of the exercise is properly secured.

9.3.8 Archaeological assessment follows best practice and guidelines laid out in Managing Archaeological Projects (English Heritage 1991) and those recommended by the Institute of Field Archaeologists' Standard and Guidance for Desk-Based Assessment (2001).

9.3.9 As stated above the Practice Guide accompanying Planning Policy Statement 5: Planning for the Historic Environment highlights three main points in the process of assessing the significance of a heritage asset. The following paragraphs are taken from the Practice Guide, sections 68, 70, 90, 91, 92, 102, 103, 130 and 131.

The PPS requires [...] a level of information that is proportionate to the significance of the asset and the potential impact upon that significance of the proposals. For example, for a substantial demolition it is reasonable to expect the applicant to provide detailed information on the asset as a whole and a thorough explanation of the impact.

Where the fabric of a heritage asset is physically affected by a proposed development, the identification of the asset is straight forward.

Harmful development may sometimes be justified in the interests of realising the optimum viable use of an asset, notwithstanding the loss of significance caused, provided that the harm is minimised. Where substantial harm to, or total loss of, the asset's significance is proposed a case can be made on the grounds that it is necessary to allow a proposal that offers substantial public benefits. For the loss to be necessary there will be no other reasonable means of delivering similar public benefits, for example through different design or development of an appropriate alternative site. Alternatively a case can be made for such serious harm or loss on the grounds that the designated heritage asset is genuinely redundant itself and it is preventing all reasonable uses of the site in which it sits. Where development will lead to loss of a material part of the significance of a heritage asset, policy HE12.3 requires local planning authorities to ensure that developers take advantage of the opportunity to advance our understanding of the past before the asset or the relevant part is irretrievably lost. As this is the only opportunity to do this it is important that: Any investigation, including recording and sampling, is carried out to professional standards and to an appropriate level of detail proportionate to the asset's likely significance, by an organisation or individual with appropriate expertise. The resultant records, artefacts and samples are analysed and where necessary conserved. The understanding gained is made publicly available. An archive is created, and deposited for future research.

9.3.10 The steps to be taken by the Developer to achieve these aims can be controlled through a Written Scheme of Investigation (WSI), usually drafted by the applicant. The local planning authority can advise as

to what the Scheme should cover. Conditions can then be applied to the consent or a Section 106 Agreement entered into to secure the implementation of the written scheme of investigation.

Regional Planning Policy

9.3.11 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

National Planning Policy Framework (the NPPF)

9.3.12 As noted above the heritage section of the NPPF incorporates – and streamlines - the previous policies contained in PPS5. It does not alter those policies or create new ones. The PPS5 policies have been condensed and are included within the heritage section or incorporated elsewhere within the NPPF

9.3.13 While the NPPF is to be read as a whole in the context of archaeology the NPPF states at paragraph 126 that “Local planning authorities should set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. In doing so, they should recognise that heritage assets are an irreplaceable resource and conserve them in a manner appropriate to their significance. In developing this strategy, local planning authorities should take into account:

- the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
- the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
- the desirability of new development making a positive contribution to local character and distinctiveness; and
- opportunities to draw on the contribution made by the historic environment to the character of a place.

9.3.14 Paragraph 128 states that in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

9.3.15 In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the presumption in favour of sustainable development, the scale of any harm or loss and the significance of the heritage asset.

9.3.16 Paragraph 141 notes states that Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible¹⁷. However, the

ability to record, evidence of our past should not be a factor in deciding whether such loss should be permitted”.

Local Policy Framework

9.3.17 In the City and County of Cambridge the relevant policy documents are the Cambridgeshire and Peterborough Structure Plan (October 2003), the Cambridge Local Plan (Core Strategy; 2006), the Northwest Cambridge Area Action Plan (October 2009) and the East of England Plan (2008).

9.3.18 In the Cambridge Local Plan the relevant sections are 4/9 Scheduled Ancient Monuments/Archaeological Areas and 4/10 Listed Buildings. These state:

4/9 Scheduled Ancient Monuments/Archaeological Areas

Proposals affecting Scheduled Ancient Monuments or other important archaeological remains and their settings must be accompanied by a full assessment of the nature and importance of the remains and the impact of the proposals on them as part of the application. When the remains or their settings are deemed to be of national importance, they should be preserved in situ and development damaging them will not be permitted.

In other cases, development will be permitted where deposits are being left undisturbed or impacts mitigated to an acceptable level and detailed arrangements for the recording, publication and archiving and/or display of and access to any artefacts are secured.

The desirability of preserving ancient monuments and their settings is a material planning consideration. Information on the archaeology of much of the historic core of Cambridge is available in an Urban Archaeological Database (UAD). The Historic Core Conservation Area Appraisal will contain specific archaeological guidance. Those involved in the development of sites need to have an early understanding of the potential for archaeological remains to be found on site.

Where the likelihood of archaeological remains exists, a project brief will normally be prepared by the County Council and endorsed by the City Council. The developer will then employ an archaeological consultant to carry out a thorough investigation based on this brief prior to the start of the development.

It is important that any findings are properly recorded and the information disseminated. This would include ensuring that the information is added to the UAD and copies of any reports lodged with the County Records Office, Cambridgeshire Collection and the City Council.

9.3.19 The relevant section from the Northwest Cambridge Area Action Plan, Policy NW2 states:

3. Planning permission will not be granted where the proposed development or associated mitigation measures would have an unacceptable adverse impact:

n) On biodiversity, archaeological, historic landscape and geological interests;

Scoping Criteria

9.3.20 It was agreed with the local archaeological planning authorities that, following a desktop appraisal of the Application Site's archaeological resources, the Application Site would be subject to evaluation fieldwork. As detailed in **Appendix 9.3**, this was undertaken to a specification agreed by the County Council Archaeological Development Control Office (then CAPCA, now the Historic Environment Team - HET; Mr Andrew Thomas) and fully monitored throughout in the field by them. The fieldwork was undertaken in full accordance with:

- PPG 16 *Archaeology and Planning* (replaced March 2010 by PPS5)

- *Management of Archaeological Projects*, English Heritage, 1991
- *Code of Conduct*, Institute for Field Archaeologists, 2000.

Limitations to Assessment

9.3.21 Trial trenching has not been undertaken within the fields in the south-eastern corner of the Application Site (**Figures 9.1 & 9.3**); this being due to standing farm building-cover, and also that the marked ground slope-contours there indicated that it had extensively quarried. Similarly, due to standing buildings and hardstanding-cover, trenching did not occur within the area of University Farm buildings on Huntingdon Road (opposite Girton College). Equally, due to what was understood to be Home Office Licence conditions, trial trenching could not be conducted within the Dept. of Physiology plots at the north-western apex of the Application Site (as identified on **Figures 9.1 & 9.3**). These omissions from the evaluation programme were agreed by CAPCA on the grounds that it is fully understood and accepted by the Applicant that evaluation and any necessary mitigation fieldwork will occur in those areas prior to development. The ridge and furrow fields beside the Park-and-Ride (**Figure 9.2**) was also not investigated (apart from contour surveying), as it was decided from the outset to preserve the earthworks in situ.

9.4 Baseline Conditions

9.4.1 The following section sets out a summary of the archaeological and historical development of the Application Site. Numbers referred to in brackets the text e.g. (60) relate to more detailed descriptions which can be found in **Appendix 9.1**, these sites are depicted on **Figure 9.3**. Archaeological sites or heritage assets referred to in the text outside the application area and as Site III are described in further detail in **Appendices 9.2 and 9.3** and are depicted on **Figures 9.4 & 9.5**. The wider context of the archaeological remains within the Application Site is discussed further in **Appendix 9.5**.

Landscape and Geology

9.4.2 The landscape of the Application Site can be divided into two distinct portions. The eastern half is dominated by a ridge of high ground, which extends beyond the limits of the project-area in a north-easterly to south-westerly direction, whilst the western half comprises a lower, relatively even plain. Geologically, the ridge consists of a head or drift deposit known as the Observatory Gravels (British Geological Survey, Sheet 188). Some 300-700m wide, the ridge gravels overlies solid chalk to the east, whereas the plain to the west is comprised of Gault clay and such deposits also flank its northern side (only being exposed along the northern side of the Gravel Hill fields; Mackay et al. 2002). Within the area of evaluation, the present surface height ranges between 24.5m OD (towards the crest of the ridge) and 12.50-15.00m OD (on the clay plain below). It includes a distinct small valley within its north-western quarter, where – following the course of Washpit Brook – the levels drop to c. 12.00m OD and rises up again along the area's western margin to c. 15.00m OD. At present the area comprises agricultural land, a mixture of arable fields and permanent pasture.

Prehistoric

9.4.3 Within the and immediately adjacent to the Application Site evidence for early prehistoric activity is limited to the gravel region between the area of the University Observatory (60) and Howe House (65). All find spots are related to mineral extraction (1, 2, 3, 5-8). Work by Marr and Burkitt in the area behind the former Traveller's Rest public house, on the southern side of Huntingdon Road, is of particular note for the Palaeolithic (Marr & Burkitt 1924). These important finds have revealed the nature of past animal communities and have provided a chronology for the area (Reynolds 2000). No Mesolithic find spots were recorded within the assessment area, but a scatter of Mesolithic material was recovered during the Vicar's Farm excavations south of Madingley Road. For the Neolithic within the Application Site, finds are limited to a number of stone tools again found as part of the gravel extraction (5, 7 and possibly 8). Consequently, and depending upon the depth of excavation, further individual flint tools dating from the Palaeolithic and flint scatters and objects dating from the Mesolithic to Bronze Age may be encountered within the Application Site.

9.4.4 Although a single Late Neolithic – and a small number of Late Bronze Age – features were identified during the trial trenching on Site II within the Application Site (**Figure 9.4**), occupation only appears to have

begun in earnest during the Middle Iron Age. No Bronze Age material has been found within the Application Site; only two sites (9, 10) are recorded in the vicinity of the study area, but are located more than 200m beyond the Application Site's boundary. An excavation in 1975, on the line of the current A14 and 700m 500m to the north of Howe's Farm, revealed Bronze Age material (F.A.R.G. & Croft 1977; 81) and a Bronze Age ring ditch is recorded 800m to the west of the Application Site. A small amount of residual Late Bronze Age pottery and flint work was discovered c. 680m south of the Madingley Park and Ride site during the High Cross evaluation (Whittaker 2001; 36, 149).

9.4.5 By the later/Late Iron Age, occupation was well established in both geological areas across the Application Site, with a minimum of five settlements being present (Sites II, IV-VI & XII) (see Appendix 9.3 for further details).

9.4.6 Less than 250m northeast of the Application Site at Marion Close (11), two large ditches were recorded and probably represent a discrete settlement comparable to the New Addenbrooke's site (Mortimer & Evans 1997). Further Iron Age material was recovered as part of the New Hall College excavations (Evans 1996; 125). The High Cross evaluation, 700m to the south of the Application Site (36), provides evidence for settlement through the Middle and later Iron Age. The scale of this site, and the distribution of features, seems to suggest this was a small rural community. Adjacent to High Cross and immediately south of Madingley Road, the Vicar's Farm excavation (37) revealed two concentrations of Iron Age pits. The cluster to the north of the site suggested a very Late Iron Age date (1st century AD) and the cluster to the south suggested a Late Bronze Age/Early Iron Age date. The presence of these features relatively close to the Application Site would indicate similar archaeological remains may be encountered within areas designated for archaeological assessment.

Roman

9.4.7 Evidence for at least five Romano-British settlements were identified during the trial trenching, of which two lay on the clays: an Early Roman period farmstead on the south side of Washpit Brook (Site VI) and, down by Madingley Road, what is possibly a Late Roman period villa (Site VII). Settlements of this period extended almost continuously along the southern side of the ridge's gravels (Sites II, IV & V). Of these, Site IV covers more than 9ha and exhibits both 'Early' and Late Roman period components (and with an Iron Age precursor).

9.4.8 This evidence is supported by existing records of Roman period archaeology within the Application Site (13-16, 19, 21, 23, 25, 26, 31, 33). As with the prehistoric remains, most represent spot finds associated with the coprolite and gravel extraction of the 19th and 20th centuries. Significant amongst these finds were the two covered stone coffins (19) found close together at Gravel Hill Farm in 1863. One was a male, and the other female. No grave goods were recovered in the coffins, but near the female burial was a cache with four glass bottles, a colour-coated beaker, jet jewellery and other artefacts. Cremation burials were discovered in 1861 (21) and a number of pottery, Samian, coins and bronze objects have been found near the University Observatory and Storeys Way (14, 15, 16) and within the Application Site on University Farm (31, 33). Clustering towards the eastern boundary of the Application Site, these finds locations and the type of objects found highlight the possibility of further human remains and artefacts being recovered from this area between Madingley and Huntingdon Roads.

9.4.9 A known Roman road runs along the northern edge of the Application Site, from the Roman settlement at Castle Hill, west towards Girton and Godmanchester. This is a section of the Via Devana, whose path Babington originally traced in the late 19th century (Babington 1883). The exact location of this road is uncertain; Babington states that it runs to the left of Huntingdon Road. It is worth noting at this point that Huntingdon Road has in the past been considered to run on or very close to the Via Devana. Recent work, however, has suggested that acceptance of this route may not be so straightforward. Excavations at New Hall, c. 600m east of the Application Site (125) indicated a section of parallel ditches that may be the line of the road. If this interpretation is correct, it would indicate a route further to the south, possibly cutting through the Application Site.

9.4.10 Other Roman finds include a barrow adjacent to the southern boundary of the Roman Road at Howe House (25) destroyed during construction of Huntingdon Road. There were several Roman coins within the barrow, although this does not conclusively date the feature itself. A discrete, small round rise in ground level was observed during a site visit in 2001, in the vicinity of Bunker Hill that may represent a surviving

barrow; however, the aerial photographic assessment revealed a longer headland feature of probable medieval or post-medieval date and which may be a part (89). At Girton College, in 1881, an extensive Roman and Anglo-Saxon cemetery was discovered (24, 44). The Roman remains consisted principally of the contents of two square wooden boxes, the form of which was clearly traced by the nails (Babington 1883). Included in these 'boxes' were glass cinerary vessels, various metal objects, other glass objects and Samian ware and other pottery. This cemetery may extend south beyond Huntingdon Road and into the Application Area and the human remains found during the evaluation phase may denote the southern extent of interred human remains. Other spot finds within the assessment area include a bronze ring found in 1904 on Huntingdon Road (17), pottery found in service trenches dug in 1938 on the north side of Windsor Road (22) and on the bank of the M11 Motorway. Located more than 300m from the Application Area, a Roman Sestertius (27) of Marcus Aurelius was found in 1888. In addition, a number of Roman inhumations were discovered during building work along Grange Road (12, 18) and coins and pottery have been recovered along Madingley Road (33, 34, and 35). Fieldwalking prior to the constructions of the A14 (formerly A45) road resulted in the collection of several stray Roman pottery finds (29 & 30) from fields immediately south of the dual carriageway. Excavations 1.2km north-east of the Application Site in 1991 (28) revealed a Roman ditch and other smaller features. The nature and distribution of these numerous small finds most likely relate to domestic household rubbish that has been incorporated into midden material and subsequently removed from settlement foci and distributed during manuring of outfields.

9.4.11 The High Cross evaluation (36) revealed Roman occupation evidence, probably related to small-scale settlement of the later 1st and 2nd centuries (Whittaker 2001). The much larger Vicar's Farm site (37), revealed an important settlement site spanning the 1st to the early 5th centuries, with associated cremation and inhumation cemeteries (Lucas & Whittaker 2001). Other sites are also recorded more than a kilometre south of the Application Site on Grange Road at Burrells Field, opposite Robinson College, and at Newnham College (Hall 2001, Whittaker 2000b, Gdaniec 1992). These 'southern' sites lie some distance away from the evaluation area imply a landscape of small-scale settlements, probably farmsteads, relatively evenly distributed within the western hinterland of the Roman town, a dispersal pattern that should be repeated within the Application Site. Furthermore, recent fieldwalking in the Trinity Conduit Head area has resulted in the collection of Roman pottery (Lucas & Whittaker 2001).

Anglo-Saxon

9.4.12 Prior to the evaluation assessment only one find spot (40), an Anglo-Saxon inhumation burial and objects, found during gravel extraction in 1903 (Fox 1923; 40), is recorded within the Application Site. However, an important cemetery site lies immediately to the north at Girton College (see above; 44). Other cemeteries of the period are found at St John's playing field (Fox 1923) and the recently excavated inhumation cemetery at King's Garden Hostel (Dodwell et al. 2004), respectively 750m and 500m to the southeast of the Application Site. A third significant cemetery of this period was also found c. 2km south of the site at Newnham Croft (Fox 1923). The presence of this population implies a settlement focus west of the River Cam. This focus remains undiscovered, although it may lie within the area of the mill at Newnham (Whittaker 2000b), within the area of the later medieval town of Cambridge or associated with the cemetery site at Girton College. A number of Anglo-Saxon stray finds, including pottery, human bone, beads and possible tweezers that were part of three cremations from Girton College (53) donated to Powysland Museum, Welshpool, by T. Simpson Jones in 1874. The recent trial trenching within the evaluation area recovered only one feature of Anglo-Saxon origin, a pit at Site V on the ridge gravels opposite the cemetery site excavated within the grounds of Girton College.

Medieval

9.4.13 The core of the medieval town of Cambridge was situated to the east of the River Cam, with a smaller settlement recorded in the Domesday book around the mill area at Newnham. At this time, the development area was agricultural land with a small settlement probably in the area of Howes Close. This may be represented by the deserted medieval village (38) that stood in a corner of the northwest end of Grithow Field. The best source of information for this medieval rural landscape is Hall and Ravensdale's study of the West Fields of Cambridge based on the 'Corpus Terrier', which listed all the tithable lands in the mid 14th century (Hall and Ravensdale 1976) owned by Corpus Christi College. In this document the Application Site falls within the West Field called Grit How field and the map includes all land between Huntingdon Road, Madingley Road and the current City boundary. The remaining development area from the City boundary to the M11 is positioned just off the edge of the map to the west. Of most interest on this map is the location of Howes Close on the southern side of the Huntingdon Road (today it is situated to the north), the evidence of

gravel extraction in the vicinity of Grithow (University Farm) and the alignment of 'Grithow Weye', running west from Castle Hill (an alignment similar to the new Hall Roman Road).

9.4.14 Evidence of the Howes Close medieval settlement (known from documentary records; Site IX) was found during trial trenching beside the former University Department of Applied Biology field station buildings on Huntingdon Road. Directly related to Cambridge's medieval West Fields (as outlined in Hall & Ravensdale's 1976 volume), traces of ridge-and-furrow agriculture and a trackway; (Site VIII) were recovered across the lower clayland areas; whereas, upon the ridge, features relating to a similar routeway and a hedged paddock were also found (Sites II & III); two other named tracks (Milnweye and Braderusshe) are recorded by Hall and Ravensdale that bisect the central and western part of the Application Site, in addition to the possible presence of a pond (Dukmere) located in the central area of the site towards Huntingdon Road and evidence of gravel pits.

9.4.15 The exact nature of the pre-19th century quarrying of gravel varies from site to site, including those found within the evaluation area; however, in general they were worked by hand and take the form of overlapping quarry pits as at New Hall (Evans 1996) or the 'chain' quarries at Jesus College (Evans et al. 1997). These tend to result in the near total destruction of the earlier archaeological record, whereas later post-medieval strip quarries at Haddenham have illustrated a significant survival of archaeology in the strips between the quarrying (Evans & Hodder 2006).

9.4.16 An interesting feature that lies on the south-eastern edge and just outside the Application Site is Trinity Conduit Head (55; **Figure 9.4**). It forms the origin for the water supply for the fountain at Trinity Hall. Water was first obtained from this point by an aqueduct laid in 1372 to supply the Franciscan friary formerly on the site of Sidney Sussex College. It is probable that a spring head of greater antiquity existed here prior to 1372 and may have been a focus of earlier settlement.

9.4.17 The mainly rural landscape of the Application Site is evidenced by the presence of large amounts of ridge and furrow identified from aerial photography and the HER (39, 41, 45, 46, 47, 49, 50, 51, 52, 54 & 59). Large areas of ridge and furrow survive as visible soil marks in the areas of permanent pasture within the and extending beyond the boundary of the Application Site (**Figure 9.2**). This indication of agricultural usage is also discussed within the aerial photographic study within the desk based study.

9.4.18 The only area of intricate linear ditches within the Application Site are those at TL 428/599 (48), which have been mapped as part of the aerial assessment (Palmer, in Redfern 2001). Further linear features within the Application Site have been mapped at TL 4254/6011 (87) and TL 4215/6054 (88), although no date can be attributed to them. Stray finds of a medieval date have been recovered within the Application Site and the wider area, including pottery (43 & 56), and a bronze coin at No. 71 Grange Road (42). Such material may represent casual losses or may have originated from manuring. However, a possible medieval structure was recorded c. 1km to the east of the evaluation area during building work on Madingley Road in 1893 (57) and there is a recorded moated site (58) adjacent to Moor Barns Farm, 850m west of the Application Site and M11 (RCHME 1968).

Post-medieval and recent land use

9.4.19 Extensive areas of the gravel ridge within the Application Site were found to have suffered through earlier quarrying and two principal quarry-types have been identified. The first, and most destructive form of quarrying, represents mid to late 19th century coprolite extraction. This practice was undertaken on an industrial scale in the northeast corner of the Application Site and involved the bulk extraction of overlying gravels to expose their interface with Upper Greensand and Lower Gault, where a layer of rich phosphatic material is situated (used as an artificial fertiliser). The trial trenching conducted within the evaluation area on the area surrounding Gravel Hill Farm in 2002 (**Figure 9.2**) identified extensive evidence of coprolite extraction, with only very limited survival of the gravel in the form of widely dispersed 'islands'. Of a non-archaeological nature, these quarries were not excavated; however, it is likely that they varied in depth relative to fluctuations in the topography of the underlying strata, and are likely to be several metres deep (perhaps up to 6m+ in places). The majority were backfilled with loosely compacted upcast material along with deposits of refuse material (although the extent of such inclusions remains unclear). The extant Traveller's Rest Pit (7), which was only partially backfilled, gives a clear indication of the original scale of extraction. Coprolite extraction comprises one of the earliest forms of industrialised open-cast mining, and the affected portion of the site can, therefore, effectively be regarded as an abandoned mine working.

9.4.20 The second type of quarrying activity to be identified at the Application Site is more extensive, but less destructive in nature. A very limited number of these features were investigated during the archaeological evaluation. Basic gravel extraction appears to have been undertaken across much of the gravel ridge, principally in the form of hand-dug pits of limited size, during the medieval and post-medieval periods (c. 1000 to 1700 AD). These were generally less than 5m in diameter, varied between c. 0.5m and 1m in depth, and were backfilled with upcast quarry material. From around the 18th century onwards the degree of extraction activity intensified. Areas of 'strip-quarrying' were created, principally in the northern part of Fields 112 and 114, but also to a much lesser degree in Field 113 and the southeastern portion of Field 114 (**Figure 9.1**). These features were also hand-dug, being on average around 1m wide and less than 1m deep, but were linear in form and situated in very close proximity to each other (often with less than 0.2m of gravel surviving between them); large quantities of material could be extracted in this way, with the upcast being discarded behind the working face. Despite their extent, however, these features were relatively shallow (often being only c. 0.5m deep). During the later 19th and possibly early 20th centuries, a series of much larger quarries were created in Field 132. Although consisting of strip-quarries, these were located within large – potentially machine-dug – pits that were in excess of 50m across. A sondage excavated across one of these pits demonstrated that it was at least 1.6m deep, and had been backfilled with very loosely compacted upcast material.

9.4.21 The Traveller's Rest Pit is of both regional and national significance. Quarrying activity across the landscape can thus be considered part of the industrial archaeological heritage of the Cambridge region.

9.4.22 Other post-medieval features are several buildings. The most prominent are the University Observatory (60) located north of Madingley Road and built in 1822-23 in the Doric style by John Clement Mead, and an adjacent telescope platform for the Northumberland Dome, built in 1838 (73). In the gardens of the Observatory a number of worked stone fragments have been recorded, including figurative friezes and a double-headed eagle motif (A. Dickens pers. comm.). No origin or date for these fragments has been suggested to date. Howe House on the site of How House (65) lies to the north of Huntingdon Road and Mulberry House (63), centrally located within the Application Site itself, is said to have 17th century origins. Several gardens are listed on the Cambridge Parks and Gardens register, including St Giles and St. Peter's cemetery (71), on the eastern boundary of the evaluation area and Girton College (72). Fragments of masonry were observed next to the farm trackway leading to University Farm (Gravel Hill Farm) in 1984 and probably form part of the former Methodist's chapel at St. Peter's Street in Cambridge, destroyed in 1964 (61). As late as the late 16th century, a further chapel was said to have adjoined the cemetery at Girton College (64) and a milestone is marked on enclosure maps located within the extreme northwest corner of the evaluation area (62). Rectory Farm, c. 350m to the southwest of the Application Site, has a 17th-century farm house (68), a 17th/18th-century dovecote (67) and an 18th-century barn (66). Two WWII pillboxes are located within the evaluation area, both of wood-shuttered concrete construction and conforming to War Office FW3/Type 22 design. The gazetteer sites 75, 76 & 77 (east of the assessment area between New Hall and the Observatory) refer to CAU evaluation trenches that produced only post-medieval material.

9.4.23 Late 19th century and 20th century westwards expansion of Cambridge has had a great effect on the area. Ribbon development along Huntingdon road has effectively joined the City with the village of Girton and surrounded the Howes Close area. Housing and University Colleges have pushed along the Madingley Road as far as Landsdown Road and north along the stepped Storey's Way, linking with Huntingdon Road. To the south of Madingley Road, the University has recently developed the West Cambridge Site and the Madingley Road Park and Ride is between Landsdown Road and the M11 and bordered on three sides by the Application Site. On the former Gravel extraction areas there has been considerable redevelopment of University Farm, the Observatory site, the World Conservation Centre and the Meteorological Research station. The M11 Motorway and the A14 (formerly A45) effectively cut off the Application Site from its surrounding countryside following their construction in the 1980s. This westwards expansion is illustrated by Baker's map of 1830 and the Ordnance Survey six inch maps for 1888 and 1950.

Undated

9.4.24 A number of undated earthworks and linear features within and adjacent to the Application Site (78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89 & 90) recorded as part of the aerial survey assessment and from the Cambridge HER have been included in the gazetteer. The large curvilinear features at Bunkers Hill (84) on the southern side of Huntingdon Road are confused by subsequent field boundaries, but may have some relationship with the nearby headlands or Roman Road that are found within the Application Site. A possible large enclosure with small paddocks and a possible double row of pits is located behind the former

Traveller's Rest public house (82); however, it has not been clearly mapped by the aerial survey assessment and the relationship to other features in adjacent fields within the evaluation area is unclear. Finally, observations in service trenches near the Observatory (86) produced no information other than that no Roman features or finds were recorded (Liller 1966).

Statutory or Non-Statutory Designations

9.4.25 No statutory or locally designated (archaeological) heritage assets lie within the Application Site.

Summary of baseline

9.4.26 Twelve distinct archaeological areas (Sites I – XII), were identified during this assessment, principally sites identified during the fieldwork programme (**Figure 9.4 and Appendix 9.3**); the archaeological and historical context of the wider environs are provided in Appendix 9.2 and 9.5.

9.4.27 The earliest activity to be identified is Palaeolithic in date, and consisted of stone artefacts recovered from post-medieval gravel quarries situated at the eastern end of the Application Site. Similarly, a number of Mesolithic and Early Neolithic artefacts were also recovered from similar contexts. A single Late Neolithic and a small number of Late Bronze Age features were identified during the trial trenching (Site II).

9.4.28 By the later/Late Iron Age, occupation was well established within the Application Site, with a minimum of five distinct settlements being present (Sites II, IV-VI & XII). Five Romano-British settlements were also identified during the trial trenching; an Early Roman period farmstead on the south side of Washpit Brook (Site VI); possibly a Late Roman period villa (Site VII), near Madingley Road; and other settlements along the southern side of the ridge's gravels (Sites II, IV & V). Of these, Site IV covers more than 9ha and exhibits both 'Early' and Late Roman period components (and with an Iron Age precursor). Only one archaeological feature yielded Anglo-Saxon material, a pit at Site V on the ridge gravels opposite the cemetery site of that date excavated within the grounds of Girton College. Evidence of the Howes Close medieval settlement (known from documentary records; Site IX) was found, as was evidence related to Cambridge's Medieval West Fields in the form of traces of ridge-and-furrow agriculture and a trackway (Site VIII); Upon the gravel ridge, features relating to a similar medieval routeway and a hedged paddock were found (Sites II & III).

9.4.29 No statutory or locally designated (archaeological) heritage assets lie within the Application Site. Based on current evidence it is unlikely that surviving buried archaeological remains (or associated artefacts) would be of such importance to warrant statutory designation (i.e. of schedulable quality due to their archaeological or historic interest) and as a result be worthy of preservation in situ.

9.5 Likely Significant Effects

Effects during Construction

9.5.1 Groundworks, including earthmoving, levelling, road construction, foundation excavations, heavy vehicular movements, landscaping works and the installation of services all have the potential to disturb or damage buried archaeological remains.

9.5.2 However, not all of Application Site will be subjected to ground disturbing works that could adversely affect buried archaeological remains; large areas will be set aside as open land (**Figure 2.3**). As outlined in **Appendix 9.6** (9.1.1), Written Schemes of Investigations will be prepared for areas to be subject to building works or substantial earth moving, and will include agreement concerning the actual footprint-areas of archaeological excavation and whether further investigations are necessary. The consultation process with the County Council's Historic Environment Team will also fully consider the phasing of archaeological works to ensure that sensitive deposits (e.g. waterlogged) are not damaged by on-going construction works prior to their excavation.

9.5.3 Approved by, and prepared in full consultation with, the County Council's Historic Environment Team, management plans will also be prepared for each of the preserved site-areas, ensuring that the proposed land-use is appropriate to the goals of their long-term preservation.

9.5.4 **Table 9.4** summarise the significant effects of the proposed development, employing the criteria for assessing the importance of the heritage asset and the magnitude of change that would brought about by development (as described in **Tables 9.1, 9.2 & 9.3**).

Table 9.4: Summary of the significant effects

Site	Sensitivity / Importance	Magnitude of change	Effect allowing for mitigation
I	Low	High	Moderate adverse
II	Medium	Medium	Moderate adverse
III	Low	Low	Minor
IV	Medium	High	Major adverse
V	Medium	High	Major adverse
VI	Medium	Negligible	Negligible
VII	Medium	Negligible	Negligible
VIII	Low	Negligible	Negligible
IX	Medium	Negligible	Negligible
X	Low	High	Moderate adverse
XI	Low	Medium	Minor
XII	Medium	High	Moderate adverse

9.5.5 Much of the proposed ground disturbing works will take place along the gravel ridge, and will effect Sites II (west half), IV, V and X (and Site XII on the northwestern clays). Within that area, Sites III and IX will be left as green space (as will also be the eastern portion of Site II).

9.5.6 The lower lying southern sites, VI-VIII and Site XI, will essentially be preserved in situ.

9.5.7 Furthermore, although not reflected in **Table 9.4** above, those sites which will not be disturbed by construction (Sites VI-VIII & XI and the western part of Site II), and through the development will be taken out from further arable usage, could well benefit from the cessation of ploughing.

Effects during operation

9.5.8 No additional effects are anticipated following the completion of site construction works.

9.6 Effects of Highway and Utility Works

9.6.1 The highway and utility works that are to be undertaken in the highway and road verges along Huntingdon Road and Madingley Road are within the corridors of existing routes and are, therefore, unlikely to give rise to significant adverse effects on archaeological features.

9.6.2 In relation to the Potable water main extension works, there are two possible route options for the off-site 450mm diameter water main extension. Option 1 would require installation across third party land; option 2 would install the extension along existing streets, thereby avoiding potential effects on archaeological remains.

9.6.3 To the north of the Application Site the possible route for option 1 would be along Whitehouse Lane and the line of a public footpath heading north-east to a connection with an existing 18 inch water main below Kings Hedges Road. The majority of the route follows an existing track, which is surfaced in places and which forms an edge to the NIAB proposals. To the south of the Application Site the possible route for option 1 would be through the West Cambridge development and then across farmland to the south to connect with an existing 18 inch water main located adjacent to A603 Barton Road.

9.6.4 The NIAB land-area has already been evaluated and, where the option 1 water main would run along its western side, no sites have been identified. Its proposed route across the Application Site would affect Sites II, III and VIII. In the case of Sites III and VIII this would require agreed WSIs detailing their excavation. In the case of where it would cross Site II, dependent upon its timetabling this will either have already been excavated or, if its construction proceeds the full area's excavation, then a c. 10m-wide corridor straddling its

length will need to be fully excavated beforehand; a separate WSI would be prepared for this. Of the route's length south of Madingley Road in the West Cambridge lands and the field immediately to the south, as the southern field within the West Cambridge area has already been evaluated watching brief monitoring will be sufficient across this area generally, with a separate WSI prepared.

9.6.5 The option 2 route would only pass through farmland within the Application Site area (otherwise its route follows road lines). For the length that crosses the Application Site the same condition would apply as outlined in the preceding section (9.6.4).

9.6.6 Generally, the installation of new service lines (and potential contractor haul roads) across undisturbed farmland could effect the archaeology, especially if crossing designated site-areas prior to their excavation; in which case, their corridors would have to be excavated beforehand. In areas otherwise deemed sensitive, their routes will either be trench evaluated or have watching brief monitoring undertaken during their construction (to be agreed by the County Council's Historic Environment Team). It is therefore considered unlikely that the highway and utility works would give rise to significant adverse effects.

9.7 Measures to Avoid, Reduce or Manage Effects

9.7.1 A scheme of archaeological works will be enacted in advance of and during construction operations. This will include further evaluations to investigate those areas where access restrictions prevent surveys that could have informed this assessment. These further evaluations will be followed by a programme of archaeological excavations.

9.7.2 The full programme of archaeological investigations will be devised in consultation with the Historic Environment Team at Cambridgeshire County Council; this is a requirement of national and local policy.

9.7.3 This Proposed Development will adhere to industry standards and guidance, further details are provided in **Appendix 9.6**.

9.8 Cumulative Effects

9.8.1 The proposed development of the Application Site, and both the NIAB and West Cambridge developments, will result in development above and around similar types of archaeological sites within the north western quadrant of Cambridge. Whilst some archaeological sites will be developed as part of this process, it is anticipated that schemes of archaeological works will be enacted in advance of and during construction operations for all of the strategic sites and the developments will adhere to industry standards and guidance so that the cumulative effect of the Proposed Development and the other strategic sites listed in Chapter 1 of this ES will be negligible. Indeed, in the light of the excavation of the High Cross and Vicar's Farm Iron Age/Roman settlements at West Cambridge, and anticipating the excavation of the two main NIAB sites of the same date, the excavation of North West Cambridge's main site complexes (Sites II, IV & V) will greatly increase understanding of the periods' settlement systems within this area of Cambridge's hinterland. Providing an unprecedented scale of understanding of late prehistoric/Roman land-use, this will result in a deeper public appreciation of the local historic landscape sequence and must therefore count as a positive heritage benefit.

9.9 Summary

Introduction

9.9.1 This chapter assesses the likely significant effects of the Proposed Development upon one particular type of heritage asset, buried archaeological remains. Other heritage assets are described and assessed in Chapter 10 of the ES.

Baseline conditions

9.9.2 Twelve distinct archaeological areas (Sites I – XII), were identified during this assessment, principally sites identified during the fieldwork programme (**Figure 9.4**). The earliest activity to be identified is Palaeolithic in date, and consisted of stone artefacts recovered from post-medieval gravel quarries situated at the eastern end of the Application Site. Similarly, a number of Mesolithic and Early Neolithic artefacts

were also recovered from similar contexts within the assessment area. A single Late Neolithic and a small number of Late Bronze Age features were identified during the trial trenching (Site II). By the later/Late Iron Age, occupation was well established within the Application Site, with a minimum of five distinct settlements being present (Sites II, IV-VI & XII). Five Romano-British settlements were also identified during the trial trenching: an Early Roman period farmstead on the south side of Washpit Brook (Site VI); possibly a Late Roman period villa (Site VII), near Madingley Road; and other settlements along the southern side of the ridge's gravels (Sites II, IV & V). Of these, Site IV covers more than 9ha and exhibits both 'Early' and Late Roman period components (and with an Iron Age precursor) and is comparable in size, if not larger, to the walled settlement focus on Castle Hill. Only one archaeological feature yielded Anglo-Saxon material, a pit at Site V on the ridge gravels opposite the cemetery site of that date excavated within the grounds of Girton College. Evidence of the Howes Close medieval settlement (known from documentary records; Site IX) was found, as was evidence related to Cambridge's Medieval West Fields in the form of traces of ridge-and-furrow agriculture and a trackway (Site VIII). Upon the gravel ridge, features relating to a similar medieval routeway and a hedged paddock were found (Sites II & III).

9.9.3 No statutory or locally designated (archaeological) important heritage assets lie within the Application Site. Based on current evidence it is unlikely that surviving buried archaeological remains (or associated artefacts) would be of such importance to warrant statutory designation (i.e. of schedulable quality due to their archaeological or historic interest) and as a result thus be worthy of in situ preservation. The lack of statutory or local designation of these heritage assets does not remove consideration of the impact and any significant effects on the identified finite archaeological resource.

Likely significant effects

9.9.4 The significance of the effects of development varies dependent on the relative importance of the heritage asset and the magnitude of the change (see **Table 9.4**). Allowing for the implementation of industry standard mitigation measures the proposed development will have an adverse effect on buried archaeological remains within the Application Site. However, the Proposed Development would not conflict with national or local policy regarding the safeguarding of heritage assets. In conclusion, none of the identified effects are of such significance that they should preclude the proposed development. Furthermore the adverse effects will all be felt during construction, no additional effects will occur during operation and no reduction in effects will be felt at 2014. It is considered that the highway and utility works are unlikely to give rise to significant adverse effects on archaeological unless occurring on undisturbed land and, in which, separate WSIs will be required.

Mitigation

9.9.5 A scheme of archaeological works will be enacted in advance of and during construction operations. The full programme of archaeological investigations will be devised in consultation with the Historic Environment Team at Cambridgeshire County Council; a requirement of national and local policy. This scheme will adhere to industry standards and guidance, further details are provided in **Appendix 9.6**.

- 1 Introduction and Assessment Approach
- 2 Application Site Description and Proposed Development
- 3 Phasing and Implementation
- 4 Planning Policy Considerations
- 5 Socio-Economic Assessment
- 6 Landscape and Visual Issues
- 7 Ecology and Nature Conservation
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10 CULTURAL HERITAGE

10.1 Introduction

10.1.1 This chapter assesses the likely significant effects (direct and indirect) of the Proposed Development on cultural heritage assets and their settings (specifically in relation to the historic built environment), including the following:

- Listed buildings (Grade II* and II; there are no Grade I listed buildings in the study area);
- Conservation Areas and proposed conservation areas;
- Locally listed buildings; and
- Historic landscape.

10.1.2 There are a number of such heritage assets in proximity to the Application Site and the effect of the Proposed Development upon them and their settings has been assessed in line with Planning Policy Statement 5 Planning for the Historic Environment and the National Planning Policy Framework ("the NPPF").

10.1.3 The below-ground archaeology of the Application Site is addressed in Chapter 9 of the ES, but it is worth noting here also that there are no Scheduled Ancient Monuments in the study area.

10.1.4 The principles on which the assessment of effect on heritage assets is based are underpinned by the planning policy framework set out in Chapter 4: Planning Policy Context and used to form the methodology outlined in Chapter 1: Introduction and Assessment Approach.

10.2 Assessment Approach

Methodology

Introduction

10.2.1 The process of assessing the effects on a heritage asset has involved the following:

- (i) establishing the importance (or sensitivity) of the asset and its setting; and
- (ii) making an assessment of magnitude of change, based on the location of development in relation to the cultural heritage feature.

10.2.2 The assessment of effects includes consideration of two types of effect: direct and indirect. These are set out below.

- **Direct Effects:** A direct effect upon heritage assets would involve physical alteration or destruction as a result of the constructional and/or operational phases of the development.
- **Indirect Effects:** An indirect effect on a heritage asset involves an alteration to its setting, or an effect on a view that materially affects its significance.

Receptor Sensitivity Criteria

10.2.3 There is no formally adopted set of criteria which enables the attribution of a scale of sensitivity to a heritage asset (receptor).

10.2.4 Therefore the following criteria used in this assessment have been derived from DMRB1 (Design Manual for Roads and Bridges) guidance, adapted to be specifically relevant to assessing the effects of the Proposed Development considered in this ES. Using an adapted version of these criteria, the assessment of the sensitivity of cultural heritage assets can be classified into the following categories: High; Medium; Low; and Negligible in accordance with their significance (i.e. national significance; regional significance; local significance and no heritage significance).

10.2.5 The sensitivity of the heritage asset is defined by its importance in terms of national, regional or local statutory or non-statutory protection and grading of the asset. It will also depend on factors such as the condition of the site and the perceived heritage value/importance of the asset. **Table 10.1** sets out the criteria for assessing sensitivity.

Table 10.1: Criteria for Assessing Sensitivity of Receptors

Sensitivity	Criteria
High	Listed Buildings and their settings Conservation Areas and their settings ¹
Medium	Wider Historic Landscape (while the wider historic landscape affected by the development proposals is not designated, we have considered it as of regional significance for the purposes of this assessment) Locally Listed Buildings
Low	Non-designated historic buildings and structures Non-designated historic landscape features
Negligible	No heritage importance

Magnitude of Change Criteria

10.2.6 The significance of an effect is assessed by taking into account the sensitivity of the receptor and the potential magnitude of the change upon it. Magnitude of change is a function of the nature, scale and type of disturbance, or damage to the heritage asset. For example, a substantial magnitude of change may result in the loss of or major alteration to a feature of cultural heritage interest. Criteria for assessing the magnitude of predicted change are given in **Table 10.2**.

10.2.7 The English Heritage Planning Practice Guide accompanying PPS5 provides guidance on the assessment of effects on heritage assets, and the English Heritage Consultation Draft on The Setting of Heritage Assets (August 2010), sets out a process for making an assessment of the effects on the settings of heritage assets; the considerations in these documents have been taken into account.

Table 10.2: Criteria for Assessing Magnitude of Change on Receptors

Magnitude of Change	Definition
High (Adverse)	Total loss or major/substantial alteration to key elements/features/characteristics that make up the 'special interest' of the asset such that post-development the baseline character or composition or setting will be fundamentally changed.
Medium (Adverse)	Partial loss or alteration to one or more key elements/features or characteristics that make up the 'special interest' of the asset such that post-development the baseline character or composition or setting will be partially changed.
Low (Adverse)	Minor shift away from the baseline conditions. Change arising from the loss/ alteration will be discernible/detectable but not material: the underlying character/composition/attributes/setting will be similar to the baseline.

¹ Although designated by Local Authorities these are statutory designations.

Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, or no change, i.e. no direct effect on heritage assets, no observable change in setting or ambience of heritage asset.
Low (Beneficial)	Land use change resulting in slightly improved conditions for the protection of archaeological remains or understanding/appreciation of a historic building or place; Minor decrease in visual or noise intrusion on the setting of a building, archaeological site or monument; Minor improvement of the wider landscape setting of a building, archaeological site or monument.
Medium (Beneficial)	Land use change resulting in moderately improved conditions for the protection of archaeological remains, or understanding/appreciation of a historic building or place, including through interpretation measures (heritage trails, etc). Removal of harmful alterations to better reveal the significance of a building or structure, with no loss of significant fabric. Moderate reduction or removal of visual or noise intrusion on the setting of a building, archaeological site or monument; Moderate improvement of the wider landscape setting of a building, archaeological site or monument; Moderate improvement of the cultural heritage amenity, access or use of a building, archaeological site or monument.
High (Beneficial)	Major enhancement of a building or archaeological site, its cultural heritage amenity and access or use; Arrest of physical damage or decay to a building or structure;

10.2.8 The sensitivity of the heritage asset (receptor), combined with the magnitude of change, defines the significance of the effect. The assessment matrix used is included as Table 1.3 in Chapter 1 and is included below for ease of reference. The assessment of the significance of effects uses a seven-point scale derived from **Table 1.3**: Major Beneficial - Moderate Beneficial - Minor Beneficial - Negligible - Minor Adverse - Moderate Adverse - Major Adverse.

Degrees of Significance and their criteria [Table 1.3 of Chapter 1]

Magnitude of Change	Sensitivity of Receptor				
		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Minor to Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Methodology Used to Obtain Baseline Data

10.2.9 The survey methodology used is set out in full at **Appendix 10.1** and is summarised in **Table 10.3**.

Table 10.3: Summary of Survey Methodology

Heritage Asset/Receptor Type	Methodology
Listed Buildings	<ul style="list-style-type: none"> • Site visits • List Descriptions • Published sources • Historic map regression
Conservation Areas	<ul style="list-style-type: none"> • Site visits • Published sources (character appraisals) • Historic map regression
Locally Listed Buildings	<ul style="list-style-type: none"> • Site visits • Published sources • Historic map regression
Wider Historic Landscape	<ul style="list-style-type: none"> • Historic map regression • Site visits • Published studies • 'Cambridge Suburbs and Approaches' Studies

10.2.10 Site visits were undertaken on 3rd and 4th August 2010 and on January 5th 2011. During the August site visits the weather was generally good, with some rain showers on one of the days; visibility was good to fair most of the time. Each asset visited was photographed and information regarding its location, outlook and general surroundings was noted. The assets were all viewed from public land and where assets could not be visually assessed from nearby, largely as a result of tree cover or because they were on private land, the assessment was made from the nearest available position. The January visit was undertaken to assess the situation in winter when the screening effect created by trees and other vegetation is reduced. The weather conditions during this visit were variable, with sunny spells intervening between longer periods of cloud cover and occasional light rain.

Policy FrameworkStatutory Designations

10.2.11 Designated heritage assets considered in this chapter include:

- Statutorily listed buildings
- Conservation areas

National

10.2.12 National policy guidance in relation to the historic built environment is now provided in the National Planning Policy Framework having been previously provided by Planning Policy Statement 5: Planning for the Historic Environment (March 2010) which has replaced PPG15 and PPG16. The heritage section of the NPPF incorporates – and streamlines - the previous policies contained in PPS5. It does not alter those policies or create new ones. The previous guidance as well as the relevant provisions of the NPPF.

10.2.13 PPS5 provided guidance for planning authorities, property owners, developers and others on the conservation of the historic environment, including the conservation, preservation and investigation of Heritage Assets.

10.2.14 Heritage Assets are defined in Annex 2 of PPS 5 and in the NPPF as 'A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions'. Heritage assets include designated assets and assets identified by the local authority during the process of decision-making or through the plan-making process, such as locally listed buildings.

10.2.15 Annex 2 of PPS5 and the NPPF also defines 'setting' as 'the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve...'.

10.2.16 Policy HE6 of PPS5 states that, 'Local planning authorities should require an applicant to provide a description of the significance of the heritage assets affected and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset'.

10.2.17 As Policy HE9.1 of PPS5 sets out, 'there should be a presumption in favour of the conservation of designated heritage assets' and explains that, 'significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting'.

10.2.18 Policy HE10 of PPS5 (Additional Policy Principles Guiding the Consideration of Applications for Development Affecting the Setting of a Designated Heritage Asset) provides that 'local planning authorities should treat favourably applications that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset...When considering applications that do not do this, local planning authorities should weigh any such harm against the wider benefits of the application'. This policy is relevant both to the settings of listed buildings and conservation areas.

10.2.19 The English Heritage Planning Practice Guide that accompanies PPS5 (paragraph 118) explains further that, 'For the purposes of spatial planning, any development or change capable of affecting the significance of a heritage asset or people's experience of it can be considered as falling within its setting'. Paragraph 119 goes on to say that, 'Understanding the significance of a heritage asset will enable the contribution made by its setting to be understood', while paragraph 122 states that the assessment of impact on setting should take into account, and be proportionate to, the significance of the heritage asset and the degree to which proposals enhance or detract from it and the ability to appreciate it.

10.2.20 The Planning Practice Guide also explains (at paragraph 114) that, 'the extent and importance of setting is often expressed by reference to visual considerations,' and can also be 'influenced by other environmental factors such as noise, dust and vibration; by spatial associations; and, by our understanding of the historic relationship between places'.

"The National Planning Policy Framework ("the NPPF")

10.2.21 As previously noted the heritage section of the NPPF incorporates – and streamlines - the previous policies contained in PPS5. It does not alter those policies or create new ones. All PPS5 policies have been condensed and are included within the heritage section or incorporated elsewhere within the NPPF.

10.2.22 The heritage section of the NPPF incorporates – and streamlines - the previous policies contained in PPS5. It does not alter those policies or create new ones. The PPS5 policies have been condensed and are included within the heritage section or incorporated elsewhere within the NPPF. While the NPPF is to be read as a whole in the context of cultural heritage the NPPF states at paragraph 126: "Local planning authorities should set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. In doing so, they should recognise that heritage assets are an irreplaceable resource and conserve them in a manner appropriate to their significance. In developing this strategy, local planning authorities should take into account:

- the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;

- the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
- the desirability of new development making a positive contribution to local character and distinctiveness; and
- opportunities to draw on the contribution made by the historic environment to the character of a place.”

10.2.23 Paragraph 128 states that in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

10.2.24 In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the presumption in favour of sustainable development, the scale of any harm or loss and the significance of the heritage asset.

10.2.25 Paragraph 141 notes states that Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible¹⁷. However, the ability to record, evidence of our past should not be a factor in deciding whether such loss should be permitted”.

Regional and Local

10.2.26 The Cambridgeshire and Peterborough Structure Plan (adopted on 22nd October 2003) provided the framework for the District Councils' preparation of detailed Local Development Frameworks or Local Plans up to 2016. Following approval of the East of England plan 2001-2021 (the Regional Spatial Strategy) in May 2008, only 13 of the Structure Plan policies have been 'saved', none of which relate to cultural heritage. Previous saved policies were incorporated in the East of England plan. The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

10.2.27 Policy CSR1 of the East of England Plan refers to the protection and enhancement of 'the historic character and setting of Cambridge'.

10.2.28 On abolition of the East of England Plan, Local Plans incorporating neighbourhood plans where relevant, will be the statutory Development Plan for the determination of any planning application. The presumption in favour of sustainable development within the NPPF will require that development proposals that accord with statutory plans should be granted planning consent without delay; and where the plan is absent, silent, indeterminate or where relevant policies are out of date planning permission should still be granted unless the adverse impacts of allowing development would significantly and demonstrably outweigh the benefits, when assessed against the policies in this NPPF taken as a whole. The local statutory development plan covering the area of the Application Site comprises the North West Cambridge Area Action Plan (AAP), South Cambridgeshire District Council Core Strategy and related local development documents and Cambridge City Local Plan. The Area Action Plan is up to date and is

the central policy document in relation to this Proposed Development forming part of the Councils' Local Development Framework.

10.2.29 Policy NW2: Development Principles is of particular relevance to this study; part 2(f) of the policy requires, inter alia, the incorporation of historic landscape features into development proposals, while part 3 states that 'Planning permission will not be granted where the Proposed Development or associated mitigation measures would have an unacceptable adverse impact: ... (n) on...archaeological...[and] historic landscape...(r) On adjacent Conservation Areas and Listed Buildings...'

English Heritage Guidance

'Conservation Principles: Policies and Guidance' (2008)

10.2.30 This document sets out the approach of English Heritage (EH) in making decisions and providing guidance on all aspects of England's historic environment. The document also contains EH's definition of the setting of an historic asset. This is EH's own guidance, which they use to assess the effects of change on the historic environment.

10.2.31 According to this document, it is vital to understand the significance of an asset in order to assess the effects of a change to it. The guidance describes a range of 'heritage values' arranged into four groups, according to which the significance of an asset can be established. These four groups of 'heritage values' are:

- a. **Evidential value** - the potential of an asset to yield evidence about past human activity.
- b. **Historical value** - the ways in which past people, events and aspects of life can be connected through an asset to the present. Historical value tends to be illustrative (i.e. the visual perception of an asset as a link between past and present) or associative (i.e. historic associations with significant persons or events).
- c. **Aesthetic value** - the ways in which people draw sensory and intellectual stimulation from a place. It can be the conscious design of an asset or fortuitous outcome of the way in which an asset has evolved and been used through time.
- d. **Communal value** - the meanings of an asset for the people who relate to it, or for whom it figures in their collective experience or memory. Examples include commemorative value, symbolic value, social value and spiritual value.

'The Setting of Heritage Assets ' (October 2012)

10.2.32 This document was published in October 2011. It sets out English Heritage guidance on managing change within the settings of heritage assets and provides detailed advice intended to assist in the implementation of PPS5 and its supporting Planning Practice Guide. The guidance provides the basis for EH advice on the setting of heritage assets when responding to consultations and when assessing the implications of development proposals on the historic estate the organisation manages. It is also intended to assist others involved with managing change that may affect the setting of heritage assets. The aim of the guidance is to assist effective and timely decision-making by ensuring it takes place within a clear framework and is as transparent and consistent as possible.

10.2.33 In relation to the definition of setting, the draft guidance reiterates the definition set out in PPS5 and sets out 'key principles' both for understanding setting and for assessing the implications of change affecting setting..

Scoping Criteria

10.2.34 A number of baseline archaeological studies and investigations have been carried out by the Applicant in order to inform the ES. However, the responses received from the local planning authorities in their Scoping Opinion (included at **Appendix 1.2**) advised that a number of additional considerations needed to be covered within the ES in relation to the historic built environment. These are as summarised below in **Table 10.4**.

Table 10.4: Consultee Responses to EIA Scoping Report

Consultee	Key Points of Response
EH	Letter of 23.11.09 requested the ES to assess: <ul style="list-style-type: none"> the issue of building height and the impact that buildings of various heights would have on open views from the M11; the impact on the Storey's Way and Conduit Head Road Conservation Areas; the impact on the proposed NIAB/Howes Place Conservation Area; the impact on listed buildings near the site, including the Grade II* listed Girton College.
CCC	The Historic Environment Manager John Preston (26.11.09) requested the ES to assess: <ul style="list-style-type: none"> the impact on the Storey's Way and Conduit Head Road Conservation Areas; the impact on the proposed NIAB/Howes Place Conservation Area.; the impact on listed buildings, including: the Observatory and the Northumberland Dome, Madingley Road; Shawms and Spring House on Conduit Head Road; the impact on locally listed buildings close to the Application Site.
SCDC	Response from David Bevan (November 2009) requested the ES to assess: <ul style="list-style-type: none"> the impact on heritage assets and their settings the assessment of historic development and historic environment/landscape character and patterns.

Further Consultation

10.2.35 In his response to the Scoping Report, CCC's Historic Environment Manager, John Preston, identified the requirement to assess the potential effects on the following locally listed buildings and their settings:

- Clements End, Conduit Head Road
- Conduit Rise, Conduit Head Road
- No.130 Huntingdon Road
- No.136 Huntingdon Road
- No.138 Huntingdon Road
- No.141 Huntingdon Road (aka 'Wayside', Storey's Way)
- Nos.143 Huntingdon Road
- No.145 Huntingdon Road
- No.162 Huntingdon Road
- No.171 Huntingdon Road
- No.173 Huntingdon Road
- No.183 Huntingdon Road
- NIAB
- Nos. 1-14 Howes Place
- Ascension Burial Ground Chapel
- No. 34 Storey's Way

10.2.36 During the baseline study, correspondence was exchanged with CCC's Conservation and Design Officer in order to request information on the boundary of the proposed NIAB/Howes Place Conservation Area, and to re-confirm which locally listed buildings the CC required to be included in the assessment. In

addition to those Locally Listed buildings identified in the Scoping Opinion the following additional buildings were identified:

- No.3 Huntingdon Road
- Blackfriars, Huntingdon Road (Buckingham Road)
- Wychfield, Huntingdon Road

10.2.37 CCC have extended the West Cambridge Conservation Area (on 15th March 2011 and 9th May 2011, the latter extension to include Wolfson College, Barton Close and adjacent properties in Barton Road). The additional area included in the conservation area extends to abut the south-eastern corner of the Application Site; the baseline study for this chapter (**Appendix 10.1**) includes an assessment of the conservation area as extended

10.2.38 It should be noted that heritage assets outside the Applicant's ownership (for instance, private dwellings) were inspected from the public realm only. However, the assessment was made in each such case from as close to the building as possible and was considered satisfactory for the purposes of this assessment.

10.3 Baseline Conditions

Application Site Description and Context

10.3.1 To the north the Application Site incorporates Huntingdon Road, beyond which lies residential development and agricultural fields. To the west the Application Site is bound by the M11 motorway, beyond which lies land in agricultural use, while to the south the Application Site incorporates the A1303 (Maddingley Road), and is bound by residential properties and the Park and Ride car park. Agricultural fields and residential properties bound the Application Site to the east. The majority of the Application Site comprises arable farmland divided into medium- and large-sized enclosures currently occupied by the University Farm. To the east of the Application Site lies the urban edge of the city of Cambridge.

10.3.2 The shallow ridge running across the Application Site means that the ground rises to the north-east. The Washpit Brook crosses the western part of the Application Site.

10.3.3 There are four groups of buildings within the Application Site; these comprise the former Animal Research Station buildings in the north-western part of the Application Site (dating from the 1930s onwards); the University Farm buildings on the Huntingdon Road frontage (including an altered Victorian house, several modern farm buildings and a late 20th-century accommodation block); former Gravel Hill Farm buildings (now University Farm and laboratories, including a late Victorian farmhouse) in the south-eastern part of the Application Site; and the Agronomy Centre (late 20th-/early 21st-century) in the eastern central part of the Application Site.

10.3.4 The World Conservation Monitoring Centre is also in this part of the Application Site (albeit it is outside the Application redline boundary); this modern building is highly visible in views across the Application Site and also in long-distance views from the west and south-west.

10.3.5 There are no significant long-distance views towards the City Centre from the Application Site.

10.3.6 The extent of the study area covered by the Cultural Heritage assessment is shown on Figure 10.1 and includes buildings and conservation areas (and proposed conservation areas) on the section of Huntingdon Road between the A14 at the north-western end of the Application Site and the junction with Histon Road and Victoria Road south-east of the Application Site; Storey's Way and Churchill Road south-east of the Application Site; Conduit Head Road south of the Application Site; and the northern side of Maddingley Road between the M11 and Storey's Way. In addition, the historic landscape within the Application Site and its surroundings was assessed, and longer-distance views looking towards the Application Site from the west and south-west. There are no designated heritage assets within the Application Site itself.

10.3.7 There are three Grade II* listed buildings, 22 Grade II listed buildings, three conservation areas, one proposed conservation area, and 33 locally listed buildings within this study area. The locations of all of these are shown on **Figure 10.1**.

10.3.8 We have included in the assessment all locally listed buildings identified above at paragraphs 10.2.29 and 10.2.30 by CCC for assessment. In addition we have included the locally listed buildings Nos. 25, 44 and 52 Storey's Way (within the Storey's Way Conservation Area).

Baseline Survey Information

Historic Landscape

10.3.9 The wider historic landscape and pattern of historic built development within the Application Site and the study area have been discussed in full in the baseline study at **Appendix 10.1**. A brief tabulated summary of the findings of that assessment is provided here.

Table 10.5: Summary of Historic Landscape Assessment

Landscape Type	Application Site and W and SW - Western Claylands. N and NW - Western Fen Edge. The most prominent natural landscape feature extending into the Application Site is the Girton ridge, visible as rising land on the approach into the city on the A14 and M11.
Elements of the Historic Landscape of the Application Site	<p>Historic landscape features:</p> <ul style="list-style-type: none"> • hedge-lined track in NW corner • access road lined with horse chestnuts running SW from Huntingdon Road • area of prominent ridge and furrow (part of Cambridge's medieval 'West Fields') E of the Conduit Head Road development (see Chapter 9). • site of a former early C20 gravel pit now protected as a SSSI (see Chapter 9). • Fragmentary survival of historic field boundaries. A veteran oak tree marks the boundary between the city and the parish of Girton
Key Elements of the Historic Landscape/Development Pattern of the Environs of the Application Site	<p>Huntingdon Road:</p> <ul style="list-style-type: none"> • Prevailing character early-mid C20 large detached suburban residential development in generous garden plots, forming a linear suburb on the approach into the city. • Transition in character from rural hinterland west of the A428/A14 to semi-rural and suburban. • Enhanced by abundant trees and hedges lining the road, which reinforce its linear nature. • Spacious, leafy approach, becoming more 'enclosed' as one draws closer to the city. • General pattern is punctuated by individual distinctive developments such as NIAB/Howes Place and the Storey's Way estate, both of unique character. These developments contribute significantly to the architectural and aesthetic character of the area. • Occasional views out across Application Site but views out limited by built development and screening by belts of trees and vegetation in gardens. <p>Madingley Road:</p> <ul style="list-style-type: none"> • More sinuous, green approach to city characterised by large-scale university developments. • Punctuated by high-quality C20 residential development, including distinctive Conduit Head Rd area.
Key Phases in Historical Development of Landscape/Built Development	<p>1888 - largely agricultural landscape up to the built-up edge of the city (at Oxford Rd). Early C19 enclosures had largely survived into the later C19. Regular rectangular enclosures extended S from Madingley Rd, narrowing in width towards the city. Girton College one of main developments and University Observatory.</p> <p>1904-1927 - suburban expansion of the city and university developments to NW. Discrete high-quality residential developments: Storey's Way developed 1912-24; Conduit Head Rd (begun 1925). NIAB/Howes Place developed 1921. New development broadly utilised the form of existing rectangular enclosures, leading to development on a regular pattern.</p> <p>1927-1938 - suburban ribbon development continued along Huntingdon Rd. Further residential expansion in Girton Rd area and off S side of Madingley Rd.</p> <p>1959-1973 - further residential expansion in Girton Rd area (again following historic land boundaries) - Thornton Rd development. NW urban edge of the city had consolidated further with housing development N of Windsor Rd. These developments decreased the gap between the city and Girton village. Large university developments on Madingley Rd: Churchill College, New Hall and around the Observatory, all within large landscaped campus grounds.</p> <p>Early C21 - further residential expansion in Girton Rd area (Wellbrook Way) and</p>

	large-scale university buildings within landscaped grounds on S side of Madingley Rd. A park and ride facility has been established on the N side.
Key Elements of the Relationship of the Current to the Historic Landscape	<ul style="list-style-type: none"> • The historic road pattern of radial routes provides strong definition and continuity of historic land form. • Huntingdon Rd's characteristic 'Roman' linear form. • Today's NW urban edge is a creation of the 1930s - the suburban ribbon development of this era now characterises much of Huntingdon Road. • In places, early-mid C20 development retains links to previous historic landscape form, where pre-existing field boundaries have dictated the form of development. • Development on S side of Huntingdon Rd is instead strongly linear, the nature of the enclosures within the Application Site being less regular and not lending themselves easily to the kind of regular planned development seen on the N side.
Key Elements of Significance of the Application Site and Environs to the Setting of Cambridge	<ul style="list-style-type: none"> • The Application Site forms part of a larger swathe of open agricultural land outside the NW edge of the city and helps to maintain a gap between the city and the village of Girton. Maintaining a gap contributes to Cambridge's wider historic setting as a city within a predominantly rural landscape. • However, this rural character is diluted by presence of existing developments and the M11. • The rising land within the Application Site is visible in long-distance views from the W/SW (albeit partially screened by trees and hedgerows) on the approach to the city including from Cambridge Road and the A1303, and also from the M11. • The land rises to a shallow ridge at Girton, enabling long-distance views towards the tip of Girton College Tower and parts of the college roofs and chimneys, a view which is slightly more apparent in the winter months. This view helps to define the relationship between the city and its hinterland and mark the approach into the city, although the buildings are less prominent than the ridge itself and the trees along Huntingdon Road. It should be noted too that this view is a transient one obtained from vehicles travelling along the M11 • Parts of the Application Site have value for their retention of historic features such as ridge and furrow, which contribute to an understanding of the earlier history of the city and its historic relationship with its hinterland. The immediate environs of the Application Site are significant as principal approaches to Cambridge, a strong characteristic of both routes being their enclosure with trees, in particular along Huntingdon Road, where the strong linear view is channelled along the route. • The pattern of development along these approaches is significant for its retention of historic plot divisions within later development. This characteristic combined with the linear nature of the two principal roads and their mature trees, are strong factors in giving the area a sense of place. • Girton College provides a historic 'anchor' as one of the first buildings encountered after crossing the A14, helping to announce the approach into the city. • Other distinctive discrete developments such as Storey's Way, Conduit Head Road and NIAB/Howes Place provide distinctive 'markers' of their periods, which provide strong definition to the high-quality suburban character of this area and contribute to the suburban setting of the city. • This part of NW Cambridge marks the transition between suburban and rural landscapes. The key radial routes that define the space are significant entry points into the city.

Historic Built Environment

10.3.10 **Table 10.6** includes brief descriptions of the listed buildings, including a summary of their special interest and an analysis of their setting and context. Where multiple listed buildings stand within close proximity, they have been assessed in groups in order to avoid repetition of assessment.

10.3.11 The summary descriptions of each listed building provided in **Table 10.6** comprise extracts from the EH listed building descriptions.

Table 10.6: Description and Analysis of Statutorily Listed Buildings Assessed

Name, Location and Grade	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
<p>Girton College, Huntingdon Road II*</p> <p>Girton Lodge, Huntingdon Road II</p>	<p>D. <i>'College by Alfred Waterhouse. 1873 with additions of 1876, 1883 and 1886. Red brick with black mortar courses and terracotta details, constructed in Neo-Tudor style. Complex includes five-stage gatehouse tower, Cloister Court, Woodlands Court and library.'</i></p> <p>D. <i>Lodge. c.1886, Red brick with steeply pitched tiled roof and ridge stack. One storey and attic.</i></p> <p>O. The college buildings stand on the NE side of Huntingdon Road opposite the University Farm and the Application Site. They stand well back from the Huntingdon Road frontage within landscaped grounds, with the lodge on the road frontage adjoining a tree-lined drive into the site. The trees in the landscaped grounds (many of which are evergreen) obscure views out of the site and the only views into the site and college buildings are from the two driveways off Huntingdon Road.</p> <p>Summary of Special Interest</p> <p>The buildings have evidential value as purpose-built college buildings set within their own grounds, and also have historical significance in connection with the beginnings of women's education at Cambridge. The college and its grounds have high aesthetic value and their architectural significance also relates to their being designed by three generations of the Waterhouse family</p> <p>Setting</p> <p>The essential setting of Girton College and Girton Lodge is defined by their landscaped grounds, purpose-designed for the college. The 'set-back' of the building and the mature trees on the periphery of the grounds were deliberately intended to part-conceal the college in views from the road. The framed view of the gatehouse tower along the main entrance drive is also important to the significance of the listed college building. The Application Site does not contribute to this aspect of its setting, but transient long-distance views across the Application Site from the M11 take in the top of the tower and the roofs and chimneys of some of the college buildings, seen over open agricultural land and beyond and above the modern farm buildings of the University Farm. In these views (more apparent in winter) the college contributes to a sense of place and marks the transition from rural hinterland to the semi-rural/suburban fringes on the approach to the city.</p>
<p>Nos.29, 30, 48, 54, 56, 63 and 76A, B & C , Storey's Way II</p>	<p>D. No.29 Storey's Way - 'c.1910 by M.H. Baillie Scott. Painted white bricks, mansard tiled roof with two hips and three dormer windows. Neo-Georgian doorway at side'.</p> <p>D. No.30 Storey's Way - 'c.1910 by M.H. Baillie Scott. Faced in stucco and hung tiles. Horizontal casement windows with lead lights. Hipped steep-pitched roofs continuing to ground floor level in places.'</p> <p>D. No.48 Storey's Way - 'c.1910 by M.H. Baillie Scott. Faced in grey stucco. Splendid steep-pitched tile roof coming to ground-floor level on left hand side with oak entrance door below'</p> <p>D. No.54 Storey's Way - 'c.1910 by M.H. Baillie Scott. Neo-Georgian style. Brick with hipped pantile roof and modillion eaves cornice. Brick chimneys. 2 storeys. Sash windows.'</p> <p>D. No.56 Storey's Way - 'c.1910. By M H Baillie Scott. Picturesque style. Tiled roof with hipped projecting wings and 2 storey porch. Porch has 4-centred arched head in brickwork with front door set back at angle. Tall staircase window and all windows have leaded lights.'</p> <p>D. No.63 Storey's Way - '1912 by T.D. Atkinson. Yellow brick with rendered brick dressings; pantiled roof. Neo-Georgian style. 2 storeys and dormer attic. Projecting rusticated and rendered centre bay containing doorway.'</p> <p>D. No.76A, B and C Storey's Way - '1913 by A.A. Moberley. Divided into 3 houses late C20. Yellow brick with gault brick dressings; plain tile roof. Neo-Georgian style. 2 storeys in 8 window range.'</p> <p>O. These houses are situated within generous garden plots containing numerous mature trees (including against the boundaries to the street frontages and along the rear boundaries). All except No.29 are visible in direct views from the road, No.29 being completely concealed behind a high close-boarded fence. In longer views along Storey's Way the generous 'set-back' of the houses, and the tall trees in each garden plot, means they are concealed from direct view.</p> <p>Summary of Special Interest</p> <p>Nos. 29, 30, 48, 54 and 56 have significance as an architectural group by the 'Arts and Crafts' architect, Baillie Scott. Although each building is of individual design, the repetition of features typical of the architect, and the consistency of the materials used in their construction, such as stucco and red brick, add an element of visual continuity. The contribution made by this group of houses to the character and appearance of the conservation area is also important.</p> <p>Setting</p> <p>The setting of each of the listed buildings is defined by its respective designed garden, while the wider setting of the listed buildings as a group lies in the group value of the estate as a whole; the</p>

Name, Location and Grade	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
	key features of this distinctive development are its high-quality houses (all built in the 1910s and 1920s to unique designs, but constructed of consistent materials and in a similar architectural style) and its established gardens and mature trees. The Application Site does not form part of the individual settings of these buildings and does not contribute to their significance.
Shawms, Conduit Head Road II*	D. Shawms - '1938 by M.J. Blanco White. Timber-framed on concrete raft, with concrete boiler room to west end. Horizontal weather-boarding cladding. Felt roof. Modern Movement style. 2 storeys plus roof conservatory.'
Willow House, Conduit Head Road II*	D. Willow House - '1932 by George Checkley. White-painted render to reinforced concrete structure. Flat bitumenised roof behind parapet. Plan: International Modern style house of 2 storeys. Later single-storey extension on right (west).'
White House, Conduit Head Road II	D. White House - '1930 by George Checkley. Rendered and painted brick. Flat roof behind parapet. Plan: International Modern style house of rectangular plan with central entrance hall. 2 storeys with smaller third storey set back at centre of roof terrace.'
Salix, Conduit Head Road II	D. Salix - '1934, extended 1936, by H.C. Hughes for Dr Oliphant (later Sir Mark Oliphant). White painted rendered brick. Bitumenised flat roofs. Plan: International Modern style house. 2 storeys on left and long single-storey wing on right (east) with room terrace above.'
Spring House, Conduit Head Road II	D. Spring House - '1965-7 by Colin St John Wilson, assistant M.J. Long. Pale cavity brick walls. Concrete Roman tile monopitched roofs. L-shaped plan with corner angle cut away to form terrace in angle of garden.'
	O. The buildings are so well screened by dense trees and vegetation that only glimpsed views of them can be seen from Conduit Head Road itself. The mature trees and vegetation within the area occupied by the pond, known as the 'Wilderness', also add to the sense of enclosure; this is further enhanced by the relatively flat topography of the area, which does not allow long views into or out of the private gardens. Even in winter, the density of the vegetation and the proportion of evergreen varieties ensure the sense of enclosure created by vegetation is an all-year-round characteristic.
	Summary of Special Interest The buildings are significant for their historical value as examples of progressive Modern Movement architecture, designed by some of the leading architects of the time. They are also important for their aesthetic value, which stems both from their simple architectural style and from their relationship with their enclosed green setting. Setting The individual settings of these buildings are closely defined by the enclosed garden plots in which they respectively stand. The wider setting of the listed buildings as a group lies in the group value of the development as a whole (defined by the extent of the conservation area), which is visually distinct from its surroundings due to the large number of mature trees it contains. These allow (even in the winter months) only glimpsed views of the buildings, giving the estate an air of seclusion important to the buildings' overall setting. Shawms is visible between trees from the ridge and furrow field within the Application Site adjoining the CA, particularly in winter, when its horizontal lines stand out in contrast to the trees, and this particular view of it makes some contribution to the building's significance.
The Observatory, Madingley Road II	D. The Observatory - 'Commenced 1822. John Clement Mead, architect. 2 storeys, ashlar in Neo-Greek style, slate and lead roofs. Built on half H-shaped plan with wings extending towards the North and projecting central tetrastyle portico of Doric order on South entrance front.'
The Northumberland Dome, Madingley Road II	D. Northumberland Dome - 'c.1838. The dome has been reconstructed. White brick, moveable copper dome, each side of 3 bays with brick pilasters and projecting central porch.'
	O. The buildings can only be seen clearly from within the Observatory grounds as they are screened from the surrounding area by a large number of trees. The trees in the grounds of the Observatory also ensure that the two listed buildings are screened from the modern buildings to the west, including the late C20 Kavli Institute of Cosmology and the Dept of Earth Sciences. The early C20 Solar Physics Observatory S of the Observatory is also screened by trees, while the late C20 Greenwich House at the rear of the Observatory is completely concealed in views of the building's striking Neo-Greek facade.
	Summary of Special Interest The interest of the Observatory consists in its evidential value as the first major university building built outside the town and in terms of its historical connection with Cambridge University's research in the field of astronomy, the Northumberland Dome also sharing this historic importance. The Observatory, the Dome and their grounds are also important for their architectural and aesthetic values.

Name, Location and Grade	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
	<p>Setting</p> <p>The landscaped grounds of the Observatory and the Northumberland Dome were dramatically altered by the construction of Greenwich House at the rear of the Observatory during the 1990s, but the designed landscaped setting at the front of the latter survives (circular lawn with peripheral drive edged by trees) and constitutes the key setting within and from which this building is appreciated. The Observatory also stands within landscaped campus grounds and nestles into a corner created by a high evergreen hedgerow and shrubs. The trees lining the boundaries of the Observatory grounds were planted when the building was constructed and now screen it from the surrounding farmland. Neither building has any significant relationship with the Application Site.</p>
<p>Churchill College Buildings, Churchill Road.</p> <p>II</p> <p>Including -</p> <p>Sheppard Flats</p> <p>Three groups of two- to three-storey linked residential courts (listed separately)</p> <p>Churchill College Chapel</p> <p>Wolfson Hall, Bracken Library and Bevin Rooms (all one building)</p> <p>Central Churchill College Building</p>	<p>D. Sheppard Flats - '1959-60. <i>Sheppard Robson and Partners. Brown brick, flat roofs. Timber windows. Two storeys. Compact swastika layout, each flat with an outdoor terrace, secluded by storey-height walls, which continue to form the walls of the flats themselves.</i>'</p> <p>D. 3 Linked Residential Courts x3 (listed individually) - '1961-8. <i>Sheppard, Robson and Partners. Brown brick, concrete, varnished timber windows, flat roofs covered in copper. Two to three storeys.</i>'</p> <p>D. Chapel - '1961-8. <i>Sheppard Robson and Partners. Brown brick, concrete, copper roofing. Square plan with 'inscribed cross', simple brick slab walls, separated by slit windows.</i>'</p> <p>D. Wolfson Hall, Bracken Library and Bevin Rooms - '1961-8. <i>Sheppard Robson and Partners. Brown brick, concrete. 2 storeys with double height hall to east and library to west. East elevation has projecting semicircular staircase to north and three-bay window with closely spaced pre-cast concrete vertical sunshades.</i>'</p> <p>D. Central Buildings - '1961-8. <i>Sheppard Robson and Partners. Brown brick and concrete, both re-cast and board marked. 2 storeys. Irregular 'H' plan, with dining hall forming the link between two parallel ranges.</i>'</p> <p>O. The Sheppard Flats and the Chapel are located at the NW end of Churchill Road, while the main college complex is located a substantial distance away at the E end of Churchill Road on the other side of the late C20 Moller Centre. The Sheppard flats are enclosed by the Wolfson Flats and laboratory buildings to the NE and by trees surrounding the Observatory grounds to the W. The main college complex abuts Storey's Way and its southern buildings are also visible from Maddingley Road.</p> <p>Summary of Special Interest</p> <p>The Churchill College buildings are significant both for their group value as an important example of a 1960s' designed college layout and for their individual architectural merit as well-designed and carefully planned buildings whose design is closely linked to their function.</p> <p>Setting</p> <p>The spaces between the college buildings provide their immediate setting; the linked residential courts all surround their own inner courtyard, while the residential courts themselves enclose the central college buildings on the S and W sides. This creates an inward-looking complex of buildings, but they are situated within a wide expanse of green space that also forms part of their setting. They are components of a wider area occupied by educational buildings and campuses. The Application Site makes no contribution to this setting.</p>
<p>Murray Edwards College (formerly New Hall), Huntingdon Road</p> <p>II</p> <p>The Grove, Huntingdon Road</p> <p>II</p>	<p>D. Murray Edwards College - '1962-6. <i>Chamberlin, Powell and Bon. White brick, concrete, some polished some bush-hammered. Some flat roofs; hall and library with concrete vaults. Two linked courtyards, the larger with residential accommodation to three sides; the smaller with hall to east and library to west. Mostly three storeys. Hall of Greek cross plan with circular staircases in the angles, and roofed by dome of eight leaves, with indirect top-lighting introduced between.</i>'</p> <p>D. The Grove - 'Dated 1814 on the rainwater heads but altered and enlarged in the late C19. <i>Faced in grey gault brick with stone dressings, probably on red brickwork which is still visible in the cellars. Two storeys, in part with cellars and attics, the original North-east and North-west fronts are symmetrical.</i>'</p> <p>O. The Murray Edwards College is partly screened by trees in views from Huntingdon Road but its dome is visible through the gap NW of No.3 Huntingdon Road. The Grove is completely concealed from view and can only be seen from within the Fitzwilliam College campus.</p> <p>Summary of Special Interest</p> <p>Both buildings are significant for their architectural and historical value, the Murray Edwards College buildings being, in addition to the Churchill College buildings on Storey's Way, an important example of 1960s' college architecture. The Grove was formerly the home of Emma Darwin, widow of Charles.</p>

Name, Location and Grade	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
	<p>Setting</p> <p>The setting of the Murray Edwards College consists of its own landscaped grounds, the substantial tree cover meaning that only part of the complex can be seen from Huntingdon Road. The Grove is also surrounded by trees, its former landscaped grounds being mostly lost when the Fitzwilliam and Murray Edwards colleges were built during the 1960s. The college buildings are components of a wider area occupied by educational buildings and campuses. Neither building has any relationship with the Application Site.</p>

10.3.12 **Table 10.7** includes summary descriptions of the designated conservation areas (including the recent extension to the West Cambridge Conservation Area that abuts the Application Site), and the proposed conservation area at NIAB/Howes Place, including a summary of their special interest and an analysis of their setting and context. Designation of the proposed NIAB/Howes Place Conservation Area is currently (in August 2011) held in abeyance. This is related to the granting of outline planning permission for the NIAB development (between Huntingdon Road and Histon Road); confirmation that the S106 agreement has been signed is awaited, which it is anticipated will take place before Christmas 2011. The conservation area should then be designated, subject to the necessary approvals, in early 2012.

Table 10.7: Description and Analysis of Conservation Areas (and Proposed CA) Assessed

Name	Description and Analysis of Character, Appearance and Setting
Storey's Way Conservation Area	<p>Description and Character</p> <p>This CA (designated in 1984) contains 7 listed buildings and 10 locally listed buildings. It incorporates all of the houses along Storey's Way up to Nos. 63 and 76. It also includes the Trinity College buildings and playing field N and E of Storey's Way; a cluster of college buildings arranged around a central courtyard adjoining the NE corner of the playing fields; the Wolfson flats in its SE corner and 2 adjacent laboratories; the Ascension Burial Ground and its chapel; and Nos. 4, 6 and 8 All Souls Lane in the NW.</p> <p>The significance of the CA lies in its large number of fine detached family houses with spacious gardens. A number of the Grade II listed houses were designed by the well-respected Arts and Crafts architect M.H. Baillie Scott. The area also has historical significance in that its layout was determined by the establishment of the original 'L'-shaped plot of c.42 acres which was allotted to the Trustees of Storey's Charity by the Enclosure Award of 1805.</p> <p>The mature planting in the numerous gardens adds to the significance of the area, with many of the garden designs laid out at the same time that the houses were built. Several of the trees are protected by Tree Preservation Orders (TPOs) and all add to the sense of enclosure and established early C20 suburban character. The Ascension Parish Burial Ground and the playing field of Trinity Hall and Churchill College are significant areas of green space, the burial ground also being listed as a Wildlife Site by Cambridge City Council.</p> <p>Setting</p> <p>The CA is surrounded by a mix of residential suburban and late C20 university campus developments to N, E, S and SW. To the W, adjoining the Ascension Burial Ground, is a large University Farm field within the Application Site, bordered by the tree-lined track leading to the former Gravel Hill Farm buildings. As the CA is so enclosed and has such a distinct character, this field contributes relatively little to the setting of the CA, the essential character of which consists in its established early C20 suburban character and the good quality of its architecture. The CA has a more significant relationship with the other suburban developments around it than it does with the farmland to the W. In any case, the houses on Storey's Way, the abundance of mature trees and the level topography mean that views out of the CA to the Application Site are extremely limited from Storey's Way itself.</p> <p>Trees and other vegetation generally create a screening effect between the CA and its surroundings: Both sections of Storey's Way are long and straight, allowing a channelled view NE along Storey's Way to Huntingdon Rd (which helps to set the CA in its wider context). However, the trees along the NE boundary of the Trinity Hall playing field, which continue SE along the Huntingdon Rd frontage, screen both the former and the college buildings in the NE corner of the CA in views from the road. A row of trees also separates these buildings and Trinity Hall from the neighbouring Fitzwilliam College complex. The trees and hedges enclosing the garden plots of Nos. 44-76 Storey's Way ensure that views between these garden plots and the Churchill College buildings SW of the CA are also restricted.</p>

Name	Description and Analysis of Character, Appearance and Setting
	<p>A thick belt of trees precludes views of the Application Site from Nos. 4, 6 and 8 All Souls Lane, and the Ascension Parish Burial Ground is also mostly enclosed along its NW edge by a row of yew trees and bushes; a gap in the vegetation allows a view towards the tree-lined track to Gravel Hill Farm but at the time of the site surveys the height of the (largely evergreen) vegetation prevented any views out across the Application Site. The farmland within the Application Site makes some contribution to the setting of the CA in views SE to the belt of trees enclosing the burial ground and from where the gap in the former's vegetation allows a partial view of the chapel. However, the semi-rural nature of this view has recently been altered by the construction of a large new house directly adjacent to the burial ground in the garden of No. 34 Storey's Way. A single-storey building (possibly garages) has also been erected adjoining it and this partly blocks the view from here of No. 34 Storey's Way itself.</p> <p>A modern close-boarded fence has been erected along the garden boundary of No. 34, suggesting that views across the Application Site from the CA are limited to those from the upper floors of No. 34 and from the interior of the new building and its garden. The wooded area surrounding the Botany School Field Station also prevents views between the Application Site and the CA.</p>
Conduit Head Road Conservation Area	<p>Description and Character</p> <p>This CA (designated in 1984) contains 5 listed buildings and 2 locally listed buildings. It comprises 2 distinct character areas: the large, high-quality individually designed houses in the W part of the CA and at the N end of Conduit Head Rd, and the 1990s' housing with smaller garden plots on the E side of the road and along Bradrushe Fields. The larger houses include several Modernist houses built in the 1930s and '60s.</p> <p>The mature gardens associated with these houses also add to the significance of the CA, providing a sense of enclosure and seclusion that is important to its overall character. A number of the trees in the CA are protected by TPOs.</p> <p>Setting</p> <p>The CA consists of a pocket of mid and late C20 suburban development, surrounded by farmland within the Application Site to the N, a field containing ridge and furrow to the W (beyond which is the Park & Ride), and university developments to E and S. Due to the highly enclosed and leafy nature of the CA and its flat topography, its wider physical setting in fact has little impact on its character and appearance. Consequently, views from the junction with Madingley Rd are directed either along the tree-lined portion of Conduit Head Rd or out of the CA along Madingley Rd itself (Cambridge City Council, 2009).</p> <p>Only glimpsed views of the buildings within the CA are afforded from outside it. The listed Shawms and locally listed Conduit Rise are partly visible between trees from the ridge and furrow field adjoining the CA. Shawms in particular is more prominently visible in winter, and views of it from here make some contribution to the building's significance (this is set out in Table 10.6).</p>
Extension to West Cambridge Conservation Area	<p>Description and Character</p> <p>The N extension to this existing CA incorporates the Observatory and Churchill College buildings and their associated grounds in addition to the Fitzwilliam College, Murray Edwards College and St Edmund's College.</p> <p>The Churchill, Murray Edwards and Fitzwilliam Colleges were built during the 1950s and '60s, while St Edmund's College includes a late C19 central building with a Grade II listed chapel attached to its W end. This earlier building was substantially extended during the late C20 with 2 new blocks completed relatively recently on the W side of the campus (Brian Heap Building and Geoffrey Cook Building).</p> <p>The Observatory was constructed in 1822 and was the first major university building outside the town. Its grounds were altered by the addition of the Solar Physics Observatory S of the Observatory during the early C20 and, more substantially, by the construction of Greenwich House at the rear of the building during the 1990s. Two further buildings, The Kavli Institute of Cosmology and the Dept of Earth Sciences, were also built during the late C20 W of the Observatory but are located beyond the historic W boundary of the Observatory grounds and are screened in views from the Observatory by mature trees.</p> <p>Setting</p> <p>The original West Cambridge CA extended N to Madingley Rd. The extension to the CA adjoins the Storey's Way CA to the N and NW. To the W an area of land excluded from the Application Site provides a gap between the extension and the Conduit Head Rd CA.</p> <p>The West Cambridge CA Appraisal and Management Plan identifies a number of positive views into the proposed extension, including views N across the Churchill College grounds from Madingley Rd, and along the principal driveway to the Observatory. The view N across the grounds S of the Observatory is also identified as a positive view, as is the view NE along Storey's Way</p>

Name	Description and Analysis of Character, Appearance and Setting
	<p>from Madingley Rd.</p> <p>In addition to these, there are also several views into the proposed extension from Churchill Rd and Huntingdon Rd, although views of the Murray Edwards College and Fitzwilliam College from Huntingdon Rd are substantially restricted by trees. The Application Site makes no significant contribution to the character and appearance of the conservation area or to that of its setting.</p>
Proposed Howes Place Conservation Area	<p>Description and Character</p> <p>This proposed CA is located on the N side of Huntingdon Rd opposite the houses lining the NE boundary of the Application Site.</p> <p>The area proposed for designation includes the 'U'-shaped frontage building of the National Institute of Agricultural Botany (NIAB) and the landscaped gardens in front and to the side of it; the linear cul-de-sac of Howes Place, incorporating its attractive avenues of pleached lime trees, Nos. 1-12 Howes Place and Nos. 16-18 Howes Place; and Nos. 198 and 200 Huntingdon Rd, as well as the rear plots associated with these buildings and the small 'village green' in front of Nos. 1-12.</p> <p>The NIAB was established by Sir Lawrence Weaver in 1919 to promote the improvement of existing varieties of seeds, plants and crops in the UK and its construction was closely associated with the provision of houses for ex-servicemen.</p> <p>The NIAB headquarters building fronting Huntingdon Rd and Nos. 1-15 Howes Place were designed by notable architect Morley Horder and built in 1921. Their aesthetic interest lies in their symmetrical construction and Neo-Georgian architectural style. They also have an important visual relationship with their landscaped setting, also designed by Horder.</p> <p>Nos. 16-18 were built later, between 1939 and 1948 and, although they are constructed in a more simple architectural style, they are in keeping with the character of the original buildings.</p> <p>Setting</p> <p>The Howes Place development forms a discrete and highly distinctive development off Huntingdon Rd, the uniform Neo-Georgian style of its buildings at odds with other suburban development along the latter. The immediate setting of the NIAB HQ was significantly altered by the addition of its large rear extension in 1955. While only a relatively small part of this building is visible from Howes Place, its utilitarian style and form has a negative impact on the original NIAB building and on Nos. 14 and 15 Howes Place which, although forming part of the original development, are excluded from the proposed CA.</p> <p>Within the CA, the pleached lime avenues are a prominent feature, making it difficult to view any of the houses easily. Likewise, similar trees in the garden in front of the NIAB HQ obstruct direct views of the building but nevertheless both make a positive and distinctive contribution to the Huntingdon Rd streetscape.</p> <p>With the exception of the visibility of the buildings at the rear of the NIAB building, its enclosed character means that views out of the CA are limited to the tree-lined views directly along the road (identified by the Council as 'positive views'). Nos. 193 and 197 Huntingdon Road are partly visible in the view SW along Howes Place although they are mostly concealed behind their tall boundary hedges and by the mature trees in their front garden plots.</p> <p>There is no significant inter-visibility between the proposed CA and the Application Site, which does not contribute to its character and appearance or to that of its setting..</p>

10.3.13 **Tables 10.8 to 10.12** include brief descriptions and analysis of the locally listed buildings required by CCC to be assessed as part of this study. In order to be as inclusive as possible, a number of additional locally listed buildings within the Storey's Way and Conduit Head Road Conservation Areas have also been assessed.

10.3.14 Where multiple locally listed buildings stand within close proximity, they have been assessed in groups in order to avoid repetition of assessment. **Tables 10.8 to 10.12** include the following:

- Table 10.8: locally listed buildings within the Storey's Way Conservation Area.
- Table 10.9: locally listed buildings within the Conduit Head Road Conservation Area.

- Table 10.10: locally listed buildings within the now extended West Cambridge Conservation Area.
- Table 10.11: locally listed buildings within the proposed NIAB/Howes Place Conservation Area.
 - Table 10.12: locally listed buildings outside conservation areas and proposed conservation areas.

10.3.15 The summary descriptions of each building provided in **Tables 10.8 to 10.12** have been informed both by our own on-site observations and information provided with the Local List by CCC.

10.3.16 **Table 10.13** includes brief descriptions and analyses of the non-designated groups of farm buildings within the Application Site that will be affected by the Proposed Development.

Table 10.8: Description and Analysis of Locally Listed Buildings in the Storey's Way Conservation Area

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
Ascension Burial Ground Chapel, All Soul's Lane	<p>D. Built in 1875. May have been designed by Richard Reynolds Rowe, who was Diocesan architect at the time of its construction. Chapel has flint walls with stone detailing, trefoiled side windows and plate tracery in the E and W windows.</p> <p>O. The chapel is divided from neighbouring houses along Storey's Way by the tree-lined All Souls Lane, and can only be glimpsed through the trees from the lane itself. The chapel and burial ground are enclosed by trees on all sides so the chapel is not prominent in the landscape, although a glimpsed view of the building can be seen in views across the Application Site from the NW.</p> <p>Summary of Interest</p> <p>The building is important for its architectural and historic interest and is an attractive example of a late C19 chapel. The burial ground contains the graves of many notable Cambridge academics and others.</p> <p>Setting</p> <p>The immediate setting of the chapel is defined by its tree-lined burial ground. There is a longer partial view of the chapel from the track leading from Huntingdon Road to Gravel Hill Farm through the trees around the burial ground; the semi-rural nature of this view has recently been altered by the construction of a large new house directly adjacent to the burial ground in the garden of No. 34 Storey's Way, which is visually very prominent.</p>
No.34 Storey's Way	<p>D. 1923. Designed by and built for Professor F.F. Blackman. 2 storeys with a grand entrance porch and symmetrical front with bay windows. Hipped tiled roof with brick chimneystacks and beneath, decorative pargetted walls.</p> <p>O. The house is surrounded by a close-boarded fence so that only part of the upper storey and the roof are visible from Storey's Way and in the view from the track leading to Gravel Hill Farm.</p> <p>Summary of Interest</p> <p>The interest of the building is derived from its architecture and historic interest. It retains a number of original features, including drainpipes decorated with the date of construction and the initials of the architect. The garden is laid out with terraces, stone walls and paths.</p> <p>Setting</p> <p>The setting of the building is largely defined by its large garden, which is enclosed by a high close-boarded fence. Part of the garden has, however, recently been developed with a large house and associated structures, which largely obscure views of No. 34 from the Application Site.</p>

Nos. 25, 44 and 52 Storey's Way	<p>D. No.25 Storey's Way - 1924. Designed by H.C. Hughes; single-storey plastered brick property with a mansard roof. Late example of the 'Cottage Orne' style.</p> <p>D. No.44 Storey's Way - 1913. 2-storey house with attic floor. Designed by London architects Messrs Dunnage & Hartman. Exterior is rough-cast with a brick plinth. Tiled roof with pair of projecting gabled bays with flat roof in between.</p> <p>D. No.52 Storey's Way - 1913. Designed by Robert Bennett and Wilson Bidwell of Letchworth. 2-storey brick house with recessed ground-floor entrance door.</p> <p>O. All 3 buildings are visible in direct views from the road but are partly enclosed by boundary hedges and/or trees. The buildings are concealed in longer views along Storey's Way as they are set back from it and are screened by trees in the garden plots of the neighbouring buildings.</p> <p>Summary of Interest</p> <p>The buildings have architectural/aesthetic interest and historic interest as part of the Storey's Way Estate.</p> <p>Setting</p> <p>The setting of each building is defined by its garden plot and by its visual relationship with Storey's Way itself. The setting of No.44 has been substantially altered by the construction of the Wolfson Flats as part of Churchill College in the late 1960s. The Application Site does not form part of this building's setting.</p>
Nos.141-145 (odd), Huntingdon Road	<p>D. No.141 (aka Wayside) - 1912. Built for Ebenezer Cunningham, praelector and maths lecturer at St John's College. Designed by W.D. Collins. Arts and Crafts style, 2-storey L-plan with extensions. Colour-washed pebble-dash elevations, red plain-clay tiled roof.</p> <p>D. Nos.143-5 - 2-storey houses with hipped, clay-tile covered roofs. Linked by a garage structure.</p> <p>O. All 3 buildings front onto Huntingdon Road but No.141 is mostly concealed in views from the road by its boundary hedge and trees in its garden plot. A backdrop of trees behind No.143-5 adds depth to the view of these buildings and No.145 is divided from the neighbouring property by more trees.</p> <p>Summary of Interest</p> <p>The interest of the buildings lies in their architectural and historic value as part of the Storey's Way Estate and as examples of early C20 Arts and Crafts architecture.</p> <p>Setting</p> <p>The setting of the buildings comprises their tree-lined individual garden plots and their visual relationship with Huntingdon Road. The Application Site does not form part of this building's setting.</p>
Wychfield House, Huntingdon Road	<p>D. c.1890. Built for Francis Darwin, Christ's College Lecturer in Botany. 2 storeys with attics, built of red brick with decorative tile hanging. Now used as a Trinity Hall Hostel.</p> <p>O. The building is completely concealed from Huntingdon Road by a large number of trees and by Wychfield Lodge, Walter Christie House and Dean House. It is also enclosed by trees on the W side and is not visible from Storey's Way.</p> <p>Summary of Interest</p> <p>The building is significant for its architectural interest and for its historical connection with Christ's College and Francis Darwin, third son of Charles Darwin.</p> <p>Setting</p> <p>The setting comprises the tree-lined gardens N and S of the building. The southern gardens are also enclosed by the Fitzwilliam College and Trinity Hall buildings, while those to the N of the building are enclosed by further Trinity Hall buildings. The Application Site does not form part of this building's setting.</p>

Table 10.9: Description and Analysis of Locally Listed Buildings in the Conduit Head Road Conservation Area

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
Clements End, Conduit Head Road	D. Clements End - 1926. Designed by Harold Tomlinson. 2 storeys with hipped tiled roof. Rendered and painted pale pink. Main facade fronts onto road. Central bay projects forward beneath a plain parapet.
Conduit Rise, Conduit Head Road	D. Conduit Rise - 1914. Designed by Harry Redfern and constructed in Arts and Crafts style. Located behind a tall painted brick wall, 2 storeys plus attic. Walls are rendered and painted white. Heavily pitched tile roof and weatherboarding to gable ends. Number of chimney stacks.
	O. Both of these buildings are located at the far N end of Conduit Head Rd. They can be glimpsed from the track running along the NE boundary of the CA and are visible when standing directly in front of each building on Conduit Head Rd but otherwise are well concealed by surrounding trees. Conduit Rise is also partly visible through the trees bounding the E side of the ridge and furrow field W of the CA.
	<p>Summary of Interest</p> <p>Although of less innovative design than the Modernist listed buildings in the Conduit Head Road CA, these buildings are nevertheless attractive examples of early C20 architecture.</p> <p>Setting</p> <p>The setting of both buildings is defined by their respective garden plots, which are well concealed both in views across the CA itself and in views from outside the CA. Their wider setting comprises the extent of the CA itself. In winter particularly Conduit Rise can be glimpsed through the trees bounding the E side of the ridge and furrow field but these views are not of particular significance.</p>

Table 10.10: Description and Analysis of Locally Listed Buildings assessed within the West Cambridge Conservation Area as extended

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
No.3 Huntingdon Road	D. No.3 Huntingdon Road - Built between 1904 and 1927 (formerly a rectory). 2 storeys with a clay-tile covered pitched roof. White-painted pebble-dashed elevations. Tall brick chimney stacks and two canted bay windows on rear elevation.
Blackfriars, Buckingham Road	D. Blackfriars - Built between 1966 and 1972. Architect David Roberts. Flat-roofed 3-storey building with concrete frame faced in yellowish Burlwell gault bricks. First-floor projecting bay with row of tall narrow windows.
	O. No.3 fronts onto Huntingdon Rd and is set back behind a white-brick wall. Its facade is partly concealed by trees in its front garden plot. The roofscape of the Murray Edwards College is visible to the right of the building. Blackfriars forms the terminus to the view along Buckingham Road and is set against a backdrop of tall trees.
	<p>Summary of Interest</p> <p>No.3 is an attractive example of an early C20 house. Blackfriars is also of architectural interest and its simple late 1960s/early 1970s' architecture complements the style of the neighbouring Murray Edwards College.</p> <p>Setting</p> <p>The setting of No.3 includes its small garden plot and the driveway of the Murray Edwards College, and is confined by Huntingdon Road and Buckingham Road. The Application Site makes no contribution to the setting of either building.</p>

Table 10.11: Description and Analysis of Locally Listed Buildings in the Proposed NIAB/Howes Place Conservation Area

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
NIAB Building, Howes Place	D. NIAB - 1921. Designed by Morley Horder. Neo-Georgian architectural style U-shaped building. 2 storeys with attic, 'white' brick with clay-tile covered mansard roof. Six-pane sashes.
Nos.1-12 Howes Place	<p>D. Nos.1-12 Howes Place - 1921. Designed by Morley Horder. Symmetrical row of semi-detached (and one detached) houses. Arranged in U shape around front lawn. 2 storeys, 'white' brick with clay-tile covered hipped roofs. Six-pane sashes and pilastered door surrounds.</p> <p>O. The NIAB building fronts onto Huntingdon Rd but is partly concealed by the trees in its front garden in views from Huntingdon Rd. Nos.1-12 Howes Place are also concealed in views from Huntingdon Rd, due to their location set back from the road and the screening provided by the avenues of pleached lime trees along Howes Place.</p> <p>Summary of Interest</p> <p>The buildings' interest is derived from their architectural interest and their historical association with the NIAB, Sir Lawrence Weaver and the welfare of ex-servicemen.</p> <p>Setting</p> <p>The setting of the buildings includes their associated landscaping, including the courtyard and gardens around the NIAB, the avenues of pleached limes along Howes Place and the green open space in front of Nos.1-12. The setting of the NIAB was significantly altered by the addition of the large extension to the rear of the building in 1955. The gardens at the rear of Nos.1-12 are also important to their setting. Huntingdon Rd forms part of the wider setting of the NIAB but very little of the buildings can be seen from Huntingdon Rd when the pleached limes are in leaf. The Application Site makes no contribution to their settings.</p>

Table 10.12: Description and Analysis of Locally Listed Buildings Assessed Outside Conservation Areas

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
Nos. 171, 173 and 183, Huntingdon Road	<p>D. Nos.171, 173 and 183 were all built during the early-mid C20 and were designed by the architect H.C. Hughes, who also designed the Grade II listed Salix on Conduit Head Rd. No.173 was built for Professor Kapitza, a fellow of Trinity College. The houses are of contrasting design, No.171 is of L-shaped plan with a pantile-covered hipped roof and is built in yellow brick with white-painted render on the first floor. No.173 has a gabled, pantile-covered roof and is also built in yellow brick with a contrasting brown brick on the first floor. No.183 is the most distinctive of all three buildings due to its high gambrel roof.</p> <p>O. All three houses front onto Huntingdon Road and are visible in views from the road. They are concealed in views from the south-west by the trees surrounding their rear garden plots.</p> <p>Summary of Interest</p> <p>The buildings are of architectural interest as examples of buildings designed by the architect H.C. Hughes and are good examples of early C20 suburban domestic architecture along Huntingdon Rd.</p> <p>Setting</p> <p>The setting of the buildings comprises their individual garden plots and their visual relationship with Huntingdon Rd and the C20 suburban ribbon development along it. The Application Site does not contribute to their settings.</p>
No.162, Huntingdon Road	<p>D. 1928. 2 storeys of plain brick with pantiled hipped roof. Two plain chimney stacks, L-shaped plan with entrance in the angle covered by a steeply pitched lead roof.</p> <p>O. The building fronts onto the north-eastern side of Huntingdon Rd but is set back from the road and divided from it by a hedge. It is concealed in longer views along Huntingdon Rd by the trees in the neighbouring plots.</p> <p>Summary of Interest</p> <p>The interest of the building is derived from its architectural value and it is of interest as a good example of early 20th-century suburban domestic architecture on Huntingdon Rd.</p>

	<p>Setting</p> <p>The setting of the building comprises its individual garden plot and its visual relationship with Huntingdon Rd and the C20 suburban ribbon development along it. The Application Site does not contribute to its setting.</p>
Nos.130, 136 and 138, Huntingdon Road	<p>D. No.130 - 2-storey, Arts and Crafts style brick house, partly rendered with a tiled roof. Modern brick extension at the rear.</p> <p>D. Nos.136 and 138 - Both designed by M.H. Baillie Scott. No.138 was built for Professor Sir Frank Engledon, famous scientific agriculturalist. No.136 is 2 storeys with an attic and is built of red brick partly covered by white-painted render with a clay-tile covered roof. No.138 is 2 storeys and is also brick but is rendered with the exception of brick detailing, including brick quoins.</p> <p>O. All 3 buildings are located on the NE side of Huntingdon Road and are partly concealed by trees in views from the road. No.136 is located at the entrance to Marion Close, while No.138 is situated at the entrance to Oxford Rd.</p> <p>Summary of Interest</p> <p>All 3 buildings are of interest as examples of early C20 Arts and Crafts architecture, although all have been altered by later additions. Nos.136 and 138 are of interest as examples of buildings designed by M.H. Baillie Scott and No.138 has historic interest as the former house of Professor Sir Frank Engledon.</p> <p>Setting</p> <p>The setting of the buildings comprises their individual garden plots (although these have been altered by the addition of modern extensions) and also extends to Huntingdon Road. The south-western ends of Marion Close and Oxford Road also form part of the settings of Nos.136 and 138 respectively. The Application Site makes no contribution to their settings.</p>

Table 10.13: Description and Analysis of Non-Designated Farm Buildings Within the Application Site affected by the Proposed Development

Name and Location	Description (D), On-Site Observation (O) and Analysis of Asset and Setting
Howe Farmhouse	<p>D. Mid-late C19 2-storey house of Cambridgeshire gault brick (now divided into two flats) of square plan with hipped concrete pantile roof. Windows have flat arches with gauged-brick heads. Not quite symmetrical fenestration to façade. 3 original (altered) sashes, others C20 replacements. Front door late C20. Rear 1-storey range with tall chimney stack.</p> <p>O. The front elevation faces SE onto the driveway off Huntingdon Rd. House & garden surrounded by late C20 Fletton brick wall to NW. All C19 farm buildings associated with the farmhouse have been demolished and replaced in the C20 with agricultural sheds.</p> <p>Summary of Interest</p> <p>This building is of relatively plain appearance and is unremarkable architecturally. Most of the windows/doors have been replaced, as has the original roof covering. The building was originally the farmhouse to Howhill Farm (now Howe Farm) and is depicted on the 1888 O.S. map. Its historic context is now substantially altered with the loss of the rest of the original farm complex (including the continuation of the single-storey rear range along the Huntingdon Rd frontage).</p> <p>Setting</p> <p>The house is set back from the S side of Huntingdon Rd facing SE onto what was originally a circular driveway, but is now a plain tarmac surface, altered to enable vehicular access to Nos. 1-3 Howe Close, a row of three 1970s' agricultural workers' houses immediately S of the house. The setting is formed by Howe Close and the modern agricultural buildings to the W and NW. More widely, the GII* listed Girton College is opposite, set back from the N side of Huntingdon Rd, but the screening from trees means there is little if any inter-visibility between the farmhouse and college buildings. The farmhouse is generally screened from Huntingdon Rd by trees and shrubs. While the farm complex as a whole is visible in longer-distance views across the Application Site from the SW, the farmhouse itself is not individually distinguished in these views, largely concealed by modern barns and sheds.</p>
Nos. 1-3 Howe Farm Close	<p>D. Row of 3 houses built in the 1970s for farmworkers. 2 storeys, of red brick with a mono-pitched pantile roof. Each house of 3 bays, door and adjoining window to the right-hand bay with window above set in timber-clad slight recess. All windows replaced in uPVC. 'Tunnel' entries to rear between houses. Rear elevation facing Huntingdon Rd very plain with short horizontal 'strip' of fenestration to the first floor and similar to ground floor. Rear glazed entrance under canopy.</p> <p>O. Row of housing is set back from and aligned parallel with Huntingdon Rd, but front elevations</p>

	<p>face SW across the farm; the largely blank rear elevations make no engagement with the road. Gardens to front. The houses have a greater set-back from the road than the 1920s' and later detached houses SE of them along Huntingdon Rd and stand very close to the nearest of these, Howelands.</p> <p>Summary of Interest</p> <p>Typical housing of their period (post-1970), with some interest as purpose-built accommodation for farmworkers, facing in towards the farm, but of limited heritage interest. Windows and doors later C20 replacements.</p> <p>Setting</p> <p>The setting of the houses is formed by their garden plots and the driveway and parking area off Huntingdon Rd, and more widely by the farm complex as a whole, although the houses themselves do not have an overt agricultural character; they have not been designed to reflect the style or materials of Howe Farmhouse and their function in relation to the farm is not apparent from their external appearance. Howe Farmhouse stands immediately N. The farm buildings to S and W are C20 agricultural sheds/barns. Girton College stands set back from the opposite side of Huntingdon Rd but there is no inter-visibility between the houses and the college buildings, and no meaningful historical relationship.</p>
Gravel Hill Farm	<p>D. Farmhouse of 1888-1903 replacing earlier farmhouse, apparently by R.R. Rowe. Extended 1903-1926. 2 storeys (upper storey partly in attic), built of yellow-toned brick laid in Flemish bond with clay-tiled roof and diagonally-set chimneystacks. Mildly Tudor Gothic style. Projecting gabled bay and gabled half-dormer with barge boards and brackets. Open-sided timber porch in the angle. Windows (horned glazing-bar sashes with casement to dormer) dressed with red brick. Rear probably largely rebuilt with early C20 gabled infill between 2 gabled projections with canted bay windows. O. Front elevation faces SE towards complex of modern farm buildings. Farmhouse unoccupied at time of last visit (Jan 2011). All associated C19 farm buildings now gone (with exception of large brick barn, much altered) and replaced with modern farm sheds/barns.</p> <p>Summary of Interest</p> <p>Architecturally unremarkable late C19 farmhouse, altered and extended in early C20. Historic context diluted by removal and replacement of C19 farm buildings. Front elevation faces SE towards farm complex (now largely modern),</p> <p>Setting</p> <p>Complex of modern farm buildings to E have replaced C19 farm buildings, other than large altered barn. Garden to farmhouse survives to S but series of enclosures to N shown on 1888 O.S. map have been reconfigured and boundaries removed. The detached house Madingley Rise was built to the S by the astronomer H.F. Newall between 1888 and 1903 and is now occupied by the university; it was substantially and prominently extended in the late C20 and further dilutes historic agricultural character.</p>

10.4 Likely Significant Effects

10.4.1 The baseline year for assessment is 2010. The completion date for the first phase is 2014 and the overall completion date is 2026. The assessment of effects is made for phases of construction activity, and then for operation in the years 2014 (on completion of the first phase of development) and for the year 2026 (on completion of the whole development). The assessment of effects is based on the Proposed Development described in Chapter 2 and assumes that the Proposed Development will be built to the maximum parameters described therein. The assessment also assumes the phasing of the Proposed Development which is set out in Chapter 3.

Construction Phase

10.4.2 This assessment is made for all construction phases of work taking place across the Application Site, including those relating to highway and utilities works in Huntingdon Road and Madingley Road and the works in connection with the Potable water main extension.

10.4.3 In the case of historic landscape features, the loss of historic field boundaries within the Application Site has been identified as an effect of construction activity. There will also be an effect on longer-distance views of the wider historic agricultural landscape on the approach into the city, as summarised in **Table 10.14**. In addition, existing (undesignated) buildings on the Application Site will be demolished as part of clearance of the Application Site.

10.4.4 The effects of construction activity on listed buildings and their settings and on conservation areas and locally listed buildings will be indirect and temporary. There will be no direct physical effects on any of these built heritage assets but indirect and temporary effects on them and their settings may arise from construction noise and dust. Similarly, there is also potential for construction activity to have an effect on views to and from listed and locally listed buildings and conservation areas - views may be affected by the presence of construction equipment (such as cranes and other machinery) in the short to medium term. There will be similar temporary effects relating to the proposed highway and utility works on Huntingdon Road and Madingley Road and to the provision of a 450mm diameter potable water main extension. There are two possible route options for the latter: Option 1 would require installation across third party land, while Option 2 would require installation along existing streets. **Tables 10.15-10.22** summarise the effects relating to the construction phase. It has been assumed that best practice will be followed during construction, with all standard measures taken to reduce dust, noise and other irritants. A Construction Management Plan will be provided and adhered to by the Applicant which will include a range of measures to ensure such measures are complied with.

10.4.5 The effects arising are likely to range from Negligible to Minor Adverse, with a Minor to Moderate Adverse effect on the wider historic landscape .

Table 10.14: Likely Significant Effects of Construction on Physical Features of the Historic Landscape within the Application Site

Feature	Likely Constructional Effects	Significance of Effect
Physical Features of the Historic Landscape of the Application Site	The two historic tracks and the ridge and furrow field and veteran oak tree marking the parish border will not be affected by construction work relating to any part of the development. Historic field boundaries will be lost but these are already fragmentary and considered to be of low sensitivity.	Minor Adverse
The Wider Historic Landscape	There will be disruption to the historic agricultural landscape through construction activity during ground-works and building out, with machinery and construction activity visible in the distance in longer views from the SW from the brow of the hill on Cambridge Road and in transient views from the M11. Construction effects relating to the highways, utilities and potable water main should be less obtrusive as the works will be localised.	Minor to Moderate Adverse

Table 10.15: Likely Significant Effects of Construction on Listed Buildings

Name, Location and Grade	Likely Constructional Effects	Significance of Effect
Girton College, Huntingdon Road Girton Lodge, Huntingdon Road II* and II	No direct effect on these listed buildings. Views of and noise from construction activity (including for the Huntingdon Road West Junction) may be apparent from within the grounds by the secondary (NW) driveway, having a very limited effect on the immediate setting of the listed buildings but not affecting the appreciation of their significance. . Longer views towards Girton College and its wider setting from the W/SW may also take in the presence of construction machinery, but again this will not affect the appreciation of the significance of the listed buildings. The magnitude of change to this high sensitivity asset is negligible .	Negligible

Nos.29, 30, 48, 54, 56, 63 and 76A, B & C, Storey's Way II	<p>No direct effect on listed buildings. Limited or no effect on settings because of lack of inter-visibility. Some construction noise may be audible but given these are suburban houses listed for their architectural qualities, this will not affect their 'special interest' as listed buildings.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Shawms, Conduit Head Road II*</p> <p>Willow House, Conduit Head Road II*</p> <p>White House, Conduit Head Road II</p> <p>Salix, Conduit Head Road II</p> <p>Spring House, Conduit Head Road II</p>	<p>Shawms is located in the NW part of the Conduit Head Road CA close to the latter's boundary. A gap in the trees along the NW boundary of the building's garden enables a partial view of it from the adjoining ridge and furrow field. There may be views of construction activity on the Application Site and potentially from the highway and utilities works for the High Cross/Madingley Road Junction from Shawms, and construction noise may be audible, but these aspects will not affect the discrete setting of the listed building.</p> <p>Willow House, White House and Salix are well removed from the Application Site, being located at the S end of the Conduit Head Road CA. All 3 buildings are enclosed by trees and there is no inter-visibility between them and the Application Site. These heritage assets and their settings should not be significantly affected by views of or noise from construction activity.</p> <p>Spring House is well concealed from the Application Site and its setting will not be affected by the Proposed Development. Views to the NE towards the Application Site will be restricted by the belt of trees which stands along the NE boundary of the CA. Construction noise may be audible but this will not affect the discrete setting of the listed building.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>The Observatory, Madingley Road II</p> <p>The Northumberland Dome, Madingley Road II</p>	<p>These buildings are located within tree-enclosed landscaped grounds accessed from a long driveway off the N side of Madingley Road. The Application Site abuts the grounds to the NE and NW but is not visible through the thick belt of trees enclosing them. Construction noise is likely to be audible when the Proposed Development in this part of the Application Site is built out, but this should not significantly affect the ability to appreciate the buildings as heritage assets or affect their well-defined settings. Given their depth of set-back from Madingley Road they are unlikely to be affected by highway and utilities works along that road or by works to construct Option 2 of the potable water main extension along it.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Churchill College Buildings, Churchill Road. II</p> <p>Including: Sheppard Flats;</p> <p>Three groups of two- to three-storey linked residential</p>	<p>The shared landscaped campus setting of these buildings does not extend to the Application Site. All the Churchill College buildings are located a significant distance away from it and will not be affected by construction activity. Construction noise may be audible from highway and utilities works (including Option 2 of the potable water main extension) on Madingley Road but this will not have a significant effect on these buildings or their settings.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible

courts (listed separately)		
Churchill College Chapel Wolfson Hall, Bracken Library and Bevin Rooms (all one building)		
Central Churchill College Building		
Murray Edwards College (formerly New Hall), Huntingdon Road II	These buildings are located a substantial distance from the Application Site SE of the Storey's Way CA. Neither they nor their distinct settings will be affected by construction activity. The magnitude of change to these high sensitivity assets is negligible .	Negligible
The Grove, Huntingdon Road II		

Table 10.16: Likely Significant Effects of Construction on Conservation Areas Assessed

Name	Likely Constructional Effects	Significance of the Effect
Storey's Way CA	The part of the Application Site adjoining the NW boundary of the CA will be developed. Some views of construction activity and noise may affect No.34 Storey's Way and the Ascension Parish Burial Ground. As the burial ground has a peaceful tranquil character there is likely to be an indirect and temporary adverse effect on the appreciation of this heritage asset, which is addressed individually in Table 10.17 . Construction activity is unlikely to affect the appreciation of the majority of this closely-defined and inward-looking CA. The magnitude of change to this high sensitivity asset is negligible .	Negligible
Conduit Head Road CA	The part of the Application Site immediately NE of the CA will be developed. There may be glimpsed views of construction activity and also construction noise audible from the northern end of the CA and from highway, utilities and potable water main extension works along Madingley Road, but the CA is tightly defined with a distinct character and this should not affect its character and appearance. The magnitude of change to this high sensitivity asset is negligible .	Negligible
Proposed NIAB/Howes Place CA	This proposed CA is unlikely to be affected by construction activity. It is screened from the SE part of the Application Site by houses on the S side of Huntingdon Rd and there are no direct views between it and the NW part of the Application Site. Construction noise may be audible from highway and utilities works on Huntingdon Road north-west of NIAB and from works for either option of the potable water main extension, but this will not have a significant effect on this distinctly defined area. The proposed CA is on a principal route into the city and is already subject to traffic noise. The magnitude of change to this (potentially) high sensitivity asset is negligible	Negligible
Northern Extension to West Cambridge CA	The extension adjoins the Storey's Way CA in the N and covers an area of university buildings and self-contained landscaped grounds. Construction noise may be audible from the W part of the CA and from highway, utilities and Option 2 potable water main works along Madingley Road where it passes through the CA, but is unlikely to be significant; this is a college campus on a principal route into the city and is already subject to traffic noise. The magnitude of change to this (potentially) high sensitivity asset is negligible .	Negligible

Table 10.17: Likely Significant Effects of Construction on Locally listed buildings in the Storey's Way Conservation Area

Name	Likely Constructional Effects	Significance of the Effect
Ascension Burial Ground Chapel, All Soul's Lane	<p>The burial ground and chapel are screened from the Application Site by the existing trees and vegetation lining its NW boundary, but there may be views of construction activity and also construction noise apparent from the building, which may affect the ability to appreciate it and its burial ground as a place of tranquility.</p> <p>The magnitude of change to this medium sensitivity asset is low</p>	Minor to Moderate Adverse
No.34 Storey's Way	<p>Construction noise and activity are likely to be apparent from this building, and construction activity and machinery will be visible in the foreground of views towards the building from the north. However, this is a suburban building, included on the local list for its architectural qualities, which will remain unaffected by increased noise. Views to the rear of the building across the Application Site may be obstructed by machinery but these are not significant views of the building and have already been largely obstructed by new development behind it.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Nos. 25, 44, 52, 64 Storey's Way	<p>These buildings are all located a substantial distance from the Application Site and are well screened from it by the buildings lining the NW section of Storey's Way and by the trees at the NW end of the road. Neither they nor their settings are likely to be affected by construction works.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible
Nos.141-145 (odd), Huntingdon Road	<p>Construction activity on the Application Site may be visible from upper-floor rear windows of these buildings and noise may be apparent, but this will not affect the ability to appreciate these buildings or their settings as heritage assets. Likewise, potential construction of the Option 2 potable water main extension may result in noise on Huntingdon Road, but these buildings stand on a principal route into the city and are already subject to traffic noise; no additional adverse effect is identified.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible
Wychfield House, Huntingdon Road	<p>This building has no visual relationship with the Proposed Development and it and its setting will be unaffected by construction works.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible

Table 10.18: Likely Significant Effects of Construction on Locally Listed Buildings in the Conduit Head Road Conservation Area

Name	Likely Constructional Effects	Significance of the Effect
Clements End, Conduit Head Road Conduit Rise, Conduit Head Road	<p>These buildings are both situated at the NW end of the CA adjoining the Application Site and therefore may be affected by views of construction works and by noise. This should not, however, significantly affect the ability to appreciate these buildings as heritage assets.</p> <p>The magnitude of change to these medium sensitivity assets is low.</p>	Minor to Moderate Adverse

Table 10.19: Likely Significant Effects of Construction on Locally Listed Buildings in the Proposed NIAB/Howes Place Conservation Area

Name	Likely Constructional Effects	Significance of the Effect
NIAB Building, Howes Place Nos.1-12 Howes Place	<p>These buildings are unlikely to be affected by constructional activity. They have a distinctive and closely-defined setting and are screened from the SE part of the Application Site by houses on the S side of Huntingdon Rd and there are no direct views between them and the NW part of the Application Site. Construction noise may be audible from highway and utilities works on Huntingdon Road north-west of NIAB and from works for either option of the potable water main extension, but this will not have a significant effect on the buildings or their closely-defined setting.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible

Table 10.20: Likely Significant Effects of Construction on Locally Listed Buildings Assessed within the West Cambridge Conservation Area as extended

Name	Likely Constructional Effects	Significance of the Effect
No.3 Huntingdon Road Blackfriars	<p>These buildings are located a substantial distance away from the site SE of the Storey's Way CA, Fitzwilliam College and Murray Edwards College. They will not be affected by constructional activity.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible

Table 10.21: Likely Effect of Construction on Locally Listed Buildings Assessed Outside Conservation Areas

Name	Likely Constructional Effects	Significance of the Effect
Nos. 171, 173 and 183, Huntingdon Road	<p>The rear plots of these buildings abut the NE boundary of the Application Site. The settings of these buildings are clearly defined by their long and well-screened garden plots. Construction noise may be apparent from within the buildings and their gardens, but this will not affect the ability to appreciate the buildings as heritage assets. The buildings front one of the principal routes into the city and are already subject to traffic noise.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible
No.162, Huntingdon Road	<p>No.162 is located at some distance away from the Proposed Development on the NE side of Huntingdon Road and will not be affected by construction activity. While potential construction of the Option 2 potable water main extension may temporarily increase noise in front of the building, it is already subject to traffic noise on one of the principal routes into the city and this will not have any additional adverse effect.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Nos.130, 136 and 138, Huntingdon Road	<p>These buildings are unlikely to be affected by construction activity within the Application Site because of their locations. While potential construction of the Option 2 potable water main extension may temporarily increase noise in front of the building, it is already subject to traffic noise on one of the principal routes into the city and this will not have any additional adverse effect.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible

Table 10.22: Likely Significant Effects of Construction on Non-Designated Farm Buildings Within the Application Site affected by the Proposed Development

Name	Likely Constructional Effects	Significance of the Effect
Howe Farmhouse	This building will be demolished in clearing the Application Site. Because demolition results in the loss of the building, this leads to a moderate adverse effect despite the low heritage significance of the building. The magnitude of change to this low sensitivity asset is high	Moderate Adverse
Nos. 1-3 Howe Farm Close	These buildings will be demolished in clearing the Application Site. The magnitude of change to this negligible sensitivity asset is high	Negligible
Gravel Hill Farmhouse	This building will be demolished in clearing the Application Site. Because demolition results in the loss of the building, this leads to a moderate adverse effect despite the low heritage significance of the building. The magnitude of change to this low sensitivity asset is high	Moderate Adverse

Operational Phase - Completion of First Phase of Development: 2014

10.4.5 The main potential effects of the operational phase (whether assessed in 2014 or 2026) on cultural heritage assets will be as a result of:

- the introduction of new development into the setting of/within significant views to and from heritage assets;
- the introduction of new development within the wider historic landscape.

10.4.6 **Tables 10.23 to 10.30** assess the likely effects on the cultural heritage assets identified as part of this study at year 2014. All effects identified arising from operational activity are indirect and permanent in nature, but it should also be noted that in the year 2014 there will in addition continue to be temporary effects arising from constructional activity which will be on-going in parts of the Application Site and therefore these have also been identified in Tables 10.23 to 10.30. These effects will in general be of the same type as those identified in Tables 10.14-10.22 and will have no greater effect than those identified therein.

Table 10.23: Likely Significant Effects of Operation on Historic Landscape Features

Feature	Likely Effects	Significance of Effect
Physical Features of the Historic Landscape of the Application Site	Two historic field tracks, a ridge and furrow field and veteran oak tree marking the historic parish boundary will be retained and incorporated into the development. While these will survive within an altered context, the ridge and furrow field already exists surrounded by modern development to E and W and the Proposed Development will not represent any significant further change to the heritage asset. These features will not be affected by the on-going construction works because they are being retained. The magnitude of change to these low sensitivity assets is Negligible .	Negligible
The Wider Historic Landscape, Built Environment and Setting of Cambridge	There will be a change to the historic landscape through the introduction of development on what has historically been agricultural land as well as the on-going construction activity, thereby creating the perception of a new 'urban edge'. The Application Site lies in a transitional area between the rural hinterland west of the A428/A14 and the semi-rural and suburban character areas east of it. The open farmland in the Application Site is visible from the bridge over the A428/A14, although its rural character is diluted by the M11 cutting through the countryside, the Animal Research Station buildings and other development around its periphery.	Minor Adverse

	<p>Views from the SW from Cambridge Road and transient views from the M11 will retain a view with open agricultural land in the foreground and the Girton Ridge in the background. The view to Girton College tower and roofscape from the M11 will be unaffected as the 2014 phase does not include development within the sightline between the M11 and Girton College. A 'green gap' is to be retained through the eastern part of the Application Site, thereby retaining a sense of open land between Holly Nurseries and the Dept of Applied Biology on Huntingdon Road, and 'green fingers' extend through the Proposed Development, softening the new urban edge.</p> <p>While there will inevitably be a change to the sense of openness within the Application Site, the Proposed Development is contained east of the M11 and A14, with land of rural character retained to the west; the Proposed Development will be perceived as creating a more rapid transition from rural to suburban when approaching from the Huntingdon Road bridge over the A14 but the substantial greenery lining Huntingdon Road (and the houses in substantial gardens on the south side with tree belt against the road) will conceal the Proposed Development from direct view from the Huntingdon Road frontage, maintaining the present character on the approach into the city.</p> <p>The magnitude of change to these medium sensitivity assets is low.</p>	
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Table 10.24: Likely Significant Effects of Operation on Listed Buildings Assessed

Name, Location and Grade	Likely Operational Effects	Significance of the Effect
Girton College, Huntingdon Road Girton Lodge, Huntingdon Road II* and II	<p>Girton College provides a historic 'anchor' as one of the first buildings encountered after crossing the A14, helping to announce the approach into the city.</p> <p>The 2014 phase does not include development within the sightline from the M11 to the Girton College Gatehouse tower or the long-distance views from Cambridge Road from the SW. However, on-going construction activity on the site may be visible and noise may be audible, but this should not affect the appreciation of the significance of the listed buildings. The signal-controlled Huntingdon Road West Junction will not affect any significant views to or from the listed buildings.</p> <p>Views of the 2014 development will not be obtained from the college grounds.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
Nos.29, 30, 48, 54, 56, 63 and 76A, B & C, Storey's Way II	<p>The 2014 phase of the Proposed Development will be well screened from Storey's Way and there is unlikely to be any inter-visibility between the two. The 2014 phase does not include development adjoining Storey's Way, although on-going construction activity may have some minimal noise effects. These are suburban houses listed for their architectural qualities and this will not affect their 'special interest' or settings as listed buildings.</p> <p>The Application Site does not contribute to the significance of the settings of these heritage assets, and this phase will have no effect upon them.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
Shawms, Conduit Head Road II*	<p>Shawms is located in the NW part of the Conduit Head Road CA close to the latter's boundary. A gap in the trees along the NW boundary of the building's garden enables a partial view of it from the adjoining ridge and furrow field. The open green space provided by this field makes some contribution to the setting of the CA itself and to the wider setting of this building. The field is to be retained as open space within the Proposed Development.</p> <p>Development up to 18m AOD is proposed for the area NW of the field and also a CHP flue of up to c.42.5m AOD and 0.6m external diameter, and this development will have some inter-visibility with Shawms and its setting. Although tall, the CHP flue is narrow and at some distance from the listed building, and the retention of the open space between the Proposed Development and Shawms will ensure views towards the listed building are unaffected. On-going temporary effects from the visibility and noise of on-going</p>	Negligible

<p>Willow House, Conduit Head Road II*</p> <p>White House, Conduit Head Road II</p> <p>Salix, Conduit Head Road II</p> <p>Spring House, Conduit Head Road II</p>	<p>construction activity may be present, but this will not affect the appreciation of the significance of the listed building or its discrete setting.</p> <p>Willow House, White House and Salix are well removed from the Application Site, being located at the S end of the Conduit Head Road CA. All 3 buildings are enclosed by trees and there is no inter-visibility between them and the Application Site, which makes no contribution to their significance as heritage assets. The buildings and their settings will not be affected by operational or constructional activity.</p> <p>Spring House is well concealed from the Application Site and its setting will not be affected by the Proposed Development. Views to the NE towards the Application Site will be restricted by the belt of trees which stands along the NE boundary of the CA. On-going construction noise may be audible but this will not affect the discrete setting of the listed building.</p> <p>The magnitude of change to these high sensitivity assets is negligible</p>	
<p>The Observatory, Madingley Road II</p> <p>The Northumberland Dome, Madingley Road II</p>	<p>These buildings are located within tree-enclosed landscaped grounds accessed from a long driveway off the N side of Madingley Road. The Application Site abuts the grounds to the NE and NW but is not visible through the thick belt of trees enclosing them. The Proposed Development will not be visible in significant views of the Observatory or the Northumberland Dome. On-going construction noise may be audible but this should not significantly affect the ability to appreciate the buildings as heritage assets or affect their well-defined settings.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Churchill College Buildings, Churchill Road. II</p> <p>Including: Sheppard Flats;</p> <p>Three groups of two- to three-storey linked residential courts (listed separately)</p> <p>Churchill College Chapel Wolfson Hall, Bracken Library and Bevin Rooms (all one building)</p> <p>Central Churchill College Building</p>	<p>The shared landscaped campus setting of these buildings does not extend to the Application Site. All the Churchill College buildings are located a significant distance away from it and the Proposed Development will not be visible in any views of the listed buildings. The buildings and their settings will not be affected by on-going construction activity.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Murray Edwards College (formerly New Hall), Huntingdon Road II</p> <p>The Grove, Huntingdon Road II</p>	<p>These buildings are located a substantial distance from the Application Site SE of the Storey's Way CA. The development will not have any visual effect on these buildings or their settings. Likewise, on-going construction activity will have no effect.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible

Table 10.25: Likely Significant Effects of Operation on Conservation Areas Assessed

Name	Likely Operational Effects	Significance of the Effect
Storey's Way CA	<p>A key element of the CA is its nature as a discrete and distinctive planned residential development that is largely 'self-contained'. There are few views into it and few views out, and few views in either direction that are of significance to its setting as a heritage asset. It is an inward-looking development, the character and significance of which is appreciated from within rather than without.</p> <p>The part of the Application Site adjoining the NW boundary of the CA will not be developed as part of the 2014 phase and views along Storey's Way will remain unchanged. While on-going construction activity is unlikely to affect the appreciation of this closely-defined and inward-looking CA, it may have a temporary adverse effect on the appreciation of the peace and tranquility of the Ascension Parish Burial Ground. This specific effect is assessed in Tables 10.17 and 10.26.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
Conduit Head Road CA	<p>Like the Storey's Way development, Conduit Head Rd comprises a discrete residential development that is largely 'self-contained'. A significant characteristic of the CA are its abundant trees and shrubs, many of which are evergreen, through which its buildings are only glimpsed.</p> <p>The Proposed Development will be screened from within the CA and will not be visible in any views along Conduit Head Rd. There may be glimpsed views of the proposed Academic/Research buildings from the NE end of the CA but the existing vegetation between it and the Application Site will provide an effective visual barrier between the two.</p> <p>The Proposed Development NW of the CA will be partly visible in views out from the Grade II* listed Shawms on this side of the CA, as discussed in Table 10.24, but the retention of open space between the listed building/CA and the Proposed Development will ensure the effect is negligible.</p> <p>There may be glimpsed views of on-going construction activity from some parts of the CA but these will be transitory and should not affect its character and appearance.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
Proposed NIAB/Howes Place CA	<p>The Application Site does not form part of the setting of the proposed CA. There is no direct inter-visibility between the two and consequently the baseline conditions will remain unchanged (either from operational or on-going constructional activity). The proposed toucan crossing at the Huntingdon Road East Junction will not have any effect on views of or from the CA.</p> <p>The magnitude of change to this (potentially) high sensitivity asset is negligible.</p>	Negligible
Northern Extension to West Cambridge CA	<p>The extension adjoins the Storey's Way CA in the N and covers an area of university buildings and self-contained landscaped grounds. To the W an area of land excluded from the Application Site provides a gap between the proposed extension and the Conduit Head Rd CA.</p> <p>The positive views identified in the West Cambridge CA Appraisal and Management Plan will remain unaffected by the Proposed Development. The part of the Application Site adjoining this area does not contribute to the significance of the asset.</p> <p>On-going construction noise may be audible from the W part of the CA but is unlikely to be significant; this is a college campus on a principal route into the city and is already subject to traffic noise.</p> <p>The magnitude of change to this (potentially) high sensitivity asset is negligible.</p>	Negligible

Table 10.26: Likely Significant Effects of Operation on Locally listed buildings in the Storey's Way Conservation Area

Name	Likely Operational Effects	Significance of the Effect
Ascension Burial Ground Chapel, All Soul's Lane	<p>The significance of the chapel and burial ground lies primarily in its associative and illustrative historical values, being the final resting place of many Cambridge notables, including members of the Darwin family.</p> <p>The burial ground and chapel are screened from the Application Site by the existing trees and vegetation lining its NW boundary. The 2014 phase does not include development close to Storey's Way and the chapel and burial ground will not be affected. However, on-going construction noise and views of construction machinery may be evident from within the burial ground, which may affect the ability to appreciate it as a place of tranquility.</p> <p>The magnitude of change to this medium sensitivity asset is low</p>	Minor to Moderate Adverse
No.34 Storey's Way	<p>The setting of this building has already been altered by new development in its garden. The 2014 phase does not include development close to this building and it will remain unaffected. Some on-going construction noise and views of construction machinery may be evident from the building and its setting. However, this is a suburban building, included on the local list for its architectural qualities, which will remain unaffected by increased noise. Views to the rear of the building across the Application Site may be obstructed by machinery but these are not significant views of the building and have already been largely obstructed by new development behind it.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Nos. 25, 44, 52, 64 Storey's Way	<p>These buildings are all located a substantial distance from the Application Site and are well screened from it by the buildings lining the NW section of Storey's Way and by the trees at the NW end of the road. There are no views of the buildings from the Application Site and the Proposed Development at 2014 will not affect the setting of the buildings. Neither they nor their settings are likely to be affected by construction works.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible
Nos.141-145 (odd), Huntingdon Road	<p>These buildings are unlikely to be affected by the Proposed Development. Situated at the NE end of Storey's Way fronting onto Huntingdon Road, the rear plots of the neighbouring buildings on Huntingdon Road, Storey's Way and All Souls Lane form a visual barrier between the buildings and the Application Site. Consequently the Proposed Development will not be visible in views of these buildings, and neither they nor their settings will be significantly affected by on-going construction activity.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Wychfield House, Huntingdon Road	<p>This building has no visual relationship with the Proposed Development. The trees surrounding the building, together with those enclosing the W side of the Storey's Way CA, ensure that there is no inter-visibility between the building and the Proposed Development. Neither therefore will it be affected by on-going construction activity.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible

Table 10.27: Likely Significant Effects of Operation on Locally Listed Buildings in the Conduit Head Road Conservation Area

Name	Likely Operational Effects	Significance of the Effect
Clements End, Conduit Head Road Conduit Rise, Conduit Head Road	These buildings are both situated at the NW end of the CA. The buildings' settings are defined by their tree-enclosed gardens. The Application Site does not contribute to this setting. There is no development at 2014 that will have any effect on these buildings or their settings, although on-going construction activity may be visible from them and their settings. However, this should not significantly affect the ability to appreciate these buildings as heritage assets.. The magnitude of change to these medium sensitivity assets is negligible	Negligible

Table 10.28: Likely Significant Effects of Operation on Locally Listed Buildings in the Proposed NIAB/Howes Place Conservation Area

Name	Likely Operational Effects	Significance of the Effect
NIAB Building, Howes Place Nos.1-12 Howes Place	These buildings have a distinctive and closely defined setting, which will remain unaffected by the Proposed Development, which will not be visible in views from the either the NIAB building or Nos.1-12 Howes Place. Likewise there are unlikely to be any significant effects from on-going constructional activity on the buildings or their settings. The Application Site is well screened from these buildings by the houses and garden plots on the SW side of Huntingdon Road. The proposed toucan crossing at the Huntingdon Road East Junction will not have any effect on views of or from any of the locally listed buildings. The magnitude of change to these medium sensitivity assets is negligible	Negligible

Table 10.29: Likely Significant Effects of Operation on Locally Listed Buildings Assessed within the West Cambridge Conservation Area as extended

Name	Likely Operational Effects	Significance of the Effect
No.3 Huntingdon Road Blackfriars	The settings of these buildings do not extend to the Application Site. The Proposed Development will not be visible in any views of the buildings, which are located a substantial distance away from the site SE of the Storey's Way CA, Fitzwilliam College and Murray Edwards College. Therefore no effects are identified from on-going constructional activity. The magnitude of change to these medium sensitivity assets is negligible	Negligible

Table 10.30: Likely Significant Effects of Operation on Locally Listed Buildings Assessed Outside Conservation Areas

Name	Likely Operational Effects	Significance of the Effect
Nos. 171, 173 and 183, Huntingdon Road	The rear plots of these buildings abut the NE boundary of the Application Site. The settings of these buildings are clearly defined by their long and well-screened garden plots. The Application Site itself does not contribute to these settings and there is no development proposed at 2014 within this area of the Application Site. Construction noise may continue to be evident from within the buildings and their gardens, but this will not affect the ability to appreciate the buildings as heritage assets. The buildings front one of the principal routes into the city and are already subject to traffic noise.	Negligible

	The magnitude of change to this medium sensitivity asset is negligible	
No.162, Huntingdon Road	No.162 is located at some distance away from the Proposed Development on the NE side of Huntingdon Road and neither it nor its setting will be affected by the Proposed Development or by on-going construction activity. The magnitude of change to this medium sensitivity asset is negligible	Negligible
Nos.130, 136 and 138, Huntingdon Road	The settings of these buildings do not extend to the Application Site. The Proposed Development will not be visible in any views of the buildings and they will not be affected by on-going construction activity. The magnitude of change to this medium sensitivity asset is negligible	Negligible

Operational Phase - Completion of Development: 2026**Table 10.31: Likely Significant Effects of Operation on Historic Landscape Features**

Feature	Likely Effects	Significance of Effect
Physical Features of the Historic Landscape of the Application Site	Two historic field tracks and a ridge and furrow field will be retained and incorporated into the development. While these will survive within an altered context, the ridge and furrow field already exists surrounded by modern development to E and W and the Proposed Development will not represent any significant further change to the heritage asset. The beech-lined track will survive within a much altered context with new development along either side, but its retention and continued use balances this change in context. The magnitude of change to these low sensitivity assets is negligible .	Negligible
The Wider Historic Landscape, Built Environment and Setting of Cambridge	There will be a change to the historic landscape through the introduction of development on what has historically been agricultural land, thereby creating the perception of a new 'urban edge'. The Application Site lies in a transitional area between the rural hinterland west of the A428/A14 and the semi-rural and suburban character areas east of it. The open farmland in the Application Site is visible from the bridge over the A428/A14, although its rural character is diluted by the M11 cutting through the countryside, the Animal Research Station buildings and other development around its periphery. Views from the SW from Cambridge Road will retain a view with open agricultural land in the foreground and the Girton Ridge in the background. The transient views to Girton College tower and roofscape from the M11 will be retained; these will be obtained across a swathe of open land against the M11 and the narrowest part of the Proposed Development. A 'green gap' is to be retained through the eastern part of the Application Site, thereby retaining a sense of open land between Holly Nurseries and the Dept of Applied Biology on Huntingdon Road, and 'green fingers' extend through the Proposed Development, softening the new urban edge. While there will inevitably be a change to the sense of openness within the Application Site, the Proposed Development is contained east of the M11 and A14, with land of rural character retained to the west; the Proposed Development will be perceived as creating a more rapid transition from rural to suburban when approaching from the Huntingdon Road bridge over the A14 but the substantial greenery lining Huntingdon Road (and the houses in substantial gardens on the south side with tree belt against the road) will conceal the Proposed Development from direct view from the Huntingdon Road frontage, maintaining the present visual character on the approach into the city. From the M11 the higher density of built form of the Proposed Development will be visible in views across the Application Site. The 'green fingers' and retained open land will help to alleviate this. The Application Site is surrounded by differing 'grains' of built	Minor to Moderate Adverse on the wider historic landscape and built environment Minor Adverse on the wider setting of Cambridge

	<p>development and the Proposed Development will contain a mix of development that reflects both the suburban form to the north-east and the academic/institutional development of Madingley Road to the south. The new frontage against Huntingdon Road in the north-west corner of the Application Site will comprise a mix of sui generis academic/research buildings (in the location of the current Animal Research Station) and residential (in the location of the current Howe Farm), separated by a 'green finger' and new access road to break up the frontage.</p> <p>The nature of the topography of the Application Site means that the Proposed Development will be visible in longer-distance views from Cambridge Road in the south-west; however, the Proposed Development will be viewed in the distance across a foreground of open agricultural land and will not obstruct views of the Girton Ridge.</p> <p>The magnitude of change to these medium sensitivity assets is low.</p>	
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Table 10.32: Likely Significant Effects of Operation on Listed Buildings Assessed

Name, Location and Grade	Likely Operational Effects	Significance of the Effect
<p>Girton College, Huntingdon Road</p> <p>Girton Lodge, Huntingdon Road</p> <p>II* and II</p>	<p>The Proposed Development will be located within transient views towards the roofscape of Girton College and its Gatehouse tower from the M11 and from Cambridge Rd in the SW in longer-distance views. As the college stands on the Girton ridge the view of the top of the tower and other elements of roofscape will be retained, as will a swathe of open green land in the foreground of the view from the M11. Likewise, the longer view from Cambridge Rd takes in large areas of open land, in which the Proposed Development will only be visible in the distance and will retain the perception of the landform and the distinction between the agricultural landscape and the built-up edge of the city. The college building will continue to mark the transition between rural hinterland and the suburban fringes of the city. The potential CHP flue in the NW corner of the Application Site will also be visible in these views. While up to c.53.5m AOD the flue will be of 1.5m diameter and will be outside sightlines towards the Girton College Tower.</p> <p>The enclosed nature of the college grounds, which form the most significant aspect of the setting of the listed building, means that views of the development would only be gained when looking out from the secondary (NW) driveway into the grounds and the land immediately adjoining the drive, a view which does not significantly contribute to the setting of the listed building.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
<p>Nos.29, 30, 48, 54, 56, 63 and 76A, B & C, Storey's Way</p> <p>II</p>	<p>The Proposed Development will be well screened from Storey's Way and there will be limited if any inter-visibility between it and these buildings. The settings of the listed buildings are essentially formed by their garden plots, and more widely by their context as part of a distinct planned residential development, the significance of which does not rely on the presence of open farmland adjoining it. Many of these buildings are simply too far from the Application Site to have any visual relationship with it, while those closest to the site (Nos.29, 30 and 48) are also separated from it by the wooded area around the Botany School Field Station at and by No.34 Storey's Way.</p> <p>The Application Site does not contribute to the significance of the settings of these heritage assets, and the Proposed Development will have a negligible effect upon them.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible

<p>Shawms, Conduit Head Road II*</p> <p>Willow House, Conduit Head Road II*</p> <p>White House, Conduit Head Road II</p> <p>Salix, Conduit Head Road II</p> <p>Spring House, Conduit Head Road II</p>	<p>Shawms is located in the NW part of the Conduit Head Road CA close to the latter's boundary. A gap in the trees along the NW boundary of the building's garden enables a partial view of it from the adjoining ridge and furrow field. The open green space provided by this field makes some contribution to the setting of the CA itself and to the wider setting of this building. The field is to be retained as open space within the Proposed Development.</p> <p>Development up to 18m in height is proposed for the area NW of the field and will have some inter-visibility with Shawms. However, the retention of the open space between will ensure views towards the listed building are unaffected.</p> <p>Willow House, White House and Salix are well removed from the Application Site, being located at the S end of the Conduit Head Road CA. All 3 buildings are enclosed by trees and there is no inter-visibility between them and the Application Site, which makes no contribution to their significance as heritage assets or to their settings.</p> <p>Spring House is well concealed from the Application Site and its setting will not be affected by the Proposed Development. Views to the NE towards the Application Site will be restricted by the belt of trees which stands along the NE boundary of the CA.</p> <p>The magnitude of change to these high sensitivity assets is negligible</p>	Negligible
<p>The Observatory, Madingley Road II</p> <p>The Northumberland Dome, Madingley Road II</p>	<p>These buildings are located within tree-enclosed landscaped grounds accessed from a long driveway off the N side of Madingley Road. The Application Site abuts the grounds to the NE and NW but is not visible through the thick belt of trees enclosing them. The Proposed Development will not be visible in significant views of the Observatory or the Northumberland Dome. While there may be limited inter-visibility above the tree line NW of the Observatory this will not affect the view of the Observatory's façade (the area to the rear having been developed with Greenwich House during the 1990s).</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Churchill College Buildings, Churchill Road. II</p> <p>Including: Sheppard Flats;</p> <p>Three groups of two- to three-storey linked residential courts (listed separately)</p> <p>Churchill College Chapel</p> <p>Wolfson Hall, Bracken Library and Bevin Rooms (all one building)</p> <p>Central Churchill College Building</p>	<p>The shared landscaped campus setting of these buildings does not extend to the Application Site. All the Churchill College buildings are located a significant distance away from it and the Proposed Development will not be visible in any significant views of the listed buildings.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible
<p>Murray Edwards College (formerly New Hall), Huntingdon Road II</p> <p>The Grove, Huntingdon Road II</p>	<p>These buildings are located a substantial distance from the Application Site SE of the Storey's Way CA. The development will not have any visual effect on these buildings or their settings.</p> <p>The magnitude of change to these high sensitivity assets is negligible.</p>	Negligible

Table 10.33: Likely Significant Effects of Operation on Conservation Areas Assessed

Name	Likely Operational Effects	Significance of the Effect
Storey's Way CA	<p>A key element of the CA is its nature as a discrete and distinctive planned residential development that is largely 'self-contained'. There are few views into it and few views out, and few views in either direction that are of significance to its setting as a heritage asset. It is an inward-looking development, the character and significance of which is appreciated from within rather than without. This distinctiveness will not be affected by the Proposed Development.</p> <p>The part of the Application Site adjoining the NW boundary of the CA has been allocated for residential development with a maximum building height of 10m. The views along Storey's Way will remain unchanged by this, and the development will be concealed in most views across the CA.</p> <p>Views of the Proposed Development from the CA will be limited to those from No.34 Storey's Way and its garden and from the newly erected building adjacent to it. There may also be glimpsed views of the Proposed Development between the gap in the trees lining the NW boundary of the Ascension Parish Burial Ground.</p> <p>The Proposed Development will fill the currently open view towards the CA from the tree-lined track from Huntingdon Rd to Gravel Hill Farm. However, this view is largely of a belt of trees with only glimpsed views from here of the chapel and of No.34 (and the large new building adjoining it). This is not a key view of the CA.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
Conduit Head Road CA	<p>Like the Storey's Way development, Conduit Head Rd comprises a discrete residential development that is largely 'self-contained'. A significant characteristic of the CA are its abundant trees and shrubs, through which its buildings are only glimpsed. Like Storey's Way, the distinctiveness of the Conduit Head Road CA will be retained,</p> <p>The Proposed Development will be screened from within the CA and will not be visible in any views along Conduit Head Rd. There may be glimpsed views of the proposed Academic/Research buildings from the NE end of the CA but the existing vegetation between it and the Application Site will provide an effective visual barrier between the two.</p> <p>The Proposed Development NW of the CA will be partly visible in views out from the Grade II* listed Shawms on this side of the CA, as discussed in Table 10.13, but the retention of open space between the listed building/CA and the Proposed Development will ensure the effect is negligible.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible
Proposed NIAB/Howes Place CA	<p>The Application Site does not form part of the setting of the proposed CA. There is no inter-visibility between the two and consequently the baseline conditions will remain unchanged.</p> <p>The magnitude of change to this (potentially) high sensitivity asset is negligible</p>	Negligible
Northern Extension to West Cambridge CA	<p>The extension adjoins the Storey's Way CA in the N and covers an area of university buildings and self-contained landscaped grounds. To the W an area of land excluded from the Application Site provides a gap between the proposed extension and the Conduit Head Rd CA.</p> <p>The positive views identified in the West Cambridge CA Appraisal and Management Plan will remain unaffected by the Proposed Development. The part of the Application Site adjoining this area does not contribute to the significance of the asset.</p> <p>The magnitude of change to this high sensitivity asset is negligible.</p>	Negligible

Table 10.34: Likely Significant Effects of Operation on Locally listed buildings in the Storey's Way Conservation Area

Name	Likely Operational Effects	Significance of the Effect
Ascension Burial Ground Chapel, All Soul's Lane	<p>The significance of the chapel and burial ground lies primarily in its associative and illustrative historical values, being the final resting place of many Cambridge notables, including members of the Darwin family.</p> <p>The burial ground and chapel are screened from the Application Site by the existing trees and vegetation lining its NW boundary. There may be glimpsed views of the Proposed Development between the trees but the significant views of the chapel across the burial ground will remain unaltered. The view of the chapel from the track leading from Huntingdon Road to Gravel Hill Farm will be lost; while an attractive view, which retains some sense of the chapel's former semi-isolation in the agricultural landscape, this effect has recently been diluted by the construction of a large new building behind No. 34 Storeys Way, which is highly visible in and dominates the same view.</p> <p>The magnitude of change to this medium sensitivity asset is low</p>	Minor Adverse
No.34 Storey's Way	<p>The setting of this building has already been affected by new development in its garden, which is highly visible in views across the application site from the west. The proposed residential development adjoining the plot of No.34 will be visible from the upper storeys of the building and possibly from its garden but the Application Site does not in itself currently make a significant contribution to the significance of the building and this will therefore have no effect on the significance of the building.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Nos. 25, 44, 52, 64 Storey's Way	<p>These buildings are all located a substantial distance from the Application Site and are well screened from it by the buildings lining the NW section of Storey's Way and by the trees at the NW end of the road. There are no views of the building from the Application Site and the Proposed Development will not affect the settings of the buildings.</p> <p>The magnitude of change to these medium sensitivity assets is negligible</p>	Negligible
Nos.141-145 (odd), Huntingdon Road	<p>These buildings are unlikely to be affected by the Proposed Development. Situated at the NE end of Storey's Way fronting onto Huntingdon Road, the rear plots of the neighbouring buildings on Huntingdon Road, Storey's Way and All Souls Lane form a visual barrier between the buildings and their settings and the Application Site. Consequently the Proposed Development will not be visible in views of these buildings and will not affect them or their settings.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible
Wychfield House, Huntingdon Road	<p>This building has no visual relationship with the Proposed Development. The trees surrounding the building, together with those enclosing the W side of the Storey's Way CA, ensure that there is no inter-visibility between the building and its setting and the Proposed Development.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible

Table 10.35: Likely Significant Effects of Operation on Locally Listed Buildings in the Conduit Head Road Conservation Area

Name	Likely Operational Effects	Significance of the Effect
Clements End, Conduit Head Road Conduit Rise, Conduit Head Road	<p>These buildings are both situated at the NE end of the CA. The buildings' settings are defined by their tree-enclosed gardens. The Application Site does not contribute to this setting. The proposed academic/research development on the area of the Application Site adjacent to this end of the CA is therefore unlikely to have any effect on the setting of the buildings.</p> <p>The magnitude of change to this medium sensitivity asset is negligible</p>	Negligible

Table 10.36: Likely Significant Effects of Operation on Locally Listed Buildings in the Proposed NIAB/Howes Place Conservation Area

Name	Likely Operational Effects	Significance of the Effect
NIAB Building, Howes Place Nos.1-12 Howes Place	These buildings have a distinctive and closely defined setting, which will remain unaffected by the Proposed Development, which will not be visible in views from the either the NIAB building or Nos.1-12 Howes Place. The Application Site is well screened from these buildings by the houses and garden plots on the SW side of Huntingdon Road. The magnitude of change to this medium sensitivity asset is negligible	Negligible

Table 10.37: Likely Significant Effects of Operation on Locally Listed Buildings Assessed within the West Cambridge Conservation Area as extended

Name	Likely Operational Effects	Significance of the Effect
No.3 Huntingdon Road Blackfriars	The settings of these buildings do not extend to the Application Site. The Proposed Development will not be visible in any views of the buildings, which are located a substantial distance away from the site SE of the Storey's Way CA, Fitzwilliam College and Murray Edwards College. The magnitude of change to this medium sensitivity asset is negligible	Negligible

Table 10.38: Likely Significant Effects of Operation on Locally Listed Buildings Assessed Outside Conservation Areas

Name	Likely Operational Effects	Significance of the Effect
Nos. 171, 173 and 183, Huntingdon Road	The rear plots of these buildings abut the NE boundary of the Application Site. The settings of these buildings are clearly defined by their long and well-screened garden plots. The Application Site itself does not contribute to these settings and the proposed residential development within this area of the Application Site is unlikely to have an effect upon their significance or their settings. The magnitude of change to this medium sensitivity asset is negligible	Negligible
No.162, Huntingdon Road	No.162 is located at some distance away from the Proposed Development on the NE side of Huntingdon Road and neither it nor its setting will be affected by the Proposed Development. The magnitude of change to this medium sensitivity asset is negligible	Negligible
Nos.130, 136 and 138, Huntingdon Road	The settings of these buildings do not extend to the Application Site. The Proposed Development will not be visible in any views of the buildings. The magnitude of change to this medium sensitivity asset is negligible	Negligible

10.5 Effect of Highways and Utility Works

10.5.1 The effect of the highway and utility works have been assessed as part of the main assessment work set out above.

10.6 Effect of Additional Traffic

10.6.1 During the construction phase of the Proposed Development there will be an increase in traffic flows along part of Madingley Road which is pertinent to heritage assets situated along Madingley Road. Even if this increase were noticeable, however, this would be against the background that Madingley Road is already well-used as a principal route into and out of the city and an increase in flows will not, therefore, have a significant effect on heritage assets or their settings.

10.6.2 During the operation phase at 2014 there will continue to be an increase in traffic flows along part of Madingley Road in connection with on-going construction and there will also be increases in flows associated with operational activity of the new development along both Huntingdon Road and Madingley Road, which is pertinent to heritage assets situated along Madingley Road and Huntingdon Road. Again even if this increase in traffic were noticeable this would be against the background that Madingley Road and Huntingdon Road are already well-used as principal routes into and out of the city and an increase in flows will not, therefore, have a significant effect on heritage assets or their settings.

10.6.3 At 2026 there will be increase in traffic flows along Madingley Road and Huntingdon Road associated with the operational activity of the new development. Again this is pertinent to heritage assets situated along Madingley Road and Huntingdon Road. While the increase will be greater than in 2014 the same conclusions would apply as the 2014 scenario i.e given that both these roads are already well-used as principal routes into and out of the city an increase in flows will not have a significant effect on heritage assets or their settings.

10.7 Cumulative Effects

10.7.1 Other sites to be developed in the vicinity of the Proposed Development include those set out below in **Table 10.39**. Chapter 1 of this ES sets out the projected development of these sites as at 2014 and at 2026. The collective effects of the Proposed Development in combination with the development of these sites has also been assessed.

Table 10.39: Summary of Other Sites to be Developed in the Vicinity

Development	Description
West Cambridge	S of the Application Site. The development is an edge of town University Campus based around research facilities. Existing buildings date from the 1950s and '70s with more recent developments from the last ten years. The central and northern areas of the development are in operation and comprise large buildings in an open landscape with wide streetscapes.
NIAB1	Immediately NE of the Application Site. Mixed-use development comprising up to 1593 dwellings, primary school, community facilities, retail units and associated infrastructure.
NIAB2	NE of the Application Site and NE of NIAB1. Site allocated for sustainable housing-led urban extension of Cambridge.
Northstowe	NW of the Application Site, N of Oakington (former Oakington Barracks site). New town with residential and employment development.
Orchard Park	NE of Application Site and NE of NIAB1 and NIAB2. Mixed-use development and associated infrastructure.

10.7.2 The development at Northstowe is simply too far away to contribute to any cumulative effect on heritage assets in the vicinity of the Proposed Development. Likewise, the Orchard Park site has no direct relationship with the heritage assets assessed here.

10.7.3 As Chapter 6 Landscape and Visual Issues describes, there will theoretically be inter-visibility between the Application Site and NIAB1 and West Cambridge, but it is unlikely that all three developments will be seen in combination. While these three developments in combination with NIAB2 will cumulatively increase the density of development on the north-west side of Cambridge, this will not have any significant cumulative effect on the heritage assets assessed, which already lie within a built-up area defined by the A14, M11 and Huntingdon Road.

10.8 Summary

Introduction

10.8.1 This chapter assesses the likely significant effects of the Proposed Development on cultural heritage assets (the historic landscape, statutorily listed buildings, locally listed buildings and conservation areas) and their settings.

Baseline Conditions

10.8.2 The historic landscape of and pattern of development in the Application Site and its vicinity was discussed and analysed in relation to its importance to the city of Cambridge. The contribution made by the Application Site to the historic landscape has been assessed.

10.8.3 A number of designated heritage assets stand in proximity to the Application Site (and there is a small number of non-designated farm buildings within the Application Site). The significance of the heritage assets and their settings (as listed below) has been assessed:

- three Grade II* listed buildings;
- 22 Grade II listed buildings;
- three existing conservation areas;
- one proposed new conservation area;
- 33 locally listed buildings;
- Undesignated farm buildings within the Application Site.

10.8.4 This included an assessment of the contribution the Application Site makes to the significance of each heritage asset and its setting.

10.8.5 In making these assessments, full regard has been had for the relevant policy framework in relation to the historic environment.

10.8.6 Analysis informed by historical background research was used to inform the assessment, coupled with site visits in the summer and winter months to every heritage asset within the study area, and professional judgement was used to assess the magnitude of effect.

Likely Significant Effects

10.8.7 The significance of effects was assessed by taking into account the sensitivity of the heritage assets and the extent to which they would be affected by the construction and operation phases of the Proposed Development. The sensitivity of the heritage assets is dependent on factors such as the heritage value of the asset. Effect magnitude is a function of the nature, scale and type of disturbance, or damage, to the heritage asset.

10.8.8 Following this assessment it is considered that during the constructional phase of the Proposed Development, the likely effects on physical features of the historic landscape of the Application Site and the wider historic landscape will range from Minor Adverse to Minor to Moderate Adverse, while the effects on the settings of listed buildings, existing and proposed conservation areas and locally listed buildings will range from Negligible to Minor to Moderate Adverse. These effects will be indirect and temporary. Permanent effects arising from this phase relate to the demolition of a small number of non-designated farm buildings of low significance within the Application Site, resulting in a Moderate Adverse effect.

10.8.9 During the operational phases (at years 2014 and 2026) the effects are likely to range from Negligible to a Minor to Moderate Adverse effect on the Ascension Burial Ground Chapel within the Storey's Way Conservation Area, arising from on-going construction activity at the 2014 stage.. There will continue to be construction activity on the Application Site in 2014 and this has been taken into account in

the analysis of effects. A Minor to Moderate Adverse effect on the wider historic landscape is also identified, arising from the introduction of development on agricultural land and the creation of a new 'urban edge'. However, it is considered that the effect this has on the wider setting of the historic city of Cambridge itself is Minor Adverse.

Conclusions

10.8.10 This chapter has assessed the likely significant effects of the Proposed Development on heritage assets and their settings. No significant adverse effects on heritage assets have been identified other than during the construction phase; Minor and Moderate Adverse effects predicted during this phase will be indirect and temporary (excepting the demolition of non-designated buildings). Mitigation incorporated into the design of the Proposed Development will ensure that in years 2014 and 2026 the effects will range from Negligible to Minor/Moderate Adverse.

10.7 References

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11 AGRICULTURE

11.1 Introduction

11.1.1 This chapter identifies and quantifies the likely significant effects of the Proposed Development on agricultural interests. A field survey has been undertaken to identify the agricultural land classification and the survey findings are reported (as shown on **Figure 11.3**), along with descriptions of the use made of the land in terms of agricultural businesses.

11.1.2 The Application Site is shown on **Figure 1.2** and extends to approximately 150ha, of which approximately 125ha is agricultural land, with the remainder in use with agricultural and other buildings, including research facilities. Some 3.31ha is designated as a Site of Special Scientific Interest (on geological grounds), but the majority of the land within this area is still capable of agricultural use as permanent pasture used for grazing livestock.

11.1.3 The detail of the Proposed Development is set out in Chapter 2 with the phasing of the Proposed Development set out in **Figures 3.1** and **3.2**. This chapter provides an assessment of the effects of the Proposed Development on agriculture at approximately the end of Phase 1 (in 2014) and the completion of the project in 2026.

11.2 Assessment Approach

Methodology

11.2.1 In broad terms, the study is intended to identify and assess the likely significant effects of the Proposed Development on agricultural resources and interests.

11.2.2 The framework for undertaking an Environmental Impact Assessment is set out in the EC Directive 'The Assessment of the Impacts of Certain Public and Private Projects on the Environment (85/337/EEC)'. This framework is given force in the UK by the EIA Regulations.

11.2.3 This framework does not contain detailed guidance on the specific aspects of agriculture which should be included in any impact assessment, and the manner in which they should be treated. Therefore, the approach adopted has been derived from the current planning advice from central and local Government on the treatment of agricultural issues in development affecting farmland. This advice provides a guide to the factors which ought to be examined in an assessment of the effects of development proposals upon agriculture, as well as a policy framework within which weight can be attached to the significance of particular effects. This approach accords with the advice set out in the DETR Good Practice Guide 'Preparation of Environmental Statements for Planning Projects that require Environmental Assessment' (1995).

11.2.4 National land use development policies seek to safeguard scarce natural resources in the long-term national interest and give protection to the best and most versatile agricultural land. Little weight of protection is given to land of lower quality unless the land has other special environmental characteristics.

11.2.5 The inherent quality of soil, as distinct to its agricultural value, is recognised in the Government's 'Soil Strategy for England' which seeks to encourage the more sustainable management of soil resources. There is a general imperative which seeks to ensure the proper consideration of soil implications during the planning and development process, and to reduce the effect of the construction and development sectors on the long-term functioning of soils. In the latter respect, in 2009 Defra published the 'Code of Practice for the Sustainable Use of Soils on Construction Sites' which requires:

- i) identification of soil resources at an early stage in the development process;
- ii) improved planning of soil use;

- iii) a better level of soil management during project implementation, including sustainable use of surplus soil;
- iv) maintenance of soil quality and function both on and off site;
- v) avoidance of soil compaction and erosion (with a consequent reduction in flooding and water pollution);
- vi) an improved knowledge and understanding of soil at all levels in the construction industry, including soil amelioration techniques.

11.2.6 With farm businesses it continues to be Government policy to maintain an environment in which a competitive and sustainable agricultural industry with a strong market focus can flourish.

11.2.7 These policy objectives form the basis of the assessment of the effects of the Proposed Development on agriculture, and have defined the scope of the effects to be identified and examined in this study. These are:

- i) the quantity and quality of agricultural land that would be permanently taken;
- ii) the quantity and quality of agricultural land that would be affected temporarily (i.e. translocated);
- iii) the effect of land loss (and possible severance during phasing) on the farming business;
- iv) the loss of agricultural buildings and other farm infrastructure.

11.3 Policy Framework

11.3.1 A detailed examination of the planning context for this Proposed Development is provided at Chapter 4, and only a summary of the policies relevant to development of agricultural land is provided here.

National Policy

11.3.2 The planning context for development such as this was set out in Planning Policy Statement (PPS) 7: Sustainable Development in Rural Areas (2004). Paragraph 28 of PPS7 stated:

“The presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification), should be taken into account alongside other sustainability considerations (e.g. biodiversity; the quality and character of the landscape; its amenity value or heritage interest; accessibility to infrastructure, workforce and markets; maintaining viable communities; and the protection of natural resources, including soil quality) when determining planning applications. Where significant development of agricultural land is unavoidable, local planning authorities should seek to use areas of poorer quality land (grades 3b, 4 and 5) in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations.”

11.3.3 There were no policies that seek the protection of lower quality agricultural land from development. PPS7 simply stated:

“Little weight in agricultural terms should be given to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute in some special way to the quality and character of the environment or the local economy”.

11.3.4 These “particular agricultural” circumstances do not apply at the Application Site.

11.3.5 Importantly, paragraph 29 emphasised that it is for local planning authorities to decide whether best and most versatile agricultural land can be developed, having carefully weighed the options in the light of competent advice.

11.3.6 There was no guidance within PPS7 with regard to the effects of development on farm holdings, although guidance in Natural England's Technical Information Note (TIN) 049 indicates that land quality is not the sole consideration in how development proposals affect agriculture within the planning system, with other factors, such as the impact on farm size and structure, the use of buildings and other fixed equipment, or any stimulus a development might give to rural economic activity, also being relevant.

National Planning Policy Framework (NPPF)

11.3.7 The NPPF recognises that planning should support the rural economy. Paragraph 112 indicates that local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality,

Regional, County and Local Policies

11.3.8 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

11.3.9 The East of England Plan (2008) also seeks the protection of best and most versatile agricultural land from irreversible development noting at paragraph 9.24:

"The region has one of the highest concentrations of high quality agricultural land in the country. Under national policy as set out in PPS7 (sustainable development in rural areas) and the principles of sustainable development this land should, where possible, be protected from irreversible damage".

11.3.10 However, notwithstanding the presence of high quality agricultural land, the principle of extensive development at North West Cambridge is supported in Policies CSR1-CRS3 of this plan.

11.3.11 The majority of the policies in the Cambridgeshire and Peterborough's Structure Plan (2003) were superseded by the publication of the East of England Plan. However, Policy P1/2 followed the national guidance and stated that development that would significantly affect the best and most versatile agricultural land would be restricted.

11.3.12 The coalition government's stated intention to revoke the Regional Spatial Strategies is noted; however, following the second CALA homes decision, the Regional Spatial Strategy remains part of the statutory development plan although the Government's intention to abolish the Regional Spatial Strategies remains a material consideration.

11.3.13 At the Local Plan level there are no saved policies in the Cambridge Local Plan that deal with the protection of best and most versatile agricultural land. Policy NE/17 of the South Cambridge Local Plan (2007) states that the District Council will not grant planning permission for development which would lead to the irreversible loss of Grades 1, 2 or 3a agricultural land unless the land is allocated for development in the Local Development Framework (LDF).

11.3.14 The appropriateness of this site for development was subject to an Area Action Plan Sustainability Appraisal which set out a series of "Sustainability Appraisal Objectives" including the need to:

"minimise the irreversible loss of undeveloped land and productive agricultural holdings".

11.3.15 The Area Action Plan has since been subject to independent examination with the Planning Inspector determining that, subject to various amendments, the Sustainability Appraisal was appropriate and the land should be safeguarded for development. As such, the irreversible loss of best and versatile agricultural land to the development has been weighed in the balance along with other sustainability criteria, and found to be acceptable. The North West Cambridge AAP was formerly adopted in October 2009 following the Inspectors' binding changes.

11.4 Significance Criteria

11.4.1 The relative importance of the agricultural land that would be affected is scaled according to the ALC system as set out in **Table 11.1**.

Table 11.1: Importance of Agricultural Land Based on Agricultural Land Classification

Importance	ALC Category
High	Grade 1
Medium	Grade 2 and 3a
Low	Grade 3b
Negligible	Grades 4 and 5

11.4.2 There is very little guidance as to the magnitude of land take which is considered to be significant. Some assistance on this point is given in the 'Town and Country Planning (Development Management Procedure) Order' (2010) which requires Local Planning Authorities to consult Defra about any planning application that is a) not in accordance with the development plan, and b) would involve the loss of 20ha or more of high quality agricultural land in Grades 1 and 2 and Subgrade 3a. However, as PPS7 makes clear, the presence of best and most versatile agricultural land is always of significance and this has been confirmed in Secretary of State decisions where even very small areas of best and most versatile have been important. Yet, the 20ha threshold also has relevance and for such assessments a landtake of more than 20ha is considered to be a Large Effect, as scaled in **Table 11.2**, with lesser areas being of relatively less effect.

Table 11.2: Magnitude of Effect of Land Take of Agricultural Land

Scale of Effect	Land Take of Agricultural Land Area
Large	More than 20 hectares
Medium	5 – 20 hectares
Small	Less than 5 hectares
Negligible	Less than 0.1 hectares

11.4.3 Significance is calculated by combining the scale of effect and the importance or sensitivity of the resource. Again, there is no published method which specifies how the significance of the effect should be scaled with regard to agricultural or other land use and hence a generalised approach has been taken, based on professional judgment, as shown below in **Table 11.3**:

Table 11.3: Significance Matrix for Agricultural Land

Importance of Agricultural Land	Magnitude of Effect Upon Land Take on Agricultural Land			
	Large	Medium	Small	Negligible
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Moderate/Minor	Minor	Negligible
Low	Minor	Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

11.4.4 There is no standardised method for determining the effects of development proposals on agricultural businesses and thus professional judgement, having regard to relevant legislation and advice has been used for this assessment and considers the effect on each of the businesses affected individually. **Table 11.4** sets out the classification criteria.

Table 11.4: Guidance for Estimating the Effect on Agricultural Units

Significance Criteria	Definition
Major Adverse	The effect of the proposal would be likely to render the holding non-viable.
Moderate Adverse	The commercial viability of the holding should not be threatened but substantial changes in day-to-day management may be required.
Minor Adverse	The commercial viability of the holding would not be threatened but minor changes in day-to-day management would be required.
Negligible	The financial effect would be insignificant in relation to net holding income and there would be an insignificant change in day-to-day management.
Minor Beneficial	The day-to-day management of the unit would be made easier.
Moderate Beneficial	The potential profitability of the holding would be marginally improved and the day-to-day management of the unit would be made substantially easier.
Major Beneficial	The profitability of the holding would be significantly enhanced and the day-to-day management of the unit would be made substantially easier.

11.5 Limitations to the assessment

11.5.1 Access to all land was possible; there are no limitations to the assessment.

11.6 Baseline Conditions

11.6.1 The quality of agricultural land in England and Wales is assessed according to a system devised by the former Ministry of Agriculture, Fisheries and Food (MAFF) and known as the Agricultural Land Classification (ALC). This is a nationally applicable system used for land use planning and development control. The ALC provides a framework for classifying land according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use.

11.6.2 The principal physical factors influencing agricultural production are climate, site and soil. These factors, together with interactions between them, form the basis for classifying land into one of five grades; Grade 1 land being of excellent quality and Grade 5 land of very poor quality. Grade 3, which constitutes

about half of the agricultural land in England and Wales, is divided into two subgrades designated 3a and 3b.

11.6.3 The main climatic factors are temperature and rainfall although account is taken of exposure, aspect and frost risk. The site factors used in classification are gradient, microrelief and flood risk. Soil characteristics of particular importance are texture, structure, depth and stoniness. These climatic, site and soil factors result in varying degrees of constraint on agricultural production. They can act either separately or in combination, the most important interactive limitations being soil wetness and droughtiness.

11.6.4 The grade or subgrade of land is determined by the most limiting factor present. When classifying land the overall climate and site limitations should be considered first as these can have an overriding influence on the grade.

11.6.5 The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4; this land, although less significant on a national scale, can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands. Descriptions for the various grades are produced at **Appendix 11.1**.

The Provisional MAFF ALC grading for north-west Cambridge

11.6.6 Provisional ALC information for the area was published by MAFF in 1970 (Sheet 135) and indicates that the agricultural land to the north-west of Cambridge is a mix of Grades 2 and 3 (see **Figure 11.1**). However, these classification maps were based on earlier iterations of the methodology for land classification, have scale limitations and, in the case of Grade 3, do not distinguish between Subgrades 3a and 3b, which has particular relevance in any assessment of effect on best and most versatile agricultural land. They are thus not suitable for use in evaluating any individual sites for development and, in order accurately to determine the quality of the land at the Application Site, a detailed field survey has been undertaken.

Previous ALC data

11.6.7 A semi-detailed soil survey of the area was undertaken in the 1960s (Hodge & Seale, 1966) with an updating exercise undertaken in 1984 when the grade boundaries were simplified and the soils given their modern names for the national 1:250,000 soil map (Hodge et al. 1984). These surveys showed the drift plateau to be mostly covered by the Milton soil association, and the unmantled Gault slopes by the Evesham 3 association. The map also shows disturbed land in areas that were previously dug for gravel, coprolite and clay. Apart from the sunken area of the coprolite pit on the Traveller's Rest SSSI, the main traces of previous workings are some slight irregularities in the surface topography.

- i) Milton Association: the soils of this association vary considerable in the quantity and type of their stones. The stonier loams which are not calcareous in the upper layers are Milton series soils. The soils that are calcareous almost to the surface are Badsey series soils.
- ii) Evesham 3 Association: the main soil series is Evesham series, which is a calcareous pelosol. The topsoil may be slightly silty but otherwise textures are clay throughout. The subsoil is well structured olive clay, often unmottled in the upper part but usually with ochreous mottles below 50 cm. Stone contents are low.

11.6.8 The Evesham clays on Gault are moderately permeable soils, and are calcareous, unmottled in the upper subsoil, well structured and only slightly downgraded on account of restricted drainage. The drift soils are mostly freely drained, with only small areas with subsoil clay layers designated as slowly permeable. These areas are marked by tractor ruts with some standing water.

11.6.9 The dry climate means that moisture deficits are significant in very sandy and stony drift soils but not in the loams or clays.

The Detailed ALC Survey Results

General Features, Land Form and Drainage

11.6.10 The underlying bedrock geology of the Application Site is moderately calcareous sedimentary Gault Clay of Cretaceous age, though much of the northern and eastern part of the area is covered with Quaternary glacio-fluvial outwash deposits. The younger Cretaceous Chalk appears to underlie the Quaternary drift to the northeast of the area, but it was only encountered as chalky fragments in the drift.

11.6.11 The dominant material in the Quaternary drift is Head, a transported material formed under periglacial conditions usually through colluvial action. It is mostly stony, with predominantly flint and other siliceous stones but including chalk and Gault fragments in places. The matrix is medium or coarse, including sharp coarse sands. There is some fine grained alluvium on the floodplain of Washpit Brook, though this is difficult to differentiate from the Gault.

11.6.12 The northern and eastern part of the Application Site lies on a low drift plateau, at elevations of 21 - 23 m above Ordnance Datum (aOD). There is a slight break of slope down to the gentle ($< 3^\circ$) sides of the broad shallow valley of Washpit Brook, the floodplain of which is at about 12-14 m aOD.

11.6.13 The break of slope marks a distinct boundary between the two main soil parent materials in the area, with stony loams and sands on the drift plateau in the north and east and unmantled Gault Clay forming the soils on the slopes to the south and west. In the east the drift shallows out to 40-80 cm, and is underlain by the Gault. Where the clay is moderately permeable, this combination gives small areas of high quality soils, though usually the Gault is poorly-permeable and impedes soil drainage.

11.6.14 The land mostly drains south-westwards down to Washpit Brook, which is a tributary of the Cam. Surface drainage is mostly good on the coarser drift, but there are signs of poaching on the clays on the lower slopes.

Climatic Factors

11.6.15 The local climatic factors have been interpolated from the Meteorological Office's standard 5km grid point data set for the centre of the Application Site at a representative altitude and are given in **Table 11.5**. The local climate has rainfall which is typical for much of eastern England and can be considered dry by national standards. Temperatures are moderately warm to warm. The moisture deficits are moderately severe and the field capacity days (FCD) are below the national average. There are thus no climatic limitations to arable cultivation, or in the ALC grading.

Table 11.5: Local climatic factors

Average annual rainfall (AAR)	562 mm
Accumulated temperature $> 0^\circ\text{C}$ (AT0)	1446 days $^\circ$
Field Capacity Day regime (FCD)	94 days
Average moisture deficit, wheat (MDw)	119 mm
Average moisture deficit, potatoes (MDp)	114 mm

Soil Survey Methods

11.6.16 The density of observations used in ALC surveys is usually about 1 per hectare and in this case 125 soil profiles were examined using an Edelman (Dutch) auger and spade. The locations of observations are indicated on **Figure 11.2**. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120 cm or any impenetrable layer:

- i) soil texture;

- ii) significant stoniness;
- iii) colour (including local gley and mottle colours);
- iv) consistency;
- v) structural condition;
- vi) free carbonate; and
- vii) depth.

11.6.17 The soil wetness class (WC) was inferred from the colour of the soil matrix; the presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil layers at least 15 cm thick. In addition, account has been taken of apparent local high water tables influencing soil drainage.

11.6.18 Soil droughtiness was investigated by the calculation of moisture balance equations where the crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The moisture deficit is a function of potential evapotranspiration and rainfall. The grading of the land can be affected if the available water (based on rainfall figures) is insufficient to balance the calculated/ estimated moisture requirement. When a profile is found with significant stoniness, sufficient to prevent penetration of a hand auger, then it is assumed, for the purposes of calculating droughtiness, that similar levels of stoniness continues to the full 1.2 m depth considered.

Site specific ALC and Main Limitations of the Application Site

11.6.19 Assessment of quality has been carried out according to the MAFF revised guidelines (1988). Most of the soils qualify for ALC Subgrade 3a, and are potentially productive and allow flexibility of cropping. The bulk of the clay soils are of WCIII, but have calcareous topsoils which give a moderate limitation due to workability to Subgrade 3a. Some of the clays on the lower slopes are more restricted in their periods of workability during wet weather by being non-calcareous, and qualify as Subgrade 3b, as do some small wet and rutted patches on the drift.

11.6.20 Because of their moderate depth, the drift soils with mainly loamy fine earth textures are not downgraded due to droughtiness to grades lower than Subgrade 3a, even where they have relatively high stone contents. The soils with predominantly sand or loamy sand subsoils are more prone to droughtiness and are downgraded to Subgrade 3b.

11.6.21 The limited area of shallow drift over clay in the east qualifies as Grade 2. The areas of each grade or subgrade are given in **Table 11.6**, and shown on **Figure 11.3**.

Table 11.6: ALC Areas

Grade	Area (ha)	Area (% of agric. land)
Grade 1	0	0
Grade 2	6.0	5
Subgrade 3a	107.0	85
Subgrade 3b	12.0	10
Grade 4	0	0
Grade 5	0	0
Total agricultural	125.0	100
Non agricultural	25.0	
Total Area	150.0	

The Farming Business

11.6.22 The agricultural land that would be affected by the Proposed Development is predominantly farmed and managed by the Cambridge University Farm (CUF). Some small areas are occupied by the Agronomy Unit for research purposes, though this still forms part of the management structure of CUF; and some is occupied by the University Department of Physiology, Development and Neuroscience (which lies outwith the management structure of CUF), again for research purposes. This assessment is concerned solely with the effect on the agricultural business.

11.6.23 CUF farms some 1,052ha (2,600 acres) of land in the general locality, of which approximately 62% is owned by the University and 38% is rented from various colleges and private land owners. The land affected by the Proposed Development is exclusively owned by the Applicant.

11.6.24 The land is farmed mainly with wheat and break crops on some 650ha with the balance as grassland. This grass is stocked with a herd of some 200 cows (due to rise to 250 cows) and a flock of 220 ewes kept mainly to provide lambing opportunities for the University veterinary students. All youngstock are kept and either reared as replacements for the dairy herd or sold finished for beef.

11.6.25 The farm employs five full-time staff with a farm manager, a dairy manager, a herdsman, an arable supervisor, one general farm worker and a summer-time student to assist with arable operations.

11.6.26 The land farmed is dispersed and there are currently four main groups of farm buildings utilized by the business. These are:

- i) *Howe Farm, Huntingdon Road*: this farm was the main centre of operations for the farm until relatively recently and is situated at the north-western end of the Application Site. This group of buildings includes the farm office; some 2,000m² of cattle buildings; a bulk grain store and granary and a potato store. The buildings are becoming somewhat aged and in need of considerable investment to bring up to modern standards. This investment will not now take place as the farm business has invested heavily in new facilities at Park Farm, Maddingley;
- ii) *Gravel Hill, Storey Way*: this unit is located at the south-eastern end of the Application Site and is also in need of considerable investment - which will not now occur. The buildings were well suited to cattle (beef) production and comprise over 2,500m² of cattle sheds. In addition there are general storage buildings, a workshop and a 570m² grain store;
- iii) *Park Farm, Maddingley*: this farm is located some 4 miles west of the Application Site and has been farmed by the University for the past 60 years. It extends to some 500ha and provides the grazing and winter conserved feeds for the dairy herd. Significant investment was made to the farm in 1996/7 when all new cow accommodation was installed for a 200-cow dairy herd, along with a new milking parlour and dairy. These facilities have served the unit well but further investment is now

being undertaken to a) provide upgraded slurry storage facilities necessary to comply with the newly emerging Nitrate Vulnerable Zone regulations (set out in the Nitrate Pollution Prevention Regulations 2008, Statutory Instrument 2008/2349), and b) to enable the installation of four robotic milking machines. Dairy herd numbers will also be increased to 250 cows.

- iv) *Yarmouth Farm, Lolworth*: the farm at Lolworth lies some 5 miles from Maddingley and was purchased by the University in 2007; it extends to 120ha. The land is all heavy clay loam and well suited to arable production. The buildings at the farm include machinery stores and a 2,000 tonne grain store. The land was also acquired to partially off-set the loss of agricultural land at the Application Site.

11.7 Likely Significant Effects

11.7.1 The assessment of likely significant effects that follows assumes that all measures to avoid or manage any adverse effects identified in Chapter 2 of this ES and the Construction Environmental Management Plan will be incorporated, and thus the likely effects are residual.

Agricultural land

Identification

11.7.2 The principal agricultural resource is farmland, and the main policy consideration is the protection of land of best and most versatile quality. The Application Site extends to approximately 150ha and 90% of the agricultural land is classified as best and most versatile quality with 6ha in Grade 2 and 107ha in Subgrade 3a. Some 12ha of land in Subgrade 3b would also be affected.

11.7.3 All this land will be affected by the Proposed Development (as shown on **Figures 2.1 to 2.5**), and will either be subject to built form or used as open land within the development area, or some 32ha alongside the M11 motorway will be recontoured. The area that would be subject to built development or used as open space within the development area, and thus removed from agricultural production in perpetuity, extends to 91ha and includes all the land classified as Grade 2 and Subgrade 3b.

11.7.4 Along the western boundary, adjacent to the motorway, it is proposed to provide an extensive area (some 32ha) of open land. Although the land would be subject to extensive earthworks these would be carried out in accordance with the Defra '*Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*' (2009), which will retain the soil resource for a variety of functions and services, including as a carbon store, a basis for biodiversity and habitats, a provision of open space and a physical and psychological barrier between the development and the M11.

11.7.5 As far as the effect on soil is concerned, there would be loss of quality if it is handled inappropriately during removal (for example, handled or trafficked when wet; and by the mixing of topsoil and subsoil on stripping). However, provided soil recovery and placement is always carried out carefully to avoid this potential effect, there would be no significant direct effect on the soil resource.

11.7.6 An indirect adverse effect on the soil resource would accrue mainly from the re-use of soil off-site in a manner inappropriate to its quality. If topsoil is exported off site its quality should be assessed and documented to accompany its removal, to avoid inappropriate re-use of the soil elsewhere.

Evaluation

Phase 1 to 2014

11.7.7 By the end of Phase 1 approximately half the site will have been subject to built form (as shown on **Figure 3.1**). The soils across the Application Site will be stripped in an appropriate manner and surplus subsoil and topsoil will be stored in separate bunds prior to final placement on the bund alongside the M11 motorway.

11.7.8 The total area that will be subject to development by the end of Phase 1 will be approximately 60ha and includes all the Grade 2 land (6ha); some 40ha of land in Subgrade 3a and 4ha of land in Subgrade 3b.

Completed project - 2026

11.7.9 By the end of the project all the agricultural land will be removed from agricultural production, albeit approximately 32ha will be retained along the western boundary as open land.

11.7.10 The loss of best and most versatile agricultural land to built form will be 79ha, in Grade 2 (6ha) and Subgrade 3a (73ha). A further 12ha of lower quality land in Subgrade 3b will also be removed.

Assessment of Significance

11.7.11 Whether the assessment of significance is made at the end of Phase 1 (in 2014) or at the end of the project (in 2026) the loss of significant areas of best and most versatile agricultural land (46ha in 2014; 79ha in 2026) is a major adverse effect of the Proposed Development.

11.7.12 However, such an effect must be evaluated in the context that the East of England Plan and the Local Area Action Plan have already determined that Cambridge has a requirement for further residential development and, as shown at **Figure 11.1**, the majority of the agricultural land around Cambridge is likely to be best and most versatile quality. Regardless of where the Proposed Development is sited, there will be a significant loss of best and most versatile agricultural land.

11.7.13 Based on the criteria set out in **Tables 11.1 - 11.3** the likely effect of the loss of 46ha in 2014 or a total 79ha in 2026 of higher quality agricultural land in Grade 2 and Subgrade 3a is Major Adverse but nevertheless this is a factor that has already been weighed in the balance in the decision to allocate the Application Site for redevelopment under the AAP.

Land Tenure**Identification**

11.7.14 The effect of the Proposed Development on the University of Cambridge Farm will be the loss of productive agricultural land and the loss of farm buildings. Approximately 125ha of agricultural land will be removed from production by the time the Proposed Development is completed in 2026, and much of this will be lost sooner. Although the Proposed Development will be phased over 12 years, issues related to internal farm access and construction nuisance will be likely to result in the loss of approximately 60ha in Year 1, including the use of the Gravel Hill Farm buildings.

11.7.15 Existing livestock within the University Farm holdings will be removed prior to development commencing within the relevant phases. Removal will take place to other agricultural holdings controlled by the University. Consequently there will be no effects of either the construction or operational aspects of the Proposed Development on the existing livestock consequently the effect of the Proposed Development has not been assessed further within this ES.

11.7.16 At the end of Phase 1 (in 2014) the residual land to the west of Phase 1, including the majority of the land alongside the M11 motorway not required for soil storage, will continue to be farmed until it is required for development and, to that extent, the effect on the farming business would also be phased.

EvaluationPhase 1 to 2014

11.7.17 The effect of the Proposed Development on the running of the University Farm has long been recognized and substantial measures have already been taken to avoid adverse effects on the farm unit and reduce the effect including the purchase of some 120ha of replacement land at Lolworth and investment in new farm buildings at Park Farm, Madingley.

11.7.18 By 2014 some 60ha will have been taken for the development at the southern end of the Application Site including the Gravel Hill Farm buildings, though these buildings are already in a poor state of repair and replacement buildings will be erected at Madingley. The residual area of land will still be available for agricultural production and it is likely that during Phase 1 the structure and location of the farm will be

gradually altered such that the main farm centre (including the farm office) will be relocated to the new buildings at Madingley. In addition, replacement grain handling facilities are proposed to be erected at Madingley to replace those facilities to be lost at Howe Farm and Gravel Hill.

Completed project - 2026

11.7.19 By 2026 all the agricultural land and farm buildings will have been removed from production and the Cambridge University Farm will cease to have any commercial interest in the land at the Application Site. All operations will have been relocated to the new centre at Madingley, or to the other satellite farms.

Assessment of Significance

11.7.20 The effect on the farm business must also be evaluated in the context that the East of England Plan and the Local Area Action Plan has already determined that Cambridge has a requirement for further residential and University development, and that the Application Site has been allocated for development for a number of years. In light of this the Applicant has been actively acquiring additional land to offset the effect on its farm business, including the purchase of more than 120ha land at Lolworth. Considerable new investment has also been made at Park Farm, Madingley and this will become the new farm centre.

11.7.21 Based on the criteria set out in **Table 11.4** the effect of the loss of 125ha of agricultural land on the farming business would have been a moderate adverse effect. In fact, the potential for this adverse effect to arise has already been managed out with the purchase of replacement land and, in due course, investment in new farm buildings. As such the effect has been largely negated, resulting in a minor adverse effect at 2014 as the day-to-day changes that are needed are instigated; by 2026, when the business has fully relocated, the effect will be negligible.

Mitigation

11.7.22 Whilst there is clearly no mitigation that can be utilized to offset the net loss of best and most versatile land, any effects on the farm unit can be offset by acquisition of, and investment in, additional land. This has already been effected by the purchase of a slightly smaller area of land by CUF at Yarmouth Farm, Lolworth.

11.8 Effects of Highways and Utility Works

11.8.1 The highways and utility works will not give rise to adverse effects on agricultural resources as the works will occur within highway land.

11.9 Cumulative Effects

11.9.1 Other major developments will result in the loss of best and most versatile agricultural land (which are identified in Chapter 1 of this ES), but all such developments are discrete and the loss of such land has been (or will be) considered individually when planning permission is granted.

11.9.2 The ES for the Northstowe development identified the loss of 221ha of best and most versatile land, which was considered to be an effect of major adverse significance. That for the NIAB identified the loss of nearly 40ha of best and most versatile land, which was considered to be an adverse effect of moderate significance. In overall terms when all committed developments are completed as at 2014 and 2026 there will be a significant net loss of best and most versatile agricultural land (of approximately 340ha) but this has been considered already through the forward planning process.

11.10 Summary

Introduction

11.10.1 A detailed field survey to determine the agricultural land classification of the Application Site has been carried out, along with interviews with the farm business manager. The Proposed Development has been assessed against national planning policy as set out in Planning Policy Statement 7 "Sustainable

Development in Rural Areas” (2004) and national guidance for undertaking Environmental Impact Assessment.

Baseline Conditions

11.10.2 The Application Site extends to approximately 150ha. The majority of the land (125ha) is in agricultural production for arable crops and grassland, and there are two sets of farm buildings located at either end of the Application Site.

11.10.3 A detailed soil survey has been carried out to determine the Agricultural Land Classification which has identified that the majority of the land is classified as best and most versatile agricultural land in Grade 2 (6ha) and Subgrade 3a (107ha), with 12ha classified as lower quality Subgrade 3b.

11.10.4 A single agricultural business would be affected by the Proposed Development. The University of Cambridge Farm manages over 1,000ha in the locality, with four separate farmsteads. The majority of the land farmed is planted with arable crops, but there are also sizeable livestock enterprises including a 200-cow dairy herd (expected to rise to 250 cows) and a 220-ewe sheep flock.

Likely Significant Effects

11.10.5 By 2026 the Proposed Development would result in the permanent loss of 125ha of land from agricultural production, albeit some 32ha would remain as open space. This land includes 79ha of land classified as best and most versatile in Grade 2 (6ha) and Subgrade 3a (73ha). Whilst the loss of this land is a Major Adverse effect of the Proposed Development, its loss has nevertheless already been weighed in the balance by the local planning authorities and the Planning Inspectors further to the allocation of the Application Site for redevelopment in the AAP. Similarly, although the Proposed Development would be phased, by 2014 some 46ha of land classified as best and most versatile would already have been affected and such loss is assessed as Major Adverse, subject to the allocation under the AAP.

11.10.6 The University of Cambridge Farm will, over the phased lifetime of the Proposed Development, lose the use of 125ha of agricultural land. This represents 12% of the total area farmed and would normally be expected to have a marked effect on the profitability of a farm. In this instance the University has already purchased replacement land at Lolworth, and obtained replacement land near Maddingley; investment in new farm buildings will be made shortly, and further investment is forecast. Taking this into account, the effect on the farming business in 2014 is assessed as Minor Adverse and Negligible by 2026.

1 Introduction and Assessment Approach

2 Application Site Description and Proposed Development

3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

10 Cultural Heritage

11 Agricultural Circumstances

12 Traffic and Transport

13 Noise Environment

14 Air Quality

15 Hydrology, Drainage and Flood Risk

16 Utilities and Services

17 Sustainability Considerations

18 Cumulative and Interactive Effects

19 Summary

12 TRAFFIC AND TRANSPORT

12.1 Introduction

12.1.1 This chapter sets out the existing baseline conditions on the local and strategic transport network surrounding the Application Site (shown on **Figures 12.1** and **12.2**), the future baseline conditions, and then sets out the likely significant effects of the Proposed Development on the transport network, of itself and cumulatively with other developments within the area.

12.2 Transport Strategy and measures to avoid, reduce and manage effects

12.2.1 The overall transport strategy for the Development responds to a number of important national regional and local objectives, which may be summarised as follows:

- i) providing development components, development layout and disposition of uses designed from the outset to be inherently sustainable, pedestrian and cyclist friendly, being based upon the provision of an integrated transport system as well as minimising the distance to travel overall;
- ii) encouraging the use of sustainable forms of transport such as walking, cycling, and public transport, thus reducing the dependency on the motor vehicle;
- iii) minimising the traffic impact of the development;
- iv) assisting in reducing the number and severity of personal injury collisions on the local roads;
- v) integrating the development proposals with the wider existing and proposed transport network;
- vi) implementing a Travel Plan / Travel Demand Management strategy for the development.

12.2.2 The initial transport strategy modelled as part of the Do Something analysis (see Section 14 of the Transport Assessment) is described below:

- the proposed land-uses within the Proposed Development;
- the Framework Travel Plan;
- the proposed public transport strategy.

12.2.3 In addition to the travel demand management measures mentioned above, there are further measures that would be implemented to reduce further the vehicular trip generation of the Proposed Development, to reduce vehicle use on the network. These are described as:

- measures directed at trip reduction across the strategic and local highway network:
 - a reduction the car parking provision across the Proposed Development;
 - the funding of a promotional campaign for the guided busway, to increase the patronage from communities along the route and the extraction of vehicle trips from the A14 and M11 to the Park and Ride sites;
- measures directed at preserving / enhancing capacity on the network:
 - on the strategic network, a capacity enhancement scheme to the M11 Junction 13 Southbound Slip road, possibly including ramp metering;
 - minor local highway measures at the Queen's Road / Madingley Road / Northampton Street junction

- measures directed at demand management across the network;
 - the provision of SCOOT and MOVA traffic signal optimisation to the linked traffic signals along Maddingley Road - M11 Junction 13 Northbound Off Slip / M11 Junction 13 Southbound On Slip / Park and Ride / Site Access and West Cambridge Site Access junctions – to reduce any additional queuing and delays as a consequence of the Proposed Development;
 - the provision of SCOOT and MOVA traffic signal optimisation to the linked traffic signals along Huntingdon Road – Huntingdon Road - Site Access West, Huntingdon Road - Site Access East, and NIAB Site Access – to reduce any additional queuing and delays as a consequence of the Proposed Development;
 - traffic calming measures along the Oxford Road / Windsor Road link;
- measures to improve conditions for pedestrian and cyclists:
 - targeted enhancements to the movement of cyclists along Huntingdon Road into the City;
 - implementation of measures to reduce vehicle speeds on Huntingdon Road;
 - improvement of pedestrian and cyclist movements through the Huntingdon Road / Victoria Road / Castle Street junction;
 - provision of a crossing of Huntingdon Road for the Whitehouse Lane commuter cycle route.
- potential further measures directed at trip reduction from the University's facilities across the City, to improve conditions on the strategic and local highway network. Whilst the Highways Agency has identified the potential to reduce trips on the highway network, the University has also considered further strategy elements to reduce further the effect of vehicular trips on the highway network as a whole. This therefore includes for the introduction of co-ordinated Travel Plan measures across the University's facilities across the whole of the City.

12.2.4 In addition, a Construction Environmental Management Plan will be implemented to ensure that appropriate hours of operation and routes are used by construction vehicles travelling to and from the Application Site.

12.3 Assessment Approach

12.3.1 The methodology used to assess the effects of traffic associated with the Proposed Development is set out within the Transport Assessment. The following two transport models have been used, in parallel, to evaluate different aspects of the effect of the Proposed Development:

- the local highway authority's Cambridge Sub Regional Model (CSRM) SATURN model, has been used to evaluate the movement of trips generated by the Proposed Development on the external highway network in the area;
- a parallel Person Trip Model, prepared by Peter Brett Associates, modelling the person trip movements generated by the Proposed Development area in greater detail than within the strategic CSRM.

12.3.2 The methodology used in this assessment reflects the standard guidance for preparing ESs contained within:

- i) the Guidelines for the Environmental Assessment of Road Traffic published by The Institute of Environmental Assessment in 1993 (now the Institute of Environmental Management and Assessment (IEMA));
- ii) Volume 11 of the Design Manual for Roads and Bridges (Highways Agency et al) – Environmental Assessment;

- iii) The Department for Transport's "Guidance on Transport Assessment" published in March 2007.

12.3.3 The Guidelines for the Environmental Assessment of Road Traffic refer to the Manual of Environment Appraisal (MEA) published by the (then) Department of Transport in 1983. This has been superseded and reference has therefore been made to the relevant sections of the Design Manual for Roads and Bridges (Highways Agency et al) – specifically Volume 11 entitled "Environmental Assessment".

12.3.4 The summary to the introduction (Section 1) of Volume 11 states that it

"introduces guidance for environmental assessment in relation to all trunk road projects".

12.3.5 Although the introduction itself states that Volume 11 "... covers the Environmental Assessment of all projects", it is considered that this is intended to refer to trunk road projects. Nevertheless, the guidance is of more general relevance in assessing the environmental effects of traffic. In particular, Section 2, Part 5 (Advice Note HA 205/08) provides guidance for determining the significance of environmental effects, including for cumulative effects, and for the management of these effects.

12.3.6 Section 2 of Volume 11 sets out the principles of EIA, and Section 3 gives specific guidance on environmental impact assessment methods for specific topic areas. Section 3 Part 8 (Issued in June 1993), gives guidance on "... assessing a scheme's impact on the journeys which people make in its locality", and addresses, inter alia, changes in amenity, community severance, and new severance issues.

12.3.7 A Transport Assessment has been prepared by Peter Brett Associates. This assessment reviews the existing situation surrounding the Application Site as a baseline, and then assesses the effect of the Proposed Development. Potential changes likely as a result of the Proposed Development have been examined.

12.3.8 A Framework Travel Plan has been prepared to accompany the Transport Assessment which sets out the proposed travel demand management measures in order to reduce traffic generation, This report has been assumed to be implemented for the purpose of this Assessment.

12.3.9 An Addendum Report (dated February 2012) has been prepared by Peter Brett Associates, summarising the discussions with the highway authorities. This further incorporates copies of the exchanges of information. Amongst this exchange of information are re-assessments of the three Site Access junctions following a review of the alignments of these three junctions with the highway authorities (see Section 12.9.8).

Baseline Traffic Data Collection

12.3.10 For the purposes of the traffic assessment, traffic count survey data has been collated from both existing sources as well as the commissioning of traffic count surveys in order to set out baseline traffic flows. Data has been collected for the highway links listed in the following paragraphs:

12.3.11 The traffic data sources relevant to the assessment work can be summarised as follows:

- **Automatic Traffic Counts (ATC)** - Sky High Traffic Surveys was commissioned by Peter Brett Associates to undertake a two week-long ATC on the following three sites from 9th October to 22nd October 2009:
 - Huntingdon Road, by Whitehouse Lane
 - Madingley Road, west of the Park and Ride Access
 - Madingley Road, west of Clerk Maxwell Road

This survey was primarily commissioned to inform the noise and air quality assessments of the Proposed Development;

- data from the **Cambridge Sub Regional Model (CSRM)** – SATURN model outputs from Cambridgeshire County Council's Cambridge Sub Regional Model have been obtained for the available model years of 2006 and 2026. The committed development and highway infrastructure assumed in the Development-specific option tests for the 2026 Future Year was scoped and agreed with the stakeholders – further details of this process are contained in Section 14 of the Transport Assessment. The effect of the Proposed Development has been assessed with reference to the Do Minimum (i.e., with the committed and consented highway enhancements and developments other than the Proposed Development) and Do Something scenarios (i.e., with the committed and consented highway enhancements and developments as well as the Proposed Development);
- **Highways Agency's Traffic Information Database (TRADS) Website database** – volumetric and classified traffic flow information has been collated from the Highways Agency's traffic information database for the existing A421;
- **Highways Agency's Trip End Model Presentation Program (TEMPRO) database** – to provide the growth factors to convert the model flows to the appropriate timescale;
- **Cambridge Annual Traffic Monitoring Report** – provides some information relating to existing cycle movements along Huntingdon Road, Girton Road and Madingley Road.

Base Year Traffic Flows (2010)

12.3.12 The Base Year of 2010 has been adopted (the traffic growth predicted by the TEMPRO 6.2 database between 2010 and 2011 for the Cambridge area would be only 1.0%).

12.3.13 Output from the Cambridgeshire County Council Cambridge Sub Regional 2006 Model has been used in conjunction with the TEMPRO growth factors to derive the Base Year Traffic Flows for 2010. A growth factor of 1.063 has been applied to these 2006 flows to produce the 2010 Base Year flows. These 2010 Base Year flows are summarised in **Table 12.1** (enclosed in **Appendix 12.1**), the links being shown on **Figure 12.3**.

Study Area

12.3.14 The Guidelines for the Environmental Assessment of Road Traffic published by The Institute of Environmental Assessment in 1993 suggest that for environmental impact, traffic flow increases (or HGV increases) of 30% represent a reasonable threshold for inclusion of highway links within the assessment process, although a lower threshold may be appropriate where there are higher HGV flows, for example. It also suggests that links with traffic flow increases of at least 10% should be assessed in other sensitive areas. This has been used to inform the links assessed.

Year of Assessment

12.3.15 The Transport Assessment considers 3 traffic flow scenarios. As set out in the Department for Transport's 'Guidance on Transport Assessment' document, future year assessments should be undertaken for the strategic road network for a period of no less than 10 years after the date of registration of the planning application (anticipated to be 2011). For the purposes of understanding the effects of the full development, following discussions with the stakeholders a year of 2026 has been assumed, reflecting the likely implementation period of the development, and maintaining consistency with the highway authority's available model scenarios.

12.3.16 In addition to these three scenarios, this ES Chapter also considers that by 2014 a first phase of development will be completed / occupied.

12.3.17 The following scenarios are considered:

- Baseline

- 2014 Do Minimum (reflecting committed and proposed developments in 2014 other than the Proposed Development);
- 2014 Do Something (reflecting committed and proposed developments in 2014 including the completed / occupied Phase 1 of the Proposed Development);
- 2026 Do Minimum - (reflecting committed and proposed developments other than the Proposed Development);
- 2026 Do Something - (reflecting committed and proposed developments including the Proposed Development in its completed form).

Calculation of 2014 Do Minimum Traffic

12.3.18 For the 2014 Do Minimum assessment, outputs from the 2006 option test of the Cambridge Sub Regional Model (CSRM) have been used as the basis for traffic effects. Output from the Cambridgeshire County Council Cambridge Sub Regional 2006 Model has been used in conjunction with the TEMPRO growth factors to derive the Base Year Traffic Flows for 2014. A growth factor of 1.129 has been applied to these 2006 flows to produce the 2014 Base Year flows.

Calculation of 2014 Do Something Traffic

12.3.19 The 2014 Phase 1 Do Something flows have been derived as follows:

- i) the Cambridge Sub Regional Model Traffic Model has been used as the origin for traffic effects, providing the 2006 Base Year flows;
- ii) these flows have been growthed to 2014 by the application of the TEMPRO growth factor of 1.129 to provide the 2014 Base flows;
- iii) reference was made to Peter Brett Associates Person Trip Model to inform the vehicle trip generation for the Phase 1 Development;
- iv) these vehicle trips were assigned to the network pro-rata to the assigned Proposed Development flows identified by the CSRM;
- v) the 2014 Phase 1 Do Something flows were synthesised by adding the 2014 Base Flows to the assigned Phase 1 Development flows.

Calculation of 2026 Baseline Traffic

12.3.20 For the 2026 Opening Year and future baseline year assessments, outputs from the Cambridge Sub Regional Model (CSRM) have been used directly as the basis for traffic effects to enable a consistent assessment of changes in traffic flows. This is because the future model flows take account of the context of both committed developments in the growth area, and planned highway enhancements in the area.

Calculation of Traffic Generation from the Proposed Development

12.3.21 As agreed with the HA and Cambridgeshire County Council, the potential traffic generation to and from the proposed development has been calculated based on the information from the Cambridge Sub Regional Model.

12.3.22 This modelling work was supported with a “first-principles” person trip generation model developed in conjunction with Cambridgeshire County Council as part of the Transport Assessment.

Calculation of Construction Traffic Generation

12.3.23 In addition to the Proposed Development, it is likely that construction activity will be continuing at the NIAB Development and at the West Cambridge Development. For the NIAB Development, reference has been made to the Construction Management Plan prepared by Colin Buchanan and Partners Ltd in 2009 for the “Land between Huntingdon Road and Histon Road Cambridge”. For the Proposed Development and the West Cambridge Development, a first-principles approach has been undertaken to arrive at the peak construction trip generation assumptions used in this assessment.

Significance Criteria

12.3.24 The methodology and significance criteria utilised in this chapter reflect that combined within the guidance documents referenced above.

12.3.25 The significance of potential traffic and transport effects has been determined using criteria developed from best practice techniques. The effect of significance is derived from measures of the magnitude (or scale) of the change and the sensitivity (or importance) of the receptors affected. Categories of sensitivity and magnitude are defined and assessed to determine the significance of the effect.

12.3.26 This chapter considers the following environmental effects:

- Severance;
- Driver Delay;
- Pedestrian and Cyclist Delay;
- Pedestrian and Cyclist Amenity;
- Fear and Intimidation;
- Accidents and Safety;
- Hazardous Loads.

Other chapters consider traffic effects in the context of likely significant air quality and noise effects of the Proposed Development.

12.3.27 Other chapters consider traffic effects in the context of likely significant air quality and noise effects of the Proposed Development.

12.3.28 The IEMA's Guidelines for the Environmental Assessment of Road Traffic sets out the broad principles of how to assess the magnitude of effect for each category. This is summarised below:-

- i) **Severance** – The guidance states that “severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery.” Further, “Changes in traffic flow of 30%, 60% and 90% are regarded as producing ‘slight’, ‘moderate’ and ‘substantial’ changes in severance respectively”. However, the guidance acknowledges that the measurement and prediction of severance is extremely difficult. The assessment of severance pays full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities and whether or not crossing facilities are provided. For the purposes of this assessment, motorway and dual carriageway links where walking and cycling are excluded or the numbers extremely limited have not been included in the assessment tables.

Volume 11, Section 3, Part 8, Chapter 6 of the Design Manual for Roads and Bridges entitled 'Pedestrians and Others and Community Effects' provides further guidance on this aspect of New Severance. It states that new severance should be described in terms of "Slight", "Moderate" or "Severe" and that these categories "... should be coupled with an estimate of the numbers of people affected, their location and the community facilities from which they are severed." In addition (with specific reference to relief from existing severance), it acknowledges that there is a traffic flow threshold below which changes in Severance are not considered significant (existing AADT (daily) flow below 8,000 vehicles).

- ii) **Driver delay** – such delays "... are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system."
- iii) **Pedestrian delay** – "Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads." The guidance suggests that assessors "... use their judgement to determine whether pedestrian delay is a significant effect".

Although the IEMA's Guidelines for the Environmental Assessment of Road Traffic only considers Pedestrian Delay, within the assessment of the North West Cambridge Development, consideration is also given to Cyclist Delay.

- iv) **Pedestrian amenity** – broadly defined as the relative pleasantness of a journey, it is affected by traffic flow, traffic composition and pavement width / separation from traffic. The guidance suggests a tentative threshold for judging the significance of changes in pedestrian amenity of where traffic flow (or its lorry component) is halved or doubled.

Although the IEMA's Guidelines for the Environmental Assessment of Road Traffic only considers Pedestrian Amenity, within the assessment of the North West Cambridge Development, consideration is also given to Cyclist Amenity.

- v) **Fear and intimidation** – the effect of this is dependent upon the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths. Receptors are assessed as being pedestrians and cyclists. For the purposes of this assessment, the highest road category links (such as the M11 motorway, and the A14 / A428 dual carriageways) do not have pedestrian / cyclist facilities and their use of the links is restricted. Hence no receptors would be present on these links, and would therefore not experience Fear and intimidation. As such, those links have not been included within the assessment tables below. The guidance states that there are no commonly agreed thresholds for estimating "fear and intimidation" from known traffic and physical conditions, but it does nevertheless suggest some thresholds which could be used, based on previous research, and these are shown in **Table 12.2** (the Degrees of Hazard have been adapted to maintain consistency with the general Development ES nomenclature):

Table 12.2 – Fear and Intimidation Thresholds

Degree of Hazard	Average traffic flow over 18 hr day – vehicles / hour 2-way	Total 18 hour HGV flow	Average Vehicle Speed over 18 hour day – mph
High	+1,800	+ 3,000	+ 20
Medium	1,200 – 1,800	2,000 – 3,000	15 – 20
Low	600 – 1,200	1,000 – 2,000	10 – 15
Negligible	<600	<1,000	<10

- Note 1: Although no category is given in the guidance for flows less than the “Low” (was “Moderate”) threshold, this has been added to the table.
- Note 2: These categories of degree / magnitude of hazard have also been expressed consistently with the terms used in this assessment as High, Medium, Low, and Negligible.

- vi) **Accidents and safety** – the guidance suggests that “Professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g. junction conflicts”.
- vii) **Hazardous loads** – the guidance states that the Environmental Assessment needs clearly to outline the estimated number and composition of such loads, but that the analysis should reflect the nature of the load in question. The IEMA guidelines acknowledge that most developments will not result in increases in the number of movements or hazardous / dangerous loads.

12.3.29 The guidance makes it clear that a “... critical feature of environmental assessment is determining whether a given impact is significant.” Further “For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor backed up by data or quantified information whenever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact ...”.

Receptors and Receptor Sensitivity

12.3.30 The IEMA Guidelines identify groups and special interests which should be considered:

- people at home;
- people in work places;
- sensitive groups including children, the elderly and disabled;
- sensitive locations e.g. hospitals, churches, schools, historical buildings;
- people walking;
- people cycling;
- open spaces, recreational sites, shopping areas;
- sites of ecological / nature conservation value;
- sites of tourist / visitor attraction.

12.3.31 Categories of receptor sensitivity have been defined from the principles set out in the Guidelines for the Environmental Assessment of Road Traffic, and including the following:

- the need to identify particularly groups or locations which may be sensitive to changes in traffic conditions;
- the list of affected groups and special interests set out in the guidance;
- the identification of links or locations where it is felt that specific environmental problems may occur;
- such locations “... would include accident blackspots, conservation areas, hospitals, links with high pedestrian flows etc.”

12.3.32 These categories have been used to outline in broad terms the sensitivity of receptors to traffic for the categories of impact assessed in this chapter, although , each receptor assessed will have a different sensitivity to each specific impact:

Severance, pedestrian and cyclist amenity, fear and intimidation, pedestrian, cyclist and driver delay, accidents and safety, hazardous loads

12.3.33 Sources of high sensitivity receptors include:

- schools, colleges and other educational institutions;
- retirement / care homes for the elderly or infirm;
- roads used by pedestrians with no footways;
- accident blackspots.

12.3.34 Sources of medium sensitivity receptors include:

- hospitals, surgeries and clinics;
- parks and recreation areas;
- shopping areas;
- roads used by pedestrians with narrow footways.

12.3.35 Sources of low sensitivity receptors include:

- open space;
- tourist / visitor attractions;
- historical buildings;
- churches.

12.3.36 In addition, although not specifically identified within the guidelines as being sensitive for these categories, it has been assumed that individual residential and employment areas have low sensitivity to these effects.

Magnitude of Effect

12.3.37 The magnitude of effect depends upon the effect being assessed, and this has been based on the guidance relating to severance which suggests that 30%, 60% and 90% changes in traffic levels should be considered as “minor”, “moderate” and “major” effects respectively.

12.3.38 Existing receptors in the area, and their sensitivity, are described later in this section.

Determination of Significance of Effects

12.3.39 Generic significance criteria have been applied throughout this ES and are as shown in **Table 12.3**:

Table 12.3 – Generic Significance Criteria

Significance Level	Criteria
Major	These effects are likely to be important considerations at a local or district scale
Moderate	These effects are likely to be important considerations at a local scale.
Minor	These effects may be raised as local issues but are unlikely to be of importance.
Negligible	No effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.

12.3.40 These have been used, together with the assessment of magnitude of effect and receptor sensitivity, to determine the significance of effects – for both **beneficial** and **adverse** conditions. This is shown in **Table 12.4**.

Table 12.4 – Significance of Effect Categories

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude (Degree of Change)	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

12.3.41 In addition to the above, as the percentage effect is a function of the level of baseline traffic flows, trigger levels in terms of absolute levels of increase have been introduced to prevent very minor changes on links with low baseline flows from being considered as more significant.

12.3.42 For example, with reference to the above table, a change in traffic flow of greater than 90% on a road with a high sensitive receptor would result in a 'Major Significance of Effect'. However, the existing baseline traffic flows could be very minor and an increase of only a few vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is still considered to be insignificant. Therefore, reference has been made to the Fear and Intimidation threshold trigger levels in **Table 12.2** where a significance effect is only considered to occur if the baseline traffic flow is increased to any of the trigger levels Identified.

12.4 Policy Framework

National Transport Policy and Guidance

Planning Policy Guidance 13: Transport (PPG13, 2011)

12.4.1 PPG13: Transport paragraph 4 previously set out the overall strategy for a sustainable transport system, with the objectives of integrating planning and transport at the national, regional, strategic and local level to:

- 'promote more sustainable transport choices for people and for moving freight;
- promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, and;
- reduce the need to travel, especially by car'.

12.4.2 PPG13 also stated that a key planning objective is to ensure that jobs, shopping, leisure facilities and services are accessible by public transport, walking and cycling. It also encourages giving greater priority to walking by reducing the actual walking distance between the land-uses, and to public transport. This is to be achieved by locating development within the urban boundary, close to existing transport facilities.

National Planning Policy Framework ("NPPF")

12.4.3 The themes in PPS13 have been carried forward into the NPPF.

12.4.4 While the NPPF is to be read as a whole in the context of Transport considerations, the NPPF notes: at paragraph 29 that transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.

12.4.5 Paragraph 35 of the NPPF notes that; "Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- accommodate the efficient delivery of goods and supplies;
- give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians;
- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of disabled people by all modes of transport.

12.4.6 Paragraph 36 of the NPPF recognises that a key tool to facilitate this will be a Travel Plan and that all developments which generate significant amounts of movement, as determined by local criteria, should be required to provide a Travel Plan.

12.4.7 Paragraphs 37 and 38 of the NPPF note that planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities and that for larger scale residential developments in particular, planning policies should promote a mix of uses in order to provide opportunities to undertake day-to-day activities including work on site. Where practical, particularly within large-scale developments, key facilities such as primary schools and local shops should be located within walking distance of most properties.

Guidance on Transport Assessment (DfT, 2007)

12.4.8 'Guidance on Transport Assessment' was issued by the Department for Transport and Communities and Local Government in March 2007. This superseded the 'Guidelines for Traffic Impact Assessment' produced by the Institution of Highways and Transportation (IHT), 1994.

12.4.9 Paragraph 4.3 of the Guidance on Transport Assessment notes that a Transport Assessment should address the following key issues:

- reducing the need to travel, especially by car;
- sustainable accessibility;
- dealing with residual trips (the remaining vehicular trips left over after the promotion of more sustainable modes of travel), and;
- mitigation measures.

12.4.10 Where a proposed development has adverse affects on the highway network, paragraph 4.90 identifies that

‘...transport mitigation should focus on maximising sustainable accessibility to the development. At the outset, the mitigation plan should consider measures such as improvements to development site layout to facilitate walking and cycling as well as accessibility to the local public transport infrastructure, improvements to walking and cycling provisions in the vicinity of the development site, and improvements to the local public transport network’.

Regional Transport Policy and Guidance

12.4.11 The East of England Plan: The recently enacted Localism Act provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration.

12.4.12 The Revision to the Regional Spatial Strategy for the East of England was originally published by the Secretary of State for Communities and Local Government in May 2008, with a subsequent draft revision published in March 2010. To meet housing demand, the subsequent Regional Spatial Strategy for the East of England made provision for 57,400 new homes to be built in Cambridgeshire between 1999 and 2016, with 47,500 in the Cambridge Sub-Region (see Section 4). The East of England Plan supports the development of the Proposed Development, by virtue of Policies CSR1-CRS3 of this plan. In addition the housing growth targets identified in the East of England Plan were based upon delivery rates from the earlier Structure Plan, prepared by the County Council with involvement from the District Councils. Together with relevant sections of the Milton Keynes South Midlands Sub-Regional Strategy 2005, the RSS had constituted the Regional Spatial Strategy (RSS) for the East of England. The original RSS covered the period until 2021, the draft revision covered the period to 2031, and set a vision, objectives and core strategy for the longer term.

Local Policy

12.4.13 The Application Site lies within the administrative areas of both SCDC and CCC, the boundary of between these councils bisecting the Application Site on a north-south axis.

12.4.14 The key local policies consist of:

- i) saved policies from the Cambridgeshire and Peterborough Structure Plan (2003);
- ii) Cambridge Local Plan (2006);
- iii) South Cambridgeshire Local Plan (2004);
- iv) Cambridge Local Development Framework – including the North West Cambridge Area Action Plan (2009);

- v) South Cambridgeshire Local Development Framework formed by the Core Strategy (2007), the Development Control Policy (2007), and the North West Cambridge Area Action Plan (2009);
- vi) Cambridgeshire Local Transport Plan – March 2006.

12.5 Baseline Conditions

Study Area

12.5.1 As set out in Section 12.3, the Guidelines for the Environmental Assessment of Road Traffic published by The Institute of Environmental Assessment in 1993 suggest that for environmental effects, traffic flow increases (or HGV increases) of 30% represent a reasonable threshold for inclusion of highway links within the assessment process, although a lower threshold may be appropriate where there are higher HGV flows, for example. It also suggests that links with traffic flow increases of at least 10% should be assessed in other sensitive areas.

12.5.2 The study area for the Baseline has therefore been defined with reference to the Future Year case. A comparison of the CSRM 2026 Do Minimum and Do Something option tests has identified that there is one link with a predicted flow change in 2026 of greater than 30% in the operational and construction case – this link is Link 36 Oxford Road and Windsor Road. However, it is considered that this increase is unlikely to happen in reality – the CSRM has modelled this link with higher speeds (30mph) and capacity than is the case for a narrow, traffic calmed residential street with a 20mph speed limit, enabling more trips to pass along in theory. It is considered that this increase in flow reflects more the modelling methodology than the reality and is therefore discounted: indeed, the highway authority accepts that the difference across the network would be limited to the degree that such a local anomaly would not warrant a re-run of the model.

12.5.3 There are only five links that experience traffic increases greater than 10%, albeit that the increases on the latter two would be below the minimum trigger levels identified above:

- Link 15 - Huntingdon Rd – from A14 slip road to North-western NWC Site Access;
- Link 27- Madingley Road – from Park and Ride Entrance to Unnamed Road;
- Link 28 -Madingley Road – from Unnamed Road to M11 Junction 13;
- Link 41 - Girton Road;
- Link 101 - NIAB Southern End.

12.5.4 To understand the effects of the Development throughout the area, further surrounding links have been included in this assessment process, as shown on **Figure 12.3**, acknowledging that the Development flow may be limited.

Existing Pedestrian and Cycle Network

Pedestrian network

12.5.5 The Public Rights of Way in the vicinity of the Application Site are shown on **Figure 12.4**. In summary:

- i) Footpath 5 routes on a south-west to north-east axis through the northern end of the Application Site between Girton and Hardwick. It crosses Huntingdon Road via an informal crossing and the M11 through a culvert at which point it becomes Footpath 3. This footpath continues on this south-west to north-east axis until it meets Cambridge Road where it terminates;
- ii) Footpath 4 routes from Huntingdon Road to Duck End in Girton, north of the Application Site, in a south-west to north-east direction where it crosses over the A14 by a footbridge.

It continues around the south-west edge of Girton until it reaches Duck End, at which point it enters the village;

- iii) Footpath 48 routes along Whitehouse Lane through the proposed NIAB Site south-west to north-east for approximately 650m, at which point it changes into Footpath 10. After a further 200m it changes to Footpath 5 and continues until it reaches Histon Road (B1049) where it terminates;
- iv) Bridleway 30 is located to the south of Madingley Road between the M11 southbound on-slip and the West Cambridge Development, and runs on a north-south axis.

12.5.6 As shown on **Figure 12.4**, footways are located along both sides of Huntingdon Road between Girton Road and the City Centre, and in the northern verge to the north-west of Girton Road. In the northern verge, the footway varies between 1.75m to 3m wide: generally it has no median strip between the footway and Huntingdon Road. The footway in the southern verge varies between 1.75m and 3m wide, and generally has a median strip. The footways are illuminated by the carriageway lighting system. There are four controlled crossings along Huntingdon Road, which include:

- i) a toucan crossing where Girton Road joins Huntingdon Road;
- ii) a pelican crossing to the south of the junction of Whitehouse Lane and Huntingdon Road; and
- iii) a toucan crossing to the north of where Storey's Lane joins Huntingdon Road;
- iv) pelican crossings of all arms of the Castle Street / Mount Pleasant / Histon Road / Victoria Road traffic signal controlled junction.

12.5.7 Madingley Road also has footways along both sides of the road within the urban context of Cambridge (the footpath in the southern verge terminates at the High Cross junction, opposite the Madingley Road access to the Proposed Development). The footway in the southern verge is varies between 1.5m and 2m wide, and generally has no median strip. The footway in the northern verge varies between 1.5m and 2m wide and has a median strip along the majority of Madingley Road. The footways are illuminated by the carriageway lighting system. There are four controlled crossings along Madingley Road:

- i) a pelican crossing to the west of the Madingley Road and Northampton Street Roundabout;
- ii) a pelican crossing to the east of the Madingley Road / Grange Road traffic signal controlled junction;
- iii) a toucan crossing to the east of the Storey's Lane / Madingley Road junction – a footpath leads from here to the south eventually to join Clarkson Road; and
- iv) a toucan crossing of the Madingley Road Park and Ride Site entrance.

12.5.8 Footways between 2m and 3m in width are located along both sides of Storey's Way. There are no median strips running along the majority of Storey's Way although Storey's Way has a series of speed reducing facilities, including humps and a throttle. The footways are lit by the carriageway lighting system. There are no controlled pedestrian crossing points along Storey's Way.

Cycling facilities

12.5.9 The existing local cycling network in the vicinity of the Application Site is shown on **Figure 12.4**, compiled using information from Cambridgeshire County Council website (May 2009).

12.5.10 A narrow off-road combined footway / cycleway of width between 1.5m – 2.5m is provided in the northern verge of Huntingdon Road between opposite the Howes Farm access and the Huntingdon Road - Girton Road junction.

12.5.11 To the east of Girton Road, Huntingdon Road forms part of the National Cycle Route (NCR) 51. Cycle lanes are provided on Huntingdon Road to the east of Girton Road. Various cycle facilities are provided along Huntingdon Road, such as cycle right turning lanes and cycle advance stop lines with pens at the traffic signal controlled junction with Victoria Street, assisting movements towards Mount Pleasant and Castle Street. This route is illuminated by the carriageway lighting system. At the eastern end of Huntingdon Road, towards the city centre at the junction between Magdalene Street and Thompson's Lane, NCR 11 joins NCR 51.

12.5.12 Cambridgeshire County Council has recently delivered the Madingley Road Phase 1 Combined Cycleway / Footway scheme, a quality cycleway along the northern verge, significantly enhancing the cycling and walking infrastructure along this route. In summary, these proposals consist of:

- i) upgrading the existing combined footway / cycleway within the northern verge to 3m wide between Madingley Rise and Queen's Road;
- ii) enhancing the cycleway crossings of minor roads such as Storey's Way and Madingley Rise;
- iii) providing an on-road cycle lane from Queen's Road to the Park and Ride site on the southern side of Madingley Road.

12.5.13 Cambridgeshire County Council has further proposals to deliver the continuation of this scheme to the east of Lansdowne Road at a later date.

12.5.14 A further local cycle route running east - west along the southern side of Madingley Road (A1303) to the south of the Site, has been delivered with off-road lanes. This route runs from the city centre and continues along Madingley Road over the M11 until it reaches the A428. At this point the cycle route navigates towards Hardwick. The cycle routes are illuminated with the carriageway lighting scheme. At the junctions on Madingley Road with Lady Margaret Road and Grange Road there are cycle advance stop lines with pens.

12.5.15 The existing cycle facilities across a wider area of Cambridge are shown on **Figure 12.5**, including the links to the City, and to other attractors to the south and west of the City. As shown on this figure, Cambridge is exceptionally well provided with cycling facilities.

12.5.16 To the east of the Site a local cycle route runs south-west to north-east along Oxford Road and Warwick Road between Huntingdon Road and Histon Road. Routes continue along Gilbert Street and along Histon Road (B1049) where there are cycle lanes along both sides of the road. In addition to this route, a cycle route runs along Storey's Way between Huntingdon Road and Madingley Road. This section is formed on-road, there being no formal cycle lanes.

12.5.17 An off-road cycle path routes eastwards from the western bend of Storey's Lane, continues around the Observatory, then southwards along an access road to Madingley Road. This route was provided as part of the Section 106 Agreement for the West Cambridge Development.

12.5.18 Across the wider Cambridge area, there are National Cycle Network routes 1, 11, 12, 51, 53, and 63. National Cycle Route 51 passes close to the Development, as shown on Figure 12.4. This connects Huntingdon to the west and Newmarket to the east. A section of this route runs south-east to north-west adjacent to the Site along Huntingdon Road (A1307) from Cambridge Road towards Cambridge City Centre. The cycle route is formed with on-road cycle lanes along both sides of Huntingdon Road. It is signed throughout as National Cycle Route 51. Route 51 is a high quality route, and free of motorised traffic which passes through ancient pastureland. The path stretches across East Side Common and provides improved cycle links for the local villages into Huntingdon.

12.5.19 Within the City Centre, there are various cycle parking locations that would encourage and promote the use of cycling into Cambridge:

- i) Park Street Cycle Park is located on the ground floor of Park Street Car Park and provides covered space for 282 cycles. Cyclist and pedestrian access is provided from Park Street, and there is a pedestrian-only access from Bridge Street. The cycle park is currently open 7 days a week, 24 hours a day. From the centre of the Development, the approximate distance to the Grand Arcade Cycle Park is 3.5km, a 14 minute cycle time, a relatively easy cycle. The distance between the Grand Arcade Cycle Park and Cambridge railway station is approximately 1.7km, a further 6 minute cycle time;
- ii) the Grand Arcade Cycle Park is located off Corn Exchange Street and provides covered space for over 500 cycles that includes free parking for 200 spaces (other 300 spaces are charged parking). Pedestrians can access the cycle park via the lifts or stairs inside Grand Arcade or from Fisher Square. Cyclists can access the cycle park from Corn Exchange Street. From the centre of the Development, the approximate distance to the Grand Arcade Cycle Park is 3.5km, a 14 minute cycle time, a relatively easy cycle. The distance between the Grand Arcade Cycle Park and Cambridge railway station is approximately 1.7km, a further 6 minute cycle time.

12.5.20 Other cycle parks exist around Cambridge, such as bicycle stands located on East Road, Downing Site at the University, and at the Addenbrooke's Hospital. Further cycle parking located close to the Site is along Maddingley Rise, but this cycle parking is for the use of the University alone.

12.5.21 Whilst the only currently proposed amendments to the University's cycle parking provision are related to specific development proposals, it is part of the University's approach to sustainable transportation to keep cycle parking provision in their facilities throughout the city under review.

Equestrian facilities

12.5.22 As shown on **Figure 12.4**, Bridleway 30 is located to the south of Maddingley Road between the M11 southbound on-slip and the West Cambridge Development, and runs on a north-south axis.

Other Development-related cycle and pedestrian infrastructure enhancement proposals

12.5.23 The West Cambridge Development, located to the south of Maddingley Road, has Section 106 commitments to implement cycle and footway enhancements to an agreed programme stated in the Agreement for this site. These proposals would enhance linkages between the west of Cambridge and the City area, and include:

- i) a cycleway link from Clerk Maxwell Road to Grange Road to the south of Clare Hall;
- ii) a further cycleway link from Clerk Maxwell Road to Grange Road along Adams Road;
- iii) proposed cycle lane improvements to West Road between Grange Road and Queens Road;
- iv) proposed cycle lane improvements to Sidgwick Avenue Road between Grange Road and Queen's Road;
- v) proposed footway / cycleway on Queen's Road from Sidgwick Avenue to Silver Street;
- vi) cycle lane improvements on Silver Street;
- vii) improvements to the cycle links between Huntingdon Road and Maddingley Road;
- viii) improvements to the Colour Footpath Link;

- ix) toucan crossing / of Madingley Road adjacent Madingley Rise / Clerk Maxwell Road junctions.

12.5.24 Following a review of these proposals by Cambridgeshire County Council, the initial works are to consist of the provision of an enhanced cyclist link between Burrells Walk and Silver Street. Another, longer term aspiration is to provide a further footpath link to the Coton Footpath. This could be funded by West Cambridge Development should the highway authority be able to deliver this.

12.5.25 In addition to the West Cambridge Development, the NIAB site is also being redeveloped in this area to the north-east of Huntingdon Road. It is understood that the NIAB Development will provide the following off-site enhancements to the highway network:

- i) a new traffic signal controlled junction will be provided on Huntingdon Road to provide vehicular access the NIAB site. This junction will include controlled pedestrian and cycle crossings and facilities;
- ii) minor cycle lane improvements in the vicinity of the Site are proposed along Huntingdon Road, with widened on- carriageway lanes westbound and segregated lanes eastbound in the vicinity of the Site;
- iii) advanced stop lines will also be provided to provide priority at the junctions.

12.5.26 In addition, a segregated combined cycleway / footway network will be provided through the NIAB Development to enhance linkages between Huntingdon Road and Histon Road – this is also shown on Figure 12.5.

12.5.27 The enhancements proposed in conjunction with the NIAB Development proposals are compatible with those proposed in connection with the Proposed Development, and would form part of a wider strategy to extend the existing good quality cyclist and pedestrian provision in this area.

Existing Public Transport

Bus Services

12.5.28 **Figure 12.6** illustrates the bus services within the vicinity of the Application Site – current at the time of writing, but obviously subjected to periodic change. The Application Site is well served by local bus services operating on the two principal routes into the city centre, along both Madingley Road and Huntingdon Road.

12.5.29 As shown on **Figure 12.6**, there are a total of 8 bus stops located along Madingley Road and a further 8 bus stops situated on Huntingdon Road.

12.5.30 Bus stops along Madingley Road serve bus routes 1, 2, 4, Uni4, 8, 14, 77 and X5 which provide links to St Ives, Papworth Everard, Dry Drayton, Orchard Park, St Neots and Madingley Park and Ride.

12.5.31 The individual route frequencies from Madingley Road and their corresponding destinations are summarised in **Table 12.5**, the routes of the more frequent services shown in italics are shown on **Figure 12.6**.

Table 12.5 – Madingley Road Bus Routes, Destinations and Frequencies

Service- Operator	Origin- Destination	Frequency	
		Mon – Sat daytime	Evenings & Sundays
1 - Whippet	St. Ives – Papworth Everard – Cambourne – Hardwick – Coton – Cambridge	9 journeys Mon - Fri 6 journeys Sat	No service
2 - Whippet	Papworth Everard – Cambourne – Bourn – Caldecote – Toft – Hardwick – Coton – Cambridge	1 journey Mon-Fri peak	No service
8 - Whippet	Papworth Everard – Elsworth – Boxworth – Bar Hill – Dry Drayton – Madingley – Coton – Cambridge	3 journeys off-peak	No service
14 - Stagecoach	Dry Drayton – Hardwick – Madingley – Coton – Cambridge	1 journey Mon-Fri peak	No service
77 - Stagecoach	Park and Ride: Madingley Road P&R – Cambridge – Newmarket Road P&R	10 mins	15 mins Sun; no service eve
Citi 4 - Stagecoach	Orchard Park – Kings Hedges – Chesterton – Cambridge – Coton – Hardwick – Cambourne – Eltisley – St Neots	20 mins (60 mins beyond Cambourne)	60 mins
Uni 4 - Stagecoach	Addenbrooke's Hospital Nuffield Hospital – Newnham – West Cambridge – Madingley Road P&R	20 mins Mon-Fri	No service

12.5.32 Whilst the Madingley Road corridor has fourteen buses per hour on the four most popular routes, Service 77 operates non-stop along Madingley Road and Service X5 only serves the stop at Bulstrode Gardens.

12.5.33 Two frequent routes serve the area, both operated by Stagecoach. Service Citi 4 is one of a network of seven “Citi” branded routes serving the Cambridge urban area and surrounding major towns and villages. The Citi4 provides a 20 minute frequency service from Cambourne, Hardwick and the University’s West Cambridge site on Madingley Road to the city centre before serving the Chesterton and Arbury areas to the north. One bus per hour commences from St Neots. In the evenings and on Sundays there is an hourly service on the route, commencing at Cambourne.

12.5.34 The complementary Service Uni 4 route provides a link between the Madingley Road Park and Ride site, the University’s West Cambridge campus, the south of the city centre and Addenbrooke’s Hospital – it does not serve the main city centre area – and operates every 20 minutes during Monday to Friday daytimes only. This route is funded by the University of Cambridge.

12.5.35 Several other routes from outlying areas may combine to provide one or two additional buses per hour, particularly during the peak periods, but are not of sufficient frequency to be well used by passengers on the Madingley Road for journeys towards Cambridge.

12.5.36 As shown on **Figure 12.6**, further bus services from Madingley Road Park and Ride bus stops are available, which are located within a 20 minute walking distance from Madingley Rise and Storey’s Way.

12.5.37 Bus stops along Huntingdon Road accommodate bus routes 1A, 1B, 5, 6, 15, 15A, 55 and T5. These routes provide services to destinations including Cambridge Town Centre, St Ives, Huntingdon, Bar Hill, Neots and Oakington. These route frequencies and destinations are summarised in **Table 12.6**, the routes of the more frequent services shown in italics are shown on **Figure 12.6**.

Table 12.6 - Huntingdon Road Bus Routes, Destinations and Frequencies

Service- Operator	Origin- Destination	Frequency	
		Mon – Sat daytime	Evenings & Sundays
1A Whippet	Huntingdon – Houghton – St Ives – Fenstanton – Bar Hill - Cambridge	30 mins	60 mins Sun; no service eve
5 Whippet	Huntingdon – Godmanchester – Hemingford Abbots – Hemingford Grey – Fenstanton – Bar Hill - Cambridge	4 journeys	No service
15/15A/15B Stagecoach	St Ives – Fen Stanton – Fen Drayton – Swavesey – Over-Willingham – Longstanton – Bar Hill - Cambridge	60 mins	No service
55 Stagecoach	Huntingdon – Houghton – St Ives - Cambridge	20 mins	60 mins eve; No service Sun
Citi 5 Stagecoach	Bar Hill - Cambridge	20 mins	60 mins Sun; no service eve
Citi 6 Stagecoach	Oakington - Cambridge	20 mins	60 mins Sun; no service eve

12.5.38 The frequency of bus services on Huntingdon Road is twelve buses per hour on the five principal routes, with occasional additional journeys on the Whippet Service 5 route. All routes serve all stops along Huntingdon Road.

12.5.39 The most frequent services on the corridor are Stagecoach Services 55, Citi 5 and Citi 6, all of which provide a 20 minute service during Monday to Saturday daytimes, and combined provide an hourly evening service and a 30 minute frequency Sunday service.

12.5.40 Service 55 provides a fast link between Huntingdon, St Ives and Cambridge via the A14; the Service Citi 5 links the city centre with the Bar Hill area on the city's periphery and Citi 6 provides a service to the large villages of Girton and Oakington. Citi 6 approaches the Huntingdon Road from Girton.

12.5.41 Whippet Service 1A also provides an A14 route between Huntingdon, St Ives and Cambridge in competition with Service 55, running every 30 minutes during Monday to Saturday daytimes and hourly on Sundays. Service 15, provided by Stagecoach, operates an hourly service between St Ives and Cambridge via a number of communities away from the A14. Whippet Service 5 provides four additional journeys during Monday to Saturday daytimes and is the only direct link between Godmanchester and Cambridge.

12.5.42 The north area of Cambridge will also be served by the Cambridge Guided Busway, a new strategic bus-based rapid transit scheme connecting the communities of Cambridge, Huntingdon and St. Ives, along with the potential new Northstowe Community. The route is shown on Figure 12.7. The Busway will not directly serve the Development. Nevertheless, the Guided Busway services as a new and integral part of the Cambridge public transport network will be a means by which transfer of car-based trips may be achieved. The Busway started operation in August 2011.

Rail Services

12.5.43 The nearest railway station is Cambridge railway station, which is approximately 4 kilometres from the Application Site. This is shown on **Figure 12.1**.

12.5.44 Rail services from Cambridge are summarised in **Table 12.7**, indicating general daytime frequencies and key destinations – these are current at the time of writing, but obviously subjected to periodic change.

Table 12.7 - Cambridge Railway Station, Destinations and Frequencies

Operator	Origin- Destination	Frequency	
		Mon – Sat	Sundays
National Express East Anglia	Cambridge - London Liverpool Street	30 mins	30 mins to Tottenham Hale, then 60 mins to Liverpool Street or Stratford
	Cambridge - Ipswich	60 mins (1 journey to Harwich)	60 mins (1 journey to Harwich)
	Cambridge - Norwich	60 mins	120 mins
First Capital Connect	London King's Cross - King's Lynn	30 mins (60 mins beyond Cambridge)	60 mins
	London King's Cross – Cambridge	30 mins	30 mins
CrossCountry	Stansted Airport - Birmingham New Street	60 mins	60 mins

12.5.45 **Table 12.7** indicates that regular train services depart from Cambridge to London King's Cross and Liverpool Street, Harlow Town, Stevenage, Stansted Airport, King's Lynn, Norwich, Peterborough, Leicester and Birmingham New Street.

12.5.46 In total there are around four trains per hour to London throughout the day; three to King's Cross and one to Liverpool Street. First Capital Connect services between King's Lynn and London King's Cross operate non-stop between Cambridge and London, with a journey time of approximately 45 minutes (as compared to 71 minutes to Liverpool Street).

12.5.47 The location of the railway station, 1.5km to the south-east of the city centre, has historically been an issue with weak bus service connections, and there are currently no direct links from the western side of Cambridge. Passengers for the railway station must currently alight in the city centre and either use another bus or walk to their destinations.

12.5.48 The railway station and city centre are linked by eighteen buses per hour on the main Citi 1, 3 and 7 services, and there are also direct links to Addenbrooke's Hospital, Cherry Hinton, Fulbourn, Fen Ditton, Arbury, Impington, Histon, Cottenham, Saffron Walden and a number of villages south of Cambridge. Journey time from the city centre to the railway station is under 10 minutes and Plusbus tickets are available for integrated rail and bus travel.

Local and Strategic Highway Network

Local Highway Network

12.5.49 The strategic and local road network surrounding the site is shown on **Figures 12.1** and **12.2**.

12.5.50 There are two main radial routes serving the Site - Madingley Road and Huntingdon Road.

12.5.51 Madingley Road is located to the south of the Application Site, however a section is within the Application Site boundary, and is a single lane carriageway which fluctuates in width from approximately 7.5m to approximately 15m at the junction with JJ Thomson Avenue. In the vicinity of the Development, it has a speed limit of 40mph, albeit this reduces to 30mph towards the centre of Cambridge near JJ Thomson Avenue. Madingley Road leads from the village of Madingley to the inner Cambridge Ring Road and is the main arterial route into the city from the west.

12.5.52 Huntingdon Road is situated to the north of Application Site, however a section is within the Application Site boundary and is a wide single lane carriageway of 9.5m with a speed limit of 40mph, again reducing to 30mph closer to the centre of Cambridge near Oxford Road. Huntingdon Road leads directly from the A14(NW) at the M11 Junction 14 Girton Interchange, and forms the major arterial road into the city from the North West and the Midlands. A bus lane is provided for inbound bus movements from the A14 slip road, to the Huntingdon Road - Girton Road junction.

12.5.53 Madingley Rise, located to the south of the Application Site off Madingley Road, is the current access road to the Earth Science Facility and is used by university employees, students and visitors. As identified in Section 2, this road is to be used as a secondary access for a small area of the Application Site.

12.5.54 Storey's Way, located to the east of the Application Site, forms a link road between Huntingdon Road and Madingley Road. It is a residential road with width restriction barriers to reduce both the speed of vehicles passing through this section, and the attractiveness of this link. The road does provide a good pedestrian and cycle link.

Strategic Road Network

12.5.55 The local highway network in the vicinity of the Application Site provides access to the strategic highway network including the A14 and M11. Madingley Road intersects with the M11 at Junction 13 and Huntingdon Road at intersect with the M11 at Junction 14.

12.5.56 To the north of the Application Site lies the A14 on an east / west axis from Cambridge. To the east it connects to Newmarket, Bury St Edmunds, and Ipswich, finally terminating at the sea port of Felixstowe. To the west, the A14 passes through Huntingdon crossing the A1 before continuing through Kettering and terminating at Junction 19 of the M1 and Junction 1 of the M6 at the Catthorpe Interchange.

12.5.57 The M11 is located to the west of the Application Site, and routes in a north / south axis. It links between the North Circular Road in London, passes Bishop's Stortford, Harlow and Stansted Airport before passing to the immediate west of the Application Site at the merger with the A14 at Junction 14, the Girton Interchange.

12.5.58 Only limited movement access is possible at the two closest junctions to the M11, the A428 and the A14:

- i) the A14 is accessed via Huntingdon Road at A14 Junction 31, however westbound movements only are provided for – eastbound access to the A14 and southbound access to the M11 are not possible. The nearest A14 eastbound access from the Proposed Development is via Histon Road, the A14 Junction 32;
- ii) the M11 is accessed via M11 Junction 13 at Madingley Road, but only southbound movements are accommodated towards London;
- iii) the A428 cannot be directly accessed. A route to this link is formed either from Madingley Road to the west, or from the A14 Junction 31 through the village of Madingley.

Existing Cycle Movements

12.5.59 Summarised in **Table 12.8**, data informing of the existing cyclist movements has been obtained from Cambridgeshire County Council's 2010 Traffic Monitoring Report. The data has been recorded for September and October 2009 for 12 hours at the following locations:

- i) on Huntingdon Road, to the east of the A14 bridge
- ii) on Madingley Road, to the west of the Park and Ride Entrance
- iii) on Girton Road, to the south of the A14 bridge

12.5.60 As also shown in **Table 12.8**, further cycle and motor cycle movements were observed by Sky High Traffic Data Collection Ltd in October 2009, as part of the automatic traffic count data collection at:

- i) Huntingdon Road, by Whitehouse Lane
- ii) Madingley Road, west of the Park and Ride Access
- iii) Madingley Road, west of Clerk Maxwell Road.

Table 12.8 – Existing Cycle and Motor Cycle Movements

Location	Movements
Cambridgeshire Traffic Monitoring Report	Weekday 12 hour Cycle movement data
Huntingdon Road – east of A14 bridge	38
Madingley Road – west of the P+R Entrance	228
Girton Road – south of the A14 bridge	818
ATC by Sky High Traffic Data	7 day average 24 hour Cycle and Motor Cycle movement data
Huntingdon Road, by Whitehouse Lane	394 Ebd 441 Wbd 835 Total
Madingley Road, west of the Park and Ride Access	132 Ebd 89 Wbd 221 Total
Madingley Road, west of Clerk Maxwell Road.	236 Ebd 147 Wbd 383 Total

Existing Pedestrian Severance and Delay

12.5.61 The DMRB Volume 11, Section 3, Part 8, Chapter 6 provides a set of measures to identify changes in severance within a community in terms of the 2-way AADT flow on a link. **Table 12.9** summarises these thresholds. (The Severance Levels have been adapted and a further Severance Level of Negligible has been incorporated to maintain consistency with the categorisations of effect elsewhere within this assessment):

Table 12.9 – Pedestrian Severance Threshold Levels (DMRB)

Severance Level	Traffic Flow (AADT)
Negligible	<4,000
Minor	4,000 - 8,000
Moderate	8,000 - 16,000
Major	>16,000

Note 1: The original categories of Severance Level of Slight / Small, Moderate / Medium, and Severe / Large have been expressed consistently with the terms used in this assessment as Minor, Moderate and Major respectively.

12.5.62 Using this methodology, **Table 12.10** within **Appendix 12.2** identifies all future flow changes, to understand where changes are predicted in the Existing levels of Pedestrian Severance on the road network surrounding the Application Site.

12.5.63 It is concluded that the existing level of severance experienced within the vicinity of the on the local roads is in most cases Moderate.

Existing Pedestrian and Cyclist Amenity

12.5.64 Pedestrian and Cyclist amenity ("the relative pleasantness of a journey") is affected by traffic flows and composition, footway width and the degree of segregation.

12.5.65 Although the strategic highway links (such as the M11, A14, and A428) have high levels of traffic flow and high speeds, there is no pedestrian or cyclist access and there are few / no attractors along these for existing pedestrian and cyclist amenity to be a material consideration.

12.5.66 Although the levels of traffic flows on the local principal highway network are quite high, it is considered that existing pedestrian and cyclist amenity is good due to the quality of the footway and cycleway provision, the frequency of crossing facilities the limited HGV proportions, and the relatively controlled vehicle speeds.

Existing Driver Delay

12.5.67 Existing driver delay is experienced in the peak periods in the surrounding area along Madingley Road and Huntingdon Road, and on the A14. Outside of these periods, only limited driver delay is experienced in normal operating conditions.

Existing Fear and Intimidation

12.5.68 There is currently no Fear and Intimidation related to use of public rights of way within the Application Site.

12.5.69 With reference to the 2010 base traffic flows shown in **Table 12.1**, and the Fear and Intimidation thresholds given in **Table 12.2**, **Table 12.11** within **Appendix 12.2** contains the identified Existing levels of Fear and Intimidation.

12.5.70 With respect to the average speeds on links over 18 hour days, it is assumed that the majority of these links would have average vehicle speeds over an 18 hour day of in excess of 20mph, hence the existing level of Fear and Intimidation is be regarded as being Major in these cases.

12.5.71 As identified previously, the motorways and dual carriageways surrounding the site - the M11, A14, and A428 – have minimal (if any) authorised pedestrian and cyclist receptors on them, hence have a non-significant level of fear and intimidation. As such, these have been excluded from this assessment.

12.5.72 The existing levels of Fear and Intimidation reported above for the local roads around the proposed application site (Huntingdon Road, Madingley Road and Storey's Way) are limited – this is either Moderate, or Negligible. With the exception of the M11 and the A14, all other links have quality footpaths and cycleways along them, with regular crossing points.

Existing Road Personal Injury Collisions and Safety

12.5.73 As described in Section 3.8 of the Transport Assessment, Personal Injury Collision (PIC) (formerly known as Personal Injury Accidents – PIAs) summary data was obtained from Cambridgeshire County Council for the latest available 5 year period between 2004 and 2009.

12.5.74 The Transport Assessment provides a summary of the PICs (location and nature) and provides an estimate of the likely anticipated number of PICs for similar types of links and junctions to provide a comparison.

12.5.75 There is no evidence of any road traffic collision or highway safety issues in the area from an analysis of relevant data for Huntingdon Road and Madingley Road.

Existing Hazardous Loads

12.5.76 There are no known existing significant movements of hazardous loads in the vicinity of the Application Site.

Receptors

12.5.77 With reference to the 2010 base traffic flows and the Fear and Intimidation thresholds given in accordance with the relevant guidance referred to in Section 12.3, an assessment has been made of the receptors potentially affected by the traffic generated by the Proposed Development. In addition, a judgement has been made in accordance with this guidance, as to the sensitivity of these receptors in terms of severance, driver, pedestrian and cyclist delay, pedestrian and cyclist amenity, fear and intimidation, accidents and safety and hazardous loads.

12.5.78 This has been undertaken for the areas most likely to be affected as set out in Section 12.4.

12.5.79 These Sensitive Receptors are shown on **Figure 12.8** and include:

Table 12.12 – Sensitive Receptors

Reference on Figure 12.8	Receptor	Sensitivity
Albion Row 1	Retirement Homes / Care Homes	High
Arbury Road 2	St Lawrence's RC Primary School	High
Barton Road 3 4	Wolfson College Lammas Land Play Area	High Medium
Blanford Road 5	Church	Low
Bridge Street 6	Church	Low
Carlyle Road 7	Alexander Gardens play area	Medium
Castle Street 8 9 10 11	Church Church Kettles Yard Church	Low Low Low Low
Flack End 12	Corporate Nursing Agencies Park	Medium
Grange Road 13 14 23	Robinson College Margaret Beaufort Institute St John's College School	High High High
Histon Road 15	Histon Road Recreation Ground	Medium
Huntingdon Road 16 17 18 19 20	Murray Edwards (ex New Hall) College and Art Collection Westfield House Girton College Church Blackfriars Priory	High High High Low Low
Jesus Lane 21	Jesus College	High
Madingley Road 22	Various University of Cambridge facilities	High
Malting Lane 24	Ridley Hall	High
Millington Road 25	Millington Rd Nursery School	High
Mount Pleasant 26	St Edmund's College	High
Newnham Road 27	Sheeps Green / Lammas Land	Low
Park Street 28	Park Street CofE Primary School	High
Primrose Street 29	Retirement Homes / Care Homes	High
Quayside 30	Cambridge Punting Company / River Tours Tourist Attraction	Low

Table 12.12 – Sensitive Receptors (Contd/...)

Reference on Figure 12.8	Receptor	Sensitivity
Shelly Row 31	Shelly Row Play Area	Medium
Sidgwick Avenue 32 33 34	Various faculties – including Economics Newnham College Museum of Classical Archaeology	High High Low
Silver Street 35	Darwin College	High
St. Catherine's Square 36	Retirement Homes/ Care Homes	High
Storey's Way 37	Churchill College / FitzWilliam College / Murray Edwards College	High
Trinity Street 38	Gonville College / Caius College	High
Trumpington Street 39 40 41	Pembroke College / Corpus Christi College St Catherine's College Fitzwilliam Museum	High High High
Warwick Road 42 43	Mayfield Primary School Church	High Low
West Road 44 45 46	King's College School Faculty of Law Concert Hall	High High Low

12.5.80 Many of these receptors themselves actually have limited sensitivity (see 12.3.32 – 12.3.35) in terms of the effects considered in this assessment – of more relevance being movement associated with them (particularly pedestrian activity).

2014 Pre Opening Baseline Traffic Flows (Do Minimum)

12.5.81 The Interim Year of 2014 has been considered, to reflect the completion and occupation of the first phase of development.

12.5.82 Output from the Cambridgeshire County Council Cambridge Sub Regional 2006 Model has been used in conjunction with the TEMPRO growth factors to derive the Pre Opening Base Year Traffic Flows for 2014. A growth factor of 1.129 has been applied to these 2006 flows to produce the 2014 Pre Opening Base Year flows. These 2014 Pre Opening Base Year flows are summarised in **Table 12.13** (enclosed in **Appendix 12.1**), the links being shown on **Figure 12.3**.

12.5.83 The University commissioned a series of automatic traffic counts on Huntingdon Road and Madingley Road in 2009. The results from these 2009 counts are compared to the predicted 2014 Pre Opening traffic count flows in **Table 2.14**:

Table 12.14 – Comparison of 2009 traffic count observations against the predicted 2014 Pre Opening Model results

Location	Data source	Average Weekday AM Peak flows	Average Weekday PM Peak flows	Average 24 hr 7- day flows
Huntingdon Road -	ATC – 2009	707	1,058	11,433

West of Grange Drive Junction (Link 15)	2014 Base	1,112	1,267	12,615
Huntingdon Road – West of Whitehouse Lane Junction (Link 18)	ATC – 2009	1,632	1,677	17,632
	2014 Base	1,757	1,983	19,879
Madingley Road – 80m West of Park and Ride Access Jn (Link 27)	ATC – 2009	1,676	1,714	15,899
	2014 Base	1,751	1,837	16,643
Madingley Road – West of Clark Maxwell Road Junction (Link 24)	ATC – 2009	1,444	1,570	15,433
	2014 Base	1,750	1,835	18,147

12.5.84 The predicted 2014 Pre Opening flows are consistently in excess of the observed 2009 flows. The excess varies between 4% and 17%. The 2014 Pre Opening flows used in this assessment therefore represent an over-estimate and hence a robust basis for assessment.

Opening Year Baseline Traffic Flows 2026 (Do Minimum)

12.5.85 For the purposes of understanding the effect of the Proposed Development, following discussions with the stakeholders an opening year of 2026 has been assumed reflecting the likely implementation period of the Proposed Development, and maintaining consistency with the highway authority's available model scenarios.

12.5.86 As set out earlier, the Cambridge Sub Regional Model Traffic Model has been used as the basis for traffic effect, providing both the 2010 Base Year, and 2026 Opening Year flows.

12.5.87 The 2026 Opening Year Do Minimum baseline traffic flows for the highway network in the vicinity of the site are shown in **Table 12.15**, enclosed in **Appendix 12.1**.

12.5.88 This shows that in comparison with the baseline flows in **Table 12.1** for 2010, traffic flows are substantially higher.

12.6 Likely Significant Effects Before 2014 Opening

2014 Pre Opening Development Construction traffic

12.6.1 Typically, the final rate of project completion reflects many competing factors - such as access to the development, completing the sales of buildings, availability of materials and labour (such as concrete or bituminous material), as well as the prerogative of maintaining a quality environment during the early phases of a project during these construction phases.

12.6.2 The peak level of construction traffic likely to be associated with the Proposed Development has been assessed, based on an anticipated level of construction. To provide a reasonable worst case assessment of these construction movements, two of the higher generating activities have been assumed – the flows generally associated with these construction operations would be far lower. The assessed level of construction traffic is based on experience, and is considered to reflect a reasonable assessment of these numbers. The potential trip generation of these activities is considered individually, as two-way trips.

12.6.3 The Construction Environmental Management Plan, to be applied to all construction activities across the Proposed Development, will define the appropriate hours of operation and routes to be used

by HGV and other large construction vehicles associated with the Proposed Development. It is assumed that the construction access will be the proposed Madingley Road Site Access, with all HGVs routed to that access from the M11.

12.6.4 The Construction Environmental Management Plan will also impose requirements for the various contractors to coordinate activities to ensure that the construction activities with high HGV generation do not occur together.

12.6.5 It has been assumed that the following major elements of the Proposed Development to be constructed in Year 1 simultaneously would form a representative range of activities, and have been considered in the assessment (other elements, such as off-road segregated cycleways are not included in this list):

- i) on-site earthworks and landscaping – including construction of balancing ponds;
- ii) 1,800m of primary access road;
- iii) approximately 100 residential units;
- iv) 2,900m² gross floor area Food Store;
- v) Madingley Road and Huntingdon Road Site Accesses
- vi) highway and utilities works to Huntingdon Road and Madingley Road

12.6.6 The traffic generation of construction the remainder of the Proposed Development to be implemented in other phases would be less.

12.6.7 The on-site earthworks will have limited effect on the surrounding highway network, there being no requirement for material to be imported or exported. The daily movements are assumed to be limited to fuel deliveries and maintenance (assumed to be 2 HGV trips per day), and the operatives' journey to work trips (assumed to be 6 car trips per day with 1.5 occupants per vehicle).

12.6.8 The majority of the carriageway and drainage construction works are assumed to be undertaken during the first year. Most of the carriageway and drainage construction works are unlikely to generate high volumes of HGV movements on the surrounding highway network, typically consisting of a number of deliveries, and concrete supplies for kerb races / drainage chambers – 11 per day have been assumed. The highest number of movements typically occurs over a short timescale, generated by regular deliveries of bituminous material for pavement construction. For the purposes of deriving a worst case assessment, it is assumed that this paving operation would be on-going at the same time as the general works: there would be a total of 33 operatives on site, one paving machine receiving deliveries every 10 minutes through the day for ten hours (72 HGV movements). This gives a daily total for the carriageway and drainage works of 83 HGV movements, and 22 car movements. The number of days when the carriageway construction operation is on-going at full capacity and generating these higher levels of flow are anticipated to be limited due to the one access point to the site, this restricting the availability of areas made available for construction work to proceed in. It is thought that full capacity would be enabled on carriageway construction on around 20 days in total across the whole project.

12.6.9 The main construction of the housing units is assumed to start in Year 2. However, it has been assumed that around 100 completions would be achieved in the first year, with the activity occurring towards the last four months of that year. A total of 89 operatives are assumed – this is assumed to generate 59 car movements. A total of 10 HGV movements per house have been assumed, equating to 10 HGV movements per day. In reality, the movements associated with house-building are comparatively low.

12.6.10 The construction of the Food Store is assumed to start in Year 1. The peak construction activity is assumed to occur during the finishing works, a total of 25 operatives have been assumed – this is assumed to generate 17 car movements. A total of 10 HGV movements per day have been assumed. The movements associated with the Food Store construction are also low.

12.6.11 The construction of the Community uses is assumed to start in Year 1, but to continue over a longer period. A total of 34 operatives have been assumed – this is assumed to generate 23 car movements. A total of 10 HGV movements per day have been assumed. Again, the movements associated with the construction of the Community Centre uses are comparatively low.

12.6.12 In addition to the construction activities within Zone B of the Application Site, construction of highways and utilities works will be constructed within Zones A and C along Madingley Road and Huntingdon Road to enable implementation of the Proposed Development. This work would include upgrading sewer capacity, the installation of service utility company apparatus, crossing points and cycling facilities. These works are ephemeral, and are expected to be completed within 4 months. Due to the limited area likely to be available to undertake the works at any one time, the number of deliveries required would also be constrained. It is considered that the peak number of movements would be limited to around 20 HGV movements per day delivering concrete, backfill material and concrete goods for the sewer upgrade, with around 15 operatives generating 10 car movements. It is assumed that there would not be significant overlap in timing between the works on Huntingdon Road and those on Madingley Road.

12.6.13 The assumed worst case peak Daily Construction traffic flows are summarised in **Table 12.16**:

Table 12.16 – Summary of Development Construction traffic flows (Pre 2014 Opening)

Activity	Max Car and Light Vehicle Movements / Day			Max HGV Movements / Day			Max Total Movements / day		
	In	Out	Total	In	Out	Total	In	Out	Total
Earthworks	6	6	12	2	2	4	8	8	16
Carriageway / drainage	22	22	44	83	83	166	105	105	210
House Building	59	59	118	10	10	20	69	69	138
Food Store	17	17	34	10	10	20	27	27	54
Community Uses	23	23	46	10	10	20	33	33	66
Highway and utilities works	10	10	20	20	20	40	30	30	60
Total	137	137	274	135	135	270	272	272	544

12.6.14 There is the potential for the highways and utilities work along Madingley Road and Huntingdon Road to affect the existing traffic flows. To control and manage disruption to traffic flows on the surrounding road network, all contractors (including the service utility companies' contractors working for the University) would be required to plan their works in accordance with the Construction Environment Management Plan. The basic measures as summarised below would be included:

- i) design – consideration of alternative service routes to minimise construction work in the local highways;
- ii) co-ordination of works – to undertake all necessary works (such as installing more than one utility company's apparatus simultaneously in one section) to avoid having to re-install the traffic management at any one location;
- iii) co-ordination of these development-related works with works elsewhere on the network being undertaken by other developers and organisations, to prevent two parallel routes being affected simultaneously;
- iv) consideration of working anti-social hours where the number of sensitive receptors is limited (such as to the west of the proposed Site Accesses adjacent the motorway), to reduce the overall duration of the works;
- v) possible means of removing traffic management during the peak hours, to re-open the road and minimise the effects upon the surrounding highway network;
- vi) installing intelligent traffic light controllers or using manually controlled light controllers to minimise any inefficient use of green time.

12.6.15 To undertake the highways and utilities work along Madingley Road and Huntingdon Road in a safe manner, the operatives would need a working space free from passing vehicles. This working space would be provided with temporary traffic management regimes which could include single direction running controlled with temporary traffic signals to enable traffic to pass the works area.

12.6.16 The potential available link capacity of Madingley Road and Huntingdon Road with traffic management would influence the volume of trips reassigning to alternative routes. With reference to TA79/99 "Determination of Urban Road Capacity", the capacity for a road type such as these (marginally greater than 7.3m wide) with one way traffic management operation would be around 1,375 vehicles per hour. The peak hour flows on both roads are around 1,800 vehicles per hour, around 425 vehicles more than can be accommodated during the peak hour. Outside of the network peaks, these two links would still be able to provide sufficient capacity to accommodate the likely flows with the traffic management regime.

12.6.17 As identified in Section 12.4, only limited movement access is possible to the strategic highway network at the two closest junctions – to the M11 (Madingley Road – providing connections to / from the

south only), and the A14 (Huntingdon Road – providing connections to / from the north-west only). As a consequence, there would be only minimal opportunity for trips to reassign a short distance across the network between Huntingdon Road and Madingley Road to avoid any obstruction to the west of Storey's Way – any reassignment to avoid the obstruction at this location would entail travelling a significant distance across the network to the M11 Junction 12 Barton Interchange or to the A14 Histon Road Junction.

12.6.18 It is therefore considered more likely that the majority of the vehicle trips would remain on these routes, and not reassign away to alternative routes. It is also considered likely that the majority of the peak hour trips would remain on these routes, potentially reassigning in time from the peak hours to before or after the peak hours, or reassign to alternative modes (ie, the Guided Busway)..

12.6.19 Sections of Madingley Road and Huntingdon Road towards the M11 / A14 currently operate with a 40mph speed limit. It is likely that a lower temporary speed limit would be sought to minimise the risk to the workforce and members of the public to the extent that the volume of traffic movements does not achieve this effect in practice in any event.

12.6.20 Of the construction-related flows summarised above, only a limited number of car and HGV movements would usually occur during the peak hours: the working hours of most construction operatives would not coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods and delivery drivers will themselves wish to avoid being on the network at congested times of the day when drivable hours are disproportionate to quantities of goods delivered. This would be reinforced by the Construction Environment Management Plan controlling movements during peak hours. On the basis of the worst case flow relating to the construction activities, a worst case assessment of the likely effect on daily flow Pre-Opening in is shown below in **Table 12.17**.

Table 12.17 – Development Construction traffic effects – (2014 Pre Opening)

No	Link	Base 2010 Daily Flow (2-way – approx)		Estimated Construction Traffic (2-way)		Increase	
		All Vehicles	HGV	All Vehicles	HGV	All Vehicles	HGV
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	17,100	650	544	270	3.2%	41.5%
27	Madingley Road – from Park and Ride Entrance to Unnamed Rd	15,700	450	544	270	3.5%	60.0%
2	M11 – from Junction 13 to Junction 14	74,100	13,000	272	135	0.4%	1.0%
3	M11 – from Junction 12 to Junction 13	88,600	15,600	544 + 272 = 816	270+135 = 405	0.3%	2.6%
4	M11 – from Junction 11 to Junction 12	76,800	13,500	272	135	0.3%	1%

12.6.21 In the Pre-Opening scenario, the greatest peak Construction traffic effect would be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 3%, and HGVs increasing by 60%. Of all the effects considered in this Chapter, the only one likely to be affected is Pedestrian and Cyclist Amenity (and possibly Fear and Intimidation) for this short section of Madingley Road between the M11 and the site access, on the basis that HGVs may increase by 60%. Even so, applying the criteria outlined in paragraph 12.3.27 since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 270 vehicles per day - well below the 1000 vehicles per day threshold referred to in Table 12.2). Therefore, the magnitude of change is considered to be Negligible or (at worst) Minor. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists. Overall, in terms of the significance of effect, it is considered that there would be **Negligible or (at worst) Minor adverse** effect on Pedestrian and Cyclist Amenity.

12.6.22 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity would be lower and also the effects would be considered **Negligible**.

2014 Pre-Opening Scenario Cumulative Construction traffic

12.6.23 In addition to the Proposed Development, there are two further developments in the vicinity that are generating construction movements in the Pre-Opening situation:

- i) NIAB – located to the north of Huntingdon Road
- ii) West Cambridge – located to the south of Madingley Road

The trip generation of the West Cambridge and NIAB developments has been included in the CSRM data. The effects of the cumulative movements are considered.

NIAB Construction Movements

12.6.24 To assess any potential effects of additional construction movements generated by the NIAB Development, reference has been made to the Construction Management Plan prepared by Colin Buchanan and Partners Ltd in 2009 for the “Land between Huntingdon Road and Histon Road Cambridge” (ie, the NIAB Residential Development). This document identifies the following construction access arrangements:

- i) for the initial 350 units, expected to be completed within 2 years from commencement – access to the site will be from the new traffic signal controlled site access on Huntingdon Road;
- ii) for the remaining 1,430 units (to bring the total NIAB Development to 1,780 units), expected to be completed within six years from commencement – access to the site will be from the new traffic signal controlled site access on Histon Road;
- iii) the construction movements from NIAB in the later phases are reported as peaking at 41 HGV and 140 light vehicle two-way movements per day;
- iv) all construction vehicle routing for the later phases of the NIAB Development will be from the A14 and Histon Road – all construction movements through Cambridge have been voluntarily prohibited;

12.6.25 Construction has commenced already for the NIAB Development, it is anticipated that construction of the earlier phase of the NIAB Development will be completed before the North West Cambridge Development opens in 2014. There will be no cumulative effects from the first phase of the NIAB Development.

12.6.26 For the later phases of the NIAB Development, there will be no NIAB Development construction movements along Huntingdon Road or Madingley Road. As such, only minimal cumulative effects will be from a few HGV movements along the M11, hence there will be no cumulative effects from the later phases of the NIAB Development.

West Cambridge Construction Movements

12.6.27 Construction of the West Cambridge Development infrastructure and buildings commenced in 1999. Currently, around half of the final Development is completed and occupied.

12.6.28 Reflecting the likely progression of development on this site, it is anticipated that the construction of two buildings would progress in this assessment period. The construction for each is assumed to continue for a year. The peak construction activity for any new building is assumed to occur during the finishing works, not anticipated as being at the same time. A peak total of 19 operatives have been assumed – this is assumed to generate 13 car movements. A total of 10 HGV movements per day have also been assumed.

12.6.29 After 2014, it is anticipated that the construction of two buildings would progress, with the extension of the West Cambridge Development carriageway and site infrastructure. The construction of the two buildings are assumed to continue for a year, the peak construction activity for these new building occurring during the finishing works – but these finishing works are anticipated as being at different times. The same peak total of 19 operatives has been assumed – this is assumed to generate 13 car movements. A total of 10 HGV movements per day have also been assumed.

12.6.30 Whilst the West Cambridge Development infrastructure works will involve some carriageway construction, it is considered that the paving operation cannot occur at the same time as the Proposed Development due to a finite total output capacity of the bitumen plant (the paving operation flows being assumed simultaneously from the Proposed Development). The carriageway formation and drainage construction works are unlikely to generate high volumes of HGV movements on the surrounding highway network, typically consisting of a number of deliveries, and concrete supplies for kerb races / drainage chambers – 10 HGV two-way movements and per day have been assumed, along with 10 light vehicle movements for the 15 operatives on site.

12.6.31 In addition to the West Cambridge Development, a further building is being constructed off Madingley Rise. The finishing works are anticipated being completed in 2015. It is unlikely that the peak construction generation would occur at the same time as the West Cambridge Development flows, hence for the purposes of this assessment only 5 HGV per day have been assumed for the earlier construction activities, along with 10 light vehicles are assumed as well.

12.6.32 It is assumed that all construction HGV movements associated with the West Cambridge Development would route to the west towards the M11, and that no movements would be allowed further into Cambridge.

12.6.33 The assumed cumulative worst case peak Daily Construction traffic flows on surrounding routes are summarised in **Table 12.18**:

Table 12.18 – Summary of Cumulative Daily Construction traffic flows (Pre 2014 Opening)

Location	Max Car and Light Vehicle Movements / Day			Max HGV Movements / Day			Max Total Movements / day		
	In	Out	Total	In	Out	Total	In	Out	Total
Madingley Road									
North West Cambridge	137	137	274	135	135	270	272	272	544
West Cambridge	13	13	26	10	10	20	23	23	46
Off Madingley Rise	0	0	0	5	5	10	15	15	30
NIAB	0	0	0	0	0	0	0	0	0
Total	150	150	300	145	145	290	295	295	590
Huntingdon Road									
North West Cambridge	10	10	20	20	20	40	30	30	60
West Cambridge	0	0	0	0	0	0	0	0	0
NIAB	140	140	280	41	41	82	181	181	362
Total	150	150	300	61	61	122	211	211	422

12.6.34 On the basis of the worst case flow relating to the construction activities, a worst case assessment of the likely effect on cumulative daily flow Pre-Opening in is shown below in **Table 12.19**.

Table 12.19 – Cumulative Daily Construction traffic effects – (Pre 2014 Opening)

No	Link	Base 2010 Daily Flow (2-way – approx)		Estimated Construction Traffic (2-way)		Increase	
		All Vehicles	HGV	All Vehicles	HGV	All Vehicles	HGV
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	17,100	650	590	290	3.5%	44.6%
27	Madingley Road – from Park and Ride Entrance to Unnamed Rd	15,700	450	590	290	3.8%	64.4%
2	M11 – from Junction 13 to Junction 14	74,100	13,000	295 + 211 = 506	145 + 61 = 206	0.7%	1.6%
3	M11 – from Junction 12 to Junction 13	88,600	15,600	590 + 295 + 211 = 1,096	290+145 +61 = 496	1.2%	3.2%
4	M11 – from Junction 11 to Junction 12	76,800	13,500	295 +211 = 506	145 + 61 = 206	0.7%	1.5%
15	Huntingdon Road – from A14 slip road to NWC North Access	11,900	398	422	122	3.6%	30.9%
17	Huntingdon Road – from Girton Road to NWC East Access / NIAB	18,700	628	422	122	0.6%	19.4%
7	A14 – from Dry Drayton Road – M11 Merge	95,000	16,082	295 + 422 = 717	145 + 61 = 206	0.8%	1.3%

12.6.35 In terms of the Cumulative Pre-Opening Situation, the maximum effect remains on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 4% and HGVs increasing by 64%. Of all the effects considered in this Chapter, Pedestrian and Cyclist Amenity, possibly Fear and Intimidation may be affected for this short section of Madingley Road, and for the section of Huntingdon Road from the A14 to the Proposed Development North Access on the basis that HGVs may increase by 64% and 31% but only for the duration of the Pre Opening Situation. Applying the criteria outlined in paragraph 12.3.27 since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 290 vehicles per day - well below the 1000 vehicles per day threshold referred to in Table 12.2), therefore, the magnitude of change is considered to be Negligible or (at worst) Minor. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists. Overall, in terms of the significance of effect, it is considered that there would be **Negligible or (at worst) Minor adverse** effect on Pedestrian and Cyclist Amenity.

12.6.36 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity is considered **Negligible**.

12.7 2014 – Post Opening Scenario

12.7.1 The assessment of 2014 Post-Opening conditions considers:

- i) the peak daily two-way flows arising from the completed / occupied Phase 1 Development operation;
- ii) the peak daily flows from the completed / occupied Phase 1 Development and construction of the next phase of the Proposed Development;
- iii) the cumulative flows from the completed / occupied Phase 1 Development, construction of the next phase of the Proposed Development, and construction of other developments in the area.

Under this scenario improvements in the form of new signalised junctions, pedestrian and cycle crossings and improved pedestrian and cycle facilities on Huntingdon Road and Madingley Road are assumed to have been completed.

Phase 1 Development Operation traffic

12.7.2 An assessment of a first phase of development was assessed consisting of up to:

- i) 150 – 400 Total Key Worker Housing units
- ii) 50 – 200 Total Market Private Housing units
- iii) 300 Collegiate Accommodation units
- iv) School – 1 form entry
- v) Hotel – 7,000m²
- vi) Retail – 2,900m² – 5,000m² of which 2,900m² gross area is Food Store
- vii) Senior Care – 6,500m²

12.7.3 To provide a worst case assessment, the vehicle trip generation from the higher range was applied.

12.7.4 The 2014 Phase 1 Development Post Opening Do Something flows have been calculated as follows:

- i) the Cambridge Sub Regional Model Traffic Model has been used as the origin for traffic effects, providing the 2006 Base Year flows;
- ii) as described previously, these flows have been growthed to 2014 by the application of the TEMPRO growth factor of 1.129 to provide the 2014 Base flows;
- iii) reference was made to Peter Brett Associates Person Trip Model to inform the vehicle trip generation for the Phase 1 Development;
- iv) these vehicle trips were assigned to the network pro-rata to the assigned Proposed Development flows identified by the CSRM;
- v) the 2014 Phase 1 Do Something flows were synthesised by adding the 2014 Base Flows to the assigned Phase 1 Development flows.

12.7.5 This methodology would provide a worst case assessment, as

- i) the application of growth factors to busy highway links ignores the ability for each link to cater with higher flows;
- ii) the manual assessment does not allow for reassignment of trips away from congested links.

12.7.6 The 2014 Do Something flows for the highway network in the vicinity of the Application Site are shown in **Table 12.20**, enclosed in **Appendix 12.1**.

12.7.7 The 2014 Do Something link flow increases are considered in **Table 12.21**:

Table 12.21 – Traffic effect of the Proposed Phase 1 of Development

Link No.	Link	2014 Do Minimum 2-way all vehicle			2014 Do Something 2-way all vehicle			% Increase in 2-way flows		
		AM	PM	24 hr	AM	PM	24 hr	AM	PM	24 hr
1	M11 - Junction 14 to M11/A604 Merger	5754	5489	65082	5754	5489	65082	0.0%	0.0%	0.0%
2	M11 - from Junction 13 to Junction 14	6710	6898	78773	6713	6898	78788	0.0%	0.0%	0.0%
3	M11 - from Junction 12 to Junction 13	7861	8392	94086	7966	8543	95565	1.3%	1.8%	1.6%
4	M11 - from Junction 11 to Junction 12	6875	7213	81553	6965	7337	82791	1.3%	1.7%	1.5%
5	A14 - NW of B1050 Junction	7606	8333	84758	7692	8420	85682	1.1%	1.1%	1.1%
6	A14 - from B1050 Jn to Dry Drayton Road Jn	9109	10173	102536	9252	10316	104061	1.6%	1.4%	1.5%
7	A14 - from Dry Drayton Road to M11 Merge	9106	9879	100961	9256	10031	102561	1.6%	1.5%	1.6%
8	A14 and A14 Service Rd – from M11 Merge to A14 Eastbound Slip	1916	1785	19685	1916	1785	19685	0.0%	0.0%	0.0%
8A	A14 and A14 Service Rd – from A14 to M11 Merge Westbound Slip	1556	1655	17074	1556	1655	17074	0.0%	0.0%	0.0%
9	Sbd Slip Road from A14 to M11	926	832	9350	926	832	9350	0.0%	0.0%	0.0%
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	7338	6797	75166	7338	6797	75166	0.0%	0.0%	0.0%
11	A14 - from B1049 Junction to A10 Junction	6889	7141	74606	6947	7211	75289	0.9%	1.0%	0.9%
12	A14 - from A10 Junction to Horningsea Road	6630	6914	72024	6668	6957	72456	0.6%	0.6%	0.6%
13	A428 - west of Madingley Road Junction	2637	2687	28316	2684	2742	28855	1.8%	2.0%	1.9%
14	A428 - from Madingley Road Jn to M1 Jn	1632	1534	16838	1632	1534	16838	0.0%	0.0%	0.0%
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	1112	1267	12615	1292	1466	14620	16.2%	15.7%	15.9%
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	1112	1267	12615	1267	1436	14327	13.9%	13.3%	13.6%
17	Huntingdon Road – Girton Road to North-eastern NWC Site Access	1757	1983	19829	1989	2229	22363	13.2%	12.4%	12.8%
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	1757	1983	19829	1939	2179	21827	10.3%	9.9%	10.1%
19	Huntingdon Road – from Storey's Way to Victoria Road – Castle Street Junction	1367	1569	15566	1427	1636	16233	4.4%	4.2%	4.3%
20	Lady Margaret Road and Mount Pleasant	872	1263	11317	874	1289	11469	0.2%	2.1%	1.3%
21	Shelly Row and Albion Row	505	208	3782	507	211	3807	0.4%	1.2%	0.7%
22	Madingley Road – from Queens Road to Grange Road	1165	1292	13027	1210	1327	13452	3.9%	2.7%	3.3%
23	Madingley Road – from Grange Road to Storey's Way	1165	1292	13027	1233	1365	13772	5.8%	5.6%	5.7%

Link No.	Link	2014 Do Minimum 2-way all vehicle			2014 Do Something 2-way all vehicle			% Increase in 2-way flows		
		AM	PM	24 hr	AM	PM	24 hr	AM	PM	24 hr
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	1750	1835	18147	1814	1907	18838	3.7%	3.9%	3.8%
25	Madingley Rd – from JJ Thomson Ave to South NWC Site Access	1754	1832	18153	1827	1910	18917	4.1%	4.3%	4.2%
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	1751	1835	18153	1825	1916	18939	4.3%	4.4%	4.3%
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	1751	1837	16643	1915	2042	18356	9.4%	11.2%	10.3%
28	Madingley Road – from Unnamed Road to M11 Jn 13	1751	1837	16643	1915	2042	18356	9.4%	11.2%	10.3%
29	Madingley Road – from M11 Junction 23 to Cambridge Road	1377	1193	11922	1438	1247	12454	4.4%	4.5%	4.5%
30	Madingley Rd – from Cambridge Road to A428 Junction	1299	1365	12358	1340	1397	12695	3.1%	2.4%	2.7%
31	Barton Road – from M11 Junction 12 to Grange Road	1169	1464	12212	1170	1465	12222	0.1%	0.0%	0.1%
32	Barton Rd – from Grange Rd to Newham Rd / Fen Causeway Jn	872	1117	9226	873	1135	9314	0.1%	1.6%	0.9%
33	Newham Rd – from Barton Rd / Fen Causeway Jn to Queens Rd / Silver St Jn	808	1044	9813	829	1049	9959	2.7%	0.5%	1.5%
34	Queens Rd – from Newham Rd / Silver St Jn to Madingley Rd	1783	1435	17059	1822	1443	17309	2.2%	0.6%	1.5%
35	Storey's Way	942	737	8901	945	737	8919	0.4%	0.0%	0.2%
36	Oxford Road and Windsor Road	417	613	5461	512	715	6505	22.6%	16.8%	19.1%
37	Histon Road	1553	1707	17284	1631	1797	18171	5.0%	5.3%	5.1%
38	Bridge Road (Histon)	1545	1499	14123	1546	1506	14158	0.0%	0.5%	0.3%
39	Victoria Road	1152	958	11182	1202	994	11644	4.4%	3.8%	4.1%
40	A10	2456	2462	26153	2466	2476	26279	0.4%	0.5%	0.5%
41	Girton Road	583	646	5700	646	693	6210	10.7%	7.4%	9.0%
42	Grange Road	287	292	3065	307	325	33351	7.2%	11.4%	9.3%

12.7.8 Although a daily flow increase of 19% has been reported on Link 36 - Oxford Road and Windsor Road, it is considered that this increase is unlikely to happen in reality – the CSRM has modelled this link with higher capacity than is the case for a narrow, traffic calmed residential street, enabling more of the Proposed Development trips to pass along in theory. It is considered that this increase in flow reflects more the modelling methodology than the reality and is therefore discounted.

12.7.9 With the exception of the above anomaly, the highest traffic flow percentage increases on the surrounding network as a consequence of the Phase 1 Development would occur on Huntingdon Road, between the A14 and Site Access. Increases of 16% would be expected.

2014 – Post Opening Scenario – and Phase 1 Operational traffic alongside continuing Construction traffic from the Proposed Development

12.7.10 The Post-Opening Development Construction and Phase 1 Development Operation has been assessed on local links with reference to the worst case Pre-Opening Development Construction movements summarised in Section 12.6, and the Phase 1 Development Operation flows summarised in Section 12.7. The likely effect on daily flow Post-Opening in is shown below in **Table 12.22**.

Table 12.22 – Development Construction and Phase 1 Operation Daily traffic effects – (Post 2014 Opening Scenario)

No	Link	Base 2014 Daily Flow (2-way)		Estimated Construction Traffic (2-way)		Phase 1 Development (2-way)		Increase	
		All Vehs	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	HGV
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	18,153	667	544	270	1,713	48	12.4%	47.7%
27	Madingley Road – from Park and Ride Entrance to M11	16,643	468	544	270	1,713	48	13.6%	67.9%
2	M11 – from Junction 13 to Junction 14	78,773	13,855	272	135	15	3	0.4%	1.0%
3	M11 – from Junction 12 to Junction 13	94,086	16,548	544 + 272 = 816	270+135 = 405	1,479	260	2.4%	4.0%
4	M11 – from Junction 11 to Junction 12	81,553	14,343	272	135	1,238	218	1.9%	2.5%

12.7.11 In terms of the Post-Opening scenario, the maximum effect of the peak Construction traffic effect is therefore on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14%, and HGVs increasing by 68% with a further 318 2-way HGV movements. Of all the effects considered in this Chapter, the only one likely to be affected is Pedestrian and Cyclist Amenity (and possibly Fear and Intimidation) for this short section of Madingley Road between the M11 and the site access. Even so, applying the criteria outlined in paragraph 12.3.27 since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 270 vehicles per day - well below the 1,000 vehicles per day threshold referred to in Table 12.2) therefore, the magnitude of change is considered to be Negligible or (at worst) Minor. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists.

12.7.12 On all other routes in the area, the increase in traffic / HGVs resulting from construction activity is **Negligible**.

2014 Post-Opening Scenario – Phase 1 Operational traffic alongside continuing construction traffic from the Proposed Development cumulatively with construction and operational traffic from other developments

12.7.13 In addition to Phase 1 of the Proposed Development, there are two further developments in the vicinity that could generate construction movements in the Pre-Opening situation:

- i) NIAB – located to the north of Huntingdon Road
- ii) West Cambridge – located to the south of Madingley Road

The trip generation of the West Cambridge Development has been included in the CSRM data, the effects of the cumulative movements are considered.

NIAB Construction Movements

12.7.14 With reference to the Construction Management Plan prepared by Colin Buchanan and Partners Ltd in 2009 for the “Land between Huntingdon Road and Histon Road Cambridge” (ie, the NIAB Residential Development), the Huntingdon Road construction access to NIAB in the later phases will be closed, and replaced with the new traffic signal controlled site access on Histon Road and the A14 to the north. There will be no construction movements along Huntingdon Road. Any additional operational trips from NIAB will be reflected by the trip growth factors applied.

West Cambridge Construction Movements

12.7.15 For the purposes of this assessment, the construction movements for the West Cambridge Development identified in section 12.6 have been applied. These construction movements associated with the West Cambridge Development would route to the west towards the M11, and that no movements would be allowed further into Cambridge.

12.7.16 The assumed cumulative worst case Daily Construction traffic flows on surrounding routes are summarised in **Table 12.23**:

Table 12.23 – Summary of Cumulative Daily Construction traffic flows (Post 2014 Opening Scenario)

Location	Max Car and Light Vehicle Movements / Day			Max HGV Movements / Day			Max Total Movements / day		
	In	Out	Total	In	Out	Total	In	Out	Total
Madingley Road									
North West Cambridge	137	137	274	135	135	270	272	272	544
West Cambridge	23	23	46	20	20	40	43	43	86
Off Madingley Rise	10	10	20	5	5	10	15	15	30
NIAB	0	0	0	0	0	0	0	0	0
Total	170	170	340	160	160	320	330	330	660
Huntingdon Road									
North West Cambridge	0	0	0	0	0	0	0	0	0
West Cambridge	0	0	0	0	0	0	0	0	0
NIAB	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0

12.7.17 On the basis of the worst case flow relating to the construction activities, a worst case assessment of the likely effect on daily flow Post-Opening in is shown below in **Table 12.24**. As there are no further cumulative trips along Huntingdon Road, no further assessment has been undertaken on this link:

Table 12.24 – Cumulative Construction and Phase 1 Operation Daily Construction traffic effects – (Post 2014 Opening Scenario)

No	Link	Base 2014 Daily Flow (2-way)		Estimated Construction Traffic (2-way)		Phase 1 Development (2-way)		Increase	
		All Vehs	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	HGV
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	18,153	667	660	320	1,713	48	13.1%	55.1%
27	Madingley Road – from Park and Ride Entrance to M11	16,643	468	660	320	1,713	48	14.3%	78.6%
2	M11 – from Junction 13 to Junction 14	78,773	13,855	330	160	15	3	0.4%	1.2%
3	M11 – from Junction 12 to Junction 13	94,086	16,548	660+330 = 990	320+160 = 480	1,479	260	2.6%	4.5%
4	M11 – from Junction 11 to Junction 12	81,553	14,343	330	160	1,238	218	1.9%	2.6%

12.7.18 In terms of the Cumulative Post-Opening Situation, the greatest effect remains on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14% and HGVs increasing by 79%. Of all the effects considered in this Chapter, Pedestrian and Cyclist Amenity, possibly Fear and Intimidation may be affected for this short section of Madingley Road on the basis that HGVs may increase by 79% - Even so, applying the criteria outlined in paragraph 12.3.27 since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 290 vehicles per day - well below the 1,000 vehicles per day threshold referred to in Table 12.2) therefore, the magnitude of change is considered to be **Negligible** or (at worst) **Minor**. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists.

12.7.19 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity is considered **Negligible**.

Personal Injury Collision Rates – Post-Opening Cumulative Development and Construction traffic (2014)

12.7.20 Although the HGV composition along Madingley Road is higher than existing due to the levels of construction traffic, this affects two links with low numbers of pedestrians and cyclists. It is considered that this would have minimal effect on Personal Injury Collision Rates. The remaining additional flows generated by the Proposed Development would be no different to the vehicle composition on the existing links, and as the Development proposals do not alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

Public Rights of Way – Post-Opening Cumulative Development and Construction traffic (2014)

12.7.21 The Proposed Development would have no effect upon any existing footpath within the Application Site – Footpath 5, being routed on a south-west to north-east axis through the northern end of the Application Site between Girton and Hardwick would be only affected by later phases.

2014 Post opening Scenario - Overall Significance of Effects

12.7.22 **Tables 12.21 and 12.24** shows the percentage increases in traffic flow on the roads in the area, and the potential significance of each effect is summarised below. The same considerations apply for the Proposed Development alone (construction and operational traffic) and for the Proposed Development in combination with construction and operational traffic associated with the NIAB and West Cambridge developments:

- i) Severance – the guidance set out in Section 12.3 from the IEMA's Guidelines for the Environmental Assessment of Road Traffic and Volume 11, Section 3, Part 8, Chapter 6 of the Design Manual for Roads and Bridges entitled 'Pedestrians and Others and Community Effects' has been applied here. Table 12.10, included in Appendix 12.3, summarises the changes in levels of Severance.

The change in traffic link flows resulting from the Proposed Development do not result in any significant increases in the level of severance in most cases – with increases generally well below 30% - i.e. below the level at which a change in severance is significant. Moreover, the increased number and quality of pedestrian and cycle crossing facilities of Huntingdon Road and Madingley Road proposed as part of the Proposed Development would deliver a positive benefit. Overall therefore, in the context of a negligible change in severance across the network attributable to the overall significance of effect for Severance is therefore considered to be **Minor to Moderate Beneficial**;

- ii) Pedestrian and Cyclist Delay – the cumulative increase in traffic link flows due to Phase 1 of the Proposed Development is negligible in most cases - peaking at minor - and therefore the effects on pedestrian and cyclist delay are also negligible - even with the existence of some high sensitivity receptors in the area such as the retirement homes, schools and colleges.

The increased number and quality of pedestrian and cycle facilities within the area - including the crossing facilities of Huntingdon Road and Madingley Road and the Ridgeway to be delivered as part of the Proposed Development would deliver a positive benefit by delivering more direct quality routes for existing and future pedestrian and cyclist movements across the area. The overall significance of effect for Pedestrian and Cyclist Delay is therefore considered to be **Minor to Moderate Beneficial**;

- iii) Effect on Pedestrian and Cyclist Amenity – changes in pedestrian amenity are assumed to be significant where traffic flows (or the HGV component) double or more. This only occurs on Madingley Road during peak construction activity, generally these construction flows are much lower. The increased number and quality of pedestrian and cycle facilities within the area would deliver a positive benefit by delivering better quality routes for existing and future pedestrian and cyclist movements across the area. The overall significance of effect for Pedestrian and Cyclist Amenity is therefore considered to be **Minor Beneficial**;

- iv) Fear and Intimidation – using the thresholds for Fear and Intimidation given in **Table 12.2**, and the existing levels of Fear and Intimidation given in **Table 12.11**, the links that would be likely to experience a change in these effects are also summarised in **Table 12.11** in **Appendix 12.2**.

Relatively modest increases in traffic flow according to the assessment criteria do not generate increases in the levels of Fear and Intimidation.

The measures incorporated in the Proposed Development are considered across the network to result in an overall significance of effect of **Negligible**;

- v) Hazardous Loads – the Proposed Development will not have any effect on the level of hazardous loads on the local area;
- vi) Highway Safety – the analysis of existing data on personal injury collisions shows that in all cases the observed collision rate on the junctions and links surrounding the site are either similar to or lower than the national average for similar types of link and junctions. The magnitude of any change in flows on the surrounding links as a consequence of Phase 1 of the Proposed Development is no greater than a Minor increase. It is therefore considered that the effect on the number of collisions would be Negligible. The Site Access proposals – providing a further traffic signal controlled junctions at the boundary of the built environment of Cambridge on Madingley Road – and the mitigation measures – including the provision of a section of off-road cycleway, and controlled pedestrian / cyclist crossing facilities – are likely to have some positive benefit in reducing personal injury collisions by reducing the speed of potential conflicts and segregating away vulnerable road users. As such, it is considered that the overall significance of effect for Highway Safety would be **Moderate Beneficial** on these links;
- vii) Driver Delay – the relevant guidance suggests that Driver Delay is only likely to be significant when the traffic on the network surrounding the Application Site is likely to be at, or close to the capacity of the system. The effect of additional traffic flow from Phase 1 of the Proposed Development on driver delay has been identified as being Minor, hence it is concluded that the change in Driver Delay would be Negligible. The provision of SCOOT and MOVA traffic signal optimisation along Madingley Road and Huntingdon Road would assist in managing Driver Delay but it is considered that Driver Delay would be **Negligible**.

12.8 2026 – Proposed Development as completed

12.8.1 The Cambridge Sub Regional Model Traffic Model has been used to assess the traffic effects for the Proposed Development as completed as at 2026. As at 2026, all construction on the Proposed Development, NIAB and West Cambridge would have been completed and each would be fully operational. In common with the 2014 Post Opening Scenario, improvements to Huntingdon Road and Madingley Road and to pedestrian, equestrian and cyclist facilities would have been completed.

12.8.2 As described in Section 14 of the Transport Assessment, the North West Cambridge Do Something option tests have been run incorporating the benefit of the Proposed Development travel demand management strategy. The measures inherent in that assessment include:

- i) the proposed land-uses within the Proposed Development;
- ii) the Framework Travel Plan;
- iii) the proposed public transport strategy.

12.8.3 In addition to the travel demand management measures already included in the modelling exercise, there are further measures that could be implemented to reduce further the vehicular trip generation of the Proposed Development, to reduce vehicle use on the network. These are described in Section 19 of the Transport Assessment. Following discussions with the Highways Agency and Cambridgeshire County Council, consideration of additional transport management measures for the Proposed Development has therefore focussed on:

- i) Development-related measures to manage effects on the highway;
- ii) managing any increases in delay on the M11 Junction 13 Southbound On-Slip, even though the effects are less than 1%;
- iii) potential enhancements to the University's Travel Plan for all facilities across the City to effect further general reductions in trips across the network.

12.8.4 The assessment within this section of the Proposed Development as completed as at 2026 considers the likely significant effects after allowing for the full implementation of these travel demand measures.

12.8.5 **Table 12.25**, shows the assignment of development-generated traffic flows from the Proposed Development. These figures do not include effects of reassignment of flows onto other links.

12.8.6 The 2026 Opening Year Do Something flows for the highway network in the vicinity of the Application Site are shown in **Table 12.26**, included in **Appendix 12.1**.

12.8.7 The link flow increases are considered in **Table 12.27**:

Table 12.27 – Traffic effect of the Proposed Development in 2026

Link No.	Link	2026 Do Minimum 2-way all vehicle			2026 Do Something 2-way all vehicle			% Increase in 2-way flows		
		AM	PM	24 hr	AM	PM	24 hr	AM	PM	24 hr
1	M11 – Junction 14 to M11 / A604 Merger	5,488	5,474	63,455	5,490	5,434	63,235	0.0%	-0.7%	-0.3%
2	M11 – from Junction 13 to Junction 14	7,148	6,824	80,879	7,144	6,775	80,572	-0.1%	-0.7%	-0.4%
3	M11 – from Junction 12 to Junction 13	8,049	8,310	94,697	8,109	8,328	95,148	0.7%	0.2%	0.5%
4	M11 – from Junction 11 to Junction 12	7,575	7,955	89,898	7,611	8,027	90,523	0.5%	0.9%	0.7%
5	A14 – NW of B1050 Junction	7,917	8,365	86,584	7,964	8,419	87,121	0.6%	0.6%	0.6%
6	A14 – from B1050 Junction to Dry Drayton Rd Junction	10,198	10,427	109,679	10,308	10,523	110,775	1.1%	0.9%	1.0%
7	A14 – from Dry Drayton Rd to M11 Merge	10,061	10,337	108,472	10,223	10,408	109,711	1.6%	0.7%	1.1%
8	A14 – from M11 Merge to A14 Eastbound Slip	1,580	1,724	17,570	1,548	1,665	17,086	-2.0%	-3.4%	-2.8%
8A	A14 – from A14 Wbd Slip to M11 merge	1,517	1,647	16,825	1,511	1,646	16,788	-0.4%	-0.1%	-0.2%
9	Sbd Slip Road from A14 to M11	683	553	6,573	689	554	6,610	0.9%	0.2%	0.6%
10	A14 – from A428 Merger to B1049 (Cambridge Rd) Jn	7,180	7,481	77,964	7,248	7,497	78,411	0.9%	0.2%	0.6%
11	A14 – from B1049 Junction to A10 Junction	7,056	7,534	77,586	7,138	7,614	78,448	1.2%	1.1%	1.1%
12	A14 – from A10 Junction to Hovingdean Rd	6,877	7,976	78,985	6,915	8,053	79,597	0.6%	1.0%	0.8%
13	A428 - west of Madingley Road Junction	3,587	4,418	42,569	3,750	4,541	44,090	4.5%	2.8%	3.6%
14	A428 – from Madingley Rd Junction to M11 Junction	2,425	2,804	27,807	2,538	2,882	28,822	4.7%	2.8%	3.7%
15	Huntingdon Rd – from A14 slip road to NW NWC Access	1474	1444	15,469	1738	1720	18,331	17.9%	19.1%	18.5%
16	Huntingdon Rd – from North-western NWC Site Access to Girton Rd	1474	1444	15,469	1407	1290	14,297	-4.5%	-10.7%	-7.6%
17	Huntingdon Rd – from Girton Rd to North-eastern NWC Site Access	1871	1902	20,001	1755	1778	18,729	-6.2%	-6.5%	-6.4%
18	Huntingdon Rd – from North-eastern NWC Site Access to Storey's Way	2043	2100	21,962	2,128	2228	23,092	7.2%	8.0%	5.1%
19	Huntingdon Rd – from Storey's Way to Victoria Rd / Castle St Junction	1358	1546	15,394	1,410	1,621	16,068	8.4%	7.5%	4.4%

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Link No.	Link	2026 Do Minimum 2-way all vehicle			2026 Do Something 2-way all vehicle			% Increase in 2-way flows		
		AM	PM	24 hr	AM	PM	24 hr	AM	PM	24 hr
20	Lady Margaret Rd and Mount Pleasant	965	1178	11,360	937	1,196	11,307	-3.6%	-0.8%	-0.5%
21	Shelly Row and Albion Row	463	266	3,864	518	233	3,981	0.0%	-17.3%	3.0%
22	Madingley Rd – from Queens Rd to Grange Rd	1328	1203	13,417	1,382	1,184	13,603	-0.6%	-5.0%	1.4%
23	Madingley Rd – from Grange Rd to Storey's Way	1511	1448	15,686	1,576	1,473	16,163	0.2%	-1.1%	3.0%
24	Madingley Rd – from Storey's Way to JJ Thomson Avenue	1720	1838	18,013	1,653	1,754	17,248	-10.5%	-9.9%	-4.2%
25	Madingley Rd – from JJ Thomson Avenue to South NWC Site Access	1668	1820	17,658	1,499	1,748	16,438	-16.9%	-9.3%	-6.9%
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	1664	1814	17,608	1384	1651	15,365	-16.8%	-9.0%	-12.7%
27	Madingley Road – from Park and Ride Entrance to M11	1694	1816	16,282	1758	2023	17,539	3.8%	11.4%	7.7%
28	Madingley Rd – from Unnamed Rd to M11 Junction 13	1786	2020	17,655	1848	2230	18,916	3.5%	10.4%	7.1%
29	Madingley Rd – from M11 Junction to Cambridge Rd	1462	1419	13,364	1428	1368	12,970	-2.3%	-3.6%	-2.9%
30	Madingley Rd – from Cambridge Rd to A428 Junction	1482	1727	14,885	1454	1699	14,626	-1.9%	-1.6%	-1.7%
31	Barton Rd – from M11 Junction 12 to Grange Rd	1382	1573	13,707	1450	1667	14,459	4.9%	6.0%	5.5%
32	Barton Rd – from Grange Rd to Newham Rd / The Fen Causeway Junction	1096	1515	12,112	1131	1542	12,399	3.2%	1.8%	2.4%
33	Newham Rd – from Barton Rd / The Fen Causeway Junction to Queens Rd / Silver St Junction	992	927	10,173	967	902	9,908	-2.5%	-2.7%	-2.6%
34	Queens Rd – from Newham Rd / Silver St Junction to Madingley Rd	1868	1472	17,706	1885	1497	17,928	0.9%	1.7%	1.3%
35	Storey's Way	1263	992	11,954	1090	795	9,993	-13.7%	-19.9%	-16.4%
36	Oxford Rd and Windsor Rd	548	430	5,184	715	654	7,257	30.5%	52.1%	40.0%
37	Histon Rd	1943	1659	19,095	2082	1796	20,558	7.2%	8.3%	7.7%
38	Bridge Rd (Histon)	1608	1749	15,572	1572	1729	15,312	-2.2%	-1.1%	-1.7%
39	Victoria Rd	1138	1119	11,965	1220	1128	12,447	7.2%	0.8%	4.0%
40	A10	2326	2101	23,542	2330	2134	23,739	0.2%	1.6%	0.8%
41	Girton Rd	520	536	4,898	591	626	5,645	13.7%	16.8%	15.3%
42	Grange Rd	761	553	6,966	759	603	7,220	-0.3%	9.0%	3.6%
101	NIAB Southern End	188	167	1,882	210	187	2,105	11.7%	12.0%	11.8%
102	NIAB Northern End	190	231	2,232	182	252	2,301	-4.2%	9.1%	3.1%

12.8.8 The majority of the changes in flows are small single figure percentage increases, many of which are less than 1% - there are indeed a number of links with flow reductions as a result of reassignments from existing roads.

12.8.9 Only four of the linkages are higher than 10% - Huntingdon Road, NIAB (Southern End), Girton Road and Oxford Road/ Windsor Road.

12.8.10 The largest traffic flow percentage increases occur on Link 36 Oxford Road and Windsor Road – with flows increasing by around 40%, albeit from a very low base. However, it is considered that this increase is unlikely to happen in reality – the CSRM has modelled this link with higher capacity than is the case for a narrow, traffic calmed residential street, enabling more trips to pass along in theory. It is considered that this increase in flow reflects more the modelling methodology than the reality.

12.9 Cumulative Effects

12.9.1 The CSRM 2026 North West Cambridge Do Minimum and Do Something highway modelling option tests have been used to inform the Without and With Development scenarios.

12.9.2 The following committed strategic development sites in the immediate area of the Application Site have been considered within the 2026 Do Minimum assessment:

- i) West Cambridge Development – as per the extant consent;
- ii) NIAB Residential Development – assuming 1,780 units;
- iii) Orchard Park – assuming 1,120 units.

12.9.3 Following the cancellation of the A14 Ellington to Fen Ditton Scheme in 2010, as agreed with the highway authorities the strategic development included within the CSRM for the NWC Option Tests has been assumed to be as listed in Table 14.1 of the Transport Assessment (reproduced below in Table 12.28), having regard to the cancellation of the A14 scheme:

Table 12.28 – Planned Dwelling Growth at Strategic Sites

Strategic Site Name	December 2010 test – 2026 Committed Development. Core Scenario
Cambridge North West	4,400
<i>Huntingdon / Histon Rd</i>	<i>1,780</i>
<i>Huntingdon / Madingley Rd (North West Cambridge Development)</i>	<i>1,500 Market Houses - as per NWC Devt Schedule in Table 1</i>
<i>Arbury Camp (Orchard Park)</i>	<i>1,120</i>
Northern Fringe	0
<i>Sewage Works</i>	<i>0</i>
<i>Chesterton Sidings</i>	<i>0</i>
Southern Fringe	4,420
<i>Bell School</i>	<i>650</i>
<i>Clay Farm</i>	<i>2,300</i>
<i>Glebe Farm</i>	<i>300</i>
<i>Trumpington Meadows</i>	<i>600</i>
<i>TM / Monsanto</i>	<i>570</i>
Cambridge East	0
<i>North of Newmarket Road</i>	<i>0</i>
<i>North of Cherry Hinton</i>	<i>0</i>
<i>Airport</i>	<i>0</i>
<i>Northstowe</i>	<i>1,500</i>
<i>Loves Farm</i>	<i>1,900</i>

Strategic Site Name	December 2010 test – 2026 Committed Development. Core Scenario
North Bridge	1,250
Cambourne	1,000
Alternative Sites to be applied across the County at existing development	1,500
TOTAL	15,970

12.9.4 As agreed with the highway authorities, the changes to the existing infrastructure included within the CSRMS also reflected the cancellation of the A14 Ellington to Fen Ditton scheme, and that necessary to implement the planned dwelling growth at the strategic sites.

12.9.5 The cumulative effects of the completion of the surrounding strategic developments have therefore been assumed as part of the Baseline against which the likely effects of the Proposed Development are judged, and have therefore the effects of the Proposed Development cumulatively with those of these other developments have been taken into account in the analysis of the effects of the proposed development as stated earlier in this chapter.

2026 - Potential effects on Future Local Highway Capacity

12.9.6 It is apparent from this comparison between the 2026 Do Minimum and 2026 Adjusted Do Something model peak hour flows (ie, the direct comparison of the network without then with the Development) that:

- i) there is a minimal influence on flows on the M11. The greatest difference is a 1.1% increase, occurring to the south of Junction 12 – potentially reflecting the minimal available capacity on the M11. Indeed, several links experience reductions in flow as a consequence of the Proposed Development – possibly due to reassignment of existing trips away from the area;
- ii) similarly, there is a minimal influence on flows on the A14. The greatest difference is a 2.0% increase, occurring on Link 7 - differences for the remainder of the links are lower, or indeed reflect a reduction in flow – again, this may reflect a reassignment of existing trips away from this area;
- iii) the A428 experiences increases of flow of between 5% - 7%, albeit these percentage increases are created by a maximum two-flow increase of 163 trips;
- iv) the strategy of locating the Proposed Development main accesses to the west appears to be successful – whilst the differences in flows on Huntingdon Road and Madingley Road are positive to the west of the accesses, the flow differences are negative to the east – possibly due to non-Proposed Development movements reassigning away;
- v) the strategic route along Barton Road into Cambridge from M11 Junction 12 (from the south) experiences around 7% increases in flow;
- vi) Storey's Way experiences a reduction in flow in both peaks, implying that existing trips are assigning away from the area;
- vii) Oxford Road, and the NIAB Site Access, experience large increases in flows (45% and 12%), reflecting the influences of low base flows, and possible modelling methodology issues.

12.9.7 The peak hour capacity of the following junctions has been assessed:

- i) Huntingdon Road East / NWC Site Access / NIAB Site Access traffic signal controlled junction;
- ii) Huntingdon Road West / NWC Site Access traffic signal controlled junction;
- iii) Madingley Road / NWC Site Access / West Cambridge Site Access / Park and Ride Access / M11 Junction 11 traffic signal controlled junction / slip road access priority junction;
- iv) Madingley Road / Northampton Road / Queen Street mini roundabout;
- v) Huntingdon Road / Castle Street / Victoria Street traffic signal controlled junction;
- vi) Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction;
- vii) Girton Road / Huntingdon Road priority junction;
- viii) Barton Interchange Northern Roundabout;
- ix) M11 Junction 13 Southbound On-Slip merger lane.

12.9.8 Following discussions with the highways authority, minor amendments were made to the three Site Access junctions shown in the Transport Assessment. These three junctions were re-assessed, and the results reported in the Transport Assessment Addendum Report (February 2012). The results of the three proposed Site Access junction capacity assessments confirm that these would still operate within capacity in the 2026 Future Year. These assessments, undertaken in the context of adjacent junctions, have also confirmed that the adjacent junctions along the Huntingdon Road and Madingley Road corridors would also operate within capacity in this 2026 Future Year.

12.9.9 Where the CSRM identified that the Proposed Development has an effect in terms of increased delay on other junctions in the vicinity, assessments have been undertaken to these junctions. The results of these junction capacity assessments are contained in Section 17 of the Transport Assessment, and show that the influence of the Proposed Development is minimal, and that the existing junctions would not experience any significant additional delays when compared to the 2026 Do Minimum scenario – ie, Without the Proposed Development.

2026 - Personal Injury Collision Rates

12.9.10 As the additional flows generated by the Proposed Development would be no different to the vehicle composition on the existing links, nor would the Development proposals alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

2026 - Public Rights of Way

12.9.11 The extent of the Proposed Development would surround the line of existing Footpath 5 – this right of way routes on a south-west to north-east axis through the northern end of the site between Girton and Hardwick. This footpath will be accommodated within the development landscaping, to ensure the continuation of a quality standard route through the Proposed Development.

2026 - Overall Significance of Effects

12.9.12 Table 12.27 shows the percentage increases in traffic flow on the roads in the area, and the potential significance of each effect is summarised below:

- i) Severance – the same guidance set out in Section 12.3 from the IEMA's Guidelines for the Environmental Assessment of Road Traffic and Volume 11, Section 3, Part 8, Chapter 6 of the Design Manual for Roads and Bridges entitled 'Pedestrians and

Others and Community Effects' has been applied here. The change in traffic link flows resulting from the Proposed Development do not result in any significant increases in the level of severance in most cases – with several links experiencing decreases in severance, and increases generally well below 30% - i.e. below the level at which a change in severance is significant.

The exception to this is on Oxford Road / Windsor Road, however, whilst traffic flows do increase by around 40%, it is considered that this increase in flow may reflect more the highway modelling than the potential for flows to increase. The Proposed Development includes proposals for potential traffic calming measures to be implemented.

The increased number and quality of pedestrian and cycle crossing facilities of Huntingdon Road and Madingley Road proposed as part of the Proposed Development would deliver a positive benefit.. Overall therefore, in the context of a negligible change in severance across the network attributable to traffic movements, the overall significance of effect for Severance is therefore considered to be **Minor to Moderate Beneficial**;

- ii) Pedestrian and Cyclist Delay – the increase in traffic link flows due to the Proposed Development is negligible in most cases - peaking at minor - and therefore the effects on pedestrian and cyclist delay are also negligible - even with the existence of some high sensitivity receptors in the area such as the retirement homes, schools and colleges.

The increased number and quality of pedestrian and cycle facilities within the area - including the crossing facilities of Huntingdon Road and Madingley Road and the Ridgeway - would deliver a positive benefit by delivering more direct quality routes for existing and future pedestrian and cyclist movements across the area. Overall therefore the effect for Pedestrian and Cyclist Delay is considered to be **Minor to Moderate Beneficial**;

- iii) Effect on Pedestrian and Cyclist Amenity – changes in pedestrian amenity are assumed to be significant where traffic flows (or the HGV component) double or more. This does not occur. The increased number and quality of pedestrian and cycle facilities within the area would deliver a positive benefit by delivering better quality routes for existing and future pedestrian and cyclist movements across the area. The overall significance of effect for Pedestrian and Cyclist Amenity is therefore considered to be **Minor to Moderate Beneficial**;
- iv) Fear and Intimidation –using the thresholds for Fear and Intimidation given in **Table 12.2**, and the existing levels of Fear and Intimidation given in **Table 12.11**, the links that would be likely to experience a change in these effects are also summarised in **Table 12.11** in **Appendix 12.3**..

Relatively modest increases in traffic flow are according to the assessment criteria do not generate increases in the levels of Fear and Intimidation. The significance of effect on this across the network is therefore generally considered to be Minor, albeit that the significance of effect to the Oxford Road and Windsor Road link is considered to be Moderate. Mitigation measures in the form of traffic calming are proposed along this link to encourage traffic not to use this link, and to reassign to the more strategic links.

The increased number and quality of pedestrian and cycle crossing facilities of Huntingdon Road and Madingley Road proposed as part of the Proposed Development would deliver a positive benefit.. The measures incorporated in the Proposed Development are therefore considered in terms of Fear and Intimidation to have **Minor to Moderate beneficial** effects;

- v) Hazardous Loads – the Proposed Development will not have any effect on the level of hazardous loads on the local area;
- vi) Highway Safety – the analysis of existing data on personal injury collisions shows that in all cases the observed collision rate on the junctions and links surrounding the site are either similar to or lower than the national average for similar types of link and junctions. The magnitude of any change in flows on the surrounding links as a consequence of the Proposed Development is no greater than a Minor increase. It is therefore considered that the effect on the number of accidents would be Negligible. The Site Access proposals – providing traffic signal controlled junctions at the boundary of the built environment of Cambridge and other measures likely to be associated with the Proposed Development including offering contributions to the highway authority to implement a reduced speed limit along Huntingdon Road, the provision of a section of off-road cycleway, and controlled pedestrian / cyclist crossing facilities – are likely to have a positive benefit in reducing personal injury collisions by reducing the speed of potential conflicts and segregating vulnerable road users. As such, it is considered that the overall significance of effect for Highway Safety would be **Minor Beneficial** on these links;
- vii) Driver Delay – the relevant guidance suggests that Driver Delay is only likely to be significant when the traffic on the network surrounding the Application Site is likely to be at, or close to the capacity of the system. The effect of additional traffic flow from the Proposed Development on driver delay has been identified as being Minor, hence it is concluded that the change in Driver Delay would be Negligible. The provision of SCOOT and MOVA traffic signal optimisation along Madingley Road and Huntingdon Road would assist in managing Driver Delay, resulting in **Negligible** effects.

12.9.13 To understand the anticipated magnitude of effects on the links with degrees of change in excess of 5% have been considered. This scale of increase is likely to be experienced on the following links:

- i) Link 15 - Huntingdon Rd – from A14 slip road to North-western NWC Site Access;
- ii) Link 18 - Huntingdon Rd between the North-eastern site Access and Storey's Way – 5.1%;
- iii) Link 27 and 28 – Madingley Road to the West of the Site Access – 7%;
- iv) Link 31 – Barton Road from M11 Junction 12 to Grange Road – 5.5%
- v) Link 36 – Oxford Road and Windsor Road – 40% - albeit it is considered that this increase is unlikely to happen in reality – the CSRM has modelled this link with higher capacity than is the case for a narrow, traffic calmed residential street, enabling more trips to pass along in theory. It is considered that this increase in flow reflects more the modelling methodology;
- vi) Link 37 – Histon Road – 7.7%;
- vii) Link 41 – Girton Road – 15.3%;

12.9.14 Only one specifically identified high and medium sensitive receptor 15 – Histon Road Recreation Ground – is located on these links, at Histon Road. As the footways and crossing facilities along Histon Road adjacent this facility are of reasonable quality, it has been concluded that the significance of effect on these sensitive receptors overall is **Negligible**.

12.10 Summary

Introduction

12.10.1 This chapter sets out the existing baseline conditions on the local and strategic transport network surrounding the Application Site, the future baseline conditions, and then sets out the likely significant effects of the Proposed Development on the transport network, of itself and cumulatively with other developments within the area.

12.10.2 The effect of the Proposed Development has been assessed on the categories outlined below based on conditions relating to the future baseline situation. The Institute of Environmental Management Guidelines for the Environmental Assessment of Road Traffic ("the IEMA Guidelines") sets out the broad principles of how to assess the magnitude of effect for each category.

12.10.3 The categories assessed are:

- severance - i.e. the perceived division that can occur within a community when it becomes separated by a major traffic artery. IEMA's Guidelines advises that changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively. The assessment of severance also pays full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities and whether or not crossing facilities are provided;
- pedestrian and cyclist amenity - broadly defined as the relative pleasantness of a journey;
- fear and intimidation - the effect of which is dependent upon the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths. Receptors are assessed as being pedestrians and cyclists;
- accidents and safety;
- hazardous loads; and
- pedestrian and driver delay .

Assessment Approach

12.10.4 The following two transport models have been used, in parallel, to evaluate different aspects of the effect of the Proposed Development:

- the outputs from the local highway authority's Cambridge Sub Regional Model (CSRM) SATURN model, has been used to evaluate the movement of trips generated by the Proposed Development on the external highway network in the area; and
- a parallel Person Trip Model, prepared by Peter Brett Associates, modelling the person trip movements generated by the Proposed Development area in greater detail than within the strategic CSRM.

12.10.5 In addition to the outputs from the model, traffic count survey data has been collated.

12.10.6 The following scenarios have been considered:

- Baseline (2010);
- 2014 Do Minimum (reflecting committed and proposed developments in 2014 other than the Proposed Development) - to establish the 2014 future baseline;

- 2014 Do Something (reflecting committed and proposed developments in 2014 including the Pre-Opening Phase (the effect of construction activity at 2014) and the 2014 Opening Phase (i.e., with completed / occupied Phase 1 of the Proposed Development and on-going construction works for subsequent phases);
- 2026 Do Minimum - (reflecting committed and proposed developments other than the Proposed Development) to establish the 2026 future baseline;
- 2026 Do Something - (reflecting committed and proposed developments including the Proposed Development in its completed form) to establish the 2026 Operational Phase.

12.10.7 A number of measures have been proposed to as part of the Transport Strategy to manage the effects of the Proposed Development namely:

- i) the proposed land-uses within the Proposed Development;
- ii) the Framework Travel Plan which sets out the proposed travel demand management measures in order to reduce traffic generation;
- iii) the proposed public transport strategy.
- iv) The Construction Environmental Management Plan will ensure appropriate hours of operation and routes are used for deliveries of construction materials;
- v) measures directed at **trip reduction** across the strategic and local highway network:
 - a reduction the car parking provision across the Proposed Development;
 - the funding of a promotional campaign for the guided busway, to increase the patronage from communities along the route and the extraction of vehicle trips from the A14 and M11 to the Park and Ride sites;
- vi) measures directed at **preserving / enhancing capacity** on the network:
 - on the strategic network, potential capacity enhancement to the M11 Junction 13 Southbound Slip road - possibly including either a ramp metering or a merge lane enhancement, depending upon the traffic flows that may materialise;
 - minor local highway measures at the Queen Street / Maddingley Road / Northampton Street junction;
- vii) measures directed at **demand management** across the network;
 - the provision of SCOOT and MOVA traffic signal optimisation to the linked traffic signals along Maddingley Road - M11 Junction 13 Northbound Off Slip / M11 Junction 13 Southbound On Slip / Park and Ride / Site Access and West Cambridge Site Access junctions – to reduce any additional queuing and delays as a consequence of the Proposed Development;
 - the provision of SCOOT and MOVA traffic signal optimisation to the linked traffic signals along Huntingdon Road – Huntingdon Road - Site Access West, Huntingdon Road - Site Access East, and NIAB Site Access – to reduce any additional queuing and delays as a consequence of the Proposed Development;
 - traffic calming measures along the Oxford Road / Windsor Road link;
- viii) measures to improve conditions for **pedestrian and cyclists**:
 - targeted enhancements to the movement of cyclists along Huntingdon Road into the City;
 - improvement of pedestrian and cyclist movements through the Huntingdon Road / Victoria Road / Castle Street junction;
 - provision of a crossing of Huntingdon Road for the Whitehouse Lane commuter cycle route.
- ix) potential further measures directed at trip reduction from the **University's facilities across the City**, to improve conditions on the strategic and local highway network.

12.10.8 The above measures have been assumed to be implemented for the purpose of the Assessment.

Assessment of Effects

2014 Pre Opening Scenario

12.10.9 During the 2014 Pre-Opening Scenario, in addition to Phase 1 of the Proposed Development being under development, highways and utility works on Huntingdon Road and Madingley Road associated with the Proposed Development would be underway and construction works associated with the West Cambridge and NIAB developments would also be underway. Elements of development at the West Cambridge and NIAB developments would be occupied. Construction access to Zone B of the Proposed Development would be taken from Madingley Road.

12.10.10 The assumed worst case peak Daily Construction traffic flows have been calculated. Of the construction-related flows, only a limited number of car and HGV movements would usually occur during the peak hours: the working hours of most construction operatives would not coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods and delivery drivers will themselves wish to avoid being on the network at congested times of the day when drivable hours are disproportionate to quantities of goods delivered. This would be reinforced by the Construction Environment Management Plan controlling movements during peak hours.

12.10.11 In addition to the Proposed Development, there are two further developments in the vicinity that are generating construction movements in the Pre-Opening situation:

- i) NIAB – located to the north of Huntingdon Road;
- ii) West Cambridge – located to the south of Madingley Road.

The trip generation of the West Cambridge and NIAB developments has been included in the CSRM data and the effects of the cumulative movements considered.

12.10.12 In the Pre-Opening scenario, the greatest peak Construction traffic effect would be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 3%, and HGVs increasing by 60% (4% and 64% in the cumulative assessment). Of all the effects considered in this Chapter, the only one likely to be affected is Pedestrian and Cyclist Amenity (and possibly Fear and Intimidation) for this short section of Madingley Road between the M11 and the site access, on the basis that HGVs may increase by 64%. Even so, applying the thresholds in the IEMA Guidelines since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 270 vehicles per day (290 in the cumulative assessment) - this is well below the 1,000 vehicles per day threshold in the Guidelines. Therefore, the magnitude of change is considered to be Negligible or (at worst) Minor adverse. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists. Overall, in terms of the significance of effect, it is considered that there would be **Negligible** or (at worst) **Minor adverse** effect on Pedestrian and Cyclist Amenity.

2014 – Post Opening Scenario

12.10.13 The assessment of 2014 Post-Opening conditions considers:

- i) the peak daily two-way flows arising from the completed / occupied Phase 1 Development operation;
- ii) the peak daily flows from the completed / occupied Phase 1 Development and construction of the next phase of the Proposed Development;
- iii) the cumulative flows from the completed / occupied Phase 1 Development, construction of the next phase of the Proposed Development, and construction of other developments in the area.

12.10.14 Under this scenario improvements in the form of new signalised junctions, pedestrian and cycle crossings and improved pedestrian and cycle facilities on Huntingdon Road and Madingley Road are assumed to have been completed.

12.10.15 In the case of the completed / occupied Phase 1 Development operation the highest traffic flow percentage increases on the surrounding network as a consequence of the Phase 1 Development would occur on Huntingdon Road, between the A14 and Site Access. Increases of 16% would be expected.

12.10.16 The Post-Opening Development Construction and Phase 1 Development Operation have been assessed on local links with reference to the worst case Pre-Opening Development Construction movements and the Phase 1 Development Operation flows. In terms of the Post-Opening scenario, the maximum effect of the peak Construction traffic effect is again on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14%, and HGVs increasing by 68% with a further 318 2-way HGV movements. Of all the effects considered in this Chapter, the only one likely to be affected is Pedestrian and Cyclist Amenity (and possibly Fear and Intimidation) for this short section of Madingley Road between the M11 and the site access. Again applying the thresholds in the IEMA Guidelines doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 270 vehicles per day - well below the 1,000 vehicles per day threshold in the Guidelines) and therefore, the magnitude of change is considered to be Negligible or (at worst) Minor. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists.

12.10.17 On all other routes in the area, the increase in traffic / HGVs resulting from construction activity would be **Negligible**.

12.10.18 Taking into account the construction activity at NIAB and West Cambridge, the greatest effect would again be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14% and HGVs increasing by 79%. Again, possibly Fear and Intimidation may be affected for this short section of Madingley Road on the basis that HGVs may increase by 79% - Even so, applying the thresholds in the IEMA Guidelines (at an increase of 290 vehicles per day the magnitude of change is considered to be **Negligible** or (at worst) **Minor**.

12.10.19 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity would be **Negligible**.

12.10.20 Although the HGV composition along Madingley Road is higher than existing due to the levels of construction traffic, this affects two links with only low numbers of pedestrians and cyclists. It is considered that this would have minimal effect on Personal Injury Collision Rates. The remaining additional flows generated by the Proposed Development would be no different to the vehicle composition on the existing links, and as the Development proposals do not alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

12.10.21 In terms of the overall effects for the 2014 Post Opening scenario, the Cumulative traffic is considered to have a **Minor to Moderate Beneficial** effect on Fear and Intimidation, and a **Negligible** effect on Driver Delay. Reflecting the pedestrian and cycling measures to be implemented, **Minor or Moderate Beneficial** effects were considered for Severance, Pedestrian and Cyclist Delay, Effect on Pedestrian and Cyclist Amenity, and Highway Safety:

2026 – Proposed Development as completed

12.10.22 As at 2026, all construction on the Proposed Development, NIAB and West Cambridge would have been completed and each would be fully operational. In common with the 2014 Post Opening Scenario, improvements to Huntingdon Road and Madingley Road and to pedestrian, equestrian and cyclist facilities would have been completed.

12.10.23 The majority of the changes in flows as a consequence of the Proposed Development are small single figure percentage increases, many of which are less than 1% - there are indeed a number of links with flow reductions as a result of reassignments from existing roads.

12.10.24 Only four of the linkages are higher than 10% - Huntingdon Road, NIAB (Southern End), Girton Road and Oxford Road/ Windsor Road.

12.10.25 The cumulative effects of the completion of the surrounding strategic developments are incorporated into the outputs of the 2026 CSRM model and, therefore, have been assumed as part of the Baseline against which the likely effects of the Proposed Development are judged, and have therefore the effects of the Proposed Development cumulatively with those of these other developments have been taken into account in the analysis of the effects of the Proposed Development as stated earlier in this chapter.

12.10.26 The results of the three proposed Site Access junction capacity assessments confirm that these would operate within capacity in the 2026 Future Year. These assessments, undertaken in the context of adjacent junctions, have also confirmed that the adjacent junctions along the Huntingdon Road and Maddingley Road corridors would also operate within capacity in this 2026 Future Year.

12.10.27 Where the CSRM identified that the Proposed Development has an effect in terms of increased delay on other junctions in the vicinity, assessments have been undertaken to these junctions. The results of these junction capacity assessments show that the influence of the Proposed Development is minimal, and that the existing junctions would not experience any significant additional delays when compared to the 2026 Do Minimum scenario – ie, Without the Proposed Development.

12.10.28 For the Proposed Development as completed in 2026, traffic effects would have at worst a **Negligible** effect on Driver Delay. Reflecting the full measures to be implemented, **Minor** or **Moderate Beneficial** effects were considered for Severance, Pedestrian and Cyclist Delay, Effect on Pedestrian and Cyclist Amenity, Fear and Intimidation and Highway Safety – albeit that the significance of effect of Fear and Intimidation on the Oxford Road and Windsor Road link as modelled is considered locally to be Moderate so measures in the form of traffic calming are proposed along this link to encourage traffic not to use this link, and to reassign to the more strategic links.

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13 NOISE ENVIRONMENT

13.1 Introduction

13.1.1 This chapter addresses the likely significant noise and vibration effects associated with the construction, and subsequent operation, of the Proposed Development.

13.1.2 The Application Site is bounded to the west by the M11 motorway between Junctions 13 and 14. To the north-west of the site is J14 of the M11, with the A14 trunk road running approximately east-west across the northern boundary of the site.

13.1.3 The Application Site is bounded to the east by Huntingdon Road and to the south by Madingley Road, both main roads with high daytime traffic flows.

13.1.4 The noise climate across the Application Site is dominated by road traffic on the M11 motorway, with smaller local contributions from the A14 and other surrounding roads.

13.1.5 There are no other dominant sources of noise, such as industrial facilities in the locality.

13.1.6 A summary of noise and vibration terminology employed within this chapter is provided in **Appendix 13.1**.

13.2 Policy Framework

National Legislation

13.2.1 Construction noise and vibration effects are also not covered directly by legislation. However, the Control of Pollution Act (CoPA, 1974) ⁽¹⁾ and Part III of the Environmental Protection Act (EPA, 1990) ⁽²⁾ contain sections which can be applied to construction noise and vibration.

13.2.2 Under Section 60 of the CoPA a Local Authority can serve a notice on a contractor in order to control construction works. Under Section 61 of the CoPA a contractor can apply for 'prior consent' to carry out construction works, in order to agree in advance with the Local Authority the details of the works and the methods to be employed to minimise noise.

13.2.3 Under the EPA a Local Authority can serve an abatement notice on a contractor if they consider noise or vibration from construction works to amount to a statutory nuisance. In addition, individuals can also pursue private action under the EPA. The EPA can also be used by the Local Authority, or a member of the public, to take action against industrial or commercial sources of noise affecting residential properties.

National Policy Guidance

13.2.4 Planning Policy Guidance PPG24 'Planning and Noise' ⁽³⁾ was introduced by the Department of the Environment in 1994. PPG24 was issued to:

'...provide advice on how the planning system can be used to minimise the adverse effect of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business ... It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.'

13.2.5 In the summary, PPG24 states:

- *PPG24 guides local authorities in England on the use of their planning powers to minimise the adverse impact of noise. It outlines the considerations to be*

taken into account in determining planning applications both for noise sensitive developments and for those activities which generate noise

- *It explains the concept of noise exposure categories for residential development and recommends appropriate levels for exposure to different sources of noise*
- *It also advises on the use of conditions to minimise the impact of noise. Six annexes contain noise exposure categories for dwellings, explain noise levels, give detailed guidance on the assessment of noise from different sources, give examples of planning conditions, specify noise limits and advise on insulation of buildings against external noise*

13.2.6 In addition to PPG24, noise management is an integral part of the Government's policy on sustainable development to provide a high quality living environment with high standards of amenity to new development. This theme has been continued into the National Planning Policy Framework. The guidelines in PPG24 particularly on the noise exposure categories for residential development remain of practical relevance and, therefore, regard is had to them in this assessment notwithstanding the publishing of the NPPF.

13.2.7 The Environmental Noise (England) Regulations 2006 transposed the Environmental Noise Directive 2002/49/EEC. In the second round strategic noise maps, due to be reported in 2012, Cambridge City will be included. These strategic noise maps are useful for land use planning strategies and the development of mitigation strategies, but are not appropriate for the detailed assessment of specific sites.

13.2.8 The aim of Defra's Noise Policy Statement for England (March 2010) is to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. Specific aims are:

- to avoid significant adverse impacts on health and quality of life
- to mitigate and minimise adverse impacts on health and quality of life
- where possible, to contribute to the improvement of health and quality of life

Local Policy

13.2.9 The NW Cambridge Area Action Plan has been prepared jointly by Cambridge City Council and South Cambridgeshire District Council and relates to the land between Madingley Road and Huntingdon Road. The Plan was formally adopted on 22nd October 2009.

Policy NW2 1(e) states that North West Cambridge will be planned and developed:

"To avoid the necessity for noise and air quality mitigation measures that would detract from the landscape setting of Cambridge"

Paragraph 2.11 states:

"It is important that the design of the development fully takes into account the impact of the noise and air pollution arising from the M11 and A14, in relation to the amenity and health of residents, workers and school children, the amenity and use of open spaces and impact upon the setting of Cambridge. Specific studies should be undertaken to address these concerns. Masterplanning and the detailed planning application process will need to determine the appropriate disposition of uses, location and design of buildings, and mitigation measures. The use of certain types of physical acoustic barrier such as a fence alongside the M11 is unlikely to be acceptable in this sensitive location".

13.2.10 Other specific policies relevant to this proposed development are incorporated in SCDC Local Development Framework Development Control Policies Development Plan Document (adopted July 2007) and comprise:

- NE/15 Noise Pollution
- DP/3 Development Criteria
- DP/6 Construction Methods

13.2.11 South Cambridgeshire District Council's District Design Guide SPD ⁽⁴⁾, adopted in March 2010, includes Appendix 6 'Noise – Detailed Design Guidance', which references PPG24 and provides noise level criteria for noise sensitive residential development.

Relevant National Guidance

13.2.12 There is a range of national and international guidance documents relevant to this assessment. These comprise:

- Guidelines for Community Noise, World Health Organization, 2000
- Night Noise Guidelines for Europe, World Health Organization, 2009
- Approved Document E, Resistance to the Passage of Sound, The Building Regulations, 2000
- BS 5228-1 and -2: 2009 Noise and Vibration control on construction and open sites.
- Calculation of Road Traffic Noise. Department of Transport and the Welsh Office, 1988
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 (HA 213/08), 2008
- BS4142: 1997 Rating Industrial Noise Affecting Mixed Residential and Industrial Areas
- BS 7445: 1991 Description and Measurement of Environmental Noise
- BS 8233: 1999 Sound insulation and noise reduction for buildings – Code of practice
- BS 6472-1: 2008 Guide to Evaluation of Human Exposure to Vibration in Buildings. Vibration Sources Other Than Blasting
- BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration.

13.3 Assessment Approach

Scope

13.3.1 The scope of the assessment consists of the following:-

- Liaison with Local Authorities to agree background noise study methodology and results, and approach to assessment
- Baseline and with-development noise study of the area to determine the suitability of the site for the proposed development and the Noise Exposure Categories in accordance with PPG24: 1994 'Planning and Noise'
- Assessment of external and internal noise levels in accordance with the guidance provided in BS 8233: 1999 'Sound Insulation and Noise Reduction for Buildings'

- Assessment of construction noise associated with the development of the Application Site for existing residents (and, once occupied, residents of the development itself) in accordance with BS5228:2009 'Noise and Vibration Control on Construction and Open Sites' ⁽⁵⁾
- Assessment of the noise effects of development generated traffic on and off the Application Site using Calculation of Road Traffic Noise (CRTN, 1988) ⁽⁶⁾
- Assessment of the noise effects of fixed plant associated with the development with reference to BS4142: 1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' ⁽⁷⁾

13.3.2 To the extent driven by traffic noise, the noise assessment is inherently cumulative since it is based on the outputs from the traffic assessment, which takes into account the traffic effects resulting from other proposed developments in the study area.

Development Assumptions

13.3.3 For each phase, of the Proposed Development, detailed method statements based on the Construction Environment Management Plan will be provided and appropriate methods will be implemented to avoid, reduce or manage any disturbance due to construction noise and vibration.

13.3.4 Construction will adhere to the guidance provided in the Construction Environmental Management Plan (CEMP) and to follow Best Practicable Means to reduce potential noise effects upon local receptors including the following:

- All construction plant and equipment should comply with EU noise emission limits;
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order;
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum;
- Plant and equipment such as flat bed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped. Materials should be delivered during normal working hours.
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance, i.e. furthest from receptors or behind close boarded noise barriers. If necessary, acoustic enclosures should be provided and/or acoustic shielding;
- Construction contractors will adhere to the codes of practice for construction working given in BS 5228 regarding minimising noise emissions from the site.

13.3.5 All buildings in the proposed development will be designed to avoid adverse noise effects. This will include building massing, internal layouts of specific buildings, employment of appropriate stand-off distances from internal site roads and the specification of appropriate glazing and ventilation.

13.3.6 Significant shielding of noise from the M11 will be achieved for a large part of the proposed development by the buildings on the western fringe. Where feasible, less sensitive parts of the proposed development, such as commercial and academic buildings, will be located on this fringe. For facades facing areas within NEC C, measures such as acoustically

attenuated louvers, orientating windows away from noisy facades, screening balconies, and stack ventilation and earth tubes with air inlets on quieter facades will be deployed where appropriate.

13.3.7 Where practicable, habitable rooms such as living rooms and bedrooms will be located on the quiet facades of residential buildings. Less sensitive spaces such as hallways, bathrooms and kitchens will be located on the noisier facades.

13.3.8 The aim will be to place habitable rooms of all residential properties within NEC A or the lower part of NEC B for both the daytime and night-time periods.

13.3.9 External walls will provide a sound insulation equivalent to a standard brick/block cavity construction (minimum 50 dB R_w).

13.3.10 Where residential properties share a party wall or floor with commercial properties, the separating constructions will provide sufficient attenuation for the intended uses of the commercial properties, to provide the required internal noise levels to the residential properties.

13.3.11 The Energy Centre and fixed plant associated with the development will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be negligible. This will be achieved by meeting the requirements of the Local Authority for controlling adverse effects of fixed plant noise to residential properties. The design and attenuation will include some or all of the following:-

- Choice of low noise equipment
- Optimal location in relation to sensitive receptors
- Wall and roof cladding to all buildings to provide the required sound reduction
- Fitment of appropriate attenuation devices
- Enclosure or partial enclosure of noise emitting equipment

13.3.12 The level of required attenuation will depend on the prevailing background noise levels (against which the noise from the Energy Centre and fixed plant will be assessed). There is a range of cladding materials available (from which the energy centre is likely to be constructed unless a masonry construction is employed) to suit particular facilities. These range from single skin panels, providing a sound reduction of approximately 24 dB R_w to double skin panels with an absorbent liner, providing a sound reduction of 30 to 45 dB R_w .

13.3.13 Attenuation devices will include silencers to air moving equipment, acoustic lagging of some plant items and fitment of acoustically attenuated vents to building openings.

13.3.14 Bespoke and off-the shelf enclosures for plant items are readily available. These consist of double skin panels, with an absorbent liner as required, which can be readily assembled on site. They can be fitted with acoustic louvers to provide ventilation if required (including forced ventilation). For some plant items total enclosure may not be necessary, and the same panels can be employed for partial enclosures, which act as noise barriers.

Methodology

13.3.15 The assessment is based on the Parameter Plans, provided in Figures 2.1 to 2.5. Figure 2.1, the Land Use Plan, has been employed to ascertain the locations of the residential, academic/research, primary education and complementary mixed use areas.

13.3.16 Figures 2.2 and 2.3, the Building Heights Plan and the Building Zones Plan, have been employed to ascertain the maximum and minimum building dimensions in the different building zones.

13.3.17 Figure 2.4, the Access Plan, has been employed to ascertain the primary vehicular routes through the Application Site and the access points.

13.3.18 Figure 2.5, the Open Land and Landscape Areas Plan, has been employed to ascertain the areas of open land, including that within the primary school site.

13.3.19 Three assessment scenarios have been considered:-

- 2014 – pre opening scenario (off-site utility works only)
- 2014 - the completion of Phase 1
- 2026 - the completion of Phase 4

13.3.20 For each assessment year, the Parameter Plans have been employed to provide a “least favourable” scenario and a “most favourable” scenario.

13.3.21 The “least favourable” scenario assumes minimum building heights in the various building zones, which results in each building zone not benefitting from the shielding effects of other buildings and being largely unprotected from traffic noise levels from the surrounding road network (in particular the M11).

13.3.22 The “most favourable” scenario assumes maximum building heights in the various building zones, which results in each building zone benefitting from the shielding effects of other buildings and hence being at least partially protected from traffic noise levels from the surrounding road network.

13.3.23 In addition, a parameter compliant “mid range” scenario has been considered, to provide approximate noise contours across each building zone.

Baseline Noise Measurements

13.3.24 Measurements have been taken at a number of locations as shown on Figure 13.1 at heights of 1.2 to 1.5 metres above ground level. All monitoring locations were located at least 3.5m from any reflecting surface, other than the ground and complied with the requirements of British Standard BS 7445: 1991 ‘Description and Measurement of Environmental Noise’ ⁽⁸⁾.

Suitability of the Site for Proposed Development

Prediction Methodology

13.3.25 Road traffic noise levels across the site have been predicted using SoundPLAN (v6.5) noise mapping software, which implements the CRTN methodology.

13.3.26 Details of the SoundPLAN software package, the CRTN methodology and the development of the site model within the software are provided in **Appendix 13.2**.

13.3.27 The $L_{A10,18h}$ traffic noise levels determined by CRTN are converted within SoundPLAN to the standard European Union 12 hour day (07:00-19:00), 4 hour evening (19:00-23:00) and 8 hour night (23:00-07:00) L_{Aeq} levels using the conversion factors provided by the Transport Research Laboratory ⁽⁹⁾⁽¹⁰⁾.

13.3.28 For residential properties a 16 hour daytime (07:00-23:00) and 8 hour night time (23:00-07:00) period is employed in PPG 24. To determine a 16 hour daytime L_{Aeq} , the 12 hour day and 4 hour evening levels are logarithmically combined.

Significance Criteria

13.3.29 The significance of the monitored and predicted ambient noise levels within the residential areas of the proposed development has been considered with regard to the guidance in PPG 24.

13.3.30 Relevant to the introduction of new residential property into a potentially noisy area, PPG 24 states in paragraph 8:

‘This guidance introduces the concept of Noise Exposure Categories (NECs), ranging from A - D, to help local planning authorities in their consideration of applications for residential development near transport-related noise sources. Category A represents the circumstances in which noise is unlikely to be a determining factor, while Category D relates to the situation in which development should normally be refused. Categories B and C deal with situations where noise mitigation measures may make development acceptable.’

13.3.31 The full advice provided in PPG 24 regarding the NECs is reproduced as **Table 13.1**.

Table 13.1: NEC Planning Guidance

NEC	Guidance
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

13.3.32 When assessing a proposed residential development site it is therefore necessary to categorise the site into the NEC bands stipulated in PPG 24. For large development sites it is quite possible that different areas of the site will fall into different daytime and night-time NEC categories due to varying distance from local noise sources (major roads, etc.).

13.3.33 The recommended values for specifying NEC bands are tabulated in PPG 24 and repeated below in Table 13.2. In addition, PPG 24 recommends that if the $L_{Amax,slow}$ level regularly exceeds 82 dB at night, a site should be classed as NEC C, regardless of the day and night L_{Aeq} levels.

Table 13.2: NEC Noise Levels

Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings				
Noise Source	Noise Exposure Category (dB $L_{Aeq,T}$)			
	A	B	C	D
Road Traffic				
07.00-23:00	<55	55-63	63-72	>72
23.00-07:00	<45	45-57	57-66	>66
Rail Traffic				
07.00-23:00	<55	55-66	66-74	>74
23.00-07:00	<45	45-59	59-66	>66
Air Traffic				
07.00-23:00	<57	57-66	66-72	>72
23.00-07:00	<48	48-57	57-66	>66
Mixed Sources				
07.00-23:00	<55	55-63	63-72	>72
23.00-07:00	<45	45-57	57-66	>66

13.3.34 BS 8233: 1999 'Sound Insulation and Noise Reduction for Buildings' ⁽¹¹⁾ provides guidelines on acceptable internal noise levels to various spaces during the day and night. A summary of the internal ambient noise levels relevant to this project is shown in **Table 13.3** and **Table 13.4**.

Table 13.3: Indoor Ambient Noise Levels in Unoccupied Spaces

Criterion	Room Types	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable resting/sleeping conditions	Living rooms	30	40
	Bedrooms	30	35
Reasonable speech or telephone communications	Cafeteria, Kitchen	50	55
	Department Store	50	55
	Corridor, Atria, Washroom, Toilet	45	55
Reasonable conditions for study and work requiring concentration	Library, Cellular Office	40	50
	Staff Room	45	45
	Meeting Room, Executive Office	35	40
Reasonable listening conditions	Teaching Space	35	40

Table 13.4: Indoor Ambient Noise Levels for Privacy

Criterion	Room Types	Design Range $L_{Aeq,T}$ dB	
		Lower Limit	Upper Limit
Reasonable acoustic privacy in shared spaces	Restaurant	40	55
	Open Plan Office	45	50

13.3.35 South Cambridgeshire District Council's District Design Guide SPD, adopted in March 2010, includes Appendix 6 'Noise – Detailed Design Guidance', which references PPG24 and provides noise level criteria for noise sensitive residential development. These criteria are based on BS 8233 and are reproduced below as **Table 13.5**.

Table 13.5: SCDC Noise Standards for Noise Sensitive Development

Area	Criterion
External private amenity areas (e.g. gardens and balconies and communal gardens)	Levels should be as low as practicable and not greater than 50 dB $L_{Aeq,T}$
Bedrooms	Not greater than 30 dB $L_{Aeq,T}$ between the hours 23:00 to 07:00. No single peak noise events greater than 45 dB $L_{Amax (fast)}$
Living rooms and dining rooms	Not greater than 35 dB $L_{Aeq,T}$
Kitchens, bathrooms, utility rooms	Not greater than 45 dB $L_{Aeq,T}$
<p>Note 1: At BS 8233 paragraph 7.6.1.2 it is stated "As well as protection for buildings, barriers or bunds should be considered to protect the gardens. In gardens and balconies etc., it is desirable that the steady noise level does not exceed 50 dB $L_{Aeq,T}$ and 55 dB $L_{Aeq,T}$ should be regarded as the upper limit". SCDC aspires to achieving the lower limit, as this is likely to result in moderate annoyance.</p> <p>Note 2: Internal building services noise generated from ventilation systems and lifts etc.</p>	

should meet the same criteria as specified above.

Note 3: Time base T for L_{Aeq} , T should be appropriate for the circumstances, typically 1 hour during the day and 5 minutes at night and in agreement with LPA.

Note 4: PPG24 and BS 8233 make it clear that the above recommended absolute noise levels should only be used for anonymous / relatively benign noise (e.g. diffuse transport related noise). That is, noise not attributable to, or which has no correlation with, any particular site or premises. For dominant industrial noise, consideration should be given to BS 4142 and the relative noise effect.

Note 5: Due regard may also have to be given to the emerging WHO document 'Night noise guidelines for Europe 2009' which recommends night time external noise levels.

13.3.36 The significance of the predicted ambient noise levels within the proposed development has been assessed with regard to the criteria provided in **Table 13.5**.

Construction Noise

Prediction Methodology

13.3.37 The noise levels generated by construction activities and experienced by any nearby sensitive receptors, such as residential properties, depend upon a number of variables, the most significant of which are:

- the noise generated by plant or equipment used on site, generally expressed as sound power levels (L_w);
- the periods of operation of the plant on the site, known as its 'on-time';
- the distance between the noise source and the receptor; and
- the attenuation provided by ground absorption and any intervening barriers.

13.3.38 Construction noise predictions have been carried out based on the methodology outlined in BS 5228-1: 2009 'Code of practice for noise and vibration control on construction and open sites. Part 1: Noise'. BS 5228 predicts noise as an equivalent continuous noise level averaged over a period such as 1 hour ($L_{Aeq,1h}$).

13.3.39 BS 5228 contains a database of the noise emission from individual items of equipment and activities and routines to predict noise from construction activities at identified receptors. The prediction method gives guidance on the effects of different types of ground, barrier attenuation and how to assess the effect of fixed and mobile plant.

Significance Criteria

13.3.40 Noise levels generated by construction activities are regulated by guidelines and subject to Local Authority control. Guidance on the significance of construction noise levels is provided in Annex E of BS 5228: 2009.

13.3.41 The approach taken is the ABC method, as provided in Annex E of BS 5228. This method provides a methodology for the assessment of significance based on the existing ambient noise level. A Threshold Value is defined for each receptor, based on the existing ambient noise level. A significant effect is deemed to occur if the total noise level (ambient noise level plus construction noise level) exceeds the Threshold Value.

Construction Vibration

Prediction methodology

13.3.42 The vibration peak particle velocity (ppv) due to specific construction works has been estimated at sensitive receptors using example measured source data and the appropriate propagation relationship taken from BS 5228-2: 2009 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration'.

Significance Criteria - Disturbance

13.3.43 Guidance on the effects of vibration on people is provided in BS 5228-2 Annex B, and reproduced below as **Table 13.6**.

Table 13.6: Guidance on Effects of Vibration Levels

Vibration Level	Effect	Significance
0.14 mms ⁻¹	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3 mms ⁻¹	Vibration might be just perceptible in residential environments.	Minor
1 mms ⁻¹	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate
10 mms ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	Major

13.3.44 The estimated ppv values due to construction works on site are compared to the target limits specified in **Table 13.6** to determine the significance of the vibration effect in terms of disturbance.

Significance Criteria – Building Damage

13.3.45 Buildings are reasonably resilient to ground-borne vibration and vibration-induced damage is rare. Vibration induced damage can arise in different ways, making it difficult to arrive at universal criteria that will adequately and simply indicate damage risk. Damage can occur directly due to high dynamic stresses, due to accelerated ageing or indirectly, when high quasi-static stresses are induced by, for example, soil compaction.

13.3.46 BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration' ⁽¹²⁾ provides guidance on vibration levels likely to result in cosmetic damage, and is referenced in BS 5228. Limits for transient vibration, above which cosmetic damage could occur, are given in **Table 13.7**.

Table 13.7: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mms^{-1} at 4 Hz and above	-
Unreinforced or light framed structure Residential or light commercial buildings	15 mms^{-1} at 4 Hz increasing to 20 mms^{-1} at 15 Hz	20 mms^{-1} at 15 Hz increasing to 50 mms^{-1} at 40 Hz and above
Note 1: Values referred to are at the base of the building. Note 2: For unreinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

13.3.47 The guide values relate predominantly to transient vibration which does not give rise to resonant responses in structures. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 13.7 may need to be reduced by up to 50%.

13.3.48 The estimated ppv values due to construction works on site are compared to the target limits specified in BS 7385-2 to determine the significance of the vibration effect in terms of cosmetic building damage.

Operational Road Traffic Noise levels

Prediction Methodology

13.3.49 Changes in road traffic noise levels to sensitive receptors along existing roads, resulting from the proposed development, have been predicted using the methodology provided in CRTN.

Significance Criteria

13.3.50 It is generally accepted that changes in road traffic noise levels of 1 dB(A) or less are imperceptible, and changes of up to 3 dB(A) are required to be perceptible. An increase of 10 dB(A) is generally perceived as a doubling in loudness.

13.3.51 Based on these perceptions, a scheme for assessment of the effects of changes in road traffic noise levels, taken from the Design Manual for Roads and Bridges (HA 213/08), is presented in **Table 13.8**.

Table 13.8: Scheme For Assessment of the Effects Changes in Road Traffic Noise Levels

Change in Noise Level (dB)	Subjective Response	Magnitude of the Effect
< 1	None	Negligible
1 < 3	Perceptible	Minor
3 < 5	Noticeable	Moderate
> 5	Intrusive	Major

13.3.52 BS 8233 provides acceptable internal noise levels (and hence sensitivity to noise) for a range of building uses, examples of which are:-

Heavy engineering	70 – 80 dB L _{Aeq}	(negligible sensitivity)
Garages, warehouses	65 – 75 dB L _{Aeq}	(low sensitivity)
Department store	50 – 55 dB L _{Aeq}	(low / medium sensitivity)
Cellular office, museum	40 – 50 dB L _{Aeq}	(medium sensitivity)
Residential	30 – 40 dB L _{Aeq}	(high sensitivity)

13.3.53 Based on these noise level ranges and the assessment scheme provided in **Table 13.8**, a scheme for attributing degrees of significance to changes in road traffic noise levels is proposed and presented in **Table 13.9**.

Table 13.9: Scheme For Significance of Changes in Road Traffic Noise Levels

Change in Noise Level (dB)	Sensitivity of Receptor			
	High	Medium	Low	Negligible
> 5	Major	Moderate/Major	Moderate	Negligible
3 < 5	Moderate	Minor/Moderate	Minor	Negligible
1 < 3	Minor	Negligible/Minor	Negligible	Negligible
< 1	Negligible	Negligible	Negligible	Negligible

13.3.54 The significance criteria provided in **Table 13.9** have been employed for the assessment of changes in road traffic noise levels.

Operational Fixed Plant Noise

13.3.55 There is an energy centre included as part of the Proposed Development (plus a reserved site for an alternative energy centre in the north west corner of the Application Site). Additionally, there will likely be fixed plant associated with the academic / commercial research buildings, the school, community centres, retail and hotel premises, and possibly some of the residential blocks.

13.3.56 An assessment has been undertaken based on the likely noise generation and noise attenuation characteristics of these buildings and plant.

13.3.57 There will be a range of noise sources associated with the energy centre, including fans, pumps, furnaces and exhaust stacks. Much of this plant results in broad band noise emission but there may be tonal components which will require particular attention to ensure no disturbance to nearby residential properties.

13.3.58 Fixed plant associated with the academic / commercial research buildings, the school, the community centres, retail and hotel premises will generally consist of chillers and air handling equipment. This type of equipment is common in urban situations and is readily attenuated with the fitment of silencers and acoustic cladding or enclosure.

13.4 Baseline Conditions

Site Description and Prevailing Noise Climate

13.4.1 The site is bounded to the west by the M11 motorway between Junctions 13 and 14. To the north-west of the site is J14 of the M11, with the A14 trunk road running approximately east-west across the northern boundary of the site.

13.4.2 The site is bounded to the east by Huntingdon Road and to the south by Madingley Road, both main roads with high daytime traffic flows.

13.4.3 The noise climate across the site is dominated by road traffic on the M11 motorway, with smaller local contributions from the other surrounding roads.

13.4.4 There are no other dominant sources of noise, such as industrial facilities, in the locality.

Baseline Noise Levels

13.4.5 Longer term noise levels were monitored at two locations on the site by Peter Brett Associates (PBA) in October 2009 as part of the initial work to define the noise baseline. Additionally, PBA carried out modelling work to provide calculated daytime and night-time baseline noise levels across the site. This work was fully reported in document 'North West Cambridge Masterplan – Baseline Noise Assessment' ⁽¹³⁾, issued as revision 02 in November 2009, reproduced here as **Appendix 13.3**.

13.4.6 **Figure 13.1** shows a plan of the site and surroundings, overlain with the plot areas from the Land Use (Built Development and Ancillary Space) Parameter Plan. The PBA monitoring locations are shown marked as PBA 1 and PBA 2.

13.4.7 In August 2010, Scott Wilson (SW) carried out further short-term noise monitoring at six locations on the Application Site. These monitoring locations are shown in **Figure 13.1** marked as M1 to M6.

13.4.8 A computer noise model of the existing site and surroundings has been developed in the SoundPLAN (v6.5) suite of programs, which implements the CRTN calculation methodology. Traffic data on surrounding roads for the baseline year of 2010 have been input to the model and daytime and night-time noise level contours across the site have been calculated at a height of 1.5 metres above ground level.

13.4.9 The daytime noise level contours are provided as Figure 13.2 and the night-time noise level contours are provided as Figure 13.3. In each figure, the noise contours are presented in the format of NEC categories as defined in PPG24.

13.4.10 A comparison of the measured noise levels and calculated noise levels has been carried out. The results are provided in Tables 13.10 and 13.11.

Table 13.10: Comparison of PBA Measured Noise levels and Calculated Noise Levels

Location	Period	Measured Noise Level (dB L _{Aeq,16h/8h})	Calculated Noise Level (dB L _{Aeq,16h/8h})
PBA 1	Daytime	59.0	59.5
	Night-time	56.9	56.0
PBA 2	Daytime	62.7	64.0
	Night-time	58.1	59.5

Table 13.11: Comparison of SW Measured Noise levels and Calculated Noise Levels

Location	Period	Measured Noise Level (dB L _{Aeq,16h})	Calculated Noise Level (dB L _{Aeq,16h})
M1	Daytime	60.5	61.0
M2	Daytime	58.5	58.5
M3	Daytime	51.0	53.0
M4	Daytime	54.0	53.0
M5	Daytime	56.0	56.0
M6	Daytime	53.0	55.0

13.4.11 Inspection of the values in **Tables 13.10** and **13.11** indicates a good correlation between the measured noise levels and the calculated noise levels.

13.5 Likely Significant Effects

Suitability of the Site for Proposed Development

13.5.1 Using the outputs from the traffic assessment, noise level contours across the Application Site have been calculated for the years 2014 and 2026, employing the detailed models of the site developed in the SoundPLAN software. These models included the proposed landscape features to the west of the site, which will provide noise attenuation to the open area and to the lower floors of the buildings on the western fringe of the built area.

13.5.2 For each assessment year, noise level contours across the Application Site have been calculated for:-

- a “least favourable” scenario, assuming no noise shielding to the various building zones (in effect, an empty site)
- a “most favourable” scenario, assuming maximum building heights from the Parameter Plans and providing maximum noise shielding to the various building zones
- a “mid range” scenario based on a parameter compliant layout

13.5.3 For each scenario, noise level contours have been calculated at two heights:-

- 1.5 metres, equivalent to ground floor level
- 13.5 metres, equivalent to fourth floor level, and representative of the maximum building heights in the Parameter Plans

13.5.4 Noise propagation across the Application Site is dependent on ground effects (shielding and absorption). These are less pronounced at greater heights, resulting in slightly higher noise levels.

Assessment Year 2014

13.5.5 For the least favourable scenario, Figures 13.4 and 13.5 show daytime noise level contours across the empty site at heights of 1.5 metres and 13.5 metres, overlain on the building zones extant in 2014. Figures 13.6 and 13.7 show the corresponding night-time noise level contours.

13.5.6 For the daytime period:-

- At ground floor level the majority of the development is in NEC B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a very small western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.7 For the night-time period:-

- At ground floor level the majority of the development is in NEC B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.8 For the most favourable scenario, Figures 13.8 and 13.9 show daytime noise level contours across the site at heights of 1.5 metres and 13.5 metres, assuming maximum building heights, overlain on the building zones extant in 2014. Figures 13.10 and 13.11 show the corresponding night-time noise level contours. The effects of noise shielding provided by buildings can be seen, placing some parts of the development in NEC A.

13.5.9 For the daytime period:-

- At ground floor level the majority of the development is in NEC A and B, with those parts of the development fronting internal site roads potentially in NEC C.

- At fourth floor level the majority of the development is in NEC A and B, with a very small western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.10 For the night-time period;-

- At ground floor level the majority of the development is in NEC A and B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.11 Figures 13.12 and 13.13 show daytime noise level contours across the site at heights of 1.5 metres and 13.5 metres for the mid-range parameter compliant layout extant in 2014. Figures 13.14 and 13.15 show the corresponding night-time noise level contours.

13.5.12 For the daytime period;-

- At ground floor level the majority of the development is in NEC A and B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC A and B, with a very small western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.13 For the night-time period;-

- At ground floor level the majority of the development is in NEC A and B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a small western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.14 By employing the procedures outlined in the Development Assumptions, the Proposed Development will achieve, to the extent practicable, acceptable internal noise levels to residential and non-residential properties with the use of natural ventilation. It is concluded that the Proposed Development, as shown in the Parameter Plans, could be developed to meet the required criteria.

Assessment Year 2026

13.5.15 For the least favourable scenario, Figures 13.16 and 13.17 show daytime noise level contours across the empty site at heights of 1.5 metres and 13.5 metres, overlain on the building zones extant in 2026. Figures 13.18 and 13.19 show the corresponding night-time noise level contours.

13.5.16 For the daytime period;-

- At ground floor level the majority of the development is in NEC A and B, with a significant western fringe and those parts of the development fronting internal site roads in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a significant western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.17 For the night-time period;-

- At ground floor level the majority of the development is in NEC B, with a significant western fringe and those parts of the development fronting internal site roads in NEC C.
- At fourth floor level the majority of the development is in NEC B and C.

13.5.18 For the most favourable scenario, Figures 13.20 and 13.21 show daytime noise level contours across the site at heights of 1.5 metres and 13.5 metres, assuming maximum building heights, overlain on the building zones extant in 2026. Figures 13.22 and 13.23 show

the corresponding night-time noise level contours. The effects of noise shielding provided by buildings can be clearly seen.

13.5.19 For the daytime period;-

- At ground floor level the majority of the development is in NEC A, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC A and B, with a western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.20 For the night-time period;-

- At ground floor level the majority of the development is in NEC A, with a western fringe and those parts of the development fronting internal site roads in NEC C.
- At fourth floor level the majority of the development is in NEC A and B, with a western fringe and those parts of the development fronting internal site roads in NEC C.

13.5.21 Figures 13.24 and 13.25 show daytime noise level contours across the site at heights of 1.5 metres and 13.5 metres for the mid-range parameter compliant layout extant in 2026. Figures 13.26 and 13.27 show the corresponding night-time noise level contours.

13.5.22 For the daytime period;-

- At ground floor level the majority of the development is in NEC A and B, with those parts of the development fronting internal site roads potentially in NEC C.
- At fourth floor level the majority of the development is in NEC A and B, with a western fringe in NEC C.

13.5.23 For the night-time period;-

- At ground floor level the majority of the development is in NEC A and B, with a small western fringe and those parts of the development fronting internal site roads in NEC C.
- At fourth floor level the majority of the development is in NEC B, with a small western fringe in NEC C.

13.5.24 During the masterplanning and detailed design process, employing the procedures outlined in the Development Assumptions, the Proposed Development will be progressed to ensure, as far as practicable, acceptable internal noise levels to residential and non-residential properties with the use of natural ventilation. It is concluded that the Proposed Development, as shown in the Parameter Plans, could be developed to meet the required criteria.

Construction Noise

2014 Pre-Opening Highway and Utility Works

13.5.25 This scenario considers the effects resulting from the off-site highway and utility works on Huntingdon Road and Madingley Road, carried out prior to 2014.

13.5.26 On Huntingdon Road, these works will consist of;-

- Construction of new 3 arm and 4 arm signal controlled junctions
- Installation of Toucan Crossing
- Construction of unsegregated footway/cycleway
- Diversion/replacement/protection of existing utilities affected by the highways works
- Provision of new telecommunications infrastructure

13.5.27 On Madingley Road, these works will consist of;-

- Improvement works at High Cross/Madingley Road Junction
- Installation of Toucan Crossing
- Diversion/replacement/protection of existing utilities affected by the highways works
- Provision of new telecommunications/electricity/gas infrastructure
- Provision of new foul water rising main

13.5.28 The works on Huntingdon Road and Madingley Road are in close proximity to a number of residential properties. The works will consist of breaking out of the existing carriageway, installation of new carriageway and significant trenching works for the utilities. These activities have the potential to result in short term significant noise impacts to nearby residential properties. As part of the work planning, detailed method statements should be produced, indicating likely noise impacts and how these will be minimised as far as practicable.

13.5.29 The utility works by their very nature are mobile. It is anticipated that the works will generally progress at a rate of 20 metres per day. Hence, for any particular residential receptor on Huntingdon Road or Madingley Road, noise levels will increase as the works approach to a maximum and decrease as the works recede.

13.5.30 Construction noise levels to a representative residential receptor have been calculated for the various likely activities associated with the utility works (breaking road surface, trenching, fill and compaction, surfacing), assuming a closest approach distance of 15 metres. No mitigation, in the form of mobile noise barriers to the works has been assumed. The results are provided in Table 13.12

Table 13.12: Estimated Facade Noise Levels for Utility Works ($L_{Aeq,1h}$)

Day	Construction Activity			
	Break Road Surface	Trenching	Fill and Compaction	Surfacing
1	67	51	61	63
2	70	54	64	66
3	75	59	69	71
4	79	63	73	75
5	75	59	69	71
6	70	54	64	66
7	67	51	61	63

13.5.31 Based on the existing traffic flows on Huntingdon Road and Madingley Road, prevailing noise levels to the closest residential properties on these links will be relatively high, in the region of 65 to 68 dB(A). Construction noise levels will be above these prevailing noise levels for only a few days at any particular receptor. The estimated construction noise levels are at or below the generally accepted construction noise level of 75 dB(A) for short term works.

13.5.32 With the provision of mobile noise barriers to the noisiest works, where practicable, these noise levels can be reduced by 5 to 10 dB(A).

13.5.33 With noise avoidance and management measures and construction traffic routing in place, as outlined in the Development Assumptions, off-site construction works for junctions and utilities will be effectively managed, minimising significant effects at off-site receptors.

13.5.34 During these works, there will be traffic management in place on Huntingdon Road or Madingley Road. The changes in traffic conditions on these roads due to the traffic

management will potentially result in reduced traffic noise levels to residential properties on these links, although the significance of these reductions is assessed to be negligible/minor.

13.5.35 Regarding the possible changes in traffic flows on other links as a result of drivers avoiding Huntingdon Road or Madingley Road, the traffic modellers have indicated that there will not be a significant redistribution of traffic during the utility and highways works on Huntingdon Road and Madingley Road, as the traffic is tidal and intelligent signals will be used to minimise delay. It is noted that an increase in traffic volume of 25% is required to provide a 1 dB(A) increase in noise level to adjacent receptors, and a doubling of traffic volume is required to provide a 3 dB(A) increase. Reference to the criteria in Table 13.9 shows that increases of 1 to 3 dB(A) are assessed as minor.

On-Site Construction Works

13.5.36 Noise levels resulting from on-site construction activities have been calculated at five representative off-site residential properties. These are shown in Figure 13.1 and detailed below:

- R1: property to north end of Huntingdon Road
- R2: closest property on Huntingdon Road to construction works
- R3: property to south end of Huntingdon Road
- R4: property on All Souls Lane
- R5: property on Conduit Head Road

13.5.37 Assumed construction activities and plant employed in the assessment, with sourced noise data, are provided in **Appendix 13.4**.

13.5.38 Examination of the prevailing ambient noise levels in Table 13.11 shows that the prevailing ambient noise levels are all below 65 dB L_{Aeq}. It follows that the threshold value to be employed in the construction noise assessment, as defined in BS5228-1 Annex E, is 65 dB L_{Aeq}. Construction noise levels to sensitive receptors above this threshold value are considered to be significant.

Assessment Year 2014

13.5.39 With noise avoidance and management measures in place, as outlined in the Development Assumptions, construction noise levels to all off-site receptors should be below the threshold value, resulting in no significant effects at off-site receptors according to the methodology provided in BS5228-1 Annex E.

13.5.40 For the majority of the construction works, noise levels to all off site receptors will be at or below the prevailing ambient noise levels. For some phases of the construction works, when working close to particular receptors, construction noise levels are likely to exceed the prevailing ambient levels. Estimated worst-case construction noise levels to the representative receptors are provided in Table 13.13.

Table 13.13: Estimated Worst-Case Construction Noise Levels (2014)

Receptor	Prevailing Ambient Noise Level (dB L _{Aeq})	Construction Noise Level (dB L _{Aeq,1h})
R1	61	61
R2	59	63
R3	51	53
R4	54	54
R5	56	57

13.5.41 The amount of construction traffic will vary throughout the construction period. The site is surrounded by relatively highly trafficked roads. Construction traffic will access and leave the Application Site mainly via Madingley Road between the site access and the M11 junction. A minimal amount of construction traffic will use the site entrance on to Huntingdon Road. It is noted that construction traffic will not be routed through Cambridge City Centre or built up areas.

13.5.42 Employing the results provided in the traffic and access chapter, the increases in noise levels to receptors fronting Madingley Road and Huntingdon Road resulting from the site construction traffic have been calculated.

13.5.43 For the pre-2014 works, receptors fronting Madingley Road will experience noise increases of 0.5 dB(A) as a result of the additional construction traffic. Receptors fronting Huntingdon Road will experience noise increases of 0.1 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of these noise increases is assessed as negligible.

13.5.44 For the post-2014 works, receptors fronting Madingley Road will experience noise increases of 0.5 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of this noise increase is assessed as negligible. Receptors fronting Huntingdon Road will experience no increase in noise levels as there will be no construction traffic on this road.

13.5.45 Incorporating the additional traffic on Madingley Road due to the operation of the proposed development post-2014, the increase in noise levels to receptors fronting Madingley Road is 0.9 dB(A). With reference to the significance of effects scheme provided in **Table 13.9**, the significance of this noise change is assessed as negligible.

13.5.46 Hence, the significance of the combined effects of construction traffic and development traffic post-2014 is assessed as negligible.

Assessment Year 2026

13.5.47 With mitigation in place, as outlined in the Development Assumptions, construction noise levels to all off-site receptors should be below the threshold value, resulting in no significant effects at off-site receptors according to the methodology provided in BS5228-1 Annex E.

13.5.48 For the majority of the construction works, noise levels to all off-site receptors will be at or below the prevailing ambient noise levels. For some phases of the construction works, when working close to particular receptors, construction noise levels are likely to exceed the prevailing ambient levels. Estimated worst-case construction noise levels to the representative receptors are provided in Table 13.14.

Table 13.14: Estimated Worst-Case Construction Noise Levels (2026)

Receptor	Prevailing Ambient Noise Level (dB L _{Aeq})	Construction Noise Level (dB L _{Aeq,1h})
R1	61	62
R2	59	63
R3	51	62
R4	54	63
R5	56	62

13.5.49 As the various phases of the Proposed Development are completed and occupied, ongoing construction works will affect future residents. Some construction works will be carried out in close proximity to occupied buildings. For each phase of the Proposed Development, as per the CEMP, noise attenuation measures as specified in the Development

Assumptions will be provided and the requirement for additional mitigation methods will be assessed. For each phase of the Proposed Development, as per the CEMP, detailed method statements will be provided and appropriate methods will be implemented to effectively manage any disturbance.

Construction Vibration

13.5.50 Construction vibration is most likely to derive from piling works if they are required. Selection of piling methods will depend on a number of factors including ground conditions, extent of piling works and construction schedule, and likely effects to surrounding sensitive receptors. Construction works close to existing receptors are unlikely to include piling. If they did, the piling methods employed would ensure that the effects were negligible. In particular, percussive non-noise attenuated piling techniques would not be employed in noise-sensitive locations.

13.5.51 Vibration levels have been estimated at the selected off-site construction noise receptors R1-R5 assuming rotary bored piling for the closest proposed new buildings to each receptor having regard to ground conditions established as part of the Soils and Geology assessment.

13.5.52 Empirical formulae have been proposed for known ground conditions based on previously measured data.

13.5.53 The vibration peak particle velocity (ppv) due to piling of foundations has been estimated at the receptors using example measured source data and the appropriate propagation relationship taken from the BS 5228-2: 2009.

13.5.54 The ppv data for rotary bored piling has been assumed to be 0.4 mms⁻¹ at 10m based on measured data reported in BS 5228.

Assessment Year 2014

13.5.55 The estimated maximum ppv values at the receptors are given in Table 13.15. For the vast majority of the construction works, vibration levels will be significantly lower than these values.

Table 13.15: Estimated Vibration levels due to Piling Works (2014)

Vibration Level	Receptor				
	R1	R2	R3	R4	R5
ppv (mms ⁻¹)	<0.10	0.22	<0.10	<0.10	0.11

13.5.56 Comparison of the estimated ppv values in **Table 13.14**, with the ppv criteria for annoyance in **Table 13.6** indicates that vibration levels during any foundation piling works may just be perceptible at receptor R2. It is unlikely that vibration levels at R1, R3, R4 and R5, and other residential properties in their vicinity, will be perceptible.

13.5.57 Comparison of the estimated ppv values in **Table 13.14**, with the ppv criteria for building damage in **Table 13.7** indicates that vibration levels during any foundation piling works would not be expected to have any effect on existing surrounding buildings.

13.5.58 Overall, the significance of construction vibration effects is therefore assessed as negligible.

13.5.59 It is concluded that ground vibration levels during Phases 1 construction can be effectively managed to result in negligible effects to off-site receptors.

Assessment Year 2026

13.5.60 By 2026 the Proposed Development is expected to have been completed and therefore construction vibration effects are considered highly unlikely as at 2026. Nevertheless the assessment below has been undertaken on the unlikely assumption that some vibration generating works will remain outstanding as at that date.

15.5.61 The estimated maximum ppv values at the receptors are given in Table 13.16. For the major part of the construction works, vibration levels will be significantly less than these values.

Table 13.16: Estimated Vibration levels due to Piling Works (2026)

Vibration Level	Receptor				
	R1	R2	R3	R4	R5
ppv (mms ⁻¹)	<0.10	0.22	0.13	0.26	0.11

13.5.62 Comparison of the estimated ppv values in Table 13.15, with the ppv criteria for annoyance in Table 13.6 indicates that vibration levels during any foundation piling works may just be perceptible at receptors R2 and R4 and other residential properties in their vicinity. It is unlikely that vibration levels at R1, R3 and R5, and other residential properties in their vicinity, will be perceptible.

13.5.63 Comparison of the estimated ppv values in Table 13.15, with the ppv criteria for building damage in Table 13.7 indicates that vibration levels during any foundation piling works would not be expected to have any effect on existing surrounding buildings.

13.5.64 As the various phases of the development are completed and occupied, ongoing construction works will affect future residents. Some construction works will be carried out in close proximity to occupied buildings. For each phase, and sub-phase, of the development, detailed method statements will be provided and appropriate mitigation methods will be implemented to manage any disturbance resulting from the chosen piling methods.

13.5.65 Overall, the significance of construction vibration effects is assessed as negligible.

13.5.66 It is concluded that ground vibration levels during Phases 2, 3 and 4 construction can be effectively managed to result in negligible effects to on-site and off-site receptors.

Operational Road Traffic Noise Levels

13.5.67 Traffic data have been provided for the following scenarios:

- Do Minimum (DM) 2014 (i.e. traffic on the local road network for the year 2014 without the Proposed Development)
- Do Something (DS) 2014 (i.e. traffic on the local road network for the year 2014 with the Proposed Development in place, to the extent assumed in Chapter 3)
- Do Minimum (DM) 2026 (i.e. traffic on the local road network for the year 2026 without the Proposed Development)
- Do Something (DS) 2026 (i.e. traffic on the local road network for the year 2026 with the Proposed Development completely in place)

13.5.68 The differences in traffic flows between DM 2014 and DS 2014, and between DM 2026 and DS 2026, on each road link, have been calculated (there is no change in percentage of HGV vehicles and average speed on each road link for the compared scenarios). The changes in noise level at receptors along these links, resulting from the change in traffic flow on each link, have been calculated. The detailed results are provided in **Appendix 13.5**. For the vast majority of road links the change in noise level between the DM and DS scenarios is substantially less than 1 dB(A), the significance of which is negligible for all receptors according to the scheme provided in **Table 13.9**.

13.5.69 A summary of the results is provided in **Table 13.17** for 2014 and in **Table 13.18** for 2026. For each year, the changes in noise level for the 18 hour day (06:00 to 24:00), AM Peak hour and PM Peak hour are presented.

Table 13.17: Changes in Noise Levels Resulting From Changes in Traffic Flows on the Local Road Network (2014)

Link No.	Road Link	Change in Noise Level (dB L _{A10,18h} or dB L _{A10,1h})		
		18 hours	AM Peak	PM Peak
1	M11 - Junction 14 to M11 / A604 Merger - Nbd	0.0	0.0	0.0
1	M11 - Junction 14 to M11 / A604 Merger - Sbd	0.0	0.0	0.0
2	M11 - from Junction 13 to Junction 14 - Nbd	0.0	0.0	0.0
2	M11 - from Junction 13 to Junction 14 - Sbd	0.0	0.0	0.0
3	M11 - from Junction 12 to Junction 13 - Nbd	0.1	0.1	0.1
3	M11 - from Junction 12 to Junction 13 - Sbd	0.1	0.0	0.1
4	M11 - from Junction 11 to Junction 12 - Nbd	0.1	0.1	0.1
4	M11 - from Junction 11 to Junction 12 - Sbd	0.1	0.1	0.1
5	A14 - NW of B1050 Junction - NWbd	0.1	0.0	0.1
5	A14 - NW of B1050 Junction - SEbd	0.0	0.1	0.0
6	A14 - from B1050 Jn to Dry Drayton Rd Jn - NWbd	0.1	0.1	0.1
6	A14 - from B1050 Jn to Dry Drayton Rd Jn - Sebd	0.1	0.1	0.0
7	A14 - from Dry Drayton Road to M11 Merge - NWbd	0.1	0.1	0.1
7	A14 - from Dry Drayton Road to M11 Merge - SEbd	0.1	0.1	0.1
8	A14 - from M11 Merge to A14 Ebd Slip	0.0	0.0	0.0
8A	A14 - from A14 Wbd Slip to M11 Merge	0.0	0.0	0.0
9	Sbd Slip road from A428 to M11	0.0	0.0	0.0
10	A14 - from A428 Merger to B1049 (Cambridge Road) Junction - Ebd	0.0	0.0	0.0
10	A14 - from A428 Merger to B1049 (Cambridge Road) Junction - Wbd	0.0	0.0	0.0
11	A14 - from B1049 Junction to A10 Junction - Ebd	0.0	0.0	0.0
11	A14 - from B1049 Junction to A10 Junction - Wbd	0.0	0.0	0.0
12	A14 - from A10 Junction to Horningsea Road - Ebd	0.0	0.0	0.0
12	A14 - from A10 Junction to Horningsea Road - Wbd	0.0	0.0	0.0
13	A428 - west of Madingley Road Junction - Ebd	0.1	0.1	0.1
13	A428 - west of Madingley Road Junction - Wbd	0.1	0.1	0.1
14	A428 - from Madingley Rd Jn to M11 Jn - Ebd	0.0	0.0	0.0
14	A428 - from Madingley Rd Jn to M11 Jn - Wbd	0.0	0.0	0.0
15	Huntingdon Road - from A14 slip road to North-western NWC Site Access	0.6	0.7	0.6
16	Huntingdon Road - from North-western NWC Site Access to Girton Road	0.6	0.6	0.5
17	Huntingdon Road - from Girton Road to	0.5	0.5	0.5

	North-eastern NWC Site Access			
18	Huntingdon Road - from North-eastern NWC Site Access to Storey's Way	0.4	0.4	0.4
19	Huntingdon Road - from Storey's Way to Victoria Road / Castle Street Junction	0.2	0.2	0.2
20	Lady Margret Road and Mount Pleasant	0.1	0.0	0.1
21	Shelly Row and Albion Row	0.0	0.0	0.1
22	Madingley Road - from Queens Road to Grange Road	0.1	0.2	0.1
23	Madingley Road - from Grange Road to Storey's Way	0.2	0.2	0.2
24	Madingley Road - from Storey's Way to JJ Thompson Ave	0.2	0.2	0.2
25	Madingley Road - from JJ Thompson Ave to South NWC Site Access	0.2	0.2	0.2
26	Madingley Road - from South NWC Site Access to Park and Ride Entrance	0.2	0.2	0.2
27	Madingley Road - from Park and Ride Entrance to Unnamed Road	0.4	0.4	0.5
28	Madingley Road - from Unnamed Road to M11 Junction 13	0.4	0.4	0.5
29	Madingley Road - from M11 Junction to Cambridge Road	0.2	0.2	0.2
30	Madingley Road - from Cambridge Road to A428 Junction	0.1	0.1	0.1
31	Barton Road - from M11 Junction 12 to Grange Road	0.0	0.0	0.0
32	Barton Road - from Grange Road to Newham Road / The Fen Causeway Junction	0.0	0.0	0.1
33	Newham Road - from Barton Road /The Fen Causeway Junction to Queens Road / Silver Street Junction	0.1	0.1	0.0
34	Queens Road - from Newham Road / Silver Street Junction to Madingley Road	0.1	0.1	0.0
35	Storey's Way	0.0	0.0	0.0
36	Oxford Road and Windsor Road	0.8	0.9	0.7
37	Histon Road	0.2	0.2	0.2
38	Bridge Road (Histon)	0.0	0.0	0.0
39	Victoria Road	0.2	0.2	0.2
40	A10	0.0	0.0	0.0
41	Girton Road	0.4	0.4	0.3
42	Grange Road	0.4	0.3	0.5
101	NIAB Southern End			
102	NIAB Northern End			

Table 13.18: Changes in Noise Levels Resulting From Changes in Traffic Flows on the Local Road Network (2026)

Link No.	Road Link	Change in Noise Level (dB L _{A10,18h} or dB L _{A10,1h})		
		18 hours	AM Peak	PM Peak
1	M11 - Junction 14 to M11 / A604 Merger - Nbd	0.0	0.0	-0.1
1	M11 - Junction 14 to M11 / A604 Merger - Sbd	0.0	0.0	0.0

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2	M11 - from Junction 13 to Junction 14 - Nbd	0.0	0.0	-0.1
2	M11 - from Junction 13 to Junction 14 - Sbd	0.0	0.0	0.0
3	M11 - from Junction 12 to Junction 13 - Nbd	0.0	0.1	0.0
3	M11 - from Junction 12 to Junction 13 - Sbd	0.0	0.0	0.0
4	M11 - from Junction 11 to Junction 12 - Nbd	0.0	0.0	0.0
4	M11 - from Junction 11 to Junction 12 - Sbd	0.0	0.0	0.1
5	A14 - NW of B1050 Junction - NWbd	0.0	0.0	0.0
5	A14 - NW of B1050 Junction - SEbd	0.0	0.0	0.0
6	A14 - from B1050 Jn to Dry Drayton Rd Jn - NWbd	0.0	0.1	0.0
6	A14 - from B1050 Jn to Dry Drayton Rd Jn - Sebd	0.0	0.0	0.0
7	A14 - from Dry Drayton Road to M11 Merge - NWbd	0.0	0.1	0.0
7	A14 - from Dry Drayton Road to M11 Merge - SEbd	0.1	0.1	0.0
8	A14 - from M11 Merge to A14 Ebd Slip	-0.1	-0.1	-0.1
8A	A14 - from A14 Wbd Slip to M11 Merge	0.0	0.0	0.0
9	Sbd Slip road from A428 to M11	0.0	0.0	0.0
10	A14 - from A428 Merger to B1049 (Cambridge Road) Junction - Ebd	0.0	0.0	0.0
10	A14 - from A428 Merger to B1049 (Cambridge Road) Junction - Wbd	0.0	0.1	0.0
11	A14 - from B1049 Junction to A10 Junction - Ebd	0.0	0.0	0.0
11	A14 - from B1049 Junction to A10 Junction - Wbd	0.1	0.1	0.0
12	A14 - from A10 Junction to Horningsea Road - Ebd	0.0	0.0	0.0
12	A14 - from A10 Junction to Horningsea Road - Wbd	0.0	0.0	0.1
13	A428 - west of Madingley Road Junction - Ebd	0.2	0.2	0.1
13	A428 - west of Madingley Road Junction - Wbd	0.1	0.2	0.1
14	A428 - from Madingley Rd Jn to M11 Jn - Ebd	0.2	0.2	0.3
14	A428 - from Madingley Rd Jn to M11 Jn - Wbd	0.1	0.2	0.0
15	Huntingdon Road - from A14 slip road to North-western NWC Site Access	0.7	0.7	0.8
16	Huntingdon Road - from North-western NWC Site Access to Girton Road	-0.3	-0.2	-0.4
17	Huntingdon Road - from Girton Road to North-eastern NWC Site Access	-0.3	-0.3	-0.3
18	Huntingdon Road - from North-eastern NWC Site Access to Storey's Way	0.2	0.2	0.3
19	Huntingdon Road - from Storey's Way to Victoria Road / Castle Street Junction	0.2	0.2	0.2
20	Lady Margret Road and Mount Pleasant	0.0	-0.1	0.1
21	Shelly Row and Albion Row	0.1	0.5	-0.5
22	Madingley Road - from Queens Road to	0.1	0.2	-0.1

	Grange Road			
23	Madingley Road - from Grange Road to Storey's Way	0.1	0.2	0.1
24	Madingley Road - from Storey's Way to JJ Thompson Ave	-0.2	-0.2	-0.2
25	Madingley Road - from JJ Thompson Ave to South NWC Site Access	-0.3	-0.4	-0.2
26	Madingley Road - from South NWC Site Access to Park and Ride Entrance	-0.5	-0.7	-0.4
27	Madingley Road - from Park and Ride Entrance to Unnamed Road	0.3	0.2	0.5
28	Madingley Road - from Unnamed Road to M11 Junction 13	0.3	0.1	0.4
29	Madingley Road - from M11 Junction to Cambridge Road	-0.1	-0.1	-0.2
30	Madingley Road - from Cambridge Road to A428 Junction	-0.1	-0.1	-0.1
31	Barton Road - from M11 Junction 12 to Grange Road	0.2	0.2	0.3
32	Barton Road - from Grange Road to Newham Road / The Fen Causeway Junction	0.1	0.1	0.1
33	Newham Road - from Barton Road /The Fen Causeway Junction to Queens Road / Silver Street Junction	-0.1	-0.1	-0.1
34	Queens Road - from Newham Road / Silver Street Junction to Madingley Road	0.1	0.0	0.1
35	Storey's Way	-0.7	-0.6	-0.8
36	Oxford Road and Windsor Road	1.5	1.2	1.8
37	Histon Road	0.3	0.3	0.3
38	Bridge Road (Histon)	-0.1	-0.1	0.0
39	Victoria Road	0.2	0.3	0.0
40	A10	0.0	0.0	0.1
41	Girton Road	0.6	0.6	0.7
42	Grange Road	0.2	0.0	0.4
101	NIAB Southern End	0.5	0.5	0.5
102	NIAB Northern End	0.1	-0.2	0.4

13.5.70 Considering the links with the largest changes in noise level, there are no receptors fronting on to Link 15, although there is a residential property at some distance to the east. The noise climate at this receptor is likely to be dominated by traffic noise on the A14 to the immediate north. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of noise changes on this road link resulting from the Proposed Development is assessed as negligible for the years 2014 and 2026.

13.5.71 Links 16,17, 18 and 19 (Huntingdon Road) are fronted by residential properties of high sensitivity. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of noise changes on these road links resulting from the Proposed Development is assessed as negligible for the years 2014 and 2026.

13.5.72 Links 22 to 30 (Madingley Road) are fronted by residential properties of high sensitivity in some locations. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of noise changes on these road links resulting from the Proposed Development is assessed as negligible for the years 2014 and 2026.

13.5.73 Link 36, Oxford Road and Windsor Road, is fronted by residential properties along almost the entire length. These properties are of high sensitivity. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of noise changes on this road link resulting from the Proposed Development is assessed as negligible for the year 2014 and minor adverse for the year 2026.

13.5.74 Link 41 (Girton Road) is fronted by residential properties of high sensitivity. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of noise changes on this road link resulting from the Proposed Development is assessed as negligible for the years 2014 and 2026.

13.5.75 Overall, the significance of changes in traffic noise levels on surrounding off-site roads resulting from the Proposed Development is assessed as negligible for the year 2014 and negligible / minor adverse for the year 2026.

13.5.76 With respect to residential properties on Huntingdon Road, All Souls Lane and Conduit Head Road which back on to the development site, the vast majority of these will experience reductions in noise levels of approximately 2 to 5 dB(A) to their rear facades with the development in place. This would result from the shielding provided by the development buildings to noise from the M11 motorway. The effect of the Proposed Development on these properties is therefore assessed as minor/moderate beneficial.

13.5.77 Four existing properties to the north west of the Huntingdon Road East access will experience increases in noise levels of 1 to 3 dB(A) to some facades resulting from traffic accessing and leaving the Application Site. This is assessed as a minor adverse effect. These four properties are currently in PPG24 NEC A/B during the daytime, depending on distance from Huntingdon Road, and in NEC B during the night-time. With the Proposed Development in operation, these NEC categories will remain the same.

13.5.78 The strip of land immediately to the north of this junction, including Holly Nurseries, which will be incorporated into the design, is to be landscaped as part of the Proposed Development. It may be possible to tailor this landscaping, or the design of any landuses located within this area of landscaping, to provide acoustic shielding to these properties, thus reducing a minor adverse effect to negligible.

13.5.79 Three properties adjacent to the development site access on Madingley Road will experience increases in noise levels of up to 1 dB(A) to some facades resulting from traffic accessing and leaving the site. This is assessed as a negligible effect and no additional mitigation is required.

13.5.80 There will be construction works on the Application Site throughout the period pre-2014 to 2026, resulting in construction HGV traffic on Madingley Road and, to a much lesser extent, on Huntingdon Road. As provided in the construction noise assessment above, the increases in noise level to properties fronting these road links will be less than 1 dB(A) and the significance of the combined effects of construction traffic and development traffic is assessed as negligible.

Operational Fixed Plant Noise

13.5.81 In Phase 1 of the Proposed Development, leading up to 2014, the Local Centre will commence with the construction of the supermarket and hotel. There will be fixed plant associated with these developments. The Energy Centre will also be completed during Phase 1.

13.5.82 In the following phases, leading up to 2026, the Local Centre will be completed and the school and academic/research buildings will be built. There will be fixed plant associated with all of these developments.

Assessment Year 2014

13.5.83 The Energy Centre will include the usual plant items required for a facility of this nature, such as furnaces, boilers, pumps and fans. All of these items are amenable to effective noise attenuation.

13.5.84 The Energy Centre will be designed and attenuated, using the noise avoidance, attenuation and management measures referred to in Chapter 2, such that noise from the fixed plant will not exceed the target levels agreed with the LPA. This will include consideration of future sensitive receptors to be built in later phases. On this basis, the significance of noise effects to sensitive receptors in the vicinity is assessed as negligible.

13.5.85 Fixed plant associated with the supermarket and hotel will be designed and attenuated using the noise avoidance, attenuation and management measures referred to in

Chapter 2, such that noise from the fixed plant will not exceed the target levels agreed with the LPA. This will include consideration of future sensitive receptors to be built in later phases. On this basis, the significance of noise effects to sensitive receptors in the vicinity is assessed as negligible. The attenuation will take the form of:-

- Choice of low noise plant items where possible
- Silencers to fans as necessary
- External fixed plant to be suitably located and enclosed as necessary

Assessment Year 2026

13.5.86 Fixed plant associated with the retail outlets, the school and the academic/research buildings will be designed and attenuated using the noise avoidance, attenuation and management measures referred to in Chapter 2, such that noise from the fixed plant will not exceed the target levels agreed with the LPA. This will include consideration of future sensitive receptors to be built in later phases. On this basis, the significance of noise effects to sensitive receptors in the vicinity is assessed as negligible. As for the fixed plant operational in 2014, the attenuation will take the form of:-

- Choice of low noise plant items where possible
- Silencers to fans as necessary
- External fixed plant to be suitably located and enclosed as necessary

Operational Noise from Supermarket and Other Retail Outlets**Assessment Year 2014**

13.5.87 HGV deliveries to the supermarket within the local centre have the potential to affect neighbouring residential properties within the Proposed Development, particularly in the early morning. It is unlikely that deliveries to the hotel will be on the same scale as the supermarket.

13.5.88 Effective management of these deliveries, stipulating delivery times and procedures (e.g. maximum speeds and not parking up on site with engines idling) would result in the significance of these effects being negligible.

13.5.89 Noise breakout from the supermarket and hotel, affecting nearby residential units, will be controlled in a similar way through the effective management of procedures (e.g. control of music levels and door management).

13.5.90 Where residential properties share a party wall or floor with the supermarket, the dividing/separating partitions or structures will provide sufficient attenuation for the intended uses of the commercial properties, to provide the required internal noise levels to the residential properties.

Assessment Year 2026

13.5.91 With the addition of further retail outlets in the local centre, increased HGV deliveries may affect neighbouring residential properties within the Proposed Development, particularly in the early morning.

13.5.92 As for the supermarket, effective management of these deliveries, stipulating delivery times and procedures would result in the significance of these effects being negligible.

13.5.93 Noise breakout from the retail outlets, affecting nearby residential units, will be controlled in a similar way to that for the supermarket and hotel.

13.5.94 Where residential properties share a party wall or floor with retail / commercial properties, the dividing/separating partitions or structures will provide sufficient attenuation for the intended uses of the commercial properties, to provide the required internal noise levels to the residential properties.

Operational Noise from School External Play Areas and Open Space Activity

13.5.95 The Open Land and Landscape Areas are shown in Figure 2.5. In Phase 1 the open space comprising the Girton “gap” would be developed. Part of this area may be used for school playing fields.

13.5.96 After 2014, in Phases 2 and 3, the open land to the west side of the proposed development, adjacent to the M11, would be developed. Sports pitches may be included in this area.

13.5.97 The open land will be used for vehicular, pedestrian and cycle routes, outdoor entertainment and for formal and informal recreation.

Assessment Year 2014

13.5.98 Activity in the areas of open land is likely to be fairly limited for most of the time, mainly confined to pedestrians and cyclists passing through and “passing the time of day”. It is unlikely that this will be considered by nearby residents as a significant disturbance.

13.5.99 Other activities involving outdoor entertainment and formal and informal games will require management to minimise noise disturbance to nearby residents. Sensible location and timing of these activities should not result in a significant effect.

13.5.100 Prevailing noise levels across these areas during the daytime, with the proposed development in place, will generally be below 55 dB(A), with some parts above this (reference Figure 13.12).

Assessment Year 2026

13.5.101 Noise from the school outdoor area will only occur during limited times of the day during normal school hours. There is unlikely to be activity during the night. It is unlikely that the school play area will be considered by nearby residents as a significant disturbance. If necessary, suitable fencing to the play area would provide additional noise attenuation.

13.5.102 Activity in the areas of open land to the west of the proposed development is likely to be fairly limited for most of the time, mainly confined to walkers and naturalists. Considering the distance to sensitive receptors, and the noise producing effects of these activities, this will not be considered by residents as a significant disturbance.

13.5.103 Sports pitches located in this area have the potential to result in disturbance to the nearest residential properties. As for activities on other areas of open land, careful management, including optimal location and timing of formal events, should not result in a significant effect.

13.5.104 Prevailing noise levels across these western areas during the daytime, with the proposed development in place, will generally be below 63 dB(A), with some parts slightly above this (reference Figure 13.24). These noise levels should prove acceptable for the type of sports and recreational activities to be carried out.

13.6 Measures to Avoid, Reduce or Manage Effects**Suitability of the Site for Proposed Development**

13.6.1 The assessment has demonstrated that the Proposed Development, as shown in the Parameter Plans, would be developed to meet the required noise criteria for both 2014 and 2026.

13.6.2 Landscape features to the west of the site between the built development and the M11 will provide additional mitigation to the open area and to proposed buildings on the western fringe.

13.6.3 Building massing and orientation, internal layouts of specific buildings, employment of appropriate stand-off distances from internal site roads and the specification of appropriate glazing and ventilation will be employed to provide acceptable internal noise climates to all buildings.

13.6.4 Less sensitive parts of the proposed development, such as commercial and academic buildings, will be located on the western fringe.

13.6.5 Where practicable, habitable rooms such as living rooms and bedrooms will be located on the quiet facades of residential buildings. Less sensitive spaces such as hallways, bathrooms and kitchens will be located on the noisier facades.

Construction

13.6.6 For each phase, and sub-phase, of the development, detailed method statements will be provided and the need for additional mitigation will be assessed to effectively manage any disturbance. This will take the form of temporary noise barriers to specific noisy activities, together with selection of low noise plant, proper use of plant (e.g. fitted with effective silencing and fully maintained), optimal location of fixed plant items and other measures referred to in the CEMP.

Operational Road Traffic

13.6.7 A minor adverse effect has been identified for one road link in the transport assessment. Residential properties fronting this road link (Oxford Road and Windsor Road) will experience noise increases of approximately 1.5 dB(A) as a consequence of traffic increases resulting from the development.

13.6.8 Mitigation, for example in the form of noise barriers, is not practicable for these established residential roads. Additionally, these residential roads have a speed limit of 30 mph and a speed reduction is unlikely to be practicable and would bring minimal noise reduction.

Operational Fixed Plant Noise

13.6.9 The Energy Centre will be designed and attenuated, as outlined in the Development Assumptions, so that the significance of noise effects to sensitive receptors in the vicinity will be negligible. No further mitigation would therefore be required.

13.6.10 Fixed plant associated with the development will be designed and attenuated, as outlined in the Development Assumptions, so that the significance of noise effects to sensitive receptors in the vicinity will be negligible. No further mitigation would therefore be required.

13.7 Cumulative Effects

13.7.1 There are several committed developments in the area around the Proposed Development which may result in cumulative effects during both construction and operation.

13.7.2 On-site construction works at the developments at Northstowe, Orchard/Arbury Park and NIAB2 are too distant from the Proposed Development for there to be any significant cumulative effects during the Phase 1 works completed in 2014 or the Phase 2, 3 and 4 works up to 2026.

13.7.3 There is the potential for significant cumulative effects at properties on Madingley Road and Huntingdon Road resulting from on-site construction works at West Cambridge and NIAB, when these works are at their closest approach to the Proposed Development.

13.7.4 The on-site Phase 1 works for the Proposed Development up to 2014 will generally be at considerable distances from these roads and construction noise levels will be negligible. Therefore, any cumulative effect will be negligible. During highways and utilities works on Huntingdon Road and Madingley Road, there is the potential for significant cumulative effects at properties on Madingley Road and Huntingdon Road. However, taking into account the speed at which the utilities works will progress (approx. 20 metres per day), the duration of these significant effects at any particular sensitive receptor will be small.

13.7.5 Taking into account the fact that noise from the West Cambridge and NIAB developments will affect the front facades of properties on Huntingdon Road and Madingley Road, whereas noise from the Proposed Development will affect rear facades, and the negligible effects of construction noise from the Proposed Development in 2026, the cumulative effect is likely to be negligible in Phases 2, 3 and 4 of the construction works.

13.7.6 Construction HGV traffic from the developments at Northstowe and Orchard/Arbury Park will not access the same sections of the public road network as that for the Proposed Development. It follows that there will not be any significant cumulative effects during the Phase 1 works completed in 2014 or the Phase 2, 3 and 4 works up to 2026.

13.7.7 Employing the results provided in the traffic and access chapter, the increases in noise levels to receptors fronting Madingley Road and Huntingdon Road resulting from the combined construction traffic for the Application Site, West Cambridge and NIAB, have been calculated.

13.7.8 For the pre-2014 works, receptors fronting Madingley Road will experience noise increases of 0.5 dB(A) as a result of the additional construction traffic. Receptors fronting Huntingdon Road will experience noise increases of 0.3 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of these noise increases is assessed as negligible.

13.7.9 For the post-2014 works, receptors fronting Madingley Road will experience noise increases of 0.6 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in **Table 13.9**, the significance of this noise increase is assessed as negligible. Receptors fronting Huntingdon Road will experience no increase in noise levels as there will be no construction traffic on this road.

13.7.10 Incorporating the additional traffic on Madingley Road due to the operation of the proposed development post-2014, the increase in noise levels to receptors fronting Madingley Road is 1.0 dB(A). With reference to the significance of effects scheme provided in **Table 13.9**, the significance of this noise change is assessed as negligible/minor.

13.7.11 Hence, the significance of the cumulative effects of construction traffic for the Application Site, West Cambridge and NIAB, and operational development traffic post-2014, is assessed as negligible.

13.7.12 The transportation modelling, undertaken as part of the Transport Assessment, has estimated the cumulative effect for operation of all the Schemes listed in Table 1.4 on traffic flows on the local road network.

13.7.13 Data has been made available to the noise and vibration assessment for a baseline scenario in 2026 with none of the Schemes in operation (nor the Proposed Development) and for a scenario in 2026 with all of the schemes and the Proposed Development in operation.

13.7.14 The developments at Northstowe, Orchard/Arbury Park, West Cambridge, NIAB and NIAB2 are too distant from the Proposed Development for there to be any significant cumulative effects resulting from on-site operational noise for both 2014 and 2026.

13.7.15 Overall the cumulative effect of the Proposed Development and the other schemes in the Cambridgeshire Growth Areas is assessed as negligible in 2014 and in 2026.

13.8 Summary

Introduction

13.8.1 The noise and vibration effects associated with the construction, and subsequent operation, of the proposed mixed use development have been assessed for the years 2014 and 2026. Additionally, a 2014 pre-opening scenario has been assessed for off site utility works on Huntingdon Road and Madingley Road.

13.8.2 The assessment considers the suitability of the site for the proposed uses, construction noise and vibration effects, changes in traffic noise levels on the local road network as a result of the development and operational noise generated by the proposed uses of the site itself.

13.8.3 The noise climate across the site is dominated by road traffic on the M11 motorway, with smaller local contributions from the A14 and other surrounding roads.

Suitability of the Site for Proposed Development

13.8.4 For both assessment years, noise level contours across the Application Site have been calculated for:-

- a “least favourable” scenario, assuming no noise shielding to the various building zones (in effect, an empty site)

- a “most favourable” scenario, assuming maximum building heights from the Parameter Plans and providing maximum noise shielding to the various building zones
- a “mid range” scenario based on a mid-range parameter compliant layout

13.8.5 It has been concluded that the Proposed Development, as shown in the Parameter Plans, could be developed to provide an acceptable noise climate across the Application Site.

Construction

13.8.6 Noise levels resulting from on-site construction activities have been calculated at five representative off-site residential properties. The resultant noise levels have been assessed using the methodology provided in BS5228.

13.8.7 An assessment of off-site construction works for road junctions and services and utilities has been carried out.

13.8.8 It has been concluded that noise during all construction works can be effectively managed to result in negligible effects to on-site and off-site receptors.

13.8.9 Vibration levels resulting from piling works have been estimated at five representative off-site residential properties assuming rotary bored piling for the closest proposed new buildings to each receptor.

13.8.10 It has been concluded that vibration during all construction works can be effectively managed to result in negligible effects to on-site and off-site receptors.

Road Traffic Noise Levels

13.8.11 The effect of changes in road traffic noise levels resulting from the development has been assessed. Two existing residential streets will experience increases in noise level of approximately 1.5 dB(A). The significance of this increase is assessed as minor adverse. Changes in noise level on all other roads in the locality will be negligible.

13.8.12 With respect to residential properties on Huntingdon Road, All Souls Lane and Conduit Head Road which back on to the development site, the vast majority of these will experience reductions in noise levels to their rear facades with the development in place. This is as a result of the shielding provided by the development buildings to noise from the M11 motorway. This effect is assessed as moderate beneficial.

13.8.13 Four properties adjacent to the Huntingdon Road East access will experience increases in noise levels of 1 to 3 dB(A) to some facades resulting from traffic accessing and leaving the Application Site. This is assessed as a minor adverse effect. The strip of land immediately to the north of this junction, including Holly Nurseries, which will be incorporated into the design, is to be landscaped as part of the Proposed Development. It may be possible to tailor this landscaping, or the design of any landuses located within this area of landscaping, to provide acoustic shielding to these properties, thus reducing a minor adverse effect to negligible.

13.8.14 Three properties adjacent to the development site access on Madingley Road will experience increases in noise levels of up to 1 dB(A) to some facades resulting from traffic accessing and leaving the site. This is assessed as a negligible effect.

Fixed Plant

13.8.15 An assessment of noise from the Energy Centre and fixed plant associated with the development has been carried out.

13.8.16 During the detailed design, once details for the Energy Centre and any fixed plant associated with the development are available, assessments according to the methodology provided in BS 4142: 1997 ‘Rating industrial noise affecting mixed residential and industrial areas’ will be carried out and appropriate mitigation specified.

13.8.17 The Energy Centre will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be negligible.

13.8.18 Fixed plant associated with the development will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be negligible.

Operational Noise from Supermarket and Other Retail Outlets

13.8.19 An assessment of noise resulting from operation of the supermarket and other retail outlets has been carried out.

13.8.20 Effective management of HGV deliveries to the supermarket and other retail outlets, stipulating delivery times and procedures (e.g. maximum speeds and not parking up on site with engines idling) would result in the significance of these effects being negligible.

13.8.21 Noise breakout from the retail outlets, affecting nearby residential units, will be controlled in a similar way through the effective management of procedures (e.g. control of music levels and door management).

13.8.22 Where residential properties share a party wall or floor with retail / commercial properties, the dividing/separating partitions or structures will provide sufficient attenuation for the intended uses of the commercial properties, to provide the required internal noise levels to the residential properties.

Operational Noise from School External Play Areas and Open Space Activity

13.8.23 An assessment of noise from the school play areas and activity on the open spaces has been carried out.

13.8.24 Activity in the areas of open land associated with the Local Centre is likely to be fairly limited for most of the time.

13.8.25 Other activities involving outdoor entertainment and formal and informal games will require management to minimise noise disturbance to nearby residents.

13.8.26 Noise from the school outdoor area will only occur during limited times of the day during normal school hours. It is unlikely that the school play area will be considered by nearby residents as a significant disturbance.

13.8.27 Activity in the areas of open land to the west of the proposed development is likely to be fairly limited for most of the time, mainly confined to walkers and naturalists. This will not be considered by residents as a significant disturbance. Sports pitches located in this area have the potential to result in disturbance to the nearest residential properties. As for activities on other areas of open land, careful management should result in no significant effect.

Measures to Avoid, Reduce or Manage Effects

13.8.28 Landscape features to the west of the site between the built development and the M11 will provide noise attenuation to the open area and to proposed buildings on the western fringe.

13.8.29 For each phase of the Proposed Development, detailed construction method statements will be provided and the need for additional mitigation will be assessed to effectively manage any disturbance.

13.8.30 A minor adverse effect has been identified for one road link in the transport assessment. Mitigation, for example in the form of noise barriers, is not practicable for these established residential roads.

13.8.31 The Energy Centre will be designed and attenuated so that the significance of noise effects to sensitive receptors in the vicinity will be negligible. No further mitigation would therefore be required.

13.8.32 Fixed plant associated with the development will be designed and attenuated so that the significance of noise effects to sensitive receptors in the vicinity will be negligible. No further mitigation would therefore be required.

Cumulative Effects

13.8.33 An assessment of cumulative effects, resulting from the developments at Northstowe, Orchard/Arbury Park, West Cambridge, NIAB and NIAB2, has been carried out. To the extent that any effects between these developments are cumulative, they derive from traffic related

noise. Traffic from developments other than the Proposed Development is taken into account in modelled baseline flows. The assessment of traffic related noise associated with the Proposed Development has had regard to these baseline flows and noise associated with them.

During highways and utilities works on Huntingdon Road and Madingley Road, there is the potential for significant cumulative effects at properties on Madingley Road and Huntingdon Road. However, taking into account the speed at which the utilities works will progress (approx. 20 metres per day), the duration of these significant effects at any particular sensitive receptor will be small.

13.8.34 Overall the cumulative effect of the Proposed Development and the other schemes in the Cambridgeshire Growth Areas is assessed as negligible in 2014 and in 2026.

Summary of Effects

13.8.35 A summary of effects is provided in **Table 13.19**.

Table 13.19: Summary of Effects

Description	Measures to Avoid, Reduce or Manage Effects	Significance of Effect	P/T	D/I	S/M/L	Relevant Policy, Legislation and Guidance
1. Construction noise affecting existing sensitive receptors	Adherence to CEMP and employment of Best Practicable Means to reduce potential noise effects.	Negligible	T	D	M	Control of Pollution Act Environmental Protection Act BS5228-1
2. Construction noise affecting proposed sensitive receptors	For each phase, and sub-phase, of the development, detailed method statements will be provided and appropriate mitigation methods will be implemented to effectively manage any disturbance.	Negligible/Minor Adverse	T	D	M	Control of Pollution Act Environmental Protection Act BS5228-1
3. Construction vibration affecting existing sensitive receptors	Adherence to CEMP and employment of Best Practicable Means to reduce potential noise effects.	Negligible	T	D	M	Control of Pollution Act Environmental Protection Act BS5228-2
4. Construction vibration affecting proposed sensitive receptors	For each phase, and sub-phase, of the development, detailed method statements will be provided and appropriate mitigation methods will be implemented to manage any disturbance resulting from the chosen piling methods.	Negligible/Minor Adverse	T	D	M	Control of Pollution Act Environmental Protection Act BS5228-2
5. Construction traffic noise affecting existing	Adherence to CEMP and employment of Best Practicable	Negligible	T	D	M	Control of Pollution Act

sensitive receptors	Means to reduce potential noise effects.					Environmental Protection Act BS5228-1
6. Operational noise affecting proposed school	Mitigation incorporated in the design	Negligible	P	D	L	Building Bulletin 93
7. Operational noise from proposed school affecting existing and proposed sensitive receptors	Suitable fencing to play areas	Negligible	P	D	L	
8. Operational noise affecting proposed employment, commercial and mixed use development	Mitigation incorporated in the design	Negligible	P	D	L	BS8233
9. Operational noise from proposed employment, commercial and mixed use development affecting existing and proposed sensitive receptors	Mitigation incorporated in the design Control of operating times. Effective management of deliveries, stipulating delivery times and procedures	Negligible	P	D	L	BS4142 BS8233
10. Operational noise from proposed recreational development affecting existing and proposed sensitive receptors	Effective management, including optimal location and timing of formal events	Negligible	P	D	L	
11. Operational noise from industrial sources	Detailed quantitative assessments with required	Negligible	P	D	L	BS4142

(waste and recycling centres, substations, energy centre, commercial fixed plant) affecting existing and proposed sensitive receptors	mitigation to meet target noise levels at sensitive receptors Mitigation incorporated in the design					BS8233
12. Operational traffic noise affecting existing sensitive receptors	Appropriate design of site access	Negligible/Minor Adverse	P	D	L	DMRB CRTN
13. Operational traffic noise affecting proposed sensitive receptors	Detailed design to minimise exposure of sensitive internal spaces to on-site road traffic noise. Incorporation of landscape features to west of site between built development and M11 motorway to provide noise shielding for open areas and buildings on western fringe.	Negligible	P	D	L	South Cambridgeshire District Council. District Design Guide SPD PPG24 BS8233

Key to Table

P/T Permanent or Temporary
D/I Direct or Indirect
S/M/L Short, Medium or Long Term

13.9 References

1. Control of Pollution Act (1974).
2. Environmental Protection Act (1990).
3. Department of the Environment Planning Policy Guidance: Planning and Noise PPG 24 (1994).
4. South Cambridgeshire District Council. District Design Guide SPD (March 2010)
5. BS 5228: 2009 Noise and Vibration control on construction and open sites.
6. Calculation of Road Traffic Noise. Department of Transport and the Welsh Office (1988).
7. BS4142: 1997 Rating Industrial Noise Affecting Mixed Residential and Industrial Areas.
8. BS 7445: 1991 Description and Measurement of Environmental Noise.
9. TRL (2002) Converting the UK traffic noise index $L_{A10,18h}$ to EU Noise Indices for Noise Mapping, TRL Report PR/SE/451/02.
10. TRL (2006) Method for converting the UK road traffic noise index $L_{A10,18h}$ to EU Noise Indices for road noise mapping, TRL Report st/05/91/AGG04442.
11. BS 8233: 1999 Sound insulation and noise reduction for buildings – Code of practice.
12. BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration.

- 1 Introduction and Assessment Approach
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14 AIR QUALITY

14.1 Introduction

14.1.1 This chapter addresses the likely significant effects on local air quality associated with the construction, and subsequent operation, of the Proposed Development. Any effects of the Proposed Development with respect to emissions of greenhouse gases are considered in Chapter 17 Sustainability.

14.1.2 The construction and operation of the site have the potential to affect air pollutant concentrations at existing sensitive receptors adjacent to the Application Site and located along surrounding affected roads. In addition, the exhaust emissions of motor vehicles on roads in the area, and new sources of emissions of air pollution introduced as part of the Proposed Development, have the potential to affect proposed new residential properties and other sensitive receptors within the Proposed Development.

14.1.3 This assessment considers construction effects on amenity and health, the suitability of the site for the proposed uses with respect to local air quality, changes in traffic derived pollutant concentrations levels on the local road network as a result of the Proposed Development and operational emissions generated by the proposed energy plant within the site itself.

14.1.4 The assessment of significance of effects on local air quality is based on the Proposed Development's descriptions and development parameters described in Chapters 2 and 3. The assessment is supported by a sensitivity analysis of the magnitude of effects associated with an illustrative example that is consistent with the Parameter Plan.

14.1.5 A Pre-Opening Scenario in 2014 has also been considered in this assessment. This scenario considers the effects resulting from highway and utility works on Huntingdon Road and Madingley Road, carried out prior to the main site works.

14.2 Assessment Approach

Methodology

Overview

14.2.1 There is currently no statutory guidance on the method by which an air quality impact assessment should be undertaken for EIA purposes. Several non-statutory bodies have published their own guidance relating to air quality and development control (Environmental Protection UK, 2010) or to the assessment of the significance of air quality effects (Institute of Air Quality Management, 2009). The methods applied to assess the significance of air quality effects associated with the Proposed Development are based on current best practice tools and techniques.

14.2.2 This section will explain the methods used to assess the significance of the effects on air quality sensitive receptors of:

- fugitive emissions of particulate matter from construction activities;
- exhaust emissions from future baseline road traffic at the Application Site;
- exhaust emissions from future road traffic with the Proposed Development in operation; and
- the combination of energy plant emissions and future road traffic emissions with the Proposed Development in operation.

14.2.3 The potentially affected air quality sensitive receptors are identified for each element of the assessment and the magnitude of the change in air quality statistics at each receptor is considered. The approach to the assessment of the significance of effects is consistent with the approach promoted by the Institute of Air Quality Management (IAQM, 2009) and adopted by Environmental Protection UK (EPUK, 2010)

Definition of Air Quality Sensitive Receptors

Receptors Affected by Construction Emissions of Particulate Matter

14.2.4 The Application Site is to the North West of Cambridge. Whilst much of the land use surrounding the Application Site to the west is of an insensitive nature, there a number of potentially sensitive receptors nearby to the south, north and east. Potentially sensitive receptors for the purposes of this element of the assessment are considered to be of equal sensitivity to effects due to airborne particulate matter soiling property and comprise residential properties, educational and day care facilities and buildings used for research activities. Sensitive properties introduced in early phases of the Proposed Development are considered in the assessment of the potential effects of subsequent construction works.

14.2.5 When assessing the effect of dust emissions generated during the construction of the Proposed Development, receptors are defined as the nearest potentially sensitive receptor to the perimeter of the working area from each direction. These receptors have the potential to experience effects of greater magnitude due to dusts generated by the works, when compared with other more distant receptors and represent examples of worst-case exposure.

Receptors Affected by Operational Road Traffic Emissions

14.2.6 The air quality objective values for NO₂, PM₁₀ and PM_{2.5} have been set by the Expert Panel of Air Quality Standards at a level below the lowest concentration at which the more sensitive members of society have been observed to be adversely affected by exposure to each pollutant. Therefore all receptors that represent exposure of the public are of equal sensitivity, as any member of the public could be present at those locations.

14.2.7 Effects from road traffic emissions are considered at existing receptors located adjacent to areas of the local highway network where the Proposed Development is likely to have the greatest effect. This includes receptors located adjacent to the Proposed Development, on Madingley Road and Huntingdon Road, and receptors located away from the Proposed Development, on Hilton Road and at Histon, where vehicles accessing or leaving the Proposed Development are likely to pass on their way to or from Cambridge City Centre, the M11 or the A14. With development pollutant concentrations are also considered at locations within the boundary of the site, close to proposed new roads. The receptors are listed in **Table 14.1** and their locations are displayed in **Figure 14.1**.

Table 14.1 Air Quality Sensitive Receptors

<i>Receptor Number</i>	<i>Description</i>	<i>Grid Reference</i>
R1	Old Lodge, Huntingdon Rd	542360, 260900
R2	Howelands, Huntingdon Rd	542299, 260883
R3	No. 2 Girton Rd	542675, 260684
R4	24 Bandon Rd	542784, 260595
R5	Howe House, Huntingdon Road	542963, 260460
R6	Holly Nurseries, Huntingdon Road	542965, 260412
R7	189 Huntingdon Road	543322, 260137
R8	18 Howes Place	543310, 260214
R9	Rosemary Cottage, Madingley Rd	542620, 259317
R10	Conduit Rise, Conduit Head Rd	542879, 259604
R11	Merton Farm, Cottages	542780, 259266
R12	Gilling House, Madingley Rd	543343, 259133
R13	27 Madingley Rd	543732, 259081
R14	55 Storey's Way	543664, 259493
R15	Garden House, Grange Road	544001, 258977
R16	328 Histon Rd	544355, 260881
R17	333 Histon Rd	544318, 260835
R18	24 Badminton Close	544348, 260487
R19	230 Histon Rd	544385, 260244
R20	150 Oxford Rd	544305, 259843

R21	211 Histon Rd	544346, 260251
R22	1a Weavers Field	542515, 261469
R23	Bonde Mteko	541707, 259426
R24	Moor Barn Farm Cottages	541509, 259460
R25	137 Huntingdon Road	543765, 259799
R26	54 Huntingdon Rd	544112, 259568
R27	27 Castle Street	544360, 259345
R28	Lower Histon Road	544308, 259664
R29	Victoria Road	544422, 259544
R30	136 Huntingdon Rd	543780, 259845
R31	17 Mt Pleasant	544285, 259236
R32	17 Albion Rd	544391, 259161
R33	1 Madingley Rd	544171, 259033
R34	50 Girton road	542600, 261041
R35	16 Histon Rd	544320, 259520
R36	253 Victoria Rd	544350, 259465
R37	2 Huntingdon Rd	544268, 259448
R38	Blackhall Road	544304, 261098
R39	<i>Illustrative Receptor D2</i>	<i>542056, 261115</i>
R40	<i>Illustrative Receptor D5</i>	<i>542099, 261083</i>
R41	<i>Illustrative Receptor D13a</i>	<i>542198, 260423</i>
R42	<i>Illustrative Receptor D13b</i>	<i>542259, 260441</i>
R43	<i>Illustrative Receptor B5</i>	<i>542736, 260040</i>
R44	<i>Illustrative Receptor B4</i>	<i>542479, 259975</i>
R45	<i>Illustrative Receptor B10</i>	<i>542299, 259819</i>

Method for Assessing the Effect of Construction Emissions

14.2.8 At present, there are no statutory UK or EU standards relating to the assessment or control of construction dust. The emphasis of the regulation and control of demolition and construction dust should therefore be the adoption of best working practices on site.

14.2.9 An assessment has been undertaken to assess the significance of any effects on nearby sensitive receptors. This is based on the nature of construction activities being carried out, the risk of significant effects occurring as a result of these activities, their likely duration and proximity to the nearest sensitive receptors. The assessment presumes that current best-practice measures (Building Research Establishment, 2003) would be applied to avoid, reduce or manage any effects on nearby sensitive receptors. With regard to this assessment, the nearby dust sensitive receptors are located on Marbled White Drive to the north and east of the Application Site.

14.2.10 The generation of dust at the Application Site would be dependent on the sources of dust inherent within the activities undertaken. The best control of dust during construction of the Proposed Development would be obtained using a combination of the established best practice techniques described within relevant guidance (Building Research Establishment, 2003). This assessment identifies best practice measures that will be included within the Construction Management Plan (see Chapter 2) to ensure that emissions are minimised and controlled.

14.2.11 **Table 14.2**, which sets out empirically derived measures of the maximum distance, from a source of airborne dust, within which significant adverse effects of a given magnitude may be observed. These values are estimates for works employing standard dust control procedures, based on the collective experience of many practitioners, as presented in an extensive body of environmental assessment reports and expert evidence. These criteria have been developed in the absence of any nationally agreed criteria.

Table 14.2 Zone for Potentially Significant Construction Dust Effects from Construction Activities, with Standard Mitigation in Place

Source	Zone within which Potentially Significant Effects may Occur (Distance from Source)	
	Soiling at levels likely to cause annoyance	Exposure to PM ₁₀ at levels that could exceed the 24-hour air quality objective*
Visible emissions of dust, likely to occur at the source on a regular basis	100 m	25 m – 50 m
Visible emissions of dust, likely to occur at the source on an infrequent basis	50 m	15 m – 30 m
Short-lived limited emissions of dust, occurring at the source on an irregular basis	25 m	10 m – 20 m

*Significance is based on the objective for 2004, contained within the Air Quality (England) Regulations 2000, which allow 35 exceedences / year of 50 µg/m³ and take into account existing concentrations in the area. A range has been specified as it is difficult to assess specific PM₁₀ effects, especially in an area with high baseline concentrations.

Adapted from the Air Quality Impact Assessment for the Thames Gateway Bridge (Scott Wilson, 2004).

Adapted from the Air Quality Impact Assessment for the Thames Gateway Bridge (Scott Wilson, 2004).

14.2.12 The distances in **Table 14.2** are based on professional experience drawn from assessments of many different types of project, discussions with practitioners in the field, and from published reports. They assume that standard control measures will be in place as described in section 14.5.3.

14.2.13 Although dust emissions from potential dust generating sources would be present throughout the construction programme, they would not be expected to affect the same location on a regular basis. For this reason, existing or proposed receptors located within 50 m of the Application Site boundary for phased works would be at an increased risk of experiencing a measurable increase in rates of surface soiling. The equivalent distance for the risk of a potentially significant increase in annual mean exposure to PM₁₀ is 30 m.

Method for Assessing the Effect of Operational Road Traffic Emissions and Energy Plant Emissions

- A qualitative assessment method has been used to determine the potential for the Proposed Development to have a significant effect on local air quality. The assessment takes into consideration:
 - published information on current baseline and future baseline pollutant concentrations;
 - local authority action plans for the management of local air quality;
 - the magnitude of the change in road traffic vehicle movements forecast by the Transport Assessment;
 - the form and operating conditions of energy plant reported by the Sustainability Assessment.

14.2.14 A quantitative method has been used within a sensitivity analysis to predict the absolute pollutant concentrations, for a number of parameter compliant assessment scenarios, as a result of contributions from local road emissions, proposed energy plant and background sources of air pollutants. The method and results of this analysis form a separate technical report that is included as **Appendix 14.1**.

Assessment of Significance

14.2.15 For amenity effects (including those of dust and odour), the aim is to bring forward a scheme, including mitigation measures if necessary, that does not introduce the potential for additional complaints to be generated as a result of the Proposed Development.

14.2.16 With regard to road traffic emissions, the change in pollutant concentrations with respect to baseline concentrations has been quantified at receptors that are representative of exposure to effects on local air quality within the study area. The absolute magnitude of pollutant concentrations in the baseline and with development scenario is also quantified and this is used to consider the risk of the air quality limit values being exceeded in each scenario.

14.2.17 For a change of a given magnitude (**Table 14.3**), the Institute of Air Quality Management (IAQM) has published recommendations for describing the magnitude of effects at individual receptors and describing the significance of such effects (Institute of Air Quality Management, 2009).

14.2.18 A change in predicted annual mean concentrations of NO₂ or PM₁₀ of less than 1% (0.4 µg/m³) is considered to be so small as to be imperceptible. A change that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.

Table 14.3 Magnitude of Changes in Air Quality Statistics

14.2.19 Magnitude of Change	14.2.20 Annual Mean Concentration for NO ₂ (µg/m ³)	14.2.21 Annual Mean Concentration for PM ₁₀ (µg/m ³)	14.2.22 Exceedances of the 24-hour Mean Objective for PM ₁₀ (Days)
14.2.23 High	14.2.24 > 4	14.2.25 > 4	14.2.26 > 4
14.2.27 Medium	14.2.28 2 – 4	14.2.29 2 – 4	14.2.30 2 to 4
14.2.31 Low	14.2.32 0.4 – 2	14.2.33 0.4 – 2	14.2.34 1 to 2
14.2.35 Imperceptible*	14.2.36 < 0.4	14.2.37 < 0.4	14.2.38 <1

* The term imperceptible, is equivalent to the smallest magnitude of change used in this Environmental Statement.

14.2.39 The magnitude of a change to the annual mean concentration of PM_{2.5} that is equivalent to 1% of the objective value is 0.25 µg/m³. It is very unusual for the predicted change to levels of this pollutant associated with urban development projects to exceed 0.1 µg/m³.

14.2.40 All relevant receptors that have been selected to represent locations where people are likely to be present are based on effects on human health. The air quality objective values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such, the sensitivity of receptors was considered in the definition of the air quality objective values and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary.

14.2.41 For individual receptors that are predicted to experience a perceptible change, the effect of the change on local air quality and the risk of exceeding the air quality objective value is summarised in Table 14.4. The terms used on the seven point scale of significance have been revised to remain consistent with the terminology use throughout this Environmental Statement, but the structure of the table is consistent with the IAQM approach.

14.2.42 A low magnitude increase in annual mean concentrations, at receptors exposed to baseline concentrations that are just below the objective value (36 µg/m³ to 40 µg/m³) is considered to have a minor adverse effect as the slight increase in the risk of exceeding the objective value is significant.

However, a low magnitude increase in annual mean concentration, at receptors exposed to baseline concentrations that are below or well below ($< 36 \mu\text{g}/\text{m}^3$), is not likely to directly affect the achievement of the objective value and is therefore not a significant effect (negligible).

Table 14.4 Descriptors for Changes to Annual Mean Concentrations of Nitrogen Dioxide or Particulate Matter at an Individual Receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration			
	Imperceptible	Low	Medium	High
Increase with Scheme				
Above Objective/Limit Value With Scheme ($>40 \mu\text{g}/\text{m}^3$)	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Just Below Objective/Limit Value With Scheme ($36-40 \mu\text{g}/\text{m}^3$)	Negligible	Minor Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme ($30-36 \mu\text{g}/\text{m}^3$)	Negligible	Negligible	Minor Adverse	Minor Adverse
Well Below Objective/Limit Value With Scheme ($<30 \mu\text{g}/\text{m}^3$)	Negligible	Negligible	Negligible	Minor Adverse
Decrease with Scheme				
Above Objective/Limit Value Without Scheme ($>40 \mu\text{g}/\text{m}^3$)	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial
Just Below Objective/Limit Value Without Scheme ($36-40 \mu\text{g}/\text{m}^3$)	Negligible	Minor Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Scheme ($30-36 \mu\text{g}/\text{m}^3$)	Negligible	Negligible	Minor Beneficial	Minor Beneficial
Well Below Objective/Limit Value Without Scheme ($<30 \mu\text{g}/\text{m}^3$)	Negligible	Negligible	Negligible	Minor Beneficial

14.2.43 The significance of all of the reported effects is then considered for the Proposed Development in overall terms. The potential for the scheme to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality is considered if relevant, but the principal focus is any change to the likelihood of future achievement of the air quality objective values.

Assessment Criteria

14.2.44 The principal assessment criteria are the air quality objective values for the following pollutants:

- Annual mean nitrogen dioxide (NO₂) concentration of 40 µg/m³
- Annual mean particulate matter (PM₁₀) concentration of 40 µg/m³
- Annual mean fine particulate matter (PM_{2.5}) concentrations of 25 µg/m³
- 24-hour mean PM₁₀ concentration of 50 µg/m³ not to be exceeded on more than 35 days per year

14.2.45 The achievement of local authority goals for local air quality management are directly linked to the achievement of the air quality objective values described above and as such this assessment focuses on the likelihood of future achievement of the air quality objective values. In addition, consideration is given to the potential for effects to interfere with, prevent or support the successful implementation of measures listed within the Air Quality Action Plan for the Cambridgeshire Growth Areas.

14.3 Policy Framework

Legislation

14.3.1 The European Union's (EU) Framework Directive on Ambient Air Quality Assessment and Management (96/62/EC) (Council of European Communities, 1996) required the European Commission to propose several Daughter Directives. The first of these was transcribed into UK legislation by the 2001 Air Quality Limit Values Regulations. These limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

14.3.2 The Clean Air for Europe (CAFE) programme revisited the management of air quality within the EU with the aim of replacing the EU Framework Directive and the associated Daughter Directives with a single legal act. The Ambient Air Quality and Cleaner Air for Europe Directive came into force when it was published in the Official Journal of the European Union on 11th June 2008 (Council of European Communities, 2008). Existing limit values have been retained and new target values for fine particulate matter (PM_{2.5}) have been introduced. At the present time, the limit values have been transposed into national legislation through the Air Quality Standards Regulations 2010 (H.M. Government, 2010).

National Planning Policy

14.3.3 There are both national policies for the control of air pollution and local action plans for the management of local air quality within the District of South Cambridgeshire and the City of Cambridge. The effect of the Proposed Development on the achievement of such policies and plans are matters that may be material for consideration by planning authorities in taking decisions on individual planning applications.

14.3.4 Planning Policy Statement (PPS) 23: Planning and Pollution Control (Office of the Deputy Prime Minister, 2004) previously set out some of the Government's core policies and principles on the most important aspects of land use planning. The following matters were identified in Appendix A of PPS 23, that are of particular relevance to this proposal:

- **“the possible impact of potentially polluting development (both direct and indirect) on land use, including effects on health, the natural environment or general amenity”;**
- **“the potential sensitivity of the area to adverse effects from pollution, in particular reflected in landscape, the quality of the soil, air, and ground and surface waters...”;**

- “the environmental benefits that the development might bring”;
- “the existing, and likely future, air quality in an area, including any Air Quality Management Areas (AQMA)s or other areas where air quality is likely to be poor (including the consideration of cumulative impacts of a number of smaller developments on air quality, and the impact of development proposals in rural areas with low existing levels of background air pollution)”;
- “the need for compliance with any statutory environmental quality standards or objectives (including the air quality objectives prescribed by the Air Quality 2000 and Amending Regulations 2002 ...”;
- “existing action and management plans with a bearing on environmental quality including: Air Quality Management Area Action Plans (prepared by local authorities under Part IV of the Environment Act 1995)”;
- “the possibility that (whether or not some aspects of the development are subject to pollution control), emissions of smoke, fumes, gases, dust, steam, smell, ... from the development might nevertheless be seriously detrimental to amenity in addition to constituting a statutory nuisance under Part III of the Environmental Protection Act 1990”.

The overarching themes of PPS23 have continued into the NPPF.

14.3.5 Regional Planning Policy The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

Local Planning Policy

14.3.6 The secretary of state issued a formal direction on 2nd July 2009 saving specific policies in the Cambridge Local Plan (Cambridge City Council, 2006), including two policies relating directly to air pollution.

Cambridge Local Plan policy 4/13 Pollution and Amenity

“Development will only be permitted which:

- a. does not lead to a significant adverse effects on health, the environment and amenity from pollution; or**
- b. which can minimise any significant adverse effects through the use of appropriate reduction or mitigation measures.**

Proposals that are sensitive to pollution, and located close to existing pollution sources, will be permitted only where adequate pollution mitigation measures are provided as part of the development package”.

14.3.7 The stated purpose of the policy is to protect amenity, particularly in residential areas from the effects of pollution in any form. The accompanying text advises that development would “*not normally be permitted in areas that are, or are expected to become, subject to levels of pollution that are incompatible with proposed use*”. The Plan “does not seek to duplicate controls that are the statutory responsibility of the pollution control agencies”.

Cambridge Local Plan policy 4/13 Air Quality Management Areas

“Development within or adjacent to an Air Quality Management Area (AQMA) will only be permitted if:

- a. it would have no adverse effect upon air quality within the AQMA; or**
- b. air quality levels within the AQMA would not have a significant adverse effect on the proposed use/users”.**

14.3.8 The accompanying text describes the planning system’s role in protecting air quality by “ensuring that land use decisions do not adversely affect the air quality in any AQMA, or conflict with or render ineffective any elements of a local authority’s air quality action plan”.

14.3.9 South Cambridgeshire District Council’s Development Control Policies DPD was adopted in July 2007. Air quality is addressed in policy NE/16 Emissions.

“1. Development Proposals will need to have regard to emissions arising from the proposed use and seek to minimise those emissions to control any risks arising and prevent any detriment to the local amenity by locating such development appropriately.

2. Where significant increases in emissions covered by nationally prescribed air quality objectives are proposed, the applicant will need to assess the impact on local air quality by undertaking an appropriate modelling exercise to show that the national objectives will still be achieved. Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area”.

14.3.10 The North West Cambridge Area Action Plan was adopted October 2009 and includes Policy NW2: Development Principles that are consistent with the planning policy context for North West Cambridge provided by the Cambridge Local Plan, the South Cambridgeshire Core Strategy and national planning policy.

Policy NW2: Development Principles

“3. Planning permission will not be granted where Proposed Development or associated mitigation would have an unacceptable adverse impact: 13. On air quality;”

Local Air Quality Management

14.3.11 The UK National Air Quality Strategy (DETR, 2000) was initially published in 2000, under the requirements of the Environment Act 1995. The most recent revision of the strategy (Defra, 2007) was published on 17th July 2007, and sets objective values for important pollutants, as a tool to help local authorities manage local air quality improvements. Some of these objective values have been laid out within The Air Quality (England) Regulations 2000 (H.M. Government, 2000) and later amendments (H.M. Government, 2002).

14.3.12 The air quality objective values referred to above have been set down in regulation solely for the purposes of local air quality management. Under local air quality management local authorities have a duty is to carry out assessment against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures set out in a subsequent action plan. Consequently it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective or EU Limit Value.

14.3.13 The UK National Air Quality Objective Values for the pollutants considered in this assessment are displayed in **Table 14.5**.

Table 14.5 Air Quality Objectives

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Value</i>	<i>Permitted Exceedances</i>	<i>Compliance Date</i>
Nitrogen Dioxide (NO ₂)	Annual Mean	40 µg/m ³	None	31/12/05
	Hourly Mean	200 µg/m ³	18 hours per year	31/12/05
Particulate Matter (PM ₁₀)	Annual Mean	40 µg/m ³	None	31/12/04
	24-hour Mean	50 µg/m ³	35 days per year	31/12/04
Fine Particulate Matter (PM _{2.5})	Annual Mean	25 µg/m ³	None	2020
	Annual Mean	Target of 15 % reduction in concentrations at urban background	None	Between 2010 and 2020

14.3.14 Cambridge City Council (Cambridge City Council 2010) have identified that the annual mean concentration of nitrogen dioxide is currently greater than the air quality objective value, at some sites within the city centre. The AQMA declared in 2004 remains in force.

14.3.15 South Cambridgeshire District Council have identified that the annual mean objective value for nitrogen dioxide is currently exceeded at properties close to the A14 to the north of Cambridge. The 24 hour mean objective for particulate matter (PM10) is also at risk of exceedance where there is relevant exposure close to the same section of the A14. The AQMA as amended in 2008, remains in force.

14.3.16 An Air Quality Action Plan for the Cambridgeshire Growth Areas (Cambridge City Council, 2009) has been jointly published by Cambridge City Council, Huntingdon District Council and South Cambridgeshire District Council.

Scoping Criteria

14.3.17 Cambridge City Council has published *Air Quality in Cambridge Developers Guide* (Cambridge City Council, 2008) that identifies when an air quality impact assessment would be required in support of a planning application. The scale of the Proposed Development, the nature of the Proposed Development and proximity to the AQMAs all trigger the need to assess the significance of the local air quality related effects.

Limitations to the Assessment

14.3.18 The spatial scope of the assessment has been determined by the extent of the traffic model, that is the source of traffic related input data used in the air dispersion model. The traffic model does not extend into the areas of exceedance within the Cambridge City Centre AQMA, but does include the sections of Maddingley Road, Castle Street and Lower Histon Road that approach the ring road. The traffic model does include roads within the South Cambridgeshire AQMA along the A14.

14.3.19 The magnitude of predicted effects on local air quality will be greatest on the roads linking the Application Site and the roads in the AQMAs. Effects within the City Centre AQMA must be smaller in magnitude as road traffic has the option of alternative routes around the ring road. The omission of roads within the City Centre AQMA from the scope of quantitative assessment data is not considered to have prejudiced the validity of the conclusions reached in this assessment.

14.3.20 At the request of Cambridge City Council a conservative approach to the prediction of pollutant concentrations in 2014 has been adopted. This is based on the assumption that background pollutant

concentrations and vehicle emission rates will not change significantly between 2008 and 2014. The predicted pollutant concentrations are therefore very conservative.

14.4 Baseline Conditions

Site Description and Context

14.4.1 The site boundary and surrounding roads are illustrated in **Figure 14.1**. The land bounded by the Huntingdon Road (A1307) to the north, Madingley Road (A1303) to the south and the M11 to the West currently contains air quality sensitive receptors already. Existing relevant receptors are located facing onto the A1307 and A1303 and there are additional relevant receptors located further from these A-roads. There are no existing air quality sensitive receptors located within the Application Site.

14.4.2 Road vehicle derived emissions of oxides of nitrogen and particulate matter are the dominant source of measured concentrations of nitrogen dioxide and PM₁₀ at locations close to the more heavily used roads in the area. As a result of the magnitude of the current baseline emissions, receptors close to some roads are exposed to these pollutants at concentrations that do not meet objective values set for the protection of human health. These locations, in the City Centre of Cambridge and along the A14 corridor to the north of Cambridge, have been declared as Air Quality Management Areas and the local authorities have prepared an action plan that aims to deliver an acceptable standard of air quality as soon as possible.

14.4.3 There is currently no air quality management area along the M11 to the west of the site. The Cambridge City Centre AQMA is located closest to the Application Site at the junction of the ring road (A1134) with Huntingdon Road (A1307) and Histon Road (B1049). Histon road provides an alternative route between the A14 and the city centre, to the A1307 and receptors along this road are also sensitive to local air quality.

Current Baseline Conditions

14.4.4 The Air Quality Action Plan for the Cambridgeshire Growth Areas (Cambridge City Council, 2009) summarises the current (2006) and likely future (2016) standard of air quality in North West Cambridge. It identifies that the general standard of air quality in Cambridgeshire is very good and the elevated concentrations of nitrogen dioxide reported at roadside locations rapidly decrease to background levels with distance from the local source of the pollutants. In contrast, background concentrations of particulate matter (PM₁₀) are closer to the 24 hour mean objective value in the study area, as they are in much of East Anglia. The relatively small additional contribution made by particulate matter emissions from road traffic, increases the risk of baseline exceedances of the 24 hour mean objective at locations close to major roads.

14.4.5 Current baseline conditions as reported by Cambridge City Council (Cambridge City Council, 2010) and by South Cambridgeshire District Council (South Cambridgeshire District Council, 2010) provide empirical evidence of the standard of air quality in the years prior to 2010. This information is useful in identifying the locations within the study area that are potentially of most concern, but the absolute concentration values measured at all locations within the study area can reasonably be expected to have change by the time each phase of the Proposed Development is completed. The baseline conditions of direct relevance to this assessment are represented by the future year baseline scenarios.

Future Baseline Conditions

14.4.6 There are a range of national and local measures in place that are intended to deliver reductions in pollutant concentrations in future years, so that the air quality objectives are achieved. Forecast air quality statistics for 2016, calculated by CERC on behalf of the local authorities show that the annual mean objective for nitrogen dioxide and the 24 hour mean objective could be achieved at existing properties near to the A14, A1307 and A1303 by 2016. The risk of continuing exceedances of the annual mean objective for nitrogen dioxide in 2016, were reported by that study at sections of the City Centre AQMA, including the junctions of the ring road and the A1307 and B1049. 2016 equates to Phase 2 of the Proposed Development.

14.4.7 Whilst the UK is committed to achieving the air quality limit value, from which the air quality objective values are derived, the future rate of reduction in ambient air pollutant concentrations that will

be realised at urban and roadside locations is uncertain. In the last 5 years, measured concentrations have not matched the rate of year on year improvement projected at some measurement sites in Cambridgeshire. Defra's most recent projections for future year background concentrations of nitrogen dioxide and particulate matter were published in February 2010 (Defra, 2010) and these factors have not been used in the sensitivity analysis to calculate baseline concentrations at each of the selected receptors in 2014, but have been used for the 2026 scenarios. Factors for 2008 have been used for the 2014 scenarios as the local authority measurement data does not demonstrate a current trend of improvement in annual mean nitrogen dioxide concentrations within the study area.

14.4.8 The calculated air quality concentration values for 2014 and 2026 baseline scenarios are reported in **Table 14.6** and **Table 14.7** respectively. There are no exceedances of the air quality objectives predicted to occur at any air quality sensitive receptors within the study area in the proposed year of full opening (2026) scenario. It is against these predicted baseline concentration values that operational effects are compared to determine the magnitude of effects.

Table 14.6 Predicted 2014 Baseline Pollutant Concentrations

Receptor	Pollutant Concentrations			
	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	No. of Exceedences of the 24-hour PM ₁₀ Objective (Days)	Annual Mean PM _{2.5} (µg/m ³)
R1	24.1	19.0	2	11.8
R2	22.2	18.6	1	11.5
R3	22.8	18.9	2	11.8
R4	24.1	19.2	2	11.9
R5	26.8	19.4	2	12.0
R6	24.8	19.0	2	11.9
R7	26.3	18.2	1	11.6
R8	25.1	18.2	1	11.5
R9	22.4	19.3	2	12.0
R10	18.8	18.8	2	11.6
R11	21.7	19.2	2	12.0
R12	20.3	17.7	1	11.3
R13	27.0	18.4	1	11.8
R14	20.1	17.7	1	11.3
R15	19.4	17.1	0	11.3
R16	29.0	18.3	1	12.2
R17	24.1	17.7	1	11.7
R18	20.9	17.3	0	11.4
R19	22.8	17.7	1	11.7
R20	19.8	17.3	0	11.3
R21	20.4	17.3	0	11.4
R22	35.8	19.6	2	12.7
R23	20.6	19.6	2	12.0
R24	20.6	20.9	4	12.2
R25	26.6	18.2	1	11.4
R26	41.0	18.9	2	12.1
R27	31.3	17.9	1	11.4
R28	41.8	19.3	2	13.0
R29	43.8	19.7	3	13.3
R30	27.5	18.6	1	12.4
R31	31.3	18.1	1	11.8
R32	31.1	18.0	1	11.8
R33	35.1	18.4	1	12.2
R34	22.3	18.0	1	11.8
R35	48.9	20.5	4	13.9
R36	43.4	21.2	5	13.8
R37	41.5	19.9	3	12.8
R38	27.1	18.5	1	12.2
R39	26.5	18.4	1	12.1
R40	25.9	18.2	1	12.1
R41	24.3	19.7	3	12.4
R42	22.6	18.4	1	11.6
R43	19.2	18.2	1	11.5
R44	20.6	18.5	1	11.4
R45	24.2	18.8	2	11.6

Italics represent illustrative receptor locations

Table 14.7 Predicted 2026 Baseline Pollutant Concentrations

Receptor	Pollutant Concentrations			
	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	No. of Exceedences of the 24-hour PM ₁₀ Objective (Days)	Annual Mean PM _{2.5} (µg/m ³)
R1	17.6	18.6	1	11.4
R2	17.1	18.4	1	11.2
R3	17.4	18.5	1	11.4
R4	17.6	18.6	1	11.5
R5	18.5	18.8	2	11.5
R6	18.0	18.6	1	11.4
R7	18.6	17.5	1	11.0
R8	18.3	17.6	1	11.0
R9	17.2	18.9	2	11.8
R10	16.5	18.6	1	11.5
R11	17.1	18.9	2	11.8
R12	16.9	17.5	1	11.0
R13	18.6	17.6	1	11.2
R14	17.0	17.5	1	11.0
R15	16.9	17.0	<1	11.1
R16	19.4	17.3	<1	11.4
R17	17.9	17.2	<1	11.3
R18	17.1	17.2	<1	11.1
R19	17.5	17.3	<1	11.3
R20	16.7	17.0	<1	11.1
R21	17.0	17.1	<1	11.1
R22	20.0	18.4	1	11.6
R23	16.9	19.4	2	11.7
R24	17.0	20.8	4	12.1
R25	18.6	17.5	1	10.8
R26	30.0	17.7	1	10.9
R27	27.3	17.5	1	11.0
R28	30.8	18.1	1	11.8
R29	31.3	18.2	1	11.8
R30	18.8	17.8	1	11.6
R31	27.2	17.7	1	11.6
R32	27.2	17.7	1	11.6
R33	28.4	17.7	1	11.6
R34	17.1	17.6	1	11.4
R35	33.5	18.5	1	12.1
R36	31.2	19.9	3	12.4
R37	30.3	18.6	1	11.6
R38	18.9	17.8	1	11.6
<i>R39</i>	<i>18.1</i>	<i>17.8</i>	<i>1</i>	<i>11.6</i>
<i>R40</i>	<i>17.9</i>	<i>17.8</i>	<i>1</i>	<i>11.6</i>
<i>R41</i>	<i>17.5</i>	<i>19.1</i>	<i>2</i>	<i>12.0</i>
<i>R42</i>	<i>17.2</i>	<i>18.0</i>	<i>1</i>	<i>11.3</i>
<i>R43</i>	<i>16.6</i>	<i>18.0</i>	<i>1</i>	<i>11.2</i>
<i>R44</i>	<i>16.9</i>	<i>18.2</i>	<i>1</i>	<i>11.2</i>
<i>R45</i>	<i>17.5</i>	<i>18.2</i>	<i>1</i>	<i>11.2</i>

Italics represent illustrative receptor locations

14.4.9 This assessment has not sought to duplicate the local authority's local air quality review and assessment function, and so has not predicted the calendar year after which exceedances of the air quality objectives values are unlikely to occur. It would however be reasonable to expect national and

local measures to have delivered the required standard of air quality within North West Cambridge, for the baseline scenario, soon after 2016.

14.5 Likely Significant Effects

Construction Emissions

14.5.1 The types of site activity expected to generate coarse dusts and PM₁₀ include the following:

- Site clearance;
- Excavations and landscaping;
- Roadworks
- Cutting and grinding;
- Removal of waste materials from site;
- Vehicle movements on un-surfaced ground; and
- Transfer and storage of dusty materials.

14.5.2 The application of the standard dust control measures included in the British Research Establishment guidance (Building Research Establishment, 2003) are normal working practice on all well managed construction sites in the UK. Therefore, it is assumed in this assessment that measures will be implemented, based on a Construction Management Plan (CMP) agreed with the local authority air quality/pollution control officer. The role of the CMP is to avoid and manage any adverse air quality effects during the construction period, as well as defining onsite rules.

14.5.3 Measures that will be adopted to avoid and manage potential construction emission effects or increases in dust deposition rates and airborne concentrations of particulate matter and which are included in the CEMP include the following:

- Contractors will be required to sign up to the 'Considerate Contractor Scheme' (CCS) run by the City Council, in association with the Cambridge Forum for the Construction Industry.
- The CMP will incorporate the requirements of the CCS for an 'Emission Control Plan'. The CMP will set out responsibilities and the approach to be adopted for the monitoring and management of activities with the potential to emit particulate matter or oxides of nitrogen to air, including the approach to liaison meetings with the local authority and local community.
- Monitoring where required will be undertaken at the site boundary.
- Screens will be employed when there is a need to minimise effects on specific nearby receptors.
- Engines of vehicles, mobile and fixed plant will be switched off when not required to be on.
- The on-site roads will be paved and used as the principal haul routes on site.
- Mud will be washed from roads as often as necessary to avoid dust generation.
- Vehicle and wheel washing facilities will be employed if required.
- Damping down of dust generating surfaces as necessary.
- Considerate location of stockpiles and storage areas.

- Covering and/or regularly damping down any stockpiles of dusty materials.
- New earthworks and long term stock piles to be seeded as soon as practicable.
- Considerate location of gridding and cutting activities.
- No bonfires.
- All loads entering and leaving site will be covered.
- Just in time deliveries outside of peak periods will be the norm.

14.5.4 Construction of the Proposed Development will be carried out over a period of 14 years. The nature and duration of specific aspects of the construction works are not yet known, but a development of this size and duration has the potential to include dust generating activities throughout the construction period.

14.5.5 Within the site boundary Phase 1 introduces a paved road between Madingley Road and Huntingdon Road. The paved road will act to minimise dust generation by construction vehicle movements. The hotel, a school and residential properties are air quality sensitive receptors built in Phase 1. Additional properties are added to the site in a progressive manner as development spreads across the sites. For all phases of the Proposed Development there will be pre-existing properties that could be sensitive to construction works required for subsequent phases of the Proposed Development. The potential for adverse effects to occur at each property is likely to be limited to a period of 2 years or less, while construction works are undertaken in close proximity.

14.5.6 During each phase of the works, if dust generating activities are subject to the dust suppression measures proposed in the CEMP, then the effects on residential receptors would be small under normal atmospheric conditions, producing an effect of negligible significance. Residential properties within 50 m of the site boundary may experience an occasional increase in local soiling rates during times when activities are carried out close by in extremely dry and windy weather. Any such effects would be restricted to short-term episodes affecting a small number of properties and would be of minor significance. These effects are not normally associated with a general risk to health.

14.5.7 Works to Madingley Road and to Huntingdon Road and works for utilities will affect the normal operation of Madingley Road and Huntingdon Road for the duration of the works. The phasing of works will be agreed with the local transport authority to ensure that effects on the network as a whole are managed and this in turn will manage the magnitude of any additional road traffic emissions of air pollutants.

14.5.8 Table 12.18 (Chapter 12) indicates that during the early construction phases of the Proposed Development (Pre 2014 Opening), the majority of construction traffic would use junction 13 of the M11 and egress the site from the access point on Madingley Road (with the exception of vehicles directly associated with the utility works on Madingley Road, to the west of the site access). Between this site entrance point and junction 13 of the M11 motorway there are very few sensitive receptors, and those present are all set well back from the highway. As such, any impacts on air quality associated with the additional construction related vehicle movements of the Proposed Development on Madingley Road and Huntingdon Road would be negligible.

14.5.9 In the later phases (Post 2014 Opening), Table 12.23 (Chapter 12) indicates that there would be no vehicle movements associated with the construction of this development on Huntingdon Road. Instead, all construction traffic would use the site egress on Madingley Road via junction 13 of the M11 motorway. Again, any impacts on air quality associated with additional construction related vehicle movements at the sensitive areas on this route would be negligible.

2014 Pre-Opening Scenario

14.5.10 The 2014 pre-opening scenario considers the effects resulting from the off-site highway and utility works on Huntingdon Road and Madingley Road, carried out prior to the main site works.

14.5.11 On Huntingdon Road, these works consist of the construction of a new 3 arm signal controlled junction, and on Madingley Road, improvement works at its junction with High Cross. On both roads the works would also involve the installation of a Toucan Crossing, the construction of an unsegregated footway/cycleway, the diversion/replacement/protection of existing utilities affected by the works and the provision of new telecommunications infrastructure.

14.5.12 During these works, there will be traffic management in place on Huntingdon Road and Madingley Road. This will have the potential to slow down the speed of traffic along sections of both roads and may also lead to localised congestion during the morning and afternoon rush hour periods. At receptors located adjacent to the work areas on Huntingdon Road (R5 and R6) and Madingley Road (R9 and R11), the effect of this change in traffic flow may temporarily increase their exposure to emissions of NO₂, PM₁₀ and PM_{2.5}.

14.5.13 In the 2014 baseline scenario, the receptors located adjacent to the stretch of Huntingdon Road that is subject to the works (R5) are predicted to experience annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} of 27 µg/m³, 19 µg/m³ and 12 µg/m³ respectively. The receptors located adjacent to the stretch of Madingley Road that is subject to the works (R11) are predicted to experience annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} of 22 µg/m³, 19 µg/m³ and 12 µg/m³ respectively. These concentrations are well below the relative air quality objective values, which have been set for the protection of human health.

14.5.14 The increase in vehicle movements during the construction phase has not been quantified, but would be negligible when compared against baseline flows on Huntingdon Road and Madingley Road. Whilst the installation of traffic management during the works would increase vehicle emissions at locations on these roads, it is highly unlikely that this would increase pollutant concentrations to the extent that they would be at risk of breaching their respective air quality objectives.

14.6 Operational Emissions

Operational Effects Prior to Completion

14.6.1 The Proposed Development has been designed to locate buildings away from the boundary with the M11 and hence limit potential receptors within buildings being exposed to any road traffic emissions from this source.

14.6.2 The assessment of air quality effects of the Proposed Development when in operation is based on 2010 traffic data projected forward to 2014 and 2026.

14.6.3 Baseline mean pollutant concentrations at each of the representative receptors have been quantified and are reported in Table 14.6 and 14.7 and are referred to in **Appendix 14.1** as Scenario AQ-B2 and AQ-B3 respectively. No exceedances of the 24 hour mean objective for PM₁₀ are predicted to occur without the Proposed Development, at any receptor in the study area. No exceedances of the annual mean objective values for nitrogen dioxide, PM₁₀ or PM_{2.5} are likely to occur without the Proposed Development, at any receptor outside of the existing AQMAs. With the exception of receptors in the AQMAs or at the southern end of Huntingdon Road and Histon Road where there is currently limited headroom between annual mean concentrations and the objective value.

14.6.4 The predicted concentrations for the 2014 post opening scenario are displayed in **Table 14.8** and are referred to in **Appendix 14.1** as Scenario AQ-WD1.

Table 14.8 Predicted 2014 Post Opening Scenario Pollutant Concentrations

Receptor	Pollutant Concentrations			
	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	No. of Exceedences of the 24-hour PM ₁₀ Objective (Days)	Annual Mean PM _{2.5} (µg/m ³)
R1	24.5	19.0	2	11.9
R2	22.4	18.6	1	11.6

R3	23.3	19.0	2	11.8
R4	24.7	19.3	2	11.9
R5	28.0	19.6	2	12.2
R6	27.2	19.4	2	12.2
R7	27.1	18.3	1	11.6
R8	25.9	18.2	1	11.6
R9	23.5	19.4	2	12.2
R10	19.3	18.8	2	11.8
R11	22.1	19.3	2	12.0
R12	20.6	17.7	1	11.3
R13	27.4	18.4	1	12.0
R14	20.2	17.7	1	11.3
R15	19.6	17.1	0	11.3
R16	29.6	18.3	1	12.2
R17	24.5	17.7	1	11.8
R18	21.2	17.5	1	11.5
R19	23.2	17.7	1	11.7
R20	20.2	17.3	<1	11.4
R21	20.6	17.3	<1	11.4
R22	35.9	19.6	2	12.7
R23	20.8	19.6	2	12.0
R24	20.8	20.9	4	12.2
R25	27.2	18.2	1	11.4
R26	41.5	19.0	2	12.1
R27	31.5	17.9	1	11.4
R28	42.4	19.4	2	13.0
R29	44.4	19.7	3	13.3
R30	28.2	18.6	1	12.4
R31	31.4	18.1	1	11.8
R32	31.2	18.1	1	11.8
R33	35.4	18.4	1	12.2
R34	22.5	18.0	1	11.8
R35	49.7	20.6	4	14.1
R36	44.0	21.4	5	13.9
R37	42.1	20.0	3	12.9
R38	27.6	18.5	1	12.4
<i>R39</i>	<i>26.8</i>	<i>18.4</i>	<i>1</i>	<i>12.1</i>
<i>R40</i>	<i>26.3</i>	<i>18.4</i>	<i>1</i>	<i>12.1</i>
<i>R41</i>	<i>24.4</i>	<i>19.7</i>	<i>3</i>	<i>12.4</i>
<i>R42</i>	<i>22.7</i>	<i>18.4</i>	<i>1</i>	<i>11.6</i>
<i>R43</i>	<i>25.3</i>	<i>18.8</i>	<i>2</i>	<i>11.9</i>
<i>R44</i>	<i>25.7</i>	<i>19.0</i>	<i>2</i>	<i>11.8</i>
<i>R45</i>	<i>24.5</i>	<i>18.8</i>	<i>2</i>	<i>11.6</i>

Italics represent illustrative receptor locations

14.6.5 The change in pollutant concentrations from baseline conditions as a result of the 2014 post opening scenario are displayed in **Table 14.9**. The magnitude of the effects of the additional road traffic exhaust emissions, associated with the operation of Phase 1 of the Proposed Development and construction traffic for Phase 2 are unlikely to be large enough to be capable of causing a perceptible change in particulate matter concentrations.

14.6.6 The corresponding effects on annual mean concentrations of nitrogen dioxide are likely to be small to imperceptible at receptors along Madingley Road (R9 to R11), along Huntingdon Road (R3-R8 and R25 – R26), along Histon Road (R16, R28, R35 and R38) and at a number of locations towards the city centre (R35 – R37). A medium magnitude of change in annual mean concentrations of nitrogen dioxide is predicted to occur at a single receptor outside the Proposed Development on Huntingdon Road (R6) and also at two locations within the Proposed Development (R43 and R44).

14.6.7 Adverse effects on annual mean concentrations of nitrogen dioxide in 2014 would be small in magnitude at most of the receptors with a few medium magnitudes of changes. None of these effects are likely to raise baseline concentrations to a level ($> 36 \mu\text{g}/\text{m}^3$) where the objective could be considered to be at risk of being exceeded unless they were already above this value. These small effects are most likely to occur at properties facing onto Madingley Road (R9 – R11), Histon Road (R16 to R21) and on Huntingdon Road nearest the junction with the new site link road (R6).

Table 14.9 Change in Predicted Pollutant Concentrations - 2014 Post Opening Scenario

Receptor	Pollutant Concentrations			
	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	No. of Exceedences of the 24-hour PM_{10} Objective (Days)	Annual Mean $\text{PM}_{2.5}$ ($\mu\text{g}/\text{m}^3$)
R1	+0.4	+<0.1	+<1	+0.1
R2	+0.2	+<0.1	+<1	+0.1
R3	+0.5	+0.1	+<1	+<0.1
R4	+0.6	+0.1	+<1	+<0.1
R5	+1.2	+0.2	+<1	+0.2
R6	+2.4	+0.4	+<1	+0.3
R7	+0.8	+0.1	+<1	+<0.1
R8	+0.8	+<0.1	+<1	+0.1
R9	+1.1	+0.1	+<1	+0.2
R10	+0.5	+<0.1	+<1	+0.2
R11	+0.4	+0.1	+<1	+<0.1
R12	+0.3	+<0.1	+<1	+<0.1
R13	+0.4	+<0.1	+<1	+0.2
R14	+0.1	+<0.1	+<1	+<0.1
R15	+0.2	+<0.1	+<1	+<0.1
R16	+0.6	+<0.1	+<1	+<0.1
R17	+0.4	+<0.1	+<1	+0.1
R18	+0.3	+0.2	+1	+0.1
R19	+0.4	+<0.1	+<1	+<0.1
R20	+0.4	+<0.1	+<1	+0.1
R21	+0.2	+<0.1	+<1	+<0.1
R22	+0.1	+<0.1	+<1	+<0.1
R23	+0.2	+<0.1	+<1	+<0.1
R24	+0.2	+<0.1	+<1	+<0.1
R25	+0.6	+<0.1	+<1	+<0.1
R26	+0.5	+0.1	+<1	+<0.1
R27	+0.2	+<0.1	+<1	+<0.1
R28	+0.6	+0.1	+<1	+<0.1
R29	+0.6	+<0.1	+<1	+<0.1
R30	+0.7	+<0.1	+<1	+<0.1
R31	+0.1	+<0.1	+<1	+<0.1
R32	+0.1	+0.1	+<1	+<0.1
R33	+0.3	+<0.1	+<1	+<0.1
R34	+0.2	+<0.1	+<1	+<0.1
R35	+0.8	+0.1	+<1	+0.2
R36	+0.6	+0.2	+<1	+0.1
R37	+0.6	+0.1	+<1	+0.1
R38	+0.5	+<0.1	+<1	+0.2
R39	+0.3	+<0.1	+<1	+<0.1
R40	+0.4	+0.2	+<1	+<0.1
R41	+0.1	+<0.1	+<1	+<0.1
R42	+0.1	+<0.1	+<1	+<0.1
R43	+6.1	+0.6	+1	+0.4

<i>R44</i>	+5.1	+0.5	+1	+0.4
<i>R45</i>	+0.3	+<0.1	+<1	+<0.1

Italics represent illustrative receptor locations

14.6.8 The baseline air pollutant concentrations in 2014 are likely to be slightly lower than current values at existing and proposed receptors. The effects of the additional road traffic exhaust emissions would be small to imperceptible in magnitude at the majority of receptors although a few medium magnitudes of change are also predicted. The effect of changes of this magnitude on air quality sensitive receptors would be negligible at the majority of receptors although where the baseline concentrations are already elevated a slight adverse effect is predicted.

14.6.9 In 2014 a gas fired energy centre is proposed to be operational within the Application Site. The detailed design for plant has not been completed at this time, so a plant in the form of a unit consisting of a 1.5 MW_e gas fired CHP and a 10MW_{th} gas fired boiler, located within the Application Site, has been adopted as an indicative example of the type of plant that would be appropriate for the completion of Phase 1. The capacity of the energy centre is likely to be increased in a phased manner so that by 2026 there could be 3 identical units in operation. The proposed stack height for the energy centre of will not exceed 72 m above finished A.O.D.

14.6.10 An assessment of the potential effects of exhaust emissions from an energy plant unit has been undertaken based on the information available at this time. The contribution of plant emissions to annual mean concentrations of oxides of nitrogen at each of the representative receptors are reported in Appendix 14.1 as Scenario AQ-WD3. The magnitude of the effects relative to baseline conditions are illustrated graphically in **Figure 14.3**.

14.6.11 The effect of an energy centre unit operating continuously at full load and with a stack of 35 m, as modelled in the sensitivity analysis, would contribute less the 2 µg/m³ to annual mean concentrations of oxides of nitrogen at any existing receptor and less than 0.4 µg/m³ at any receptor within an existing AQMA. In practice, the energy plant boilers would not operate at full load all the time, but would fire in response to daily, weekly and seasonal demands for heat and hot water. It is reasonable to assume that effects would be markedly less than those represented by the modelled scenario. Overall the combined effect of road traffic emissions and emissions from a single or multiple unit energy plant on local air quality would be negligible in 2014.

14.6.12 Although not included in the modelled scenarios, the contribution of domestic heating systems within the Proposed Development to pollutant concentrations in the operational scenarios is such that the effects of such heating systems would be negligible when compared to emissions from the energy plant and hence covered, to the extent necessary by assessment of the energy plant.

Operational Effects on Completion

14.6.13 The additional traffic movements on the local road network associated with the Proposed Development and other permitted developments in 2026, have been included in the traffic data made available to this assessment. Mean pollutant concentrations at each of the representative receptors are reported in Table 14.10 and referred to in Appendix 14.1 as Scenario AQ-WD2. The magnitude of the effects relative to baseline conditions in 2026 are summarised in the Sensitivity Analysis.

Table 14.10 Predicted 2026 With Development Pollutant Concentrations

Receptor	Pollutant Concentrations			
	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	No. of Exceedences of the 24-hour PM ₁₀ Objective (Days)	Annual Mean PM _{2.5} (µg/m ³)
R1	17.6	18.6	1	11.4
R2	17.2	18.4	1	11.2
R3	17.4	18.6	1	11.4
R4	17.6	18.6	1	11.4
R5	18.8	18.8	2	11.5

R6	18.4	18.6	1	11.5
R7	18.8	17.6	1	11.0
R8	18.4	17.6	1	11.0
R9	17.2	18.9	2	11.8
R10	16.6	18.6	1	11.6
R11	17.1	18.9	2	11.8
R12	16.9	17.5	1	11.0
R13	18.5	17.6	1	11.2
R14	16.9	17.5	1	11.0
R15	16.9	17.0	0	11.1
R16	19.7	17.5	1	11.4
R17	18.1	17.2	0	11.3
R18	17.1	17.2	0	11.3
R19	17.6	17.5	1	11.4
R20	16.9	17.1	0	11.2
R21	17.1	17.1	0	11.1
R22	20.0	18.4	1	11.6
R23	16.9	19.4	2	11.7
R24	16.9	20.8	4	11.9
R25	18.7	17.5	1	10.8
R26	30.2	17.7	1	10.9
R27	27.4	17.5	1	11.0
R28	31.1	18.1	1	11.8
R29	31.5	18.2	1	11.8
R30	19.0	17.8	1	11.6
R31	27.2	17.7	1	11.6
R32	27.2	17.7	1	11.6
R33	28.4	17.7	1	11.6
R34	17.2	17.6	1	11.4
R35	34.0	18.6	1	12.1
R36	31.5	19.9	3	12.4
R37	30.5	18.7	1	11.6
R38	19.0	17.8	1	11.6
<i>R39</i>	<i>18.3</i>	<i>17.8</i>	<i>1</i>	<i>11.7</i>
<i>R40</i>	<i>19.2</i>	<i>18.2</i>	<i>1</i>	<i>11.8</i>
<i>R41</i>	<i>17.6</i>	<i>19.3</i>	<i>2</i>	<i>12.0</i>
<i>R42</i>	<i>18.1</i>	<i>18.4</i>	<i>1</i>	<i>11.5</i>
<i>R43</i>	<i>17.6</i>	<i>18.3</i>	<i>1</i>	<i>11.5</i>
<i>R44</i>	<i>17.9</i>	<i>18.5</i>	<i>1</i>	<i>11.4</i>
<i>R45</i>	<i>17.5</i>	<i>18.4</i>	<i>1</i>	<i>11.2</i>

Italics represent illustrative receptor locations

14.6.14 The change in pollutant concentrations from baseline conditions as a result of the 2026 operational scenario are displayed in Table 14.11. In 2026 no exceedances of the annual mean objective values for nitrogen dioxide, PM₁₀ or PM_{2.5} are likely to occur with or without the Proposed Development, at any receptor in the study area. No exceedances of the 24 hour mean objective for PM₁₀ are likely to occur with or without the Proposed Development, at any receptor in the study area.

14.6.15 The magnitude of the effects of the additional road traffic exhaust emissions, associated with the operation of the Proposed Development, on particulate matter concentrations would be imperceptible at all receptors apart from two locations within the proposed development (R40 and R42). The corresponding effects on annual mean concentrations of nitrogen dioxide would also be imperceptible at receptors along Madingley Road (R9 to R15) and along the majority of Huntingdon Road (R39, R1-R8 and R25). A small magnitude of change in annual mean concentrations of nitrogen dioxide is predicted to occur adjacent to the site access on Huntingdon Road (R40), at the southern end of Histon Road (R35) and at three locations within the central part of the proposed development (R42 – R44).

14.6.16 Adverse effects on annual mean concentrations of nitrogen dioxide would be low to imperceptible in magnitude at some receptors, but none of these effects would raise baseline concentrations to a level ($> 36 \mu\text{g}/\text{m}^3$) where the objective could be considered to be at risk of being exceeded. These low to imperceptible effects are most likely to occur at properties facing onto Histon Road (R16 – R19), on Huntingdon Road nearest the junction with the new site link road (R40 and R6). The completed Proposed Development in 2026 would contribute to small to imperceptible increases in annual mean concentrations of nitrogen dioxide at properties on Histon Road and Huntingdon Road close to the junction with the ring road (R28, R29 and R35-R37).

Table 14.11 Change in Predicted Pollutant Concentrations - 2026 Operational Scenario

Receptor	Pollutant Concentrations			
	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	No. of Exceedences of the 24-hour PM_{10} Objective (Days)	Annual Mean $\text{PM}_{2.5}$ ($\mu\text{g}/\text{m}^3$)
R1	+<0.1	+<0.1	+<1	+<0.1
R2	+0.1	+<0.1	+<1	+<0.1
R3	+<0.1	+0.1	+<1	+<0.1
R4	-0.1	+<0.1	+<1	+<0.1
R5	+0.2	+<0.1	+<1	+<0.1
R6	+0.3	+<0.1	+<1	+<0.1
R7	+0.2	+0.1	+<1	+<0.1
R8	+0.1	+<0.1	+<1	+<0.1
R9	+0.1	+<0.1	+<1	+<0.1
R10	+0.1	+<0.1	+<1	+<0.1
R11	+<0.1	+<0.1	+<1	+<0.1
R12	+<0.1	+<0.1	+<1	+<0.1
R13	-0.1	+<0.1	+<1	+<0.1
R14	-0.1	+<0.1	+<1	+<0.1
R15	+<0.1	+<0.1	+<1	+<0.1
R16	+0.3	+0.2	+1	+<0.1
R17	+0.2	+<0.1	+<1	+<0.1
R18	+0.1	+<0.1	+<1	+0.2
R19	+0.2	+0.2	+1	+0.1
R20	+0.2	+0.1	+<1	+0.1
R21	+0.1	+<0.1	+<1	+<0.1
R22	+<0.1	+<0.1	+<1	+<0.1
R23	+<0.1	+<0.1	+<1	+<0.1
R24	-0.1	+<0.1	+<1	-0.2
R25	+0.1	+<0.1	+<1	+<0.1
R26	+0.2	+<0.1	+<1	+<0.1
R27	+0.1	+<0.1	+<1	+<0.1
R28	+0.3	+<0.1	+<1	+<0.1
R29	+0.2	+<0.1	+<1	+<0.1
R30	+0.2	+<0.1	+<1	+<0.1
R31	+<0.1	+<0.1	+<1	+<0.1
R32	+<0.1	+<0.1	+<1	+<0.1
R33	+<0.1	+<0.1	+<1	+<0.1
R34	+0.1	+<0.1	+<1	+<0.1
R35	+0.5	+0.1	+<1	+<0.1
R36	+0.3	+<0.1	+<1	+<0.1
R37	+0.2	+0.1	+<1	+<0.1
R38	+0.1	+<0.1	+<1	+<0.1
R39	+0.2	+<0.1	+<1	+0.1
R40	+1.3	+0.4	+<1	+0.2
R41	+0.1	+0.2	+<1	+<0.1

R42	+0.9	+0.4	+<1	+0.2
R43	+1.0	+0.3	+<1	+0.3
R44	+1.0	+0.3	+<1	+0.2
R45	+<0.1	+0.2	+<1	+<0.1

Italics represent illustrative receptor locations

14.6.17 The baseline air pollutant concentrations in 2026 are very likely to be well below the respective objective values at all existing and proposed receptors. The effects of the additional road traffic exhaust emissions would be small to imperceptible in magnitude. Effects of this magnitude would have a negligible effect at the air quality sensitive receptors within the study area.

14.6.18 By 2026 the baseline mean pollutant concentrations would achieve the respective objective values by a considerable margin. The magnitude of the combined effects from additional road vehicle exhaust emissions and the proposed energy plant emissions would not be large enough to have a significant effect on local air quality at any relevant receptor. Air Quality within North West Cambridge in 2026 is predicted to be of a good standard with or without the Proposed Development. Overall the Proposed Development would not have a significant effect on local air quality in the year of completion.

Measures to avoid reduce or manage effects

14.6.19 During construction, the adoption of a construction management plan incorporating good working practices, as identified in the CEMP and others such as those associated with Cambridge City Councils considerate contractors scheme would provide the required level of protection of pre-existing receptors to construction emission effects on amenity and health.

Cumulative Effects

14.6.20 Construction works only have the potential to cause significant adverse effects at receptors located within a few hundred metres and with measures, such as those required by South Cambridgeshire District Council or Cambridge City Council, the zone within which significant effects might occur reduces to less than fifty metres. The developments at Northstowe, West Cambridge, Orchard/Arbury Park or NIAB2 are too distant from each other for there to be any potential of onsite works resulting in significant cumulative effects.

14.6.21 Onsite works for the Proposed Development and the NIAB scheme both have the potential to affect rates of dust deposition at a small number of properties on Huntingdon Road. As the Proposed Development and the NIAB scheme are located on different sides of Huntingdon Road, it is highly unlikely that combined effects would occur simultaneously. Works associated with highways and utility works on Huntingdon Road have the potential for minor adverse cumulative effects but there are opportunities to reduce the potential duration and magnitude of such effects by co-ordinated scheduling of off-site works for the schemes.

14.6.22 Onsite works for the Proposed Development and the West Cambridge scheme both have the potential to affect rates of dust deposition at a small number of properties on Madingley Road. As the Proposed Development and the West Cambridge Development are located on different sides of Madingley Road, it is highly unlikely that combined effects would occur simultaneously. Offsite works associated with infrastructure and utility works have the potential for minor adverse cumulative effects but there are opportunities to reduce the potential duration and magnitude of such effects by co-ordinated scheduling of off-site works for the schemes.

14.6.23 Traffic information provided in Chapter 12 (Table 12.18 and 12.23) confirms that the majority of construction vehicle movements associated with the Proposed Development would use the stretch of Madingley Road between the site access and junction 13 of the M11. The majority of construction vehicle movements associated with other developments at the same time would be on Huntingdon Road. As such, the cumulative impacts of construction traffic on air quality sensitive receptors would be negligible.

14.6.24 The transportation modelling, undertaken as part of the Transport Assessment, has estimated the cumulative effects of all the Schemes listed in Table 1.4 on traffic flows on the local network of roads. Data has been made available to the air quality assessment for use in the sensitivity analysis (Appendix 14.1) for a baseline scenario in 2026 with none of the schemes nor the Proposed Development and for a scenario in 2026 with all of the schemes and the Proposed Development.

14.6.25 The quantitative assessment of cumulative effects in 2026 also provides a point of reference for the qualitative assessment of cumulative effects in 2014. This assessment therefore considers the cumulative effects on completion and then the cumulative effects in 2014.

14.6.26 The air quality impact assessment for the Northstowe scheme (English Partnerships and Gallagher Longstanton, 2007) has a study area that extends south as far as the A14. Although the estimates of absolute concentrations in the Northstowe ES are now somewhat dated, the magnitude of the effects of the scheme are less sensitive to changes in assessment methods and should still represent a reasonable estimate.

14.6.27 In 2025 the Northstowe scheme is reported to increase baseline annual mean concentrations by $0.7 \mu\text{g}/\text{m}^3$ at sensitive receptors near to the A14 at Girton. The magnitude of the combined effects of all the schemes including the Proposed Development in the same location (R22) is $0.0 \mu\text{g}/\text{m}^3$ indicating that vehicle movements associated with the Northstowe developments account for the majority of the total change in this location. The cumulative effect on annual mean concentration of nitrogen dioxide or PM_{10} would be negligible in 2025.

14.6.28 To the south of the Application Site there is the potential for cumulative effects at receptors located along Madingley Road (R9, R11 to R13) as a consequence of additional road vehicle movements from the West Cambridge scheme and the Proposed Development. The combined changes to annual mean concentrations of nitrogen dioxide and PM_{10} would be imperceptible at receptors on Madingley Road and the cumulative effect at these receptors would be negligible.

14.6.29 The situation between A14 and city centre along Huntingdon Road and Histon Road is likely to experience additional traffic movements associated with the operation of Northstowe, NIAB, NIAB2, Orchard/Arbury Park and the Proposed Development. Small changes are most likely to occur at properties facing onto Histon Road (R16), on Huntingdon Road nearest the junction with the new site link road (R40). The developments would give rise to small increases in annual mean concentrations of nitrogen dioxide and imperceptible increases in annual mean concentrations of PM_{10} at properties on Histon Road and Huntingdon Road close to the junction with the ring road (R28, R29 and R35-R37). In 2026 when baseline air quality is likely to be good, these effects represent would be negligible.

14.6.30 In 2014 the total number of vehicle movements generated by the operation of the completed Phase 1 of the Proposed Development and the construction of Phase 2 will be significantly less than the number of vehicle movements generated by the operation of the completed development discussed above. If the other schemes begin phased construction within the next year, then effects of each scheme in 2014 would be proportional to the respect effects in 2026. Changes of this magnitude would have an effect on local air quality that is negligible.

14.6.31 Overall the cumulative effect of the Proposed Development and the other schemes in the Cambridgeshire Growth Areas would be negligible in 2014 and in 2026.

14.7 Summary

Introduction

14.7.1 The potential for significant effects on local air quality has been assessed for Proposed Development at the completion of Phase 1 (2014) and following completion of all phases (2026).

Baseline Conditions

14.7.2 Current baseline air quality within the study area is of a good standard, with some localised areas where annual mean concentrations of nitrogen dioxide and 24 hour mean concentrations of particulate matter (PM_{10}) do not currently achieve the objectives set in the National air quality strategy. The worst effective areas have been declared as Air Quality Management Areas and are located along the A14 and in Cambridge City Centre.

14.7.3 There are local and national measures in place, driven by national obligations, to achieve a good standard of air quality every where as soon as possible after 2010. By 2014 the baseline mean concentrations of nitrogen dioxide and particulate matter can reasonably be expected to have improved

such that the objective values for these pollutants may be achieved at all but a few receptors within the Cambridge City Centre AQMA.

Likely Significant Effects

14.7.4 During construction there is the potential for construction and site clearance works to generate airborne particulate matter in the form of dust and finer particulate matter that could adversely affect amenity and health at properties near to the works. The effectiveness of good working practices as a means of preventing particulate matter from construction works causing such adverse effects has been considered and found that the required standard of protection is readily achievable. A construction management plan would provide the means of delivering the appropriate mitigation.

14.7.5 The baseline and with development effects of road traffic exhaust emission at locations close to the local road network have been modelled in detail and the predicted changes in pollutant concentrations would be small to imperceptible in magnitude in 2014 and in 2026 at the majority of receptors although a few medium changes in magnitude are predicted. These assessment years consider the effect of the Proposed Development when the amount of additional traffic movements on the local road network would be greatest.

14.7.6 The Proposed Development would include plant to provide electricity and hot water by burning gas. The combined effects of emissions from the energy plant and the emissions from road traffic has been considered in this assessment and the magnitude of the combined effects assessed.

Measures to avoid, reduce and manage effects

14.7.7 The adoption of construction working practices consistent with the Construction and Environment Management Plan for the Proposed Development and measures associated with Cambridge City Councils considerate contractors scheme would be capable of preventing significant adverse effects on amenity of health, from occurring at existing properties or at properties constructed in earlier phases of the Proposed Development. With the incorporation of design and construction method measures to avoid and manage any air quality effects of the Proposed Development has resulted in the conclusion that the likely significant effects of the Proposed Development are negligible. Therefore no additional mitigation or enhancement measures are required.

Conclusions

14.7.8 The overall conclusions of the assessment are that future year baseline air quality is very likely to improve relative to current baseline conditions and that in 2014 and 2026, the effect of the completed scheme on local air quality would be negligible.

14.8 References

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1 Introduction and Assessment Approach

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15 HYDROLOGY, DRAINAGE AND FLOOD RISK

15.1 Introduction

15.1.1 This chapter provides an assessment of the likely significant effects on water resources as a result of the Proposed Development. Consideration is given to temporary effects during the construction phase and the likely significant effects of operation during the lifetime of the Proposed Development. Measures have been identified to avoid or manage any likely significant effects and the significance of the effects of the Proposed Development including the mitigation measures has been assessed. In the context of this chapter, the term 'water resources' covers the assessment of effects on or to:

- surface waters;
- groundwater sources; and
- flood risk.

15.1.2 Flood risk issues have been considered in a Level 3 Flood Risk Assessment (FRA) with a supporting river hydraulic modelling study and the outputs have been taken into account in formulating this chapter. The FRA and modelling study are included as part of this ES as **Appendix 15.1**.

15.1.3 The Level 3 Flood Risk Assessment includes details of a flood alleviation strategy that would enable the peak flows downstream of the Application Site to be reduced for a range of return periods and for excess flow to be stored within the landscaped areas of the Proposed Development. This strategy involves physical improvements to the Washpit Brook, which could also be used to enhance the existing landscape and to create new ecological habitats. An Addendum to the Flood Risk Assessment has been included as part of this ES as **Appendix 15.2** to define potential refinements to the proposed works to the Washpit Brook and thereby demonstrate one way in which the flood water management, ecological and landscape design could be effectively combined.

15.2 Planning Policy Context

Legislative and policy context

15.2.1 There is a very wide range of legislation, policy and guidance pertaining to water resources and impact assessment; however, this section only refers to water resources related policy and legislation that is directly relevant to the Proposed Development and its range of potential effects.

Legislation

Water Framework Directive

15.2.2 The Water Framework Directive (WFD) (Commission of the European Communities, 2000) establishes a framework for a European wide approach to action in the field of water policy. Its ultimate aim is to ensure all inland and near shore watercourses and waterbodies (including groundwater) are of 'Good' status or better, in terms of ecological, but also chemical, biological and physical parameters, by the year 2015. Therefore, any activities or developments that could cause detriment to a nearby water resource, or prevent the future ability of a water resource to reach its potential status, must be mitigated so as to reduce the potential for harm and allow the aims of the Directive to be realised.

15.2.3 A waterbody is assessed for Ecological Status and Chemical Status as part of the WFD, the methodology for determining status has been set out by the UK Technical Advisory Group on the WFD¹. The Environment Agency is responsible for monitoring and ensuring that the targets are met. Waterbodies are classed as either: High, Good, Moderate, Poor or Bad.

15.2.4 The Ecological Status is based on biological quality which includes invertebrates, fish and macrophytes; physicochemical quality which includes temperature, dissolved oxygen, salinity, pH and nutrients; and hydromorphological quality which assesses the range of available habitats.

¹ UK Technical Advisory Group on the Water Framework Directive; 2007; Recommendations on Surface Water Classification Schemes for the Purposes of the Water Framework Directive;
http://www.wfduk.org/UKCLASSPUB/LibraryPublicDocs/sw_status_classification

15.2.5 Chemical Status is assessed on the presence and concentration of Priority Substances for which standards have been established. A full list is located in the UKTAG advice for classification¹.

15.2.6 The elements that these criteria are based on are specific for the different waterbody type – Rivers, Lakes, Transitional Waters and Coastal Waters. The classification is assigned by comparing the feature in question with the reference values. The system works on a ‘worst case’ scenario, whereby if one classification is not met, then regardless of the quality of the others, the lowest value is reported². The aim is to keep or restore waterbodies as close to a natural state as possible.

15.2.7 UKTAG³ has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that waterbodies in the UK (including groundwater) meet the required status⁴. These are currently in draft form as published in the draft River Basin Management Plans (RBMPs) and will not be formalised until the final RBMPs are published in December 2009 (prior to EC sign off).

WFD Groundwater Daughter Directive

15.2.8 The existing Groundwater Directive is to be repealed by the Water Framework Directive in 2013. New or amended regulations are expected before then to enact both the Water Framework Directive and its Daughter Directive on the protection of groundwater. This new Groundwater Directive (2006/118/EC) is commonly referred to as the Groundwater Daughter Directive.

15.2.9 The Water Framework Directive and the new Groundwater Directive make changes to how groundwater can be protected. These changes will provide a new regulatory setting for the protection of groundwater. However, the new or amended Regulations will be no less protective than the existing Regulations. The existing principle of preventing or limiting the inputs of List 1 or List 2 substances respectively into groundwater under the original Groundwater Regulations 1998 will remain, but will be expanded to encompass all pollutants (any substance liable to cause pollution). For example, nitrate will be included as a pollutant.

The Water Resources Act 1991

15.2.10 The Water Resources Act 1991 (HMSO, 1991), in particular Section 92(1)(a), stipulates that the Secretary of State (SoS) may make provisions to “*prohibit a person from having custody or control of poisonous, noxious or polluting matter unless prescribed works and precautions and other steps have been carried out or taken for the purpose of preventing or controlling the entry of the matter into any controlled waters*”. This has implications for the Proposed Development, in that all potential pollution sources of controlled waters must be mitigated.

The Urban Wastewater Treatment Directive

15.2.11 The Urban Waste Water Treatment Directive (UWWTD) requires secondary treatment of urban waste-water to prevent the environment from being adversely affected by the disposal of insufficiently treated urban waste water.

The Groundwater Directive (80/68/EEC) and Groundwater Regulations 1998

15.2.12 The Groundwater Directive aims to protect groundwater from pollution by controlling discharges and disposals of certain dangerous substances to groundwater. In the UK, the directive is implemented through the Groundwater Regulations 1998. The Directive aims to protect groundwater under these Regulations by preventing or limiting the inputs of listed substances into groundwater. Substances controlled under these Regulations fall into two lists:

- **List 1** substances are the most toxic and must be prevented from entering groundwater. Substances in this list may be disposed of to the ground, under a permit, but must not

² In the Draft WRMP, where Fish or Phosphorus are considered to be poor, a compromise is made between the status of phosphorus and fish and the rest of the determinants. This will be confirmed within the final RBMPs.

³ The UKTAG (UK Technical Advisory Group) is a working group of experts drawn from environment and conservation agencies. It was formed to provide technical advice to the UK's government administrations and its own member agencies. The UKTAG also includes representatives from the Republic of Ireland.

⁴ UK Environmental Standards and Conditions (Phase I) Final Report, April 2008. UK Technical Advisory Group on the Water Framework Directive.

reach groundwater. They include pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide.

- **List 2** substances are less dangerous, and can be discharged to groundwater under a permit, but must not cause pollution. Examples include sewage, trade effluent and most wastes. Substances in this list include some heavy metals and ammonia (which is present in sewage effluent), phosphorus and its compounds

Flood and Water Management Act 2010

15.2.13 The Flood and Water Management Act which received Royal Assent in April 2010 aims to implement the recommendations of the Pitt Review, carried out following the 2007 summer floods. The Act and the Pitt Review itself, aim to respond to the pressures of climate change and increased population, which will increase water stress, drought risk, water quality issues and flood risk.

15.2.14 The key features of the Act are:

- To give the Environment Agency an overview of all flood and coastal erosion risk management and unitary and county councils the lead in managing the risk of all local floods.
- To introduce an improved risk based approach to reservoir safety.
- To encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SuDS for new developments and redevelopments.
- To allow sewerage companies to adopt drains and sewers that are connected to the adopted sewer.
- To widen the list of uses of water that water companies can control during periods of water shortage, and enable Government to add to and remove uses from the list.
- To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges.
- To reduce 'bad debt' in the water industry by amending the Water Industry Act 1991 to provide a named customer and clarify who is responsible for paying the water bill.
- To make it easier for water and sewerage companies to develop and implement social tariffs where companies consider there is a good cause to do so, and in light of guidance that will be issued by the SoS following a full public consultation.

15.2.15 The Act aims to:

- reduce the likelihood and impacts of flooding;
- improve authority ability to manage the risk of flooding;
- improve water quality;
- give water companies better powers to conserve water during drought;
- reduce red tape and other burdens on water and sewerage companies;
- improve the overall efficiency and management of the industry; and
- reduce pollution.

15.2.16 The Act will reduce flood risk by delivering surface water management plans and ending the automatic right to connect to sewers for surface water drainage, requiring developers to put SuDS in place in new developments, wherever practicable.

15.2.17 Commencement No 1 Order brings into force provisions of the Flood and Water Management Act 2010 to provide power for Ministers to make orders and regulations to give effect to the Act. Article 3

provides that sections 4 and 36 of the Act, and some definition sections, are brought into force from 1st September 2010, so far as to enable Ministers to make orders relating to flood risk management functions. The Schedule introduced by Article 4 specifies other provisions that came into force from 1st October 2010, which includes the power to make regulations relating to levies, adoption of drains or sewers by the sewerage undertaker, liability of occupiers of residential premises for water and sewerage charges, duties of a risk management authority and special administration. Article 5 contains transitional provisions.

National Policy, Guidance and Strategy

Planning Policy Statement 25: Development and Flood Risk

15.2.18 Previous planning policy PPS25 aimed to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at high risk. PPS25 stated that a FRA must be undertaken for all developments greater than 1 hectare in area to highlight and assess the significance of flooding to the Proposed Development and to assess any potential the development may have on increasing flooding in other areas.

This theme has continued into the NPPF which includes Technical Guidance on Flood Risk retaining the key elements in PPS25.

Planning Policy Statement 23: Planning and Pollution Control

15.2.19 The driver for any works aiming to mitigate any negative impacts on the water environment from the Proposed Development was PPS23: Planning and Pollution Control (Office of the Deputy Prime Minister, 2004). Annex 2 of PPS23 related to development on land affected by contamination and provides guidance on how the development of contaminated land can be controlled through the planning process.

The Code for Sustainable Homes

15.2.20 The Code for Sustainable Homes has been introduced to drive a step-change in sustainable home building practice. It is a standard for key elements of design and construction which affect the sustainability of a new home. The Code uses a sustainability rating system – indicated by ‘stars’, to communicate the overall sustainability performance of a home. The table below summarises the mandatory minimum standards which exist under the Code for each assessment level relating to indoor water consumption:

Level 1(★)	Maximum Internal potable water consumption measured in litres per person per day (l/p/d)	120 l/p/d
Level 2(★★)		120 l/p/d
Level 3(★★★)		105 l/p/d
Level 4(★★★★)		105 l/p/d
Level 5(★★★★★)		80 l/p/d
Level 6(★★★★★★)		80 l/p/d

15.2.21 Mandatory minimum performance standards are set for some issues irrespective of the code level rating that is sought. One of these is the management of surface water runoff from developments which in turn relates to:

- Peak rate of runoff into watercourses – to ensure that this is no greater for the developed site than it was for the pre-development site.
- The additional predicted volume of runoff generated by the development is reduced to zero wherever possible by means of infiltration to groundwater and/or by harvesting it for reuse within the buildings as a replacement for potable water in non-potable applications such as toilet flushing or washing machine operation.

15.2.22 Additional credits are available for using SuDS to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters.

Future Water – The Government’s Water Strategy for England

15.2.23 ‘Future Water’ presents the Government’s water strategy for England – its vision for sustainable delivery of secure water supplies and an improved and protected water environment.

15.2.24 The Government’s water strategy for England aims to secure water supplies and improve the protection of the water environment. Increases in housing and climate change will make it vital to manage demand better and new reservoirs may be needed. Work to improve water quality must continue, flooding must to be managed better and metering of household use may become compulsory.

Groundwater Protection: Policy and Practice (GP3)

15.2.25 The Environment Agency has set out a framework for the regulation and management of groundwater in a set of documents, collectively known as Groundwater Protection: Policy and Practice (GP3). The policies and guidance within GP3 replace the previous policy covered in the Environment Agency’s ‘Policy and Practice for the Protection of Groundwater’.

15.2.26 Part 4 of GP3 “Legislation and Policies” was issued for consultation in 2007 and published in July 2008. The policies for the protection and management of groundwater have been considered in this assessment, including the control of pollutants to groundwater, contaminated land, permitted activities with respect to Source Protection Zones, and groundwater resource management.

The Pitt Review

15.2.27 Sir Michael Pitt was asked by Ministers to conduct an independent review of the flooding emergency that took place in June and July 2007. The Review made the recommendations that the Government should:

- establish a Cabinet Committee dedicated to tackling the risk of flooding, bringing flooding in line with other major risks such as pandemic flu and terrorism;
- publish monthly summaries of progress during the recovery phase of major flooding events, including number of households still displaced;
- ensure proper resourcing of flood resilience measures, with above inflation increases every spending review;
- establish a National Resilience Forum to facilitate national level planning for flooding and other emergencies;
- have pre planned, rather than ad hoc, financial arrangements in place for responding to the financial burden of exceptional emergencies; and
- publish an action plan to implement the recommendations in this review, with regular progress updates.

15.2.28 The Government’s response to the Pitt Review was published in December 2008 and supported the findings of the review, indicating that Local Authorities should take the lead in implementing its recommendations.

The National Flood and Coastal Erosion Risk Management Strategy for England

15.2.29 The Environment Agency and DEFRA jointly published this document in July 2011 in order to identify actions that can be taken to manage the risk of flood and coastal erosion in England in order to reduce the impact on Communities that could occur as a result of climate change and development in areas at risk.

15.2.30 The strategy builds on existing approaches to flood and coastal risk management and promotes the use of a wide range of measures to manage risk. It also indicates that risk should be managed in a co-ordinated way within catchments and along the coast balancing the needs of communities, the economy and the environment. This strategy will form the framework within which communities have a greater role in local risk management decisions and sets out the Environment Agency’s strategic overview role in flood and coastal erosion risk management (FCERM).

15.2.31 This approach is aligned with the recommendations made by Sir Michael Pitt in his review of the summer 2007 floods. The strategy encourages more effective risk management by enabling people, communities, business, infrastructure operators and the public sector to work together to:

- ensure a clear understanding of the risks of flooding and coastal erosion, nationally and locally, so that investment in risk management can be prioritised more effectively;
- set out clear and consistent plans for risk management so that communities and businesses can make informed decisions about the management of the remaining risk;
- manage flood and coastal erosion risks in an appropriate way, taking account of the needs of communities and the environment;
- ensure that emergency plans and responses to flood incidents are effective and that communities are able to respond effectively to flood forecasts, warnings and advice;
- help communities to recover more quickly and effectively after incidents.

The National Planning Policy Framework (NPPF)

15.2.32 While the NPPF is to be read as a whole in the context of flood risk and drainage the NPPF states at paragraph 157 that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development in flood risk areas appropriate where informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and
- development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed; and it gives priority to the use of sustainable drainage systems.

15.2.33 Paragraph 158 of the NPPF notes that for individual developments on sites allocated in development plans through the Sequential Test, applicants need not apply the sequential test.

Regional Policy, Guidance and Strategy***East of England Plan Policy***

15.2.34 The East of England Plan, the Revision to the Regional Spatial Strategy for the East of England (May 2008) contains the following policies relevant to water resources:

- SS1: *Achieving Sustainable Development*: "...ensure that development... respects environmental limits by seeking net environmental gains wherever possible or at least avoiding harm..."
- ENV4: *Agriculture, Land and Soils* "...in their plans, policies, programmes and proposals, planning authorities and other agencies should:... encourage more sustainable use of water resources through winter storage schemes and new wetland creation".
- WAT1: *Water Efficiency Policy* "The Government will work with the Environment Agency, water companies, OFWAT, and regional stakeholders to ensure that development in the spatial strategy is matched with improvements in water efficiency delivered through a progressive, year on year, reduction in per capita consumption rates. Savings will be monitored against the per capita per day consumption target set out in the Regional Assembly's monitoring framework."
- WAT2: *Water Infrastructure* "The Environment Agency and water companies should work with OFWAT, EERA and the neighbouring regional assemblies, local authorities, delivery agencies and others to ensure timely provision of the appropriate additional infrastructure for water supply and waste water treatment to cater for the levels of development provided through this plan, whilst meeting surface and groundwater quality standards, and avoiding adverse impact on sites of European or international importance for wildlife."

- WAT3: *Integrated Water Management* “Local planning authorities should work with partners to ensure their plans, policies, programmes and proposals take account of the environmental consequences of river basin management plans, catchment abstraction management strategies, groundwater vulnerability maps, groundwater source protection zone maps, proposals for water abstraction and storage and the need to avoid adverse impacts on sites of European importance for wildlife. The Environment Agency and water industry should work with local authorities and other partners to develop an integrated approach to the management of the water environment.
- WAT4: *Flood Risk Management* “Local Development Documents should:
 - use Strategic Flood Risk Assessments to guide development away from floodplains, other areas at medium or high risk or likely to be at future risk from flooding, and areas where development would increase the risk of flooding elsewhere;
 - include policies which identify and protect flood plains and land liable to tidal or coastal flooding from development, based on the Environment Agency’s flood maps and Strategic Flood Risk Assessments supplemented by historical and modelled flood risk data, Catchment Flood Management Plans and policies in Shoreline Management Plans and Flood Management Strategies, including ‘managed re-alignment’ where appropriate;
 - only propose departures from the above principles in exceptional cases where suitable land at lower risk of flooding is not available, the benefits of development outweigh the risks from flooding, and appropriate mitigation measures are incorporated; and
 - require that sustainable drainage systems are incorporated in all appropriate developments.”
- WM6: *Waste Management in Development* “Development should be designed and constructed to minimise the creation of waste Provision should be made for waste management facilities to enable the sustainable management of waste through innovative approaches to local waste reduction, recycling and management.

Local Policy, Strategy & Guidance

15.2.35 The Application Site lies astride the administrative boundaries of South Cambridgeshire District Council (SCDC) and Cambridge City Council (CCC). As a result, water related policies contained within both of the authorities’ emerging Local Development Frameworks are relevant to the Proposed Development and have been referenced here.

North West Cambridge Area Action Plan

15.2.36 The principal Local Development Document that has been produced jointly by SCDC and CCC and that relates specifically to the Application Site is the North West Cambridge Area Action Plan which was adopted in October 2009. The Plan contains the following policies relevant to water resources:

- NW24: Climate Change & Sustainable Design and Construction
 - 1) ***‘Development will be required to demonstrate that it has been designed to adapt to the predicted effects of climate change’***
 - 2) ***‘Residential development will be required to demonstrate that:***
 - a) All dwellings approved on or before 31 March 2013 will meet Code for Sustainable Homes Level 4 or higher, up to a maximum of 50 dwellings across the site. All dwellings above 50 will meet Code for Sustainable Homes Level 5 or higher (these Levels include water conservation measures);***
 - b) All dwellings approved on or after 1 April 2013 will meet Code for Sustainable Homes Level 5 or higher;***

c) There is no adverse impact on the water environment and biodiversity as a result of the implementation and management of water conservation measures.'

3) 'Non residential development and student housing will be required to demonstrate that:

f) It will incorporate water conservation measures including water saving devices, greywater and/or rainwater recycling in all buildings to significantly reduce potable water consumption; and

g) There is no adverse impact on the water environment and biodiversity as a result of the implementation and management of water conservation measures.'

'The East of England has the lowest rainfall in the country and is described officially as semi-arid. A high proportion of the available water resource is already being exploited and as such, even allowing for the impacts of climate change, careful management of water resources will be crucial if the economic potential of the Cambridge Sub-Region is to continue to be realised. Development at North West Cambridge provides an opportunity to design water conservation measures into the infrastructure and buildings in order to reduce per capita demand for water. This should be a fundamental approach of the development. It is important that water conservation measures are applied to each building to ensure that there is a comprehensive strategy to water use reduction across the site and measures are not applied to some buildings and not others. The CSH provides appropriate targets to improve water conservation over time, using the same dates and Code levels as for energy reduction and other sustainability requirements set out in the Code. For residential development, the 30% reduction required at Code Level 4 compared to 2006 levels equates to 105 litres/head/day, while the 47% reduction required by Code Level 5 equates to 80 litres/head/day.'

'The principle of reuse and recycling of water is also an important part of an integrated approach to water management that will facilitate the use of water from drainage as a design feature of the development. Care must be taken to ensure that water reuse and recycling does not have an adverse effect on biodiversity, or the wider water environment, in accordance with the requirements of the Water Framework Directive.'

- Policy NW25: Surface Water Drainage
 - '1. Surface water drainage for the site should be designed as far as possible as a sustainable drainage system (SuDS) to reduce overall run-off volumes leaving the site, control the rate of flow and improve water quality before it joins any water course or other receiving body;**
 - 2. The surface water drainage system will seek to hold water on the site, ensuring that it is released to surrounding water courses at an equal, or slower, rate than was the case prior to development;**
 - 3. Water storage areas should be designed and integrated into the development with drainage, recreation, biodiversity and amenity value; and**
 - 4. Any surface water drainage scheme will need to be capable of reducing the downstream flood risk associated with storm events as well as normal rainfall events. All flood mitigation measures must make allowance for the forecast effects of climate change.'**

'The eastern and northern parts of the site lie above the surrounding land. The area then slopes down to the Washpit Brook and as such surface water at the site drains naturally in that direction. Apart from the immediate area along the Washpit Brook, there is little evidence of flood risk to the site itself.

However, surface water run-off will increase as a result of development, which will create impermeable areas. As a result, full attenuation measures will be required to ensure that surface water runoff from the development does not increase the risk of flooding to the site itself and areas downstream of the development.

The principles of Sustainable Drainage Systems (SuDS) should be employed where possible on the site to deal with surface water drainage. SuDS are an alternative approach to drainage that replicate as closely as possible the natural drainage of the site before development. This reduces the risk of flood downstream of the development, helps replenish ground water and remove pollutants gathered during run-off, benefiting local wildlife, in line with the SuDS management train.

A Strategic Water and Drainage Strategy will be required to support a planning application. This will include a strategic scale flood risk assessment for the site and any impact on the wider catchment, and will identify the types of SuDS proposed and options for future adoption and maintenance arrangements.

- Policy NW26: Foul Drainage and Sewage Disposal
Development of any single phase will not result in harm in the form of untreated wastewater or increased flood risk from treated wastewater. Planning conditions (which may include 'Grampian' style conditions) will link the start and phased development of the site to the availability of wastewater treatment capacity and the capacity of receiving watercourses.

The foul water produced at the site will be directed to Cambridge Sewage Treatment Works at Milton to take advantage of consolidating existing facilities. Anglian Water are currently undertaking an appraisal of sewerage provision for the whole catchment and the outcome of that appraisal will inform the approach to be followed for foul water arising from North West Cambridge.

In accordance with the requirements of the WFD, the treatment of wastewater must not cause deterioration of the water environment. The options for the treatment of foul drainage and sewage disposal from the site will need to be agreed with the Environment Agency to ensure that development does not result in further pressure on the water environment and compromise WFD objectives.

- Policy NW27: Management and Maintenance of Surface Water Drainage Systems
1. All water bodies, watercourses and sustainable drainage features required to serve the development will be maintained and managed by one or more publicly accountable bodies to ensure a comprehensive and integrated approach to surface water drainage with defined areas of responsibility;
2. No development shall commence until the written agreement of the local planning authorities has been secured stating that organisations with sufficient powers, funding, resources, expertise and integrated management are legally committed to maintain and manage all surface water systems on the North West Cambridge site in perpetuity.

North West Cambridge's surface water drainage systems will need to be managed in perpetuity, during and beyond the lifetime of construction. The options for this are for maintenance and management to be the responsibility of one or more of the following:

- a. The City and/or District Council;*
- b. A water company such as Anglian Water;*
- c. A publicly accountable trust.*

It is important to ensure that the body or bodies made responsible have adequate expertise and are financially stable in perpetuity. It will be the responsibility of the developer to secure and fund a suitable management and maintenance body/bodies in agreement with the Authorities.

Phase 1 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2008)

15.2.37 A Phase 1 Water Cycle Strategy (WCS) was completed by consultants for Cambridgeshire Horizons. It assesses the potential impacts and constraints associated with the proposed major development areas by considering flood risk, water resources and supply, foul sewerage, wastewater treatment, water quality and water related ecology. This study establishes the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and contains the following conclusions and recommendations in relation to the Proposed Development.

15.2.38 This strategic planning document considers how the water services infrastructure can be achieved to meet the target of 42,500 new homes in Cambridge and South Cambridgeshire by 2021. Cambridge is supplied by groundwater abstraction and is situated in an area of *Serious Water Stress* as classified by the EA. It is vital that practices are put into place to reduce water consumption significantly in the new developments and that wherever practical, rainwater is harvested and recycled within the house and on the garden. Greywater systems also need to be considered. Water neutrality i.e. no increase in water supplies for the area over the next 10 years, is potentially achievable through:

- Compulsory implementation of the Code for Sustainable Homes (aiming for Level 6)
- Compulsory metering
- Installing water smart measures in existing homes

15.2.39 The following conclusions were drawn from the study relating to the water resources of the proposed North West Cambridge development site:

- Flood Risk Management
 - most of the site appears to fall within the EA's Flood Zone 1
 - There is a known history of flooding on the Beck Brook/Cottenham Lode catchment downstream of the site therefore the surface water discharge from the development must be managed by means of flow attenuation and long term storage to prevent any increase in flood risk downstream and should seek where possible to reduce the present risk.
 - It is advised that developers on this catchment undertake an independent hydraulic modelling study to:
 - Assess the current standard of protection for Histon and Impington.
 - Demonstrate that the flood risk in the Cottenham Lode catchment will not increase as a result of the combined cumulative effect of developments in the catchment.
 - Assess the opportunity for strategic flood risk mitigations options in the catchment.
 - Assess the opportunity for enhancing the level of service to areas where there is a known flood risk and make a contribution towards the cost of a scheme to enhance the level of service.
 - A site specific FRA is required by PPS25 and the NPPF
- Groundwater and SuDS
 - The site is on variable geology of limited permeability; hence site specific surveys would be required to prepare a suitable SuDS strategy.
- Foul Drainage, Sewage Treatment and Water Quality
 - Foul water from the site will be discharged to the Cambridge WwTW. The discharge consent at the Works will not require revision to accommodate the increased flows from the strategic development sites including the NW Cambridge site before 2016; however, improvements may be needed to the treatment works in order to maintain the quality of the effluent discharged to the River Cam. Some of these improvements may be required before 2016 if the EA decide to tighten the discharge quality limits of the consent as the volume of discharge from the works increases with the increase in new development, in order to comply with the

- requirements of the Freshwater Fish Directive of the WFD. AWS will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP 5 (2010 - 2015) or AMP 6 (2015 - 2021).
- The large diameter sewer network can accommodate all of the flow from the strategic developments without upgrade. The NW Cambridge site will connect into the branches of the tunnel network on Madingley and Histon Road but downstream of the junction of Madingley Road and Wilberforce Road to avoid connections to existing sewers that have insufficient capacity.
- The strategic development sites around Cambridge will not be connected to the sewerage system upstream of the four combined sewer overflows (CSOs) (except that at Cambridge WwTW) and therefore the discharge volume from these CSOs is not expected to increase as a result of the strategic development sites including the North West Cambridge site.
- Water Supply
 - Currently provided by Cambridge Water Company which will also be responsible for strategic water resources for the North West Development site.
 - No specific technical constraints have been identified which might prevent growth in the study area including the Application Site which will require a new 3.2km long 450mm diameter extension to the existing ring main to provide the required capacity.

Phase 2 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2010)

15.2.40 A Phase 2 report was completed by consultants for Cambridge Horizons and considered the recommendations made in the Phase 1 report which focused on identifying a strategy and providing the technical evidence base to show how new sustainable water services infrastructure for the Major Sites in and around Cambridge (including the North West Cambridge University site) could be delivered to maximise three opportunities:

- aspiring to water neutrality;
- improving biodiversity by protecting environmental water quality and hydromorphology, and;
- protecting and enhancing communities through sustainable surface water management.

15.2.41 The findings and recommendations of the WCS have been incorporated into the development proposals. The following is a summary of the findings relevant to the Proposed Development presented under the following water infrastructure headings used in the WCS report:

- Water Resources – *CSH Level 5/6 should be the target for all new homes built after 2016. To meet CSH level 5/6 will require progressive implementation of greywater recycling (GWR) and/or rainwater harvesting (RWH) systems at either a household or community scale, in addition to implementation of water efficient appliances and changes in consumers' behaviours/attitudes towards water consumption. GWR and RWH are not currently widely implemented in the UK. Challenges remain with widespread implementation of GWR and RWH, not least because of the issues surrounding adoption of GWR or RWH systems; no consistent model or legislation is currently in place to support consistent adoption and water companies are currently not permitted to charge for non-potable water.*
- Sustainable Surface Water Management – taken from Section 4.5 of the Phase 2 WCS

4.5.4 Achieving the vision for sustainable surface water management relies on the development and subsequent implementation of planning policies and vigilant management of development through the planning process.

Planning applications should:

- *demonstrate the ambition for achieving 100% above ground drainage through implementation of a range of SuDS measures from source control (e.g. green roofs) to large-scale attenuation storage;*
- *provide justification and evidence where achieving 100% above ground drainage will not be feasible due to proposed densities, topography, ground conditions, or the location of development; demonstrate that drainage proposals are aligned with the forthcoming National SuDS Standards and will be accepted by Cambridgeshire County Council (as the new SuDS Approval Body); demonstrate that proposed SuDS measures will be integrated into the built environment to provide amenity and contribute to a network of open space, and; demonstrate that proposed SuDS measures will be used to enhance the local environment and biodiversity.*

4.5.5 The planning authorities will be responsible for implementing the recommendations through the development of planning policies and determination of planning applications, although other technical stakeholders (e.g. the Environment Agency) will provide technical advice and scrutiny of planning applications to support the planning authorities.

4.5.6 Development where vision for sustainable surface water management may not be achievable.

4.5.7 Overall, the evidence base supports a local policy approach which aims for 100% above ground drainage for future developments, and using SuDS to create or enhance amenity and biodiversity and contribute to the provision of green infrastructure. However, it is recognised that there are a number of site-by-site circumstances which may make it difficult to achieve the aspiration with regards to surface water management.

- *High water table – a high water table may preclude the use of above ground drainage, as was the case at the Orchard Park development. In such cases, the planning application must provide evidence that above ground drainage is not possible and provide a strategy which ensure surface water runoff to the receiving watercourse is greenfield equivalent (on greenfield sites) or at a reduced rate (on brownfield sites). In some locations with a high water table it may be possible to utilise SuDS at a shallow depth, although it must be noted that this could increase the potential land take required for drainage.*
- *Topography – where there is insufficient gradient to drain surface water and the potential to infiltrate surface water is poor, it may be necessary to utilise underground drainage to ensure surface water is effectively drained away from domestic and non-domestic dwellings.*
- Environmental Water Quality – taken from Section 5.4 of the Phase 2 WCS
The Phase 2 WCS has also set out the evidence base (from the CIRIA SUS Manual) to ensure surface and ground waters are adequately protected from polluted surface water runoff, including;
 - *ensuring a sufficient number of treatment stages are provided depending on the source of surface water runoff:*
 - *roofs only – 1 treatment stage;*
residential roads, parking areas, commercial zones – 2 treatment stages;
refuse collection/industrial areas/loading bays/lorry parks/highways – 3 treatment stages;
 - *ensuring that typical pollutants which are generated in the urban environment are considered and treated through SuDS approaches.*
- *Wastewater Infrastructure – the WCS has made an assessment of treatment capacity available for the proposed new development in the Cambridge area including the potential impacts on flood risk and river quality downstream of the Cambridge WwTW. No*

significant increase was predicted to flood risk as a result of increases in treated flows. There are two sources of potential pollution to receiving watercourses as a result of increases in discharges to treatment works. These are:

- Increase in final treated discharge load
- Increase in intermittent discharges from combined sewer overflows (CSOs), pumping stations and storm tanks at WwTW.

In the foreseeable future, consent limits will be set with a view to meeting the requirements of the Water Framework Directive (WFD) whose aim is to ensure that good river quality standards are met throughout each waterbody. The intention will be to set the discharge consent limits based upon the quality and volume of the receiving watercourse and the volume of wastewater effluent at the point of discharge. To maintain water quality in the watercourses, the consent standards in the future on the effluent discharges from the Cambridge WwTW will need to be periodically reviewed by the EA. Improvements to the treatment works will be required as the new developments come on stream to maintain the current discharge consent standards. This has been accepted by Anglian Water and planned for in their future AMP6 programme.

- Ecological Assessment – taken from Section 7.6 of the Phase 2 WCS

7.6.2 This assessment has followed DCLG guidance on HRA. Coarse screening has identified three European sites with the potential to be affected by hypothetical water management changes associated with proposed new developments around Cambridge. One of these (Wicken Fen Ramsar site) was discounted at the coarse screening stage since its hydrology cannot be affected by any of the proposed developments. The others (Breckland SAC and SPA and Ouse Washes SAC and Ramsar site) were discounted at the more detailed screening stage as it has been determined that the proposals will not have any discernible effect on their hydrology or water quality.

7.6.3 Thus, it can be concluded that No Significant Effect would result from implementing the proposals and projections that are identified in the Cambridge WCS, noting that this assessment has only considered water environment consequences.

Level 1 Strategic Flood Risk Assessment (Sept 2010)

15.2.42 A Level 1 Strategic Flood Risk Assessment (SFRA) of the district has been completed on behalf of South Cambridgeshire District Council and Cambridge City Council by consultants, and endorsed by the Environment Agency. The study assessed the flood risk from all types of flooding in the district, taking into account the existing climate and predicted changes in the climate. The principal aim of the study was to set out flood risk constraints to help inform the preparation of the Local Development Framework (LDF) documents. The study area has been categorised into Flood Risk Zones in accordance with Planning Policy Statement 25: 'Development and Flood Risk' (PPS25). The Study replaces the previous SFRA carried out in 2005.

15.2.43 The SFRA is essentially a planning tool. It is an assessment of flood risk from all sources intended to inform the spatial planning process and, therefore, the level of detail and accuracy should relate to this strategic objective. The SFRA will help to steer future land use in a sequential and holistic manner, taking into consideration sustainability and the requirements of PPS25 (Development & Flood Risk).

15.2.44 The SFRA considers all potential sources of flood risk within the administrative area and indicates that no historical flooding has been identified at the Application Site; this would indicate that the Application site would be expected almost entirely to be located within Flood Zone 1.

Catchment Abstraction Management Strategy

15.2.45 Catchment Abstraction Management Strategies (CAMS) are developed by the Environment Agency to manage water resources at a local level. Through consultation with stakeholders and data

acquisition within a CAMS area the documents present the current status of groundwater and outline a future framework for water use. CAMS incorporate a resource assessment that identifies how much water is available, known as the 'resource availability status', and where it is located.

15.2.46 The Application Site falls within the Cam and Ely Ouse Catchment Abstraction Management Strategy⁵ area which has identified the Washpit Brook as within the Old West River and Old West Level Dependent Management Unit (LDMU). The area has a current water resource availability status of 'No Water Available'. The target status of the area for 2013 and indeed up to 2019 is 'No Water Available'.

Catchment Flood Management Plan

15.2.47 Catchment Flood Management Plans (CFMPs) are developed by the Environment Agency on river catchments in the UK. Their aim is to understand the factors that contribute to flood risk within a catchment and to develop sustainable policies on the best ways to manage flood risk within the catchment over the next 50 – 100 years.

15.2.48 The Application Site lies within the Great Ouse CFMP which is divided up into 25 different Policy Units. For each Policy unit the EA have defined a specific policy for managing flood risk. There are six Policy Options one of which is chosen for each Policy Unit. Policy Unit 20 (Cambridge) includes the area of the Application Site. Policy 5, which is to '*take further action to reduce flood risk (now and/or in the future)*', was chosen by the EA for this Unit. This reflects the EA's concerns that there are high numbers of people and property in Cambridge at risk of flooding now and in the future with increased development and the impact of climate change. Policy 6 will allow present actions to control flood risk to be continued (channel maintenance and flood warning) and enhanced (the creation of new flood defences).

Cambridge and Milton Surface Water Management Plan

15.2.49 A SWMP outlines the preferred long-term strategy for the management of surface water flooding in high risk identified areas and is undertaken in consultation with local partners having responsibility for surface water management and drainage in that area. The goal of a surface water management plan is to establish a long-term action plan and to influence the future strategy of development for maintenance, investment and planning.

15.2.50 The Cambridge and Milton Surface Water Management Plan (SWMP) assesses the risk posed by surface water flooding within the study area by firstly identifying the areas with the highest risk of surface water flooding by comparing the modelling predictions with the historical database. This resulted in a list of eleven wetspots, which were then scored using a multi criteria analysis (MCA) method by which the impact of flooding on a wide range of receptors could be evaluated. MCA allows for the comparison of severity of flooding between geographical regions based on the perceived value of buildings. The eleven wetspots ranked in order of worst affected first after the MCA are:

1. King's Hedges and Arbury
2. Cherry Hinton (North and South)
3. North Chesterton
4. Bin Brook
5. South Chesterton
6. Milton
7. Castle School area
8. Cambridge Historic City Centre
9. Cherry Hinton Village
10. Vicar's Brook
11. Coldham's Common

15.2.51 The top two wetspots identified were then subjected to further more detailed computer model development and engineering options were devised. Theoretical engineering measures to reduce the surface water flood risk were introduced into the models of each wetspot. Based on national guidance and best practice, open spaces within the existing urban environment were identified as potential areas where attenuation features could be utilised. These attenuation features could be basins, ponds, wetlands,

⁵ Cam & Ely Ouse Catchment Abstraction Management Strategy, Environment Agency (March 2007)

swales etc. Measures such as permeable paving and rain gardens were also identified as potential ways of controlling the surface water and reducing flood risk.

15.2.52 The eastern portion of the Application Site extends into the Bin Brook wetspot within which there are properties with a medium risk of flooding adjacent to the northern and eastern site boundary. However, the Bin Brook is not one of the top two wetspots identified; therefore the SWMP does not contain any prescriptive requirements for the management of surface water generated by the Proposed Development.

Other Relevant Policy, Strategy and Guidance

Pollution Prevention Guidance (PPG)

15.2.53 The Environment Agency produces Pollution Prevention Guidelines (PPGs) targeted at a particular industrial sector or activity giving advice on the law and good environmental practice. The following guidance notes are considered relevant to the Proposed Development:

- PPG1 – General Guide to the Prevention of Pollution (Sustainable Development);
- PPG2 – Above Ground Oil Storage (2004);
- PPG5 – Works in, near or liable to affect watercourses;
- PPG6 – Working at construction and demolition sites; and
- PPG13 – Vehicle washing and cleaning.

15.3 Assessment Approach

Scope of Assessment

15.3.1 The scope of the assessment is to:

- identify the existing water resources baseline conditions;
- identify the likely significant effects and the associated effect on water resources during the construction and operation phases of the Proposed Development;
- identify the need for potential mitigation measures, which can be incorporated into the construction method and / or the detailed design that would reduce or remove any identified significant adverse effects; and
- determine whether any of the effects will be significant;

Source-pathway-receptor model

15.3.2 The determination of effects has been undertaken using the Source-Pathway-Receptor model. This model identifies the potential sources or 'causes' of impact as well as the receptors (in this case, water resources) that could potentially be affected; however, the presence of a potential impact source and a potential receptor does not always infer an effect. For a receptor to be impacted by a source, there needs to be a clear mechanism or 'pathway' via which the source can have an effect on the receptor; for example, an oil spillage does not necessarily cause a pollution effect unless the spillage reaches a watercourse through runoff or to the ground through permeable ground conditions.

15.3.3 The first stage in utilising the Source-Pathway-Receptor model is to identify the causes or 'sources' of potential impact from a development. The sources have been identified through a review of the details of the Proposed Development, including the size and nature of the development, potential construction methodologies and timescales. This has been undertaken in the context of local conditions relative to water resources in proximity to the application site, such as topography, geology, climatic conditions and existing site conditions such as potential sources of contamination.

15.3.4 The next step in the model is to undertake a review of the potential receptors. The water resources that have the potential to be affected were identified through:

- a desk-top review of baseline data;
- a walkover survey of the Application Site;
- undertaking an FRA for the Proposed Development as required under Planning Policy Statement 25 (PPS25): Development and Flood Risk and now the NPPF (**Appendix 15.1**)

15.3.5 The last stage of the model is therefore to determine if there is an exposure pathway or a 'mechanism' allowing an impact to potentially occur between source and receptor. Again, this has been undertaken using the various information sources as described in above.

Significance assessment methodology

15.3.6 Once likely significant effects on water resources are identified, it is necessary to determine the scale of the effects, to enable the identification of potential mitigation measures that can counteract adverse effects.

15.3.7 An assessment of each effect's significance was undertaken using the methodology provided in the Web-based Transport Analysis Guidance, specifically the Water Environment Sub-Objective WebTAG Unit 3.3.11⁶ (WebTAG 2003). Although this method was designed for transport projects it is applicable to and widely used for other development types.

15.3.8 The methodology provides an assessment of the scale of an effect by firstly considering how important or how sensitive the receptor is and secondly, by considering the likely magnitude or extent of the effect on the receptor. By combining these two elements a significance of effect can be derived. If significant adverse effects are thus identified, mitigation measures can be proposed to offset them before the assessment of significance is carried out.

15.3.9 The sensitivity or importance of each water resource (the receptor) is based on its considered value, for example its value as an ecological habitat, as a source of drinking water or as a recreational resource (see **Table 15.1 below**).

⁶ The methodology set out in this TAG Unit provides an appraisal framework for taking the outputs of the environmental impact assessment process and analysing the key information of relevance to the water environment. The guidance provides a method by which the significance of the identified potential impacts can be appraised consistently by decision makers. It is based on guidance prepared by the Environment Agency and builds on the water assessment methodology in Design Manual for Roads and Bridges (DMRB) 11:3:10.

Table 15.1 Derivation of importance of water resource – examples

Importance	Criteria	Example
Very high	Water resource with an importance and rarity at an international level with limited potential for substitution.	<ul style="list-style-type: none"> • A water resource making up a vital component of a protected Special Area of Conservation (SAC) or Special Protection Area (SPA) under the EC Habitats Directive or a RAMSAR site; • A watercourse classified as attaining 'High Ecological Status' under the Water Framework Directive; or • A major aquifer providing potable water to a large population.
High	Water resource with a high quality and rarity at a national or regional level and limited potential for substitution.	<ul style="list-style-type: none"> • A water resource designated or directly linked to a Site of Special Scientific Interest (SSSI); • A river designated as being of Grade A quality under the Environment Agency's General Quality Assessment (GQA) scheme, or classified as attaining 'Good Ecological Status' under the WFD; • A water body used for national sporting events such as regattas or sailing events; • Water body identified as an EU designated Salmonid fishery; or • A major aquifer supplying water to a small population.
Medium	Water resource with a high quality and rarity at a local scale; or Water resource with a medium quality and rarity at a regional or national scale.	<ul style="list-style-type: none"> • A river designated as being of Grade B or C quality under the Environment Agency's GQA scheme or classified as attaining 'Moderate Ecological Status' under the WFD; • Minor aquifer providing potable water to a small population; • An aquifer providing abstraction water for agricultural and industrial use; or • Water body classed as an EU designated Cyprinid fishery.
Low	Water resource with a low quality and rarity at a local scale.	<ul style="list-style-type: none"> • A river designated as being of Grade D or E quality under the Environment Agency's GQA scheme or classified as attaining 'Poor Ecological Status' under the WFD; or • A non 'main' river or stream without significant ecological habitat. • An aquifer not used for public water supply.

15.3.10 The magnitude of a potential effect is then established based on the likely degree of impact relative to the nature and extent of the Proposed Development (see **Table 15.2**). It is important to consider at this stage that potential effects can be beneficial as well as adverse and it is the purpose of this ES to highlight the likely significant effects of the Proposed Development. The derivation of magnitude is carried out independently of the importance of the water resource.

Table 15.2 Derivation of magnitude of effect – examples

Magnitude of effect	Criteria	Example
Major Adverse	Effect results in a negative shift in a water body's potential attributes.	<ul style="list-style-type: none"> Negative change in GQA grade of river reach or WFD status. Pollution of potable source of abstraction resulting in failure / recovery above drinking water standards; Potential loss of aquatic ecology or habitat 'integrity'; or Loss of economic value of water resource.
Moderate adverse	Results in negative effect on integrity of attribute or loss of part of attribute.	<ul style="list-style-type: none"> Loss in productivity of a fishery; Contribution of a significant proportion of the effluent in a receiving river, but insufficient to change its GQA grade or WFD 'status'; or Reduction in the economic value of the feature.
Minor adverse	Results in minor negative effect on water body's attribute.	<ul style="list-style-type: none"> Measurable negative change in attribute, but of limited size and / or proportion.
Negligible	Results in an effect on attribute but of insignificant magnitude to affect the use / integrity.	<ul style="list-style-type: none"> Physical impact to a water resource, but no significant reduction / increase in quality, productivity or biodiversity.
Minor beneficial	Results in a minor positive effect on water body's attribute.	<ul style="list-style-type: none"> Measurable positive change in attribute, but of limited size and / or proportion.
Moderate beneficial	Results in positive effect on integrity of attribute or gain of part of attribute.	<ul style="list-style-type: none"> Gain in productivity of a fishery; Reduction of a significant proportion of the effluent in a receiving river, but insufficient to change its GQA grade or WFD 'status'; or Increase in the economic value of the feature.
Major beneficial	Effect results in a positive shift of water body's potential attributes	<ul style="list-style-type: none"> Positive change in GQA grade of river reach or WFD status Remediation of potable source of abstraction resulting in failure / recovery above drinking water standards; Potential gain of aquatic ecology or habitat 'integrity'; or Gain of economic value of water resource.

15.3.11 Once the magnitude of an effect is derived, the significance of the potential effect can then be derived by combining the assessments of both the importance of the water resource and the magnitude of the impact in a simple matrix (see **Table 15.3**). The scale of the effect is based on a seven-point scale:

- Major adverse;
- Moderate adverse;
- Minor adverse;
- Negligible;
- Minor beneficial;
- Moderate beneficial; or
- Major beneficial.

Table 15.3 Derivation of scale of effect

Magnitude of effect	Importance of water resource			
	Very high	High	Medium	Low
Major adverse	Major adverse	Major adverse	Moderate adverse	Minor adverse
Moderate adverse	Major adverse	Moderate adverse	Minor adverse	Minor adverse
Minor adverse	Moderate adverse	Minor adverse	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible
Minor beneficial	Minor beneficial	Negligible	Negligible	Negligible
Moderate beneficial	Major beneficial	Moderate beneficial	Minor beneficial	Minor beneficial
Major beneficial	Major beneficial	Major beneficial	Moderate beneficial	Minor adverse

15.3.12 The above methodology has been used to assess the scale of all likely significant effects on water resources with the exception of flood risk. The specific methodology for defining and assessing flood risk is dictated by the requirements of a formal Flood Risk Assessment (FRA) as set out in PPS25 and now the NPPF: Development and Flood Risk (Communities and Local Government, 2006) and its relevant guidance (Communities and Local Government, June 2008).

15.3.13 The FRA reports potential flood risks both to and from the Application Site. Unlike the impact assessment methodology applied for other water resources in this chapter, (but consistently with the approach in this ES) the flood risk methodology used in the FRA assumes that the 'receptors' in the Source-Pathway-Receptor model are any areas of land or development potentially at risk both as a result of the development but also within the Proposed Development itself. The application of the Source-Pathway-Receptor model, as used in the EIA, can be considered as reversed, in the context of the FRA, in that the water resources themselves are the potential 'sources' of effect. Nevertheless, the principle of the model is the same in that an effect is only considered if all three elements of the model are identified.

15.3.14 Using the FRA methodology, sites or development areas at risk are not assigned a 'value' as it is assumed that all areas affected by flooding are given equal consideration. PPS25 and now the NPPF simply require that Proposed Development should not increase flood risk elsewhere (i.e. no adverse effect) and should look to reduce flood risk where possible, thereby promoting beneficial impacts in the context of an EIA. Flood risk to the Proposed Development is assessed and measures identified to manage any negative adverse flood effects to the development itself. In the absence of an assigned 'value' for receptors, the scale of effects is based on a qualitative assessment of the likely magnitude of flood risk impacts.

15.3.15 More information on this specific methodology is outlined in the FRA (**Appendix 15.1**).

15.4 Baseline Conditions

Site Location and Background Relevant to Water Resources

15.4.1 Chapter 2 of this ES describes the Proposed Development in detail; however this section describes those specific aspects of the Proposed Development and its location which are relevant to water resources and the potential effects upon them.

15.4.2 The Application Site is located on the north-west fringe of Cambridge bounded by the M11, Madingley Road and Huntingdon Road. At present the site accommodates the University farm and out buildings, other University research facilities and arable farmland, which includes a site of special scientific interest (SSSI) and areas of ecological value.

15.4.3 The Application Site is located within the headwaters of the Washpit Brook (a tributary of the Cottenham Lode / Beck Brook catchment). The Washpit Brook flows in a north west direction through the southern area of the site and then along the western boundary and has a number of small field drains crossing the site discharging into it. It is classified as an Award Watercourse. Downstream of the Application Site it becomes designated as Main River.

15.4.4 From the Environment Agency's on line flood maps, the Application Site is located within Flood Zone 1 (low flooding probability) as defined by PPS25 and the Technical Guidance to the NPPF. However, a hydraulic modelling study undertaken on the Washpit Brook as part of the Application Site's Flood Risk Assessment has identified areas of the site adjoining the watercourse that appear to be in Flood Zones 2 and 3. These flood risk zones are associated with the predicted flooding extent from the Washpit Brook during a flooding event with a return period of 1 in 100 years (Flood Zone 3) and a flooding event with a return period of 1 in 1000 years (Flood Zone 2). There is a known flood risk to existing development at Girton and further downstream and it is therefore important that this risk is not increased as a result of the Proposed Development.

15.4.5 The Application Site geology is variable, broadly consisting of Head Deposits (mainly clays) in the south western half of the site and Head Gravels in the central northern to north eastern areas of the site overlying the Gault Clay Formation which forms the slopes to the Washpit Brook. In the eastern part of the Application Site, reworked Chalk Marl is locally present in a historic landfill area.

15.4.6 The Proposed Development will include approximately 3000 dwellings, student accommodation, research facilities, a primary school and nursery, hotel and a local centre.

Pertinent to water resources are the requirements to:

- provide a potable water supply to the Proposed Development;
- provide the collection, transmission, treatment and disposal of wastewater generated from the Proposed Development, including surface water runoff, without detriment to the environment;
- prevent pollution to the water environment and associated aquatic ecology as a result of construction of the Proposed Development and as a result of servicing the Proposed Development with respect to water supply, wastewater and surface water runoff.
- protect the Proposed Development from the risk of flooding; and
- ensure that flood risk elsewhere is not increased as a result of the Proposed Development by managing surface water drainage on site.

15.4.7 The Application Site is generally rural in nature and does not benefit to any great extent from existing water supply or wastewater infrastructure except to serve the local research and farm facilities belonging to the Applicant. Consideration has been given to the impact of providing new sustainable water services infrastructure to the development as part of this assessment. This ES has been informed by the Cambridge Area Water Cycle Strategy and the site specific FRA (see **Appendix 15.1**)

15.4.8 The information for the baseline conditions was collected from the following sources:

- Envirocheck report;
- Environment Agency website and information request ;
- Phase 1 Geo-environmental Ground Condition Report undertaken for the Application Site;
- North West Cambridge Utilities Statement
- Topographic survey of the Application Site;
- Water company information (taken from the site Water Cycle Study);
- Flood Risk Assessment undertaken for the Application Site
- Strategic Flood Risk Assessment;

Site Geology

15.4.9 The site geology is shown in **Figure 15.1** and summarised below. Further information is provided in the site specific Geo-environmental report (See **Appendix 8.2**);

15.4.10 Reference to the British Geological Survey 1:50 000 scale geological map of the area, Sheet 188 (Cambridge), indicates that the Application Site is underlain in part by Head Gravels and Observatory Gravels, which form a low ridge running north to south across the eastern part of the Application Site. These overlie the Lower Beds (Chalk Marl) of the Lower Chalk and the Gault Clay Formation with the Lower Greensand at depth. The Chalk Marl has been largely eroded and is only shown on the eastern part of the Application Site.

15.4.11 Although not shown on the geological map, the PBA report (2007) notes that it is possible that recent Alluvial deposits are present along the line of the Washpit Brook that flows north across the western part of the Application Site. In addition, it is anticipated that the Gault Clay is overlain by Head Deposits associated with reworking of the underlying strata by natural geomorphological processes whilst some Made Ground is also likely to be present at the Application Site associated with the historical quarrying.

15.4.12 Historically the Application Site has been used predominately for farming with locations of Prehistoric and Medieval activity. Extraction of gravel and Coprolite are known to have been carried out on the south-eastern part of the Application Site and may have also been carried out on the north-western part of the Application Site. Site investigation results indicate that these workings were backfilled with the excavated overburden material and locally with imported excavated natural materials. A historic landfill is located in the eastern part of the Application Site, which consists of the deposition of approximately 50,000m³ excavated natural materials between 1984 and 1986.

15.4.13 **Table 15.4** provides a summary description of the geology at the Application Site, which is based on British Geological Survey (BGS) map sheet 138 of Cambridge (British Geological Survey, 1992) and a Geotechnical Investigation undertaken by URS/Scott Wilson in August 2010.

Table 15.4: Description of Geology

Geological Unit	Description	Aquifer Status
<i>Topsoil</i> Encountered across the majority of the Application Site	Brown, locally clayey/silty, sandy ranging in thickness between 0.2m and 1.3m	Unproductive Strata
<i>Made Ground</i> In the south eastern corner of the Application Site and at the University of Cambridge Farm to the north. Related to previous and current development in the area	Brown silty sand, sand and gravel, soft to stiff brown and white sandy clay, including fragments of brick coal and plastic. Encountered at depths ranging from 0 to 0.3m and ranging in thickness ranging from 0.9m to 3.2m. Yellow brown silty sand and gravel. Gravel/fragments included in black ash and clinker. Encountered at a depth of 0.15m and found to have a thickness of approximately 0.25m.	Unproductive Strata
<i>Head Gravels and Observatory Gravels</i> Only encountered in the central northern to north eastern portion of the Application Site.	Dense (locally loose, medium dense and very dense) orange/brown locally silty gravelly sand, clayey sandy gravel or clayey/silty sand and gravel (gravel of chalk, flint). Encountered at depths ranging from 0.2 m to 3.4m and ranging in thickness from 0.10m to 4.00m (Not fully proven)	Secondary Undifferentiated Aquifer

Geological Unit	Description	Aquifer Status
<i>Head Deposits</i> Associated with reworking of the underlying strata by natural geomorphological processes. The general distribution is variable and intermittent.	Firm to stiff (locally very stiff) orange/brown/grey locally sandy, gravelly clay. Gravel comprises flint and chalk. Encountered at depths ranging from 0.2m to 6.1m and ranging in thickness from approximately 0.20m to 3.80m.	Unproductive Strata
<i>Chalk Marl</i> Identified in the far eastern portion of the Application Site. Naturally present in this area but likely to have been reworked following Coprolite extraction as it is directly underlain by Gault Clay and not by Cambridge Greensand.	Light grey locally clayey and sandy weathered Chalk. Deposits encountered at depths ranging from 0.40m to 0.50m and ranging in thickness from 0.70m to 3.25m with the deposits increasing in thickness with distance east.	Principal Aquifer
<i>Gault Formation (Grey Mudstone)</i> Encountered in most boreholes. It forms the slopes to the Washpit Brook and underlies head gravels and chalk mark to the centre and east of the Application Site, respectively.	Stiff to very stiff (becoming hard) grey/brown occasionally mottled orange brown desiccated clay with occasional calcareous nodules and locally occasional shell fragments. Encountered at depths ranging from 0.20m to 6.50m and not fully penetrated in any of the 25m long exploratory holes.	Unproductive Strata
<i>Lower Greensand Formation</i> Underlying Gault Clay	Not encountered during geotechnical investigation, which extended to a depth of 25m.	Principal Aquifer confined by the Gault Clay

15.4.14 Groundwater has been recorded at a depth of between 0.9m and 3.8m below ground level within the Head Gravels and Observatory Gravels, often in the lower part. Groundwater was also encountered at a depth of 2m in the Chalk Marl and only on one occasion within the Gault Clay at a depth of 19.45m rising to 17.95m. The inconsistent presence of shallow groundwater and variation in relative levels across the Application Site, suggest that encountered groundwater is largely indicative of perched water above the Gault Clay, and strongly influenced by seasonal fluctuations in rainfall and in the shorter term, can be affected by antecedent weather conditions.

15.4.15 The geotechnical information identifies that the natural ground conditions comprise Head Deposits and Head Gravels within the centre of the Application Site overlying the Gault Clay Formation, which forms the slopes to the Washpit Brook. The Gault Clay has a low permeability; therefore soakaways are unlikely to be feasible on the western portion of the Application Site. The Head Gravels are permeable and will generally be suitable for soakaways, except where shallow groundwater or Gault Clay is encountered.

15.4.16 On the eastern part of the Application Site, reworked Chalk Marl is locally present overlying the Gault Clay in the area of the historic landfill. Limited depths of Made Ground are present in the eastern portion of the Application Site, towards the south side, with areas of disturbed ground associated with historic Coprolite workings. The reworked chalk may be susceptible to solution; therefore soakaways are unlikely to be suitable on the eastern side of the site in the vicinity of the historic landfill.

Hydrogeology

15.4.17 The underlying Chalk Marl in the south east of the Application Site is classified as a Principal Aquifer. Although these deposits are classed as a Principal Aquifer, there is an absence of groundwater abstractions within vicinity of the site. The results of the groundwater assessment did not indicate a potential risk to the Chalk Marl via perched groundwater flow through the sand and gravel.

15.4.18 The underlying Head Gravels and Observatory Gravels in the north east and central areas of the Application Site are classified as a Secondary Undifferentiated aquifer. Although these deposits are classed as a Secondary Undifferentiated Aquifer, there is an absence of groundwater abstractions from this strata within vicinity of the Application Site. Groundwater contained in the secondary aquifer is likely to support flow to the surface water ditches that run across the site, including the Washpit Brook and there is therefore potential for pollutants to be transmitted to the groundwater.

Groundwater Classification

15.4.19 Groundwater used for drinking water is protected by the Environment Agency. The Environment Agency classifies zones known as Source Protection Zones (SPZ) around potable water supply abstraction boreholes. There are four zones defined: Zone 1 – the Inner Protection; Zone 2 – Outer Protection Zone; Zone 3 – Total Catchment; and, a Zone of Special Interest. There are differing restrictions on the type of developments that can be located that depend on which SPZ the Application Site is located in.

15.4.20 Although the Major Aquifer (Lower Greensand Formation) is utilised for public supply, the Application Site does not lie within a Source Protection Zone owing to the lack of hydraulic connectivity between this aquifer and the ground surface at the site. Therefore the Application Site is not underlain by any Groundwater Protection Zones.

Existing Surface Water Drainage Features

15.4.21 There are several existing surface water features on the Application Site and close to the site boundary as shown in **Figure 15.2**. The Washpit Brook and the local ditches that drain into it are all located within the western half of the Application Site. There are also two ponds in the same area, one medium size and one small pond; however, both are located immediately outside the site boundary to the west. There are no surface water features e.g. ditches etc evident in the eastern half of the Application Site except for a single small pond, Pellow's Pond, which is associated with the Agronomy Centre at the University. This land drains generally in a north east direction away from Washpit Brook.

Washpit Brook

15.4.22 The Washpit Brook is not designated as Main River within the vicinity of the Application Site but is classified as an Award Watercourse (to South Cambridgeshire District Council for maintenance purposes). There are no flood defences or significant structures within the Application Site.

Hydrology

15.4.23 Towards the upstream limit of the Washpit Brook, there is no single fixed channel, but a number of small field drains that eventually form the Washpit Brook. The Cambridge City SFRA suggests that the watercourse forms the Washpit Brook in the proximity of the Pheasant Plantation near the Cambridge City Boundary. Upstream of the Pheasant Plantation, the Cambridge City SFRA suggests that one of these field drains is known as the Madingley Road Ditch. This ditch is the main upstream extension of the Washpit Brook through the Application Site and therefore for the purposes of this study, the reach referred to as the Washpit Brook includes the Madingley Road Ditch.

15.4.24 A number of culverts and bridges allow access across the Washpit Brook throughout the Application Site. An attenuation feature is located to the south of the Application Site, which accommodates runoff from a Park and Ride facility and discharges into the Washpit Brook

15.4.25 The Washpit Brook has a predominately rural catchment, which has a total catchment area of approximately 4.5km², from the lower reaches of the Application Site. This includes various catchments that are located beyond the site boundary to the west of the M11 motorway, which contribute to flow within the reach of the Washpit Brook that passes through the Application Site via several culverts under the motorway.

15.4.26 Downstream of the Application Site, the Washpit Brook passes through an area heavily congested with infrastructure, as the watercourse flows beneath the M11/A14 Interchange. This 400m reach of the Washpit Brook flows through three culverts/bridges before flowing back into an area used for agriculture and on towards Girton.

Water Quality

15.4.27 No River Quality Data is available from the Environment Agency for the brook.

15.4.28 No information is available regarding the water quality of the ponds on the Application Site which will be retained.

Abstractions

15.4.29 There are no groundwater or surface water abstractions that are currently in use within 1 km of the Brook or the Application Site.

Discharges

15.4.30 There are no known consented discharges to the Washpit Brook within the vicinity of the Application Site.

Existing Surface Water Sewers

15.4.31 The Application Site is currently considered to be a Greenfield site, and as such there is no public surface water drainage infrastructure within the Application Site boundary. There are 225/300mm diameter public surface water sewers in the vicinity of the Application Site located in Huntingdon Road, Storey's Way, Lansdowne Road and Madingley Road.

15.4.32 The Flood and Water Management Act provides powers for the sewerage undertaker to adopt existing private surface water drains and foul sewers that are connected to existing adopted sewers from 1st July 2011. Private surface water drains and foul water sewers that serve the existing properties on the Application Site will therefore be transferred to the Sewerage Undertaker on the 1st October 2011.

15.4.33 Limited records are available to define the location of private drainage on the Application Site that will be transferred to the sewerage undertaker. However, the 1923 Conveyance indicates the presence of a 150mm diameter drain located in the north-eastern corner of the Application Site, which is referred to as the 'Huntingdon Road Drain'. The existing drain passes below an existing residential dwelling on Huntingdon Road and the 1923 Conveyance granted the applicant the right of free and uninterrupted passage, including running of water through this existing outfall, and it also allowed the right to enter Trinity College's land to access the outfall drain for the purposes of repairing, cleansing and renewal.

Existing Foul Sewers

15.4.34 The Application Site is not connected to any public foul (wastewater) drainage or combined drainage infrastructure within the Application Site boundary. There are combined public sewers within the vicinity of the Site i.e. located in Huntingdon Road, Storey's Way, Lansdowne Road and Madingley Road. These are described in paragraph 16.4.34 of this ES.

Existing Public Water Supply

15.4.35 There are no potable water supply mains located within the site boundary; however, there are water supply mains servicing existing development along Madingley Road and Huntingdon Road (via Cambridge Water Company).

Flood Risk

15.4.36 The flood map for the area published by the Environment Agency, which is replicated in **Figure 15.3**, indicates that a very small section of the northern part of the Application Site immediately adjacent to the Washpit Brook is partly located in Flood Zone 2 and 3 as a result of predicted flooding from the watercourse. No detailed modelling had previously been undertaken of the Washpit Brook through the Application Site.

15.4.37 A hydraulic modelling study has been undertaken as part of the FRA to determine the likelihood of flooding on site and to define a more realistic flood extent for the 1 in 100 year (with an allowance for climate change) and the 1 in 1000 year flood event. **Figure 15.4** shows the extent of flooding derived by the baseline hydraulic modelling study.

15.4.38 The modelling of the existing Washpit Brook showed that the predicted flood extent during all events is greater than that shown on the EA flood map.

Water Resource Status

15.4.39 The Cambridge Area WCS has defined the water resource availability of the groundwater and surface water. This study concludes that the underlying Greensand Formation aquifer is fully committed and classified as over-licensed/no water available and as such does not have available resource for further abstraction.

15.4.40 The Environment Agency (2001) identifies the Anglian Region as being the driest region of England and Wales. On average the region receives just less than 600 mm of rainfall per annum. Evaporation from vegetation reduces this amount by approximately 450 mm a year, to give only 150 mm per annum of 'effective rainfall' to replenish aquifers and to maintain river flows.

15.4.41 The Application Site lies within an area which is defined by the Environment Agency as being under serious water stress (Environment Agency, 2007).

Summary of Importance of Water Resource Receptors

15.4.42 The various water resources that could be impacted by the Proposed Development have each been assigned an importance value in order that they can be assessed for potential effect and significance of effect (as outline in Section 15.3). The summary of importance of each receptor is outline in **Table 15.5**.

Table 15.5: Importance of receptors

Receptor	Importance	Reason
Washpit Brook	Medium	A small tributary in the Cottenham Lode catchment. There are no data about the water quality of this watercourse. It is likely that the water quality may have been affected by diffuse pollution sources such as highway surface water runoff and field runoff contaminated with chemical pesticides and fertilisers spread onto the fields. It is considered that the watercourse is unlikely to be of national or regional importance and due to its present function, draining agricultural fields, is unlikely to have high water quality. However, the watercourse may be important to local wildlife and as such the watercourse has been assigned a value of Medium on a precautionary basis.
Drainage Ditches	Medium	The drainage ditches that are present on site do not have any data to determine the baseline but are likely to have relatively poor water quality and are unlikely to be significant at the regional or national level. However, as they are connected to the Washpit Brook and may form an important ecological habitat and they have been assigned an importance of Medium.
Drainage Ponds	Medium	The ponds situated on and immediately adjacent to the Application Site are likely to have relatively poor water quality and are unlikely to be significant at the local, regional or national level. They are not considered to be connected to Washpit Brook; however, they form an important ecological habitat and these water features have therefore been assigned an importance of Medium.
Head Gravels and Observatory Gravels	Medium	These are classified as a Secondary Undifferentiated Aquifer and are generally designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. There are no known abstractions and hence is not significant at the local, national or regional level. Groundwater from the gravels may contribute to the baseflows of the Washpit Brook and has therefore been assigned a value of Medium.

Receptor	Importance	Reason
Chalk Marl	Medium	The Chalk Marl has been reworked on the Application Site as a result of previous mining activity. It forms the Western extremity of the outcrop, regarded by the EA as a Principal Aquifer. There are no known abstractions currently in operation and there are no known pathways from this aquifer to the Major Aquifer of the Greensand at depth below it. It is not considered to be of high importance and as such the aquifer has been assigned a value of Medium.
Lower Greensand Formation	High	This is a deep Major Aquifer but is confined by the Gault Clay above it so is not regarded as being at risk from the effects of the Proposed Development. Because of the scarcity of available water resources in the region, the importance of water resource availability has been assigned a value of High.

15.5 Measures to Avoid or Manage Significant Effects

15.5.1 Chapter 2 of this Environmental Statement summarises the mitigation measures that are proposed for the whole development. The mitigation measures that are proposed to specifically address hydrological, drainage or flood risk effects are summarised below.

Surface Water Management Strategy

15.5.2 A surface water management strategy has been developed as part of the site specific FRA, which incorporates a cascading system of Sustainable Urban Drainage Systems (SuDS) to attenuate and improve the quality of runoff. Long Term Storage will also be provided in the form of infiltration systems, in areas of uncontaminated land where the highest seasonal groundwater table is at least 1.2m below the base, or storage devices that will enable runoff to be discharged at a rate not exceeding the mean annual flood rate, QBar, or 2l/s/ha, whichever is the lesser. The Long Term Storage devices will ensure that the volume of water discharged to the Washpit Brook will not be increased by the Proposed Development.

15.5.3 The surface water management system has been initially sized to ensure that the rate and volume of surface runoff discharged from the site will not be increased above current greenfield runoff rates for all events up to and including the 1 in a 100 year event, with an allowance for climate change. This approach will ensure that no development downstream of the site will be at an increased risk of flooding during rainfall events with a return period of up to 1 in 100 years including climate change and thereby complies with the requirements of PPS25, the NPPF and all regional and local policy on flood risk.

15.5.4 Surface water runoff from the Application Site will be separated into two separate components, namely roof run-off and runoff from roads and other paved areas. The FRA, which is contained in **Appendix 15.1**, describes how the roof runoff will either be attenuated at source using green roofs, or it will be directed to an underground collection tank by each dwelling to be used for internal uses such as flushing toilets and for external uses such as gardening and car washing. Excess clean roof runoff will be discharged to swales or surface water sewers and attenuated in the retention ponds before ultimately being discharged to the Washpit Brook. Where ground conditions permit, these 'clean' excess flows could be discharged to soakaways within the Head Gravels on the Application Site.

15.5.5 Road runoff, and runoff from other hardstanding areas will be collected and attenuated locally using source control features such as swales, porous paving, filter drains and underground cellular storage units on steeply sloping development parcels. Swales and surface water sewers will be provided to convey the attenuated discharge to site control features, including retention ponds and linear wetlands that will be situated adjacent to the Washpit Brook at the downstream end of each individual catchment. These site control features have been sized initially to ensure that there is adequate retention time in the pond to allow sediments and other pollutants to settle out before discharging to the watercourse. This approach will ensure that runoff from surfaces that are at risk from pollution from hydrocarbons (e.g. roads, driveways and car parks) will be discharged from the Application Site following two levels of treatment. The runoff

from surfaces that are not at risk of pollution from hydrocarbons will be discharged from the Application Site following one level of treatment.

15.5.6 The use of above ground drainage will be prioritised, particularly on the west side of the site where the existing ground falls towards the Washpit Brook. Underground drainage will be required, particularly within the eastern portion of the site to ensure surface water is effectively drained away from domestic dwellings and non-domestic buildings, as there is insufficient gradient to drain surface water and the potential to infiltrate surface water is limited by the presence of reworked chalk.

15.5.7 The Proposed Development is located adjacent to existing residential areas and there is therefore currently potential for surface runoff to be transferred between the peripheral areas of the existing residential development and the Application Site. Furthermore, the Cambridge and Milton Surface Water Management Plan indicates that the eastern portion of the Application Site extends into the Bin Brook wetspot and that there are properties with a medium risk of flooding adjacent to the northern and eastern site boundary. The surface water management strategy that is described within **Appendix 15.1** and presented on Drawing Reference D127313-500-102 and 103 within this Appendix indicates that surface runoff from proposed impermeable areas overlying areas of land that overlie impermeable clay or reworked chalk, which fall towards the wetspot, will be intercepted and either recycled within the proposed buildings or attenuated within Long Term Storage devices and discharged via the proposed surface water drainage network to the Washpit Brook at a rate not exceeding the lesser of Q_{bar} or 2l/s/ha for rainfall events with a return period of up to 1 in 100 years. The surface water management strategy also indicates that surface runoff from proposed impermeable areas overlying gravel within the catchment that falls towards the wetspot will be discharged to ground via infiltration devices, wherever possible, in order to mimic the existing drainage regime. Filter strips will be provided along the boundary of the proposed development to intercept runoff from the peripheral areas of the existing residential development in order to reduce the risk of surface runoff ponding at the boundary. This surface water management strategy will effectively control runoff that is discharged from the Application Site towards the wetspot and existing watercourse that extends adjacent to Thornton Road and Wellbrook Road and will thereby potentially reduce flood risk to the peripheral areas of the existing residential development.

15.5.8 The permissible greenfield runoff rates presented on Drawing Reference D127313-500-108, which is contained with **Appendix 15.1**, specifically exclude the catchment that falls towards the wetspot; therefore the surface water management strategy will not cause the rate of runoff being discharged to the Washpit Brook to be increased. The runoff from roof areas within the catchment that falls towards the wetspot will be stored separately to runoff from other areas so that it may be recycled within dwellings in order to reduce the volume of runoff that would be discharged when compared to a conventional development and thereby ensure that the volume of runoff being discharged to the Washpit Brook will not be increased through the inclusion of the catchment that falls towards the wetspot.

15.5.9 As part of the on-going operation and maintenance of the Proposed Development, the Sustainable Drainage Systems will be routinely cleaned and maintained to ensure they are operating effectively.

15.5.10 The surface water management strategy will ensure; firstly, that rate and volume of surface water runoff will not be increased by the Proposed Development for rainfall events up to an including the 1 in 100 year event; and secondly, that significant levels of contaminants from road surfaces and car parking areas will be removed before the surface water is discharged to ground or to the receiving watercourse.

Flood Alleviation Strategy

15.5.11 The Environment Agency Flood Map identifies the potential for significant flooding within Girton at the confluence of the Washpit Brook and Beck Brook, which is situated approximately 2km downstream of the site, and nine properties on Dodford Lane were believed to have flooded on 21 October 2001.

15.5.12 The hydraulic modelling for the existing Washpit Brook indicates that nearly all the predicted Flood Zone 2 and Flood Zone 3 envelopes occur in what are planned to be open land areas. However, the parameter plans indicate that a very small area of two development parcels that will be developed during the 2026 assessment year could extend into Flood Zone 2 and 3, if the watercourse is unaltered.

15.5.13 As a precautionary measure, to reduce flood risk to, and from, the Application Site, the Proposed Development includes an online flow control structure within Washpit Brook and a two stage channel capable of storing attenuated flood waters. This would enable the peak flows downstream of the

Application Site to be reduced for a range of return periods and for excess flow to be stored within the landscaped areas of the Proposed Development. Earthwork bunds are proposed as a landscape design feature on the western edge of the Proposed Development, which have been designed to assist in the storage of floodwater. Hydraulic modelling, which is contained within **Appendix 15.1**, indicates that with these measures in place, peak flows downstream of the Application Site may be reduced by up to 25% and 10% for rainfall events with return periods of 1 in 20 and 1 in 100 years, respectively. The entire built development has been assessed as being located in Flood Zone 1, with the exception of one development block, which is partially located in Flood Zone 2. **Figure 15.5** shows the extent of flooding derived by the hydraulic modelling study after allowing for the effects of the measures described above.

15.5.14 The proposed flow control structure will create a positive head gradient, by retaining floodwater upstream. With respect to the risk-based approach identified in the Flood and Water Management Act 2010 for reservoirs, model simulations were investigated to determine the maximum difference in head across the flow control structure. This was found to occur under the 1 in 1000 year event, where a head difference of only 0.37m was observed. The proposed flood storage area created by the landform of the Proposed Development and by the inclusion of control structures is not considered to introduce any significant risk, with only a small difference in head across the flow control structure. In the unlikely event that any water storage elements within the landform were to fail, the M11 slip road embankment, located at the downstream extent of the site would still constrict the flow and contain floodwaters upstream and any released floodwaters would discharge slowly from the site, throttled by the culverts beneath the highway infrastructure.

Refined Flood Alleviation Strategy

15.5.15 The physical improvements to the Washpit Brook, which are proposed to assist in the attenuation and storage of floodwater, also provide opportunities for the enhancement of the existing landscape and for the creation of new and improved ecological habitats. An Addendum to the Flood Risk Assessment has been included as part of this ES as **Appendix 15.2** to provide further detail of the proposed works to the Washpit Brook and thereby demonstrate one way in which the proposed flood water management, ecological and landscape design may be effectively combined.

15.5.16 The Addendum to the Flood Risk Assessment indicates that additional low flow channels could be provided to enable floodwater to be effectively distributed within the second stage channel. These additional channels could be designed to provide more valuable habitat for water voles than is currently present, as a steep bank and planting shelves may be provided to enable the length and diversity of bankside habitat to be increased. Linear ponds could also be constructed along the route of the additional channels to create valuable new ecological habitats for amphibians and invertebrates. These ponds could be positioned immediately downstream of outfalls from proposed Sustainable Drainage Systems to ensure that they are topped up frequently and may act as refuges for wildlife during maintenance of the main channel. The Addendum to the Flood Risk Assessment also demonstrates that the proposed improvements to the Washpit Brook may effectively preserve existing vegetation and ecological habitats, as the majority of existing mature trees alongside the northern half of the brook will be retained, and the alignment of the brook may be retained where it currently holds water and supports aquatic vegetation.

15.5.17 The flood alleviation scheme is directly influenced by the proposed enhancements and a new hydraulic model has been developed. This hydraulic model has been used to determine whether the refined flood alleviation scheme will be capable of reducing flood risk as proposed within the original Level 3 FRA. Use of the model has demonstrated that the refined flood alleviation scheme offers the same opportunities as that outlined in the original Level 3 FRA concerning reductions in peak flow discharged from the site and opportunities to develop the Application Site outside the areas at risk of fluvial flooding. **Figure 15.6** shows the refined extent of flooding derived by the hydraulic modelling study after allowing for the ecological and landscape features that are described above.

Restriction of Construction Activities within the Floodplain

15.5.18 The hydraulic modelling studies undertaken as part of the FRA defines the extent of flooding for a range of flood events, up to and including the 1 in 1000 year event. Construction activities, such as the construction of buildings or raising of ground levels, will not be permitted within the 1 in 100 year floodplain, including an allowance for climate change, unless flood compensation storage is provided to ensure that

the floodwater discharge is not increased downstream. Any such scheme would need to be agreed with the Environment Agency.

15.5.19 A number of existing culverts are situated along the route of the existing Washpit Brook to permit farm vehicles to gain access to the land located on the western side of the watercourse. The existing culverts cause the conveyance capacity of the watercourse to be locally restricted and they will either be retained, or equivalent hydraulic structures will be provided, to ensure that the Proposed Development does not increase flood risk downstream.

Potable Water Demand Reduction Strategy

15.5.20 The Proposed Development will require considerable potable water resources. The deep underlying major aquifer in the Cambridge area is fully committed and classified as over-abstracted and any abstractions from this are likely to have an effect on resource availability and the WFD status of the aquifer.

15.5.21 The following measures will be incorporated into the Proposed Development to reduce overall water demand from dwellings and non residential buildings and to allow potable water to be replaced in order to minimise additional stress that the Proposed Development will exert upon the available local and regional water resources:-

- Water efficiency measures;
- Visible water meters;
- Rainwater harvesting; and
- Greywater recycling.

15.5.22 These measures are described in more detail in Chapter 16 of this ES and could permit potable water demand to be reduced to approximately half when compared to current annual potable water consumption figures. The proposed potable water demand reduction strategy will therefore ensure that the new homes comply with Level 5 and 6 of the Code for Sustainable Homes.

15.5.23 The Phase 1 Water Cycle Strategy for Major Development Areas in and around Cambridge states that strategic plans for meeting the future demand over a 25 year period are detailed within the Cambridge Water Companies Water Resource Management Plan 2009 and that detailed design of schemes defined within this plan will be undertaken when funding has been granted by OFWAT. The Phase 1 Water Cycle Strategy indicates that the use of compulsory metering, and provision of new developments that comply with the requirements of the Code for Sustainable Homes to minimise additional water demand, will cause the potable water demand to increase by 5 MI/d, which equates to an increase of 15%. The Water Resource Management Plan indicates that the Cambridge Water Resource Zone has capacity within the licensed abstractions for the forecast development and natural growth; therefore the Proposed Development may be accommodated within the existing headroom.

15.5.24 The Phase 2 Water Cycle Strategy for Cambridge and the surrounding Major Growth Areas indicates that by incorporating water efficiency into new developments, the need for additional water resources will be minimised and that the burden on the finite water resources in the environment will be reduced. This strategy assesses the requirements to build new homes at CSH level 3/4 or 5/6, and it has assumed that after 2016 all new homes will be built to CSH level 5/6. Based on this approach, approximately 8.6 MI/d of additional water will be required to serve the major growth sites in and around Cambridge. To meet CSH level 5/6 will require progressive implementation of greywater recycling (GWR) and/or rainwater harvesting (RWH) systems at either a household or community scale, in addition to implementation of water efficient appliances and changes in consumers' behaviours and attitudes towards water consumption. Cambridge Water Company's (CWC) final Water Resource Management Plan (WRMP10) identifies that there is no immediate threat to water resources within the Cambridge Water Resource Zone, and that there is capacity within its current licensed abstractions for the forecast development. The forecast population used by CWC assumes that average build rates are closely aligned with the Regional Spatial Strategy (RSS) (now revoked), though total numbers predicted exceed the RSS target by 60%, based on historical data and the water company's experience. It must also be noted that the WRMP10 continues to 2035, whereas the RSS was only to continue to 2031. There is currently no supply-demand deficit within the CWC WRZ, and the WRMP10 indicates no immediate threat to water resources.

Wastewater Treatment

15.5.25 Due to the scale of the Proposed Development, there would be a significant volume of wastewater generated by domestic and non-domestic uses requiring treatment and discharge. Anglian Water (AW) has been consulted on the Proposed Development and has indicated that the discharges should be directed to the Cambridge WwTW. AW has confirmed that there is significant capacity within the existing works in relation to the treatment of wastewater.

15.5.26 The Phase 1 Water Cycle Study by Halcrow (October 2008), which considers the cumulative effect of all major growth areas in and around Cambridge, confirms the available treatment capacity as it states that there is capacity to accommodate the increased flow from the Proposed Development and other strategic growth sites. This strategy also states that the discharge consent at Cambridge WwTW will not require revision to accommodate the increased flow from the infill or strategic development sites within Cambridge. However, improvements will be required to the treatment works in order to maintain the quality of the effluent discharged to the River Cam due to the resulting increase in actual flow and to satisfy the requirements of the Water Framework Directive. These improvements will include increasing the hydraulic capacity of the inlet works and increasing the treatment capacity. Anglian Water will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP6 (2015 – 2020). This approach will ensure that the Proposed Development will not cause there to be a reduction in water quality (e.g. reduced dissolved oxygen and elevated nutrient concentrations) in the River Cam due to increased discharges from the Cambridge Sewage Treatment Works and will thereby ensure that the Proposed Development will not cause the balance of aquatic species and overall biodiversity within the River Cam to be affected or for the WFD classification, RQO status or EU Designation of the watercourse to change.

16.1.1 The Phase 2 Water Cycle Strategy confirms that no consent change is required for ammonia to ensure no deterioration of the current WFD status downstream of the treatment works at Cambridge WwTW, up to and including 2031. However, the BOD consent will require marginal tightening, and a revised phosphate consent would be required. In the foreseeable future, consent limits will be set with a view to meeting the requirements of the Water Framework Directive (WFD) whose aim is to ensure that good river quality standards are met throughout each waterbody. The intention will be to set the discharge consent limits based upon the flow quality and dilution rates of the receiving watercourse and the volume of wastewater effluent at the point of discharge. To maintain water quality in the watercourses, the consent standards in the future on the effluent discharges from the Cambridge WwTW will need to be periodically reviewed by the EA. Improvements to the treatment works will be required as the new developments come on stream to maintain the current discharge consent standards. This has been accepted by Anglian Water and planned for in their future AMP6 programme. Therefore, water quality environmental capacity and WFD compliance should not be a constraint to growth at Cambridge WwTW.

Groundwater Protection Measures

15.5.27 Wastewater generated by the Proposed Development will be discharged via the Cambridge Sewage Treatment Works; therefore it will not affect groundwater

15.5.28 As the Proposed Development is mainly residential and university facilities, there are unlikely to be significant volumes of fuels and/or chemicals stored on-site. However, bunded, lined, containment areas will be provided within the development to accommodate small quantities of petroleum, oils and other hydrocarbons that could be used for machinery. The containment areas will be situated away from underlying aquifers, watercourses and flood flow routes to ensure that the hazardous material will not be conveyed to groundwater or the nearby watercourse. Where oil is stored on site, it should be stored in accordance with the Control of Pollution (Oil Storage) (England) Regulations.

15.5.29 15.5.18 During construction, there is an elevated risk of leaks or accidental spillage of hazardous substances (e.g. fuels) used on-site. A site Construction Environmental Management Plan (CEMP) will be developed to minimise the potential for accidental spill or leakage to migrate and contaminate the underlying groundwater, Washpit Brook or proposed ponds. The following list shows measures that should be put in place via the CEMP to prevent pollution and would confirm to the best practice policy proposed by the EA via the PPGs:

- the handling, use and storage of hazardous materials to be undertaken in line with the EA's Pollution Prevention Guidelines (e.g. PPG2 Above Ground Oil Storage Tanks);
- adequately bunded and secure areas with impervious walls and floor for the temporary storage of fuel, oil and chemicals on site during construction;
- drip trays to collect leaks from diesel pumps or from standing plant.
- oil interceptor(s) fitted to all temporary discharge points and for discharge from any temporary oil storage/ refuelling areas;
- development of pollution control procedures in line with the EA's Pollution Prevention Guidelines, and appropriate training for all construction staff;
- provision of spill containment equipment such as absorbent material on site.
- restrictions on use of machinery near adjacent water bodies;
- the treatment of any development site runoff with elevated suspended solids prior to discharge. As outlined in the Drainage Strategy approval will be obtained from the EA for any discharges to controlled waters. Treatment measures could include perimeter cut-off ditches, settlement lagoons, overland flow and/or settlement tanks;
- wheel wash facilities should be provided for vehicles moving to and from the construction site at all entry and exit points. Silty water from wheel-washes will require appropriate disposal to prevent unacceptable levels of suspended solids entering any nearby surface water bodies. As noted above, any disposal of surface water generated on site during construction to controlled waters will require consent from the EA. Wheel washing facilities should be located as far from surface waters as possible;
- if dewatering is required along any part of the construction corridor, pumped groundwater should be disposed of appropriately according to EA Pollution Prevention Guidelines;
- the reseeded of cleared land as soon as practicable, to minimise exposed land and the entrainment of sediment by overland flow; and
- this can be managed by ensuring construction plant/ materials are stored on hardstanding surfaces where possible. Where this is unavoidable, the Contractor will ensure any compacted soil is loosened as soon as possible following completion of the works; and
- temporary structures/crossings over the Washpit Brook should be designed to the appropriate standard; thereby ensuring flood risk is not exacerbated on site or to downstream areas.
- Best practice during construction as defined within CIRIA C698 site handbook for the construction of SuDS to ensure that construction works do not adversely effect the subsequent performance of SuDS that are provided to attenuate and improve the quality of surface runoff from the proposed development.

15.5.19 Emergency response procedures will also be developed for the Application Site, setting out procedures to follow in the event of an accidental spill or leakage, with spill containment kits maintained in areas of bulk storage.

15.5.30 The aforementioned Pollution Prevention Measures and good construction practices will ensure that any oils, hydrocarbons or hazardous materials stored on site will not leak onto the ground surface and thereby ensure that there is no pathway for contaminants to affect the aquifer contained within the Head and Observatory Gravels and Chalk Marl that underlie the eastern and northern portions of the site. These techniques will also ensure that surface water bodies and associated ecosystems are protected where there is a hydraulic connectivity between these bodies and the groundwater.

15.6 Likely Significant Effects

15.6.1 This section identifies the likely significant effects to hydrology, drainage and flood risk as a result of construction of the development and operation of the Application Site once completed. Mitigation measures are identified and the significance of the effect once mitigated is assessed.

Effects during Construction

15.6.2 This section is concerned with likely significant effects from the construction phase of the Proposed Development. They are all considered to be temporary and the main effects are likely to be related to the following:

- disturbance/clearance of land resulting in elevated suspended sediments in site run-off draining to nearby surface water;
- compaction of land result resulting in increased surface run-off, which may temporarily increase flood risk elsewhere;

Elevated levels of Suspended Sediments in Surface Runoff due to Disturbance and Clearance of Land

15.6.3 The most significant risk to local surface water bodies during construction is from development site run-off containing elevated suspended sediment levels. This can result from land clearance, movement and storage of materials to and from the development site, and from other construction activities (for example wheel washing). These activities will be prevalent when the site is prepared for construction and during the construction of the different development phases. High sediment input can have direct adverse effects on adjacent surface watercourses through increasing turbidity and by smothering vegetation and bed substrates. Indirect adverse effects can also be associated with suspended sediments that have associated inorganic or organic contaminants (e.g. pesticides). The magnitude of any effect will, however, depend on the scale and nature of any potential incident.

15.6.4 The attenuation ponds that will be provided as site control features to control the rate and volume of runoff from each sub-catchment will be constructed in advance of the associated development to ensure that flood risk is not increased during the construction phase. Temporary sediment traps and barriers will also be employed upstream of these ponds to intercept suspended solids that could result from the disturbance and clearance of land during the construction phase before they enter the ponds as defined within CIRIA C698 site handbook for the construction of SuDS. This mitigation will ensure that surface runoff containing elevated levels of suspended solids will not be conveyed to local surface water bodies.

Increased Surface Runoff due to Compacted Land or Development Construction Works

Haul roads will be provided to accommodate the movement of vehicles and heavy plant during the construction phase in order to remove the potential for soil to be compacted and for the runoff rate to be increased due to the soils decreased permeability. Surface water runoff from haul roads will be intercepted and conveyed via appropriate sediment removal traps and oil interceptors to attenuation ponds that will restrict the rate and volume of runoff to greenfield rates enabling sediment and hydrocarbon contaminants to be removed, as defined within CIRIA C698 site handbook for the construction of SuDS. This would prevent increases in the volume of run-off from the Application Site during rainfall events and any consequential effects on properties in Girton downstream of the Application Site.

Effects during Operation

15.6.5 The development will be constructed in phases. For each phase, the SuDS will be designed and constructed such that they will not increase the flood risk downstream nor pose a flood risk to the development itself.

15.6.6 Most of the effects from the operational phase of the Proposed Development are likely to be permanent. However, they will be mitigated as they would otherwise continue for the duration of the Proposed Development's lifespan.

15.6.7 During operation in the 2014 and 2026 assessment years, the main effect is likely to be related to the following:

- a potential reduction in surface water flows or groundwater levels in some parts of the region around Cambridge and potential increased stress levels on the deep aquifer due to increased abstraction to provide the potable water supply to the Proposed Development;
- creation of improved ecological habitats in the form of steep sided banks, planting shelves and linear ponds along the route of additional low flow channels that will enable floodwater to be effectively distributed within the second stage channel.

15.6.8 During operation in the 2026 assessment year, additional effects are likely to be related to the following:

- construction of development within Flood Zone 2, which is assessed as having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding, causing Flood Risk to the Proposed Development marginally to be increased
- use of herbicides and fertilisers in routine maintenance of agricultural areas will be reduced by the Proposed Development and could cause the nutrient and toxic concentration in surface runoff to be reduced thereby potentially reducing the likelihood of localised contamination of nearby surface or groundwater;

Reduction in Surface Water Flows or Groundwater Levels and effect on the Deep Aquifer due to Development Water Demand

15.6.9 The Proposed Development will incorporate water efficiency measures in addition to rainwater harvesting and greater recycling devices to permit the potable water demand to be approximately halved when compared to current annual potable water demand consumption figures. However, the Proposed Development will impose an additional demand on the existing water resources and additional water resources will be required to permit the full demand of the Proposed Development to be accommodated.

15.6.10 Calculations have been prepared to estimate the potable and non potable water demand of the Proposed Development, which indicate that the total water demand in 2014 will be approximately 300m³/day, comprising approximately 220m³/day potable water and 80m³/day non potable water. The total water demand for the full quantum of Proposed Development in 2026 is estimated to increase to approximately 1,500m³/day, comprising approximately 1,100m³/day potable water and 400m³/day non potable water.

15.6.11 Cambridge Water Company have confirmed that water is available within their planned resource to serve the Proposed Development, providing that the local water supply network is reinforced through the provision of a new 450mm diameter ring main that would extend through the Application Site. The proposed ring main would extend over a length of at least 3.2km from the existing 18" mains that are located at a distance of 1.5km and 2km to the south of the site near Charles Babbage Road and Barton Road to the existing 18" water main that is located near the Histon Road/Kings Hedges Road junction, near the Histon junction of the A14 trunk road.

15.6.12 Two alternative routes have been identified for the ring main. The preferred route has been identified by Cambridge Water Company and involves using powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. The alternative route extends along the existing road network, including Barton Road, Grange Road, Madingley Road, Huntingdon Road, Oxford Road and Histon Road. The effects of these alternative routes are assessed within Chapter 16.

15.6.13 The use of rainwater harvesting and greywater recycling will reduce the potable water demand in order to comply with Level 5 and 6 of the Code for Sustainable Homes. Nevertheless, Cambridge Water Company has indicated that network reinforcement will still be required as there is limited capacity within the existing potable water network situated within close proximity to the Application Site. The provision of this network reinforcement will be of more general benefit and improve capacity within the local area.

Construction Works within Flood Zone 2 and implications for Flood Risk to, or from, the development

15.6.14 Although nearly all the predicted Flood Zone 2 and Flood Zone 3 extents occur in what are planned to be open land areas, the parameter plans indicate that a very small area of one development parcel that will be developed during the 2026 assessment year could extend into Flood Zone 2.

15.6.15 The proposed type of development in this particular block is classified as being 'More Vulnerable' within Table D2 of PPS25 (Table 2 of the Technical Guidance to the NPPF); however, Table D3 of PPS25 (Table 3 of the Technical Guidance to the NPPF); states that all but 'Highly Vulnerable' development types are appropriate in Flood Zone 2; therefore the development is considered to be in compliance with the requirement of PPS25 and the NPPF and an Exception Test will not be required for the development block.

15.6.16 By applying a sequential test approach to the land use on this development parcel, the least vulnerable development will be located in the flood risk areas; therefore the effect of flood risk to the development will be negligible. This will be achieved by allocating open spaces, landscaped areas or car parking, to the region of the block affected by flooding. All main buildings would mainly be located within Flood Zone 1 (rather than Flood Zone 2). Safe and dry access is available from the site by foot or by vehicle.

Reduced Likelihood of Contamination due to reduced use of Herbicides and Fertilisers

15.6.17 The use of herbicides, pesticides and fertilisers for agricultural uses on the existing undeveloped site could cause contamination of nearby surface waters if used excessively and leaching from soil occurs during heavy rain. Fertilisers are typically high in nutrients; hence this could cause eutrophication (excessive nutrient concentration in waters) of Washpit Brook if leached during rainfall. Herbicides and pesticides are toxic in certain concentrations and hence they have the potential to cause mortality to aquatic life if they leach into watercourses. The Proposed Development will cause the concentration of herbicides, pesticides and fertilisers to be reduced as the Application Site will no longer be farmed.

15.6.18 Landscaped areas within the Proposed Development will only require minimal and infrequent use of herbicides. Although the concentrations of nutrients generated will be small, it is proposed that applications be undertaken during dry periods, and in accordance with EA guidelines. By adhering to the various mitigation measures mentioned above the Proposed Development will meet the requirements of the various policies and regulations and will comply with local and national planning requirements related to water resources.

Table 15-6: Magnitude and Significance of Effects after Mitigation

Potential effect	Nature of effect	Importance of water feature	Design measures to avoid or manage any adverse effects	Significance of effect
Run-off containing elevated suspended sediment	Temporary during construction	Washpit Brook – <i>Medium</i> Local Drainage ditches and ponds – <i>Medium</i>	Appropriate construction management practices in addition to the provision of sediment traps and pollution control interceptors to remove suspended solids and hydrocarbons generated by the disturbance and clearance of land during the construction phase. These measures will reduce the concentrations of sediments and hydro carbons significantly such that the magnitude of effect is negligible	Negligible
Increased volume of run-off from compacted soil or development construction works	Temporary during construction	Flood risk - <i>High</i>	Haul roads will be provided to accommodate the movement of vehicles and heavy plant during the construction phase in order to remove the potential for soil to be compacted and for the runoff rate to be increased due to the soil's decreased permeability. Surface water runoff from haul roads will be intercepted and conveyed to attenuation ponds that will be capable of restricting the rate and volume of discharge to greenfield runoff rates. SuDS features within each catchment/phase of the development will be installed in advance of the associated development to ensure that flood risk will not be increased downstream nor to the development itself.	Negligible
Increased demand on water resource	Permanent during operation in 2014 and 2026	General water resource availability - <i>High</i>	Water management train proposed, including rainwater harvesting, low level local abstraction using stored rainfall, greywater recycling and water efficiency measures. Development will comply with CSH Level 5 and 6. Water demand for the Application Site will be reduced by a half of current demand levels in the region. However, additional potable resources will still be required. Cambridge Water Company Water Resource Management Plan indicates that water is available within their planned resources to serve the Proposed Development and other strategic developments in the Cambridge area.	Minor Adverse

ENVIRONMENTAL STATEMENT

Hydrology, Drainage and Flood Risk

Potential effect	Nature of effect	Importance of water feature	Design measures to avoid or manage any adverse effects	Significance of effect
Creation of improved ecological habitats in the form of steep sided banks, planting shelves and linear ponds along the route of additional low flow channels	Permanent during operation in 2014 and 2026	Washpit Brook– <i>Medium</i>	<p>The Washpit Brook will be remodelled in order to assist in the attenuation and storage of floodwater. The proposed improvements include the provision of a low flow channel, which will provide more valuable habitat for water voles than is currently present as a steep bank and planting shelves may be provided.</p> <p>Linear ponds could also be constructed along the route of the new low flow channel that will distribute floodwater within the second stage channel to create valuable new ecological habitats for amphibians and invertebrates. These ponds could be positioned immediately downstream of outfalls from proposed Sustainable Drainage Systems to ensure that they are topped up frequently and may act as refuges for wildlife during maintenance of the main channel. Outfalls from retention ponds will be designed, where possible, to release water gradually in dry periods to support ecology.</p> <p>The proposed works may also effectively preserve existing vegetation and ecological habitats, as the majority of existing mature trees situated alongside the northern half of the brook could be retained, and the alignment of the brook may be retained where it currently holds water and supports aquatic vegetation.</p>	Minor Beneficial

ENVIRONMENTAL STATEMENT

Hydrology, Drainage and Flood Risk

Potential effect	Nature of effect	Importance of water feature	Design measures to avoid or manage any adverse effects	Significance of effect
Construction of buildings or raising ground levels within Flood Zone 2 causing increased flood risk to and from development	Permanent during operation in 2026	Flood risk - <i>High</i>	<p>As a precaution against any flood risk from Washpit Brook, the Proposed Development incorporates an online flow control structure within Washpit Brook and a landform with water storage characteristics. This would serve to reduce the peak flow downstream of the Proposed Development and will effectively redefine the flood zones. This approach will ensure that almost all built development within the Proposed Development will be located within Flood Zone 1, with the exception of one parcel that is situated towards the northern end of the site and will extend marginally into Flood Zone 2.</p> <p>By applying a sequential test approach to the land use on this development parcel, the least vulnerable development will be located in the flood risk areas; therefore the effect of flood risk to the development will be negligible. This will be achieved by allocating open spaces, landscaped areas or car parking, to the region of the block affected by flooding. This process will ensure that all main buildings would mainly be located within Flood Zone 1 (rather than Flood Zone 2). Safe and dry access is available from the site by foot or by vehicle.</p>	Negligible
Use of herbicides and fertilisers for routine maintenance of landscaped areas	Permanent during operation in 2026	Washpit Brook & local ditches and ponds- <i>Medium</i>	The use of appropriate volumes applied only during dry periods to ensure maximum uptake by plants and minimal run-off will ensure that the Proposed Development will cause the concentrations in runoff reaching the watercourses to be reduced as pesticides and fertilisers will no longer be applied to large areas of farmland.	Negligible

15.7 Effects of Highways and Utility Works

15.7.1 It is considered that the highway and utility works within Zone B are unlikely to give rise to significant adverse effects on hydrology, drainage and flood risk; firstly, as construction works will undertaken in accordance with the principles defined by the CEMP in order to ensure that pollutants will not be transmitted to receiving waterbodies; and secondly, as the additional runoff generated by the construction of paved areas will be directed into the cascading system of SuDS to ensure that the rate and volume of runoff entering the watercourse will not increase.

15.7.2 The highway works in Zones A and C are unlikely to give rise to significant adverse effects on hydrology, drainage and flood risk; firstly, as Sustainable Drainage Systems and/or existing highway drainage systems will be used to ensure that the runoff from the increased paved areas within the footprint of the proposed signalised junctions will be attenuated back to existing runoff rates; and secondly, as new drainage systems will be provided at the toe of retaining structures to ensure that surface runoff will not accumulate where the adjacent land falls towards the wall.

15.7.3 The utility works within Zones A and C and each of the options for delivery of the proposed new water main connection simplify involve installing utility infrastructure within trenches that will subsequently be backfilled using the same overlying material. These works will not cause there to be a material increase in impermeable area; therefore they will be unlikely to give risk to significant effects on hydrology, drainage and flood risk.

15.8 Cumulative Effects**Surface Water Drainage and Flood Risk**

15.8.1 The Proposed Development is situated at the headwaters of the Washpit Brook; therefore the development of other strategic sites listed within Chapter 1 of this Environmental Statement will not increase flood risk to the Proposed Development.

15.8.2 The Cambridge Area Phase 1 Water Cycle Study indicates that surface water discharge from all developments within the Beck Brook/Cottenham Lode catchment shall be managed by means of flow attenuation and long term storage. This approach will ensure that flood risk will not be increased as a result of the cumulative effect of the Application Site and the development of other strategic sites listed within Chapter 1. Hence, the cumulative effect will be negligible.

Wastewater Drainage

15.8.3 Wastewater generated by the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement will be discharged to the Cambridge WwTW. The Cambridge Area Phase 1 and 2 Water Cycle Strategies indicate that the discharge consent at the works will not require revision to accommodate the increased flows but that improvements will be required to the treatment works in order to maintain the quality of the effluent discharged to the River Cam due to the resulting increase in actual flow and to satisfy the requirements of the Water Framework Directive (WFD). These improvements will include increasing the hydraulic capacity of the inlet works and increasing the treatment capacity. Anglian Water will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP6 (2015 – 2020). These improvements will ensure that the projected developments in the area, including the Proposed Development will not individually or in combination cause there to be a reduction in water quality (e.g. reduced dissolved oxygen and elevated nutrient concentrations) in the River Cam due to increased discharges from the Cambridge Sewage Treatment Works and will thereby ensure that the Proposed Development will not cause the balance of aquatic species and overall biodiversity within the River Cam to be affected or for the WFD classification, River Quality Objective (RQO) status or EU Designation of the watercourse to change. The strategic development sites listed within Chapter 1 will not be connected to the sewerage system upstream of the four combined sewer overflows (CSOs) except that at Cambridge WwTW and therefore the discharge volume from these CSOs is not expected to increase as a result of the strategic development sites including the Proposed Development. Hence the cumulative effect will be negligible.

Water Supply

15.8.4 The Proposed Development and the other strategic sites listed within Chapter 1 of this Environmental Statement will impose an additional demand on existing resources. The Cambridge Water Company Water Resource Management Plan indicates that sufficient potable water is available to accommodate the Proposed Development and the other strategic sites, providing that a new 3.2km long 450mm diameter extension to the existing ring main is provided. The Proposed Development will incorporate water efficiency and recycling measures to minimise potable water demand and the same is expected of the other strategic sites. However, in light of the additional demand, unless and until water demand for the Cambridge area reduces in existing development areas, the cumulative effect on water resources has been assessed as minor adverse.

15.9 Summary

Introduction

15.9.1 The potential for significant effects on hydrology, drainage and flood risk as a result of the Proposed Development has been assessed during the construction phase of the Proposed Development, as at 2014 and following its completion at 2026.

Baseline Conditions

15.9.2 The Proposed Development is located within the headwaters of the Washpit Brook (a tributary of the Cottenham Lode / Beck Brook catchment). The Washpit Brook flows in a northwest direction through the southern area of the Application site and then along the western boundary and has a number of small field drains crossing the Site discharging into it. It is classified as an Award Watercourse. Downstream of the Application Site it becomes designated as Main River.

15.9.3 The Environment Agency's on line flood maps indicate that the Application Site is located within Flood Zone 1. However, a hydraulic modelling study undertaken on the Washpit Brook as part of the Site Specific Flood Risk Assessment has identified areas of the Site adjoining the watercourse that appear to be in Flood Zones 2 and 3. These flood risk zones are associated with the predicted flooding extent from the Washpit Brook during a flooding event with a return period of 1 in 100 years (Flood Zone 3) and a flooding event with a return period of 1 in 1000 years (Flood Zone 2). There is a known flood risk to existing development at Girton and further downstream and it is therefore critical that this risk is not increased as a result of the Proposed Development.

15.9.4 The geology underlying the site is variable, broadly consisting of Head Deposits (mainly clays) in the south western half of the Site and Head Gravels in the central northern to north eastern areas of the Site overlying the Gault Clay Formation which forms the slopes to the Washpit Brook. In the eastern part of the Site, reworked Chalk Marl is locally present in a historic landfill area.

15.9.5 The Application Site is generally rural in nature and does not benefit to any great extent from existing water supply or wastewater infrastructure except to serve the local research and farm facilities belonging to the University. Consideration has been given to the impact of providing new sustainable water services infrastructure to the development as part of this assessment.

Measures to Avoid or Manage Significant Effects

15.9.6 A surface water management system will be provided, which will incorporate a cascading system of SuDS features to attenuate runoff to pre-developed greenfield rates and long term storage features to ensure that the volume of water and peak flow rates discharged to the Washpit Brook will not increase. The proposed surface water management system will prioritise the use of above ground drainage, wherever possible, and will ensure; firstly, that the development will not increase flood risk; and secondly, that runoff from paved areas at risk from contamination from hydrocarbons will be subject to two levels of treatment; therefore water quality will not be affected.

15.9.7 As a precaution against any flood risk from Washpit Brook, the Proposed Development incorporates an online control structure within Washpit Brook and a landform with water storage characteristics. This would serve to reduce the peak flow downstream of the Proposed Development and will effectively redefine the flood zones. This approach will ensure that almost all areas of built development within the Proposed Development will be located within Flood Zone 1, with the exception of one parcel that is situated towards the northern end of the site and will extend marginally into Flood Zone 2.

15.9.8 By applying a sequential test approach to the land use on this development parcel, the least vulnerable development will be located in the flood risk areas; therefore the effect of flood risk to the development will be negligible. This will be achieved by allocating open spaces, landscaped areas or car parking, to the region of the block affected by flooding. This process will ensure that all main buildings would mainly be located within Flood Zone 1 (rather than Flood Zone 2).

15.9.9 Development, such as the construction of buildings, raising of ground levels, will only be permitted within the 1 in 100 year floodplain including climate change if flood compensation storage is provided to ensure that floodwater is not displaced downstream.

15.9.10 The Proposed Development will comply with Levels 5 and 6 of the Code for Sustainable Homes. Rainwater harvesting and greywater recycling devices will be used in combination with water efficiency

measures to permit the potable water demand to be halved when compared to current annual potable water demand consumption figures.

15.9.11 Anglian Water will make improvements to the Cambridge WwTW, as and when required by the Environment Agency, using investment obtained through its regulatory review process to ensure that the quality of effluent discharged to the River Cam will be maintained.

15.9.12 A Construction Environmental Management plan (CEMP) will be produced to confirm best practice policy proposed by the Environment Agency within Pollution Prevention Guidelines. Hazardous substances will be stored within impermeable, bunded areas to remove the risk of migration to groundwater or a nearby watercourse. The measures defined within the CEMP will assist in avoiding or minimising the potential for contaminants and suspended solids to migrate to surface and groundwater, reduce localised flood risk, and protect water quality and the ecosystems the water resources support.

Likely Significant Effects

15.9.13 Potentially adverse effects during the construction phase will be avoided as attenuation ponds within each sub-catchment will be constructed in advance of the associated development to control the discharge rates of surface runoff. Temporary pollution control structures will also be introduced upstream of the ponds to ensure that elevated levels of suspended solids will not be conveyed to local surface water bodies. Haul roads will be constructed to accommodate the movement of vehicles and heavy plant during the construction phase in order to minimise the potential for soil underneath to be compacted and for the runoff rate to be increased due to the soils decreased permeability. Rainfall runoff from haul roads will be directed to appropriate temporary pollution control structures before being conveyed to balancing ponds where the discharge to the watercourse will be controlled to greenfield runoff rates, or as otherwise agreed within the Construction Environmental Management Plan.

15.9.14 Potentially adverse effects during the operational phase of the development will be avoided through the provision of a new 3.2km long 450mm diameter reinforcement to the water supply ring main and new booster station, which will improve capacity and water pressure within the local area. Although nearly all the predicted Flood Zone 2 and Flood Zone 3 extents occur in what are planned to be open land areas, the parameter plans indicate that a very small area of one development parcel that will be developed during the 2026 assessment year could extend into Flood Zone 2. By applying a sequential test approach to the land use on this development parcel, the least vulnerable development will be located in the flood risk areas; therefore the effect of flood risk to the development will be negligible. This will be achieved by allocating open spaces, landscaped areas or car parking, to the region of the block affected by flooding. Proposed buildings will not be constructed within the floodplain to ensure that they are not vulnerable. Applications of herbicides to landscaped areas within the proposed development will be undertaken during dry periods, and in accordance with EA guidelines to reduce the likelihood of nutrients being conveyed to surface water bodies.

15.9.15 Potentially beneficial effects during the operational phase of development include the creation of improved ecological habitats when the Washpit Brook is remodelled to assist in the attenuation and storage of floodwater. These habitats could be created through the provision of low flow channels with a steep bank to provide more valuable habitat for water voles than is currently present, some of which will form linear ponds that will create valuable new ecological habits for amphibians and invertebrates, and may act as refuges for wildlife during maintenance of the main channel.

15.9.16 After allowing for the design features built into the Proposed Development and the construction methods under which it will be carried out, the likely significant effects of the Proposed Development in relation to hydrology, drainage and flood risk are generally considered to be negligible.

15.9.17 Cambridge Water Company has indicated that sufficient potable water is available to accommodate the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement. The Proposed Development will incorporate water efficiency and recycling measures to minimise potable water demand; however an additional demand will be imposed on the existing resource, unless and until water demand within the existing surrounding areas is reduced; therefore the cumulative effect on water resources has been assessed as minor adverse.

Conclusions

15.9.18 The proposals for the Application Site involve a significant change as the existing farmland will be replaced with a large residential and mixed use scheme. There is therefore potential for changes to the hydrological and hydrogeological regime, both during construction and operation.

15.9.19 Design work has been undertaken to identify, avoid and manage the effects of the Proposed Development, including a Site Specific Flood Risk Assessment, Hydraulic modelling study and a Geo-environmental Assessment.

15.9.20 After allowing for the design features built into the Proposed Development and the construction methods under which it will be carried out, the likely significant effects of the Proposed Development in relation to hydrology, drainage and flood risk are considered to be negligible or minor adverse. The measures will also ensure that the Proposed Development is at the forefront of sustainability with regards to water use and water management, meeting the aspirations of Level 5 & 6 of the CSH as well as meeting the requirements of PPS25 and the NPPF.

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1 Introduction and Assessment Approach

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15 Hydrology, Drainage and Flood Risk

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16 UTILITIES AND SERVICES

16.1 Introduction

16.1.1 This chapter assesses the likely significant effects on the existing utility infrastructure associated with the construction, and subsequent operation, of the Proposed Development.

16.1.2 The Proposed Development will require the provision of electricity, gas, water and communications infrastructure. This will be sourced from existing supplies serving the north western area of Cambridge.

16.1.3 The assessment considers the effect of the Proposed Development on the following utility networks:-

- Electricity
- Gas
- Telecommunications
- Water Supply
- Foul Water

16.1.4 This chapter also assesses the likely significant effects on local receptors resulting from changes or upgrades to the existing utility infrastructure associated with the construction, and subsequent operation, of the Proposed Development.

16.1.5 The surface water drainage requirements of the Proposed Development have been assessed separately within Chapter 15.

16.1.6 The assessment presented has been carried out in accordance with the description of development and Parameter Plans for the Proposed Development and has been undertaken in reliance on the Scott Wilson Utilities Statement dated September 2011 . This report is reproduced at **Appendix 16.1**.

16.2 Planning Policy Context

16.2.1 There is a wide range of policy and guidance pertaining to utility infrastructure; however, this section only refers to policy that is directly relevant to the Application Site and its range of potential effects.

National Policy, Guidance and Strategy

Planning Policy Statement 1: Delivering Sustainable Development

16.2.2 This previously key national planning document set out the Government's Policies on different aspects of land use planning in England and sets out overarching planning policies on the delivery of sustainable development through the planning system. The policies within this document were taken into account by local planning authorities in the preparation of local development documents and were also material to decisions on individual planning applications. The Key principles outlined within the document, which seek to ensure that development plans contribute to global sustainability by addressing the cause and potential effects of climate change through policies that reduce energy use and emissions have now been carried through into the National Planning Policy Framework.

Planning Policy Statement 1 Supplement: Planning and Climate Change

16.2.3 In December 2007, a supplement to Planning Policy 1 specifically addressing Climate Change was published. This required regional planning authorities to prepare, and manage the delivery of, spatial strategies that limit carbon dioxide emissions of new developments, make use of opportunities for decentralised, renewable and low carbon energy emissions and encourage sustainable development.

Planning Policy Statement 22: Renewable Energy

16.2.4 The Government Policy on renewable energy was set out in Planning Policy Statement 22, which states "Increased development of renewable resources is vital to facilitating the delivery of the Government's

commitments on both climate change and renewable energy” and that “Regional spatial strategies and local development documents should contain policies designed to promote and encourage, rather than restrict, the development of renewable energy resources”. Again these themes have been carried forward into the National Planning Policy Framework.

The Code for Sustainable Homes

16.2.5 The Code for Sustainable Homes has been introduced to drive a step-change in sustainable home building practice. It is a standard for key elements of design and construction which affect the sustainability of a new home. The Code uses a sustainability rating system – indicated by ‘stars’, to communicate the overall sustainability performance of a home. The table below summarises the mandatory minimum standards which exist under the Code for each assessment level relating to indoor water consumption and carbon reduction:

Code Level	Maximum Internal potable water consumption measured in litres per person per day (l/p/d)	Carbon Reduction over 2006 Building Regulations
Level 1(★)	120 l/p/d	10%
Level 2(★★)	120 l/p/d	18%
Level 3(★★★)	105 l/p/d	25%
Level 4(★★★★)	105 l/p/d	44%
Level 5(★★★★★)	80 l/p/d	100%
Level 6(★★★★★★)	80 l/p/d	Zero Carbon

Building Research Establishment Environmental Assessment Method (BREEAM)

16.2.6 BREEAM is the leading and most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance.

16.2.7 BREEAM Excellent is required for all non-domestic buildings which can be BREEAM assessed. This means that a B-rated (or better) Energy Performance Certificate (EPC) is mandatory, requiring significant reduction in CO₂ emissions from national regulations for air-conditioned buildings, but smaller reductions in CO₂ for naturally ventilated. Additional credits are available in BREEAM for the inclusion of LZC technologies and community heating and / or CHP. It should be noted that the current 2008 BREEAM schemes are likely to be updated before the NWC assessments and may in future use an alternative energy credit calculation procedure. All non-residential development should achieve a 20% reduction in CO₂ emissions using renewable energy technologies where a renewably fuelled decentralised system is not viable.

The National Planning Policy Framework (“the NPPF”)

16.2.8 Whilst the NPPF is to be read as a whole in the context of utilities the NPPF states at paragraph 31 the local planning authorities should work with other authorities and providers to:

- assess the quality and capacity of infrastructure for transport, water supply, wastewater and its treatment, energy (including heat), telecommunications, utilities, waste, health, social care, education, flood risk and coastal change management, and its ability to meet forecast demands; and
- take account of the need for strategic infrastructure including nationally significant infrastructure within their areas.

Regional Policy, Guidance and Strategy***East of England Plan Policy***

16.2.9 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be

16.2.10 The East of England Plan, the Revision to the Regional Spatial Strategy for the East of England (May 2008) contains the following policies relevant to water resources:

- SS1: *Achieving Sustainable Development* "...ensure that development... respects environmental limits by seeking net environmental gains wherever possible or at least avoiding harm..."
- WAT1: *Water Efficiency Policy* "The Government will work with the Environment Agency, water companies, OFWAT, and regional stakeholders to ensure that development in the spatial strategy is matched with improvements in water efficiency delivered through a progressive, year on year, reduction in per capita consumption rates. Savings will be monitored against the per capita per day consumption target set out in the Regional Assembly's monitoring framework."
- ENG2: *Renewable Energy Targets* "The developments of new facilities for renewable power generation should be supported, with the aim that by 2010 10% of the region's energy and by 2020 17% of the regions energy should come from renewable sources."
- WAT2: *Water Infrastructure* "The Environment Agency and water companies should work with OFWAT, EERA and the neighbouring regional assemblies, local authorities, delivery agencies and others to ensure timely provision of the appropriate additional infrastructure for water supply and waste water treatment to cater for the levels of development provided through this plan, whilst meeting surface and groundwater quality standards, and avoiding adverse impact on sites of European or international importance for wildlife."
- WAT3: *Integrated Water Management* "Local planning authorities should work with partners to ensure their plans, policies, programmes and proposals take account of the environmental consequences of river basin management plans, catchment abstraction management strategies, groundwater vulnerability maps, groundwater source protection zone maps, proposals for water abstraction and storage and the need to avoid adverse impacts on sites of European importance for wildlife. The Environment Agency and water industry should work with local authorities and other partners to develop an integrated approach to the management of the water environment."

Local Policy, Strategy & Guidance

16.2.11 The Application Site lies astride the administrative boundaries of South Cambridgeshire District Council and Cambridge City Council. As a result, infrastructure related policies contained within both of the authorities' emerging Local Development Frameworks are relevant to the Proposed Development and have been referenced here.

16.2.12 The principal Local Development Document that has been produced jointly by the two local councils and that relates specifically to the Application Site is the North West Cambridge Area Action Plan which was adopted in October 2009. The Plan contains the following policies relevant to utility infrastructure:

North West Cambridge Area Action Plan

- **Policy NW24: Climate Change & Sustainable Design and Construction**
 1. Development will be required to demonstrate that it has been designed to adapt to the predicted effects of climate change;
 2. Residential development will be required to demonstrate that:
 - a) All dwellings approved on or before 31 March 2013 will meet Code for Sustainable Homes Level 4 or higher, up to a maximum of 50 dwellings across the site. All dwellings above 50 will meet Code for Sustainable Homes Level 5 or higher (these Levels include water conservation measures);
 - b) All dwellings approved on or after 1 April 2013 will meet Code for Sustainable Homes Level 5 or higher;
 - c) There is no adverse impact on the water environment and biodiversity as a result of the implementation and management of water conservation measures.
 3. Non residential development and student housing will be required to demonstrate that:
 - d) It will achieve a high degree of sustainable design and construction in line with BREEAM "excellent" standards or the equivalent if this is replaced;
 - e) It will reduce its predicted carbon emissions by at least 20% through the use of on-site renewable energy technologies only where a renewably fuelled decentralised system is shown not to be viable;
 - f) It will incorporate water conservation measures including water saving devices, greywater and/or rainwater recycling in all buildings to significantly reduce potable water consumption; and
 - g) There is no adverse impact on the water environment and biodiversity as a result of the implementation and management of water conservation measures.
 - 4 Decentralised energy will be required at North West Cambridge to meet the targets specified above. The form of decentralised energy system to be used will be determined on the basis of minimising carbon and greenhouse gas emissions. The system will need to serve the whole site unless there are specific circumstances which would render it inappropriate.
 5. The above requirements are subject to wider viability testing.

9.1 In response to climate change, national objectives have been set to reduce the UK's carbon dioxide emissions by at least 60% by 2050, with real progress towards this target by 2020. In addition, the Government has set out its aims for all new housing to be zero carbon by 2016, with two scheduled improvements to Building Regulations between now and then, to help bridge the gap between current standards and those proposed for 2016. A national standard called the Code for Sustainable Homes (CSH) has also been launched to assess the environmental performance of new homes. It covers a range of issues including energy and water performance, drainage, recycling, environmental impact of construction materials and biodiversity. BREEAM is currently the equivalent standard for non-residential buildings, though the government is considering replacing it with a Code for non-residential buildings with similar goals to the CSH for zero carbon performance, which BREEAM currently lacks.

9.2 Climate change adaptation has been defined as the ability to respond and adjust to actual or potential impacts of climate change in ways that moderate harm or take advantage of any positive opportunities that the climate may afford⁴. New development will need to be adaptable for unavoidable changes in climate without further increasing emissions with active heating and cooling systems. There is much that can be achieved through 'passive measures' such as the location, layout orientation, aspect and external design of buildings and landscaping around buildings that can help occupants to cope more easily with the effects of climate change.

9.3 New development, and particularly large scale development such as North West Cambridge, provides significant opportunities to reduce the carbon emissions produced during the lifetime of the development. Energy efficiency through design is one of the key climate change mitigation measures and provision of decentralised energy such as combined heat and power (CHP) is another. The existing national system of centralised electricity generation is very inefficient. Power stations discharge significant levels of energy

in the form of heat to the atmosphere, rivers or sea. More energy is lost through transmission and distribution from remote power stations to towns and cities. Local power generation in “decentralised energy systems” such as through CHP allows the waste heat to be used locally, and for transmission and distribution losses to be cut significantly. This results in significantly lower carbon emissions. It will also conserve water resources that are a significant resource used in traditional power stations.

9.4 The Policy takes a flexible approach to energy reduction through provision of decentralised energy on the site, to ensure that the measures that would produce the greatest carbon emissions reductions are delivered as appropriate for the mix and phasing of development proposed. The term ‘decentralised’ refers to site-wide systems and smaller scale systems for groups or individual dwellings. There are a number of different types of decentralised energy systems, either fuelled by renewable energy or fossil fuels, which might be appropriate for use at North West Cambridge. The carbon emission savings will vary depending on the technology and fuel used. For example a renewably fuelled CHP system will have lower carbon emissions than a fossil fuelled system. This site, with its proposed mix of uses, is likely to be very suitable for CHP. The Policy requires that any proposals include the system that can viably deliver the greatest carbon savings for the site as a whole, bearing in mind factors such as technical and financial viability and phasing of the development.

9.5 The energy infrastructure necessary for decentralised energy will need to be explored at a very early stage and designed in at the front end of development in order to minimise costs and to appropriately phase the installation with the build out of the development. A Carbon Reduction Strategy which will set out the broad strategy for the site as a whole will need to be submitted and approved alongside the Masterplan and further detail will be required alongside subsequent planning applications.

9.6 Both Authorities would support the development of an energy services company (ESCo) to provide this energy infrastructure. The ESCo could maintain the system and bill users for their energy consumption. The community could partially or wholly own it, if interest is shown.

9.7 In line with the Planning Policy Statement “Planning and Climate Change”, there are clear opportunities at North West Cambridge for the use of decentralised energy and on-site renewables. Therefore specific requirements for the CSH and BREEAM for non-residential uses (or its equivalent, if this is replaced) have been set. These are one step ahead of proposed changes to the Building Regulations and therefore assist in moving towards the Zero Carbon target by 2016 and reflect the Area Action Plan’s objective for the development to be built as an exemplar of sustainable living. These standards are also phased to improve over time, as the development is built out over a number of years.

9.8 The housing trajectory has been used to determine the dwelling thresholds at which the CSH requirements will change. This is to ensure that a substantial proportion of the development will be delivered at higher sustainable design and construction standards, bearing in mind the overall viability of the development. It is possible that in the future the housing trajectory may change due to the changing economic climate, and as such these dwelling thresholds would be amended accordingly. Thresholds will be revised in consultation with developers, through the Councils’ Annual Monitoring Reports.

9.9 As BREEAM does not have as high standards as CSH, particularly in terms of carbon performance, BREEAM Excellent will be required from the outset. In the event that a renewably fuelled decentralised system is not viable there is an additional requirement for the non-residential uses within the development to meet 20% of the predicted carbon emissions from onsite renewable energy technologies. These could take various forms, including:

- a. Wind turbines;*
- b. Solar thermal;*
- c. Photo-voltaic cells (PV);*

- d. Biomass for community heating or CHP;
- e. Ground source heat pumps.

It should be noted that the requirements of the 2006 Building Regulations will be taken as the baseline for the 20% renewable energy target.

9.10 In determining which types of technologies would be most suitable for this site, there would be a requirement to minimise any potential impacts to the environment or local amenity by careful site selection, choice of technologies and mitigation measures.

9.11 The East of England has the lowest rainfall in the country and is described officially as semi-arid. A high proportion of the available water resource is already being exploited and as such, even allowing for the impacts of climate change, careful management of water resources will be crucial if the economic potential of the Cambridge Sub-Region is to continue to be realised. Development at North West Cambridge provides an opportunity to design water conservation measures into the infrastructure and buildings in order to reduce per capita demand for water. This should be a fundamental approach of the development. It is important that water conservation measures are applied to each building to ensure that there is a comprehensive strategy to water use reduction across the site and measures are not applied to some buildings and not others. The CSH provides appropriate targets to improve water conservation over time, using the same dates and Code levels as for energy reduction and other sustainability requirements set out in the Code. For residential development, the 30% reduction required at Code Level 4 compared to 2006 levels equates to 105 litres/head/day, while the 47% reduction required by Code Level 5 equates to 80 litres/head/day.

9.12 Improving the efficiency of water use in buildings can be relatively easily achieved by installing water saving devices. Rainwater recycling for garden or landscape irrigation and/or toilet flushing are also available, as well as greywater recycling systems. At the outline planning application stage, a Water Conservation Strategy with basic information as to how this target will be met will be required, with further details of the measures proposed required at the reserved matters stage.

9.13 The principle of reuse and recycling of water is also an important part of an integrated approach to water management that will facilitate the use of water from drainage as a design feature of the development. Care must be taken to ensure that water reuse and recycling does not have an adverse effect on biodiversity, or the wider water environment, in accordance with the requirements of the Water Framework Directive (WFD).

- **Policy NW26: Foul Drainage and Sewage Disposal**

Development of any single phase will not result in harm in the form of untreated wastewater or increased flood risk from treated wastewater. Planning conditions (which may include 'Grampian' style conditions) will link the start and phased development of the site to the availability of wastewater treatment capacity and the capacity of receiving watercourses.

9.18 The foul water produced at the site will be directed to Cambridge Sewage Treatment Works at Milton to take advantage of consolidating existing facilities. Anglian Water are currently undertaking an appraisal of sewerage provision for the whole catchment and the outcome of that appraisal will inform the approach to be followed for foul water arising from North West Cambridge.

9.19 In accordance with the requirements of the WFD, the treatment of wastewater must not cause deterioration of the water environment. The options for the treatment of foul drainage and sewage disposal from the site will need to be agreed with the Environment Agency to ensure that development does not result in further pressure on the water environment and compromise WFD objectives.

- **Policy NW31: Infrastructure Provision**

Planning permission will only be granted where there are suitable arrangements for the improvement or provision and phasing of infrastructure, services & facilities necessary to make the scheme acceptable in planning terms.

10.12 The development of North West Cambridge will create additional demands for physical and social infrastructure, as well as having impacts on the environment. In such cases planning obligations will be required, in accordance with Government guidance, to make any necessary improvements, provide new facilities, or secure compensatory provision for any loss or damage created. The nature and scale of contributions sought will be related to the size of the development and to the extent it places additional demands upon the area.

10.13 Contributions will be necessary for some or all of the following:

- a. Affordable Housing, as required by Policy NW6*
- b. Education (including nursery and pre-school care);*
- c. Health care;*
- d. Public open space, sport & recreation facilities;*
- e. Improvements (including infrastructure) for pedestrians, cyclists, equestrians, highways and public and community transport;*
- f. Other community facilities (e.g. community centres, youth facilities, library service, social care and the provision of emergency services);*
- g. Landscape and biodiversity;*
- h. Drainage/flood prevention;*
- i. Waste management;*
- j. Arts and cultural provision;*
- k. Community development workers and youth workers;*
- l. Energy infrastructure;*
- m. Other utilities and telecommunications.*

10.14 Depending on the nature of the services and facilities, contributions may also be required to meet maintenance and / or operating costs either as pump priming or in perpetuity, through an obligation.

10.15 The overall viability of the development will be taken into consideration in the decision on the level of planning obligations to be incorporated into the Section 106 (S106) Agreement at the planning application stage.

10.16 A schedule of services, facilities and infrastructure together with a timetable for their provision during the development of North West Cambridge will be set out in a legal agreement. In order to ensure the timely provision of services, facilities and infrastructure, trigger points will be set according to when the need for them is forecast to arise.

Delivery Mechanisms

10.17 The Area Action Plan has been prepared in consultation with key stakeholders involved in the delivery of North West Cambridge and various partnership working arrangements have been in place for the development since 2006, including Cambridgeshire County Council, Cambridgeshire Horizons, the Primary Care Trust, the Environment Agency, and the Highways Agency. Joint working arrangements have also included the developers of land between Huntingdon Road and Madingley Road in order to ensure a holistic approach to the planning and delivery of development in this area. A joint planning committee has been set up to ensure this objective is met in the determination of any planning applications. The Councils are also involved in the preparation of other key strategies and plans that will impact on the development of North West Cambridge such as their respective Community Strategies and strategies prepared by others including the County Council and Cambridgeshire Horizons.

10.18 Cambridgeshire Horizons' key focus is on the delivery of the development strategy for the Cambridge area. As such, it is assisting the local authorities with mechanisms to ensure prompt and efficient delivery of the major developments and necessary infrastructure.

Phase 1 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2008)

16.2.13 The Phase 1 Water Cycle Strategy assesses the potential impacts and constraints associated with the proposed major development areas by considering flood risk, water resources and supply, foul sewerage, wastewater treatment, water quality and water related ecology. This study establishes the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and contains the following conclusions and recommendations in relation to the Proposed Development:

Foul Drainage, Sewage Treatment and Water Quality

11.5.1 The discharge consent at Cambridge WwTW will not require revision to accommodate the increased flow from the infill or strategic development sites within Cambridge. However, improvements will be needed to the treatment works in order to maintain the quality of the effluent discharged to the River Cam. AWS will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20)

11.5.5 The large diameter sewer network can accommodate all of the flow from the strategic developments without upgrade. The majority of sites will need to provide strategic connection sewers to connect into the large diameter sewer network.....Northwest Cambridge will connect into the branches of the tunnel network on Madingley and Histon Road.

Water Supply

11.6.1 No specific technical constraints have been identified preventing proposed growth in the study area. Key infrastructure for the Northstowe and Southern Fringe sites has been proposed by Cambridge water Company and independently approved by Halcrow. Strategic Infrastructure for the remaining development sites has been identified at a high level, and will require detailed modeling and planning so infrastructure commissioning may coincide with the construction at the development sites.

Phase 2 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2010)

16.2.13 A Phase 2 report was completed by consultants for Cambridge Horizons and considered the recommendations made in the Phase 1 report which focused on identifying a strategy and providing the technical evidence base to show how new sustainable water services infrastructure for the Major Sites in and around Cambridge (including the North West Cambridge University site) could be delivered to maximise three opportunities:

- aspiring to water neutrality;
- improving biodiversity by protecting environmental water quality and hydromorphology, and;
- protecting and enhancing communities through sustainable surface water management.

16.2.14 The Phase 2 Water Cycle Study contains the following conclusions and recommendations in relation to the Proposed Development, which have been integrated into the proposals:

Foul Drainage, Sewage Treatment and Water Quality

6.3.27 At Cambridge WwTW, up to and including 2031, no consent change is required for ammonia to ensure no deterioration of the current WFD status downstream of the treatment works. However, the BOD consent will require marginal tightening from 15mg/l to 13mg/l, and a phosphate consent of 3 mg/l would be required (current phosphate discharge is 0.73 mg/l).

6.3.28 However, to meet WFD good status at Cambridge WwTW with 2031 growth flows, the BOD and ammonia consent would require tightening and that this is achievable with conventionally applied wastewater treatment technology. This analysis therefore shows that BOD and ammonia are not constraints to growth.

6.3.29 To meet good status for phosphate at Cambridge WwTW with the current population, even assuming the river quality upstream of the treatment works is good status, would require a mean annual average discharge consent of 0.23 mg/l. This is significantly beyond what can be achieved by current sewage treatment technology (1 mg/l). To meet good status for phosphate with the 2031 population tightens this consent from 0.23mg/l to 0.21mg/l.

6.3.32 Our interpretation of the current policy on assessing WFD consents in water cycle studies is that where WFD status cannot be met with the current population with conventionally applied sewage treatment technology, growth per se should not be considered a barrier to achieving good ecological status, subject to the assessment showing there will be no deterioration of current status.

6.3.33 Therefore, water quality environmental capacity and WFD compliance should not be a constraint to growth at Cambridge WwTW or Uttons Drove WwTW. The Environment Agency is responsible for determining through the RBMP if and when the consent will need to be tightened to achieve good ecological status for BOD and Ammonia, and securing water company funding for any infrastructure requirements that will be required as part of the National Environment Programme section of the appropriate Periodic Review.

Wastewater Networks

6.4.1 Additional housing growth will cause an increase in foul flows to the wastewater network. If no mitigation is put in place there is a risk that flooding due to under capacity and pollution due to overflows from the network could increase. The Phase 2 WCS defines the location of connections to the existing foul sewer and summarises AWS' preferred strategy to upgrade the wastewater networks to accommodate planned growth within Table 6-9, which is duplicated below.

Huntingdon / Madingley Rd (university site)	Site would connect to sewer in Madingley Road, which would cause increase in sewer flooding.	Connect development downstream of Madingley Road (1000m from site) on the 600mm diameter sewer

Table 6-9 Summary of impact of growth on wastewater network (adapted from Phase 1 WCS and Cambridge wastewater capacity study)

6.5.1 AWS are progressing their preferred wastewater strategy to accommodate development of the major growth sites in and around Cambridge. Upgrades will be required at both Cambridge and Uttons Drove WwTW, and the networks which drain flows to these works will also require localised upgrading. Upgrades to the WwTW and the wastewater networks will be funded through Periodic Review process and Requisition under Section 98 of Water Industry Act 98.

6.5.2 With respect to wastewater and water quality, the Phase 2 WCS has demonstrated that there are no environmental constraints to growth. In particular:

- although new consents will be required at both Cambridge and Uttons Drove WwTWs to ensure no deterioration of current WFD status, these will be within the limits of conventional technology for sewage treatment;
- growth will not hinder the ability of the receiving water bodies achieving good physico-chemical status, as required by the WFD, and;
- the discharge volumes from the combined sewer overflows is not anticipated to increase due to the major growth sites, but there is a risk it could increase due to additional flows from infill development (see Phase 1 WCS).

6.5.3 Flood risk downstream of the WwTW due to an increase in treated sewage effluent has also been assessed in the Phase 2 WCS. At Cambridge WwTW the risk of increased flood risk has been assessed to be low due to planned development up to 2031; therefore no mitigation will be required.

Water Supply

3.6.2 There are three specific recommendations and implementation themes from the Phase 2 WCS that are within the control of the steering group, which are considered to be necessary to work towards achieving the vision for water resources. These are summarised in the box below and expanded upon in subsequent paragraphs illustrating actions and responsibilities

- New domestic dwellings should achieve 80 l/h/d (potable consumption) through implementation of water efficient measures and rainwater/greywater systems, unless meeting 80 l/h/d is not viable due to the small size of development. Where 80 l/h/d is not considered to be viable the development should justify why it is unable to deliver this level of water efficiency and provide evidence of the level that can be delivered as well as minimise water consumption through use of water efficient appliances.
- New non-domestic buildings should meet the BREEAM 'excellent' standard with respect to water efficiency, through installation of water efficient measures and rainwater/greywater systems.
- As a minimum, the additional demand for water due to new development should be partially offset, through the implementation of measures in the existing housing stock, including, but not limited to, retrofit of water efficient measures and marketing/awareness campaigns with local residents and businesses.

Ecological Assessment

7.6.2 This assessment has followed DCLG guidance on HRA. Coarse screening has identified three European sites with the potential to be affected by hypothetical water management changes associated with proposed new developments around Cambridge. One of these (Wicken Fen Ramsar site) was discounted at the coarse screening stage since its hydrology cannot be affected by any of the proposed developments. The others (Breckland SAC and SPA and Ouse Washes SAC and Ramsar site) were discounted at the more detailed screening stage as it has been determined that the proposals will not have any discernible effect on their hydrology or water quality.

7.6.3 Thus, it can be concluded that No Significant Effect would result from implementing the proposals and projections that are identified in the Cambridge WCS, noting that this assessment has only considered water environment consequences

16.3 Assessment Approach**Methodology**

16.3.1 A baseline assessment has been undertaken to determine the location and capacity of existing utilities situated in the vicinity of the Proposed Development.

16.3.2 Enquiries were initially issued to the Statutory Undertakers in accordance with Section C2 of the New Roads and Street Works Act 1991, Section 84 in June 2010 to determine the location of existing apparatus. Subsequent utility infrastructure enquiries have been undertaken in two parts; firstly, to determine the available capacity in the local infrastructure, suitable points of connection for new supplies and reinforcement requirements; and secondly, to identify the requirement for any diversionary work.

16.3.3 This assessment considers the capacity of existing utility infrastructure at the 2014 and 2026 assessment years, after allowing for reinforcements that are already scheduled, and identifies the likely significant effects of the Proposed Development on the capacity of that infrastructure. Where the requirement for reinforcement works is identified, the likely significant effects of any works necessary to deliver reinforcement are assessed, and the significance of effects is assessed.

Significance assessment methodology

16.3.4 The process of assessing the effects on a receptor requires the following:

- (i) establish the importance (or sensitivity) of the receptor and its setting; and
- (ii) make an assessment of magnitude of change, based on the location of development in relation to the receptor.

16.3.5 The assessment of effects includes consideration of two types of effect: direct and indirect. These are set out below.

- **Direct Effects:** A direct effect upon a receptor would involve physical disturbance as a result of the constructional and/or operational phases of the Proposed Development.
- **Indirect Effects:** An indirect effect on a receptor would involve an alteration or an effect that materially affects its setting.

Receptor Sensitivity Criteria

16.3.6 There is no formally adopted set of criteria which enables the attribution of a scale of sensitivity to a receptor from alterations to utility infrastructure.

16.3.7 The following criteria used in this assessment have been developed to be specifically relevant to assessing the effects of the Proposed Development considered in this ES.

16.3.8 The sensitivity of the receptor is defined by its importance and proximity to the locations where the network will be reinforced or the receptor's use of the locations where the network will be reinforced. **Table 16.1** sets out the criteria for assessing sensitivity.

Table 16.1: Criteria for Assessing Sensitivity of Receptors

Sensitivity	Criteria	Example
High	<p>Receptors of strategic importance located directly adjacent to locations where utility network will be reinforced or diverted.</p> <p>Multiple receptors or buildings directly served by existing utility infrastructure which is to be extended/altered.</p>	<p>National Blood Service, which relies upon access to ensure delivery of critical supplies, situated on a road where the utility network will be reinforced.</p> <p>Strategic utility infrastructure providing supplies to the region.</p>
Medium	<p>Receptors of local importance, such as residential properties, located directly adjacent to locations where utility network will be reinforced or diverted.</p> <p>Single receptor or property directly served by existing utility infrastructure which is to be extended/altered.</p>	<p>Residential/commercial properties situated on a road where the utility network will be reinforced.</p> <p>Utility infrastructure that serves a group of properties, buildings or receptors.</p>
Low	<p>Receptors situated adjacent to locations where utility network will be reinforced or receptors that frequently use the public highway where utility network will be reinforced or diverted.</p>	<p>Properties located on side roads off Madingley Road or Huntingdon Road.</p> <p>Drivers or non motorised users who use a road where the utility network will be reinforced as a through route.</p>
Negligible	<p>Receptors that will not be affected by, or are situated remote from, utility reinforcement or diversion works.</p> <p>Receptor that is not required to frequently use the public highway where the utility network will be extended or reinforced.</p>	<p>Properties, buildings or facilities that are served by utility infrastructure that is to be altered or extended.</p> <p>Properties or facilities that are not situated adjacent to the Proposed Development.</p> <p>Drivers or non motorised users who do not use Madingley Road or Huntingdon Road</p>

Magnitude of Change Criteria

16.3.9 The significance of an effect is assessed by taking into account the sensitivity of the receptor and the potential magnitude of the change upon it. Magnitude of change is a function of the nature, scale and type of disturbance, or damage to the receptor. For example, a substantial magnitude of change may result in the loss of utility provision to the receptor or a loss of access to a receptor. Criteria for assessing the magnitude of predicted change are given in **Table 16.2**.

Table 16.2: Criteria for Assessing Magnitude of Change on Receptors

Magnitude of Change	Definition
High adverse	Total loss or major alteration to utility provision to receptor or access to property such that post-development the baseline arrangements will be fundamentally changed.
Medium adverse	Partial loss or alteration to utility provision to receptor such that post-development the baseline arrangements will be partially changed.
Low adverse	Minor shift away from the baseline arrangements. Negative change arising from the alteration will be discernible/detectable but not material; the underlying attributes will be similar to the baseline.
Negligible	No change from baseline arrangements. Change will be barely distinguishable.
Low beneficial	Minor improvement to baseline conditions. Positive change arising from the alteration will be discernible/detectable but not material; the underlying attributes will be similar to the baseline.
Medium beneficial	Moderate improvement to utility provision such that post-development the baseline arrangements will be partially changed.
High beneficial	Major improvement to utility provision to receptor such that post-development the baseline arrangements will be fundamentally changed.

16.3.10 Once the magnitude of an effect is derived, the significance of the potential effect can then be derived by combining the assessments of sensitivity of the receptor and the magnitude of the change in a simple matrix (see **Table 16.3**).

Table 16.3: Assessment Matrix

Magnitude of Change	Sensitivity of Receptor				
		High	Medium	Low	Negligible
	High adverse	Major adverse	Major adverse	Moderate adverse	Negligible
	Medium adverse	Major adverse	Moderate adverse	Minor to Moderate adverse	Negligible
	Low adverse	Minor to Moderate adverse	Minor to Moderate adverse	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low beneficial	Minor beneficial	Negligible	Negligible	Negligible
	Medium beneficial	Major beneficial	Moderate beneficial	Minor to Moderate beneficial	Negligible
	High beneficial	Major beneficial	Major beneficial	Moderate beneficial	Negligible

16.4 Baseline Conditions**Application Site Description and Context**

16.4.1 The Application Site is well located to take advantage of utility connections that serve the existing residential area that surrounds the Proposed Development. There are existing gas, water, electric and telecommunications services running within Huntingdon Road and Madingley Road, which are situated close to the northern and southern boundary of the Application Site.

16.4.2 The Proposed Development is based on a highly sustainable philosophy, which focuses on high quality design and construction to reduce the requirement for energy and water.

Electricity*Existing Apparatus*

16.4.3 EDF Energy Networks is the District Network Operator (DNO) for the Cambridge area.

16.4.4 EDF Energy Asset location plans indicate that there is a network of existing High Voltage cables in close proximity of the Application Site, as described below:-

- An 11kV cable network extends below Huntingdon Road and a 33kV cable network extends along Madingley Road from primary substation situated on the south side of Madingley Road, which is fed from a major 132kV overhead power line from the south.
- An existing 33kV cable connects an existing substation situated on the south of Madingley Road to existing dwellings on the northern side of the Application Site. This cable extends through the eastern portion of the Application Site and will form a constraint to development as it will need to be retained or diverted to ensure that the electrical supply to the existing dwellings on the north side of the Application Site is not affected. The parameter plans take cognisance of this existing apparatus as it coincides with a green corridor; therefore it is unlikely to require diversion.
- The existing buildings that are situated on the Application Site are supplied with electricity by a series of overhead lines that cross the Application Site.

Electricity Supply

16.4.5 Calculations have been prepared to estimate the electrical demand of the Proposed Development, which indicates that the peak electricity demand is approximately 2.5MW and 16.3MW in 2014 and 2026, respectively. The Annual Electricity Consumption has been estimated as approximately 9,100 MWh and 79,500 MWh in 2014 and 2026, respectively.

16.4.6 An Energy Centre will be used to generate power on-site in order to minimise the effect of the Proposed Development on the existing electricity network whilst ensuring compliance with NW Cambridge Area Action Plan and Levels 5 and 6 of the Code for Sustainable Homes. This renewable technology provides an efficient way of locally delivering both electricity and heat as they make use of waste heat from the electricity generation process for space and water heating. It also provides advantages over a typical supply arrangement of grid imported electricity and conventional heat boilers; firstly, as they permit losses incurred in the High Voltage (HV) transmission to be avoided because the electricity is generated close to the point of use; and secondly, as they form a low carbon technology.

16.4.7 The electricity generated by the Energy Centre could be exported to the grid and a Power Purchase Agreement could be negotiated with EDF Energy as it is unlikely to be feasible to provide a private wire arrangement for the electrical supply of the Proposed Development due to the legal requirement for occupants of residential dwellings to be provided with the freedom to select a supplier of electricity, regardless of the owner of the connection infrastructure. A connection to the local electricity network will therefore be required and this connection will also ensure that the Proposed Development will meet the requirements of OFGEM, the Regulator and the document ER P2/6 Distribution and Planning Guidelines

which effectively sets the reliability standard for distribution networks. The provision of a Gas Fired Combined Heat and Power Energy Centre will therefore not remove the requirement for off site improvement works to the existing electricity network to be undertaken; however, it will significantly reduce the environmental effect of the Proposed Development.

16.4.8 Initial discussions with EDF Energy have indicated that that one or more high voltage supplies are likely to be required to supply the Proposed Development. It will therefore be necessary to install an 11kVA ring main throughout the Proposed Development with step down substations, each serving approximately 200 dwellings. The location of substations will be discussed with the Applicant at detailed design stage to site them in a discrete location and thereby minimise their effect on the dwellings.

16.4.9 EDF Energy completed the construction of a new Primary Substation in 2010. This new substation is situated adjacent to the existing Madingley Road 33kV switching station and has two 18 MVA transformers that originally provided a total capacity of 18 MVA. EDF Energy has advised that 14 MVA of this capacity is likely to be available in 2011 to serve the initial phases of the Proposed Development. The available capacity and the quantum of development that may be served will depend upon the load taken by the adjacent West Cambridge development. It is therefore expected that a suitable electricity supply can be provided to the Application Site suitable for the 2014 year of assessment with negligible effects.

16.4.10 As the Proposed Development expands and electrical loads increase, it will ultimately be necessary to upgrade the substation to incorporate two 30 MVA transformers in order to serve the full quantum of Proposed Development. EDF Energy has planned for this requirement as a switchboard upgrade has already been built into the Primary Substation to enable the capacity to be increased to 30MVA when the transformers are upgraded; therefore electricity may be supplied to support the full quantum of development considered within the 2026 year of assessment.

16.4.11 The proposed installation of an 11kV electrical connection to the Proposed Development in 2014 and the proposed transformer upgrades at the Primary Substation may be provided with negligible effect to the performance of the existing road network but may temporarily affect pedestrian amenity, as the new electrical supply will be laid at the back of the footway in accordance with the National Joint Utility Guidelines. This approach will ensure that it will only be necessary for vehicle management to be used when the proposed supply is installed across Madingley Road.

Gas

Existing Apparatus

16.4.12 National Grid Gas is responsible for the provision of natural gas supplies in the local area.

16.4.13 Record drawings indicate that there is a network of high pressure and intermediate pressure gas mains in close proximity of the Application Site, as described below:-

- A pressure reducing station is situated in the south western corner of the Application Site, which is provided to accommodate an incoming 250mm diameter High Pressure (HP) Transmission main and outgoing 200mm High Pressure, 300mm Medium Pressure (MP) and 6" Low Pressure (LP) mains, which extend along Madingley Road.
- The 200mm diameter HP main extends through the Application Site adjacent to the toe of the M11 motorway embankment to the northwest corner of the Application Site. A further pressure reducing station is located at the junction of Huntingdon road and the A14 and it is used to reduce the pressure from high to intermediate.
- A network of low pressure gas mains are situated within Huntingdon Road and Madingley Road, which are used to supply existing residential dwellings.
- A 250mm diameter medium pressure gas main is situated below Huntingdon Road, which terminates on the west side of Buckingham Road.

Gas Supply

16.4.14 A Gas Fired Combined Heat and Power Energy Centre will be used to generate heat that may be distributed to Key Worker Housing, Student Accommodation and Research Buildings via a District Heating (DH) network. This approach will remove the requirement for gas boilers to be provided within these tenures and will thereby cause the peak gas demand to be reduced. The utilities infrastructure will be sized to suit the final CHP extents and demand. The infrastructure from the Energy Centre will be constructed along the service corridors as these corridors are constructed, allowing for localised connections to individual plots as required and expansion in to future phases. The Energy Centre building will be sized to cater for any expansion necessary to accommodate demands up to the 2026 development quantum.

16.4.15 Calculations have been prepared to estimate the gas demand of the Proposed Development, which indicates that the peak gas demand is approximately 8.4MW and 58.9MW in 2014 and 2026, respectively. The Annual Gas Consumption has been estimated as approximately 1,700 MWh and 18,600 MWh in 2014 and 2026, respectively.

16.4.16 National Grid Gas has indicated that a dedicated medium pressure (MP) gas connection will be required to permit gas to be supplied to the CHP in 2014 and that a low pressure supply will be required to supply gas to buildings that will utilise gas boilers to provide heat (e.g. Market Housing). The low pressure gas network will expand with the Proposed Development between 2014 and 2026.

16.4.17 National Grid Gas has indicated that the Proposed Development could be supplied from either the existing MP gas main situated in Madingley Road adjacent to the proposed signalised junction, or from the 200mm diameter HP gas main to the southeast of the Application Site, although the latter option would introduce a requirement for the local HP gas governor to be upgraded and for further new gas governors to be provided to reduce the incoming pressure to medium pressure. A suitable gas supply may therefore be supplied to support the initial and full quantum of development considered within the 2014 and 2026 assessment years, respectively.

16.4.18 A Pressure Reducing Station will be required on site to reduce the pressure to low pressure for distribution throughout the Proposed Development, irrespective of the location of the proposed connection to the existing network.

Potable Water*Existing Apparatus*

16.4.19 Cambridge Water Company (CWC) supply potable water in this area.

16.4.20 Asset location plans indicate that there is a network of water mains in close proximity of the Application Site, as described below:-

- 300mm, 12" and 6" diameter water mains lie below Huntingdon Road
- 6" and 3" diameter water mains extend below Madingley Road.
- No major water mains are located within the Application Site.

16.4.21 Cambridge Water Company has advised that the local network in the immediate vicinity of the Application Site currently has limited spare capacity for the Proposed Development. However water is available from two 18" mains, which are situated approximately 1.5km and 2km, respectively, to the south of the Application Site.

Water Supply

16.4.22 Cambridge is designated as an area with a level of serious water stress by the Environment Agency and it will therefore be necessary to employ measures to reduce potable water demand.

16.4.23 The Phase 1 Water Cycle Strategy for Major Development Areas in and around Cambridge states that strategic plans for meeting the future demand over a 25 year period are detailed within the Cambridge Water Companies Water Resource Management Plan 2009 and that detailed design of schemes defined

within this plan will be undertaken when funding has been granted by OFWAT. The Phase 1 Water Cycle Strategy indicates that the use of compulsory metering, and provision of new developments that comply with the requirements of the Code for Sustainable Homes to minimise additional water demand, will cause the potable water demand to increase by 5 Ml/d, which equates to an increase of 15%. The Water Resource Management Plan indicates that the Cambridge Water Resource Zone has capacity within the licensed abstractions for the forecast development and natural growth; therefore the Proposed Development may be accommodated within the existing headroom.

16.4.28 The Phase 2 Water Cycle Strategy for Cambridge and the surrounding Major Growth Areas indicates that by incorporating water efficiency into new developments, the need for additional water resources are minimised, which will reduce the burden on finite water in the environment. This strategy assesses the requirements to build new homes at CSH level 3/4 or 5/6, and it has assumed that after 2016 all new homes will be built to CSH level 5/6. Based on this approach, approximately 8.6 Ml/d of additional water will be required to serve the major growth sites in and around Cambridge. To meet CSH level 5/6 will require progressive implementation of greywater recycling (GWR) and/or rainwater harvesting (RWH) systems at either a household or community scale, in addition to implementation of water efficient appliances and changes in consumers' behaviours/attitudes towards water consumption. Cambridge Water Company's (CWC) final Water Resource Management Plan (WRMP10) identifies that there is no immediate threat to water resources within the Cambridge Water Resource Zone, and that there is capacity within its current licensed abstractions for the forecast development. The forecast population used by CWC assumes that average build rates are closely aligned with the Regional Spatial Strategy (RSS), though total numbers predicted exceed the RSS target by 60%, based on historical data and the water company's experience. It must also be noted that the WRMP10 continues to 2035, whereas the RSS was only to continue to 2031. There is currently no supply-demand deficit within the CWC WRZ, and the WRMP10 indicates no immediate threat to water resources.

16.4.24 The following three stage strategy has been conceived to permit the average consumption of freshwater to be reduced from 150 litres per person per day (l/hd/day) to 80 litres per head per day and thereby ensure compliance with the Stage 1 and 2 Water Cycle Study, NW Cambridge Area Action Plan and Levels 5 and 6 of the Code for Sustainable Homes:-

- Demand Reduction – The demand for all water will be minimised through use of appliances such as low-flow showers, low and dual flush toilets, spray taps, which could save approximately 32, 28, 2 l/hd/day, respectively, based on the BISRIA "Typical Dwelling" figures. Passive infra-red detectors could also be provided for automatic flushing urinals within Academic and Commercial Research Facilities to generate further savings
- Water Use Management – Central water meters will be installed on all individual dwellings and commercial properties as part of planning requirements together with check meters within commercial properties so that the occupants can determine the extent of their water use. Evidence suggests this would encourage them to consider how they use the water and will lead to a reduction in water use as occupants become conscious of their water use.
- Use of alternative sources of water – Potable water must be provided for any use where the water is likely to be ingested; however, there is an opportunity to replace up to approximately 40% and 60% of potable water within domestic and office environments, respectively. The use of potable water can therefore be significantly reduced by using alternative sources of water such as rainwater and greywater, as described below:-
 - i. Rainwater harvesting systems will be used to collect and store surface runoff from roof areas and to replace potable water conventionally used for irrigation, toilet and urinal flushing. This approach will be used for all buildings constructed on impermeable areas of the Application Site as rainwater harvesting devices may also be used to control flood risk by ensuring that the volume of runoff discharged to the Washpit Brook will not be increased by the Proposed Development. Preliminary calculations have been prepared considering sample Proposed Development plots, which demonstrate that rainwater harvesting tanks will function most effectively for low density plots as the demand for

non potable water will be more closely matched to the rainwater yield than for high density Proposed Development plots. These calculations also indicate that non potable water demand will generally exceed rainwater yield and that the harvesting systems will be capable of satisfying between 5 and 50% of the non potable demand, depending on density; therefore it will also be necessary to use greywater recycling or combined systems to permit potable water demand to be reduced to 80 l/h/day for dwellings constructed to CSH Level 5 and 6.

- ii. Greywater recycling will be used to intercept potable water that has already been used for other applications, such as bathing, and permits this water to be treated, stored and recycled for use in toilet flushing and irrigation. The yield and demand are closely aligned, particularly within residential tenures; therefore greywater or combined systems will be used for all properties constructed to Level 5 and 6 in order to accommodate the shortfall in non potable demand provided by rainwater harvesting systems.

16.4.25 The aforementioned water supply strategy will potentially permit the total water demand to be reduced by a quarter through the use of demand reduction and water use management techniques; and for the potable water demand to be reduced by a half through the use of alternative sources of water for non potable applications. This strategy is compatible with the requirements of the Phase 1 Water Cycle Strategy for Major Growth Areas in and around Cambridge and the Northwest Cambridge Area Action Plan.

16.4.26 Greywater and rainwater harvesting will reduce the potable water demand per dwelling but the level of reduction will vary by season and is unlikely to make the Proposed Development independent of potable water supply on the grounds of water quality, volume demand, water pressure and long-term responsibility for maintenance.

16.4.27 Calculations have been prepared to estimate the potable and non potable water demand of the Proposed Development, which indicate that the total water demand in 2014 will be approximately 300m³/day, comprising approximately 220m³/day potable water and 80m³/day non potable water. The total water demand for the full quantum of Proposed Development in 2026 is estimated to increase to approximately 1,500m³/day, comprising approximately 1,100m³/day potable water and 400m³/day non potable water.

16.4.28 Cambridge Water Company has indicated that it will be necessary to reinforce the existing potable water supply network to allow the Proposed Development to be supplied in 2014 as the northern arm of the ring main system around Cambridge is currently close to capacity. The proposed reinforcement works would include the provision of a new 450mm diameter ring main that would extend over a length of at least 3.2km from the existing 18" mains located 1.5km to the south of the Application Site, near Barton Road and Charles Babbage Road, to the existing 18" water main, which is located near to the Histon Road/Kings Hedges Road junction, near the Histon junction of the A14 trunk road. This reinforcement will provide sufficient capacity to permit the full quantum of Proposed Development to be served in 2026. Two alternative routes have been identified for the ring main. The preferred route has been identified by Cambridge Water Company and involves using powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. The alternative route extends along the existing road network, including Barton Road, Grange Road, Madingley Road, Huntingdon Road, Oxford Road and Histon Road.

16.4.29 Due to the elevation of the Application Site, Cambridge Water Company has also advised that water from the proposed ring main will require boosting in order to provide a satisfactory level of service. A new booster station will therefore be required, which is likely to be situated in close proximity to the proposed Huntingdon Road East Access, and will draw water from the proposed ring main and permit it to be supplied to the Proposed Development at an acceptable pressure.

Telecommunications*Existing Apparatus*

16.4.30 BT Openreach and Virgin Media are the telecommunications providers within the area. Cable and Wireless also have apparatus in close proximity to the Application Site.

16.4.31 Asset location plans indicate that the following telecommunications apparatus is located in close proximity of the Application Site:-

- BT Openreach apparatus is present within Huntingdon Road and Madingley Road and it extends into the Application Site to serve existing buildings.
- Virgin Media do not have a strategic National Core Network adjacent to the Application Site; however they do have a local network of ducts running along Huntingdon Road and Madingley Road.
- Cable & Wireless have apparatus situated in close proximity to Madingley Road.

Telecommunications Supply

16.4.32 Both voice and data connections to each building are proposed. Telecom cables, whether copper or fibre optic, will therefore be required to support high bandwidth communications. New infrastructure in the form of ducts and telecommunication cables will be provided throughout the Proposed Development and connected to every property. The telecommunications strategy for the Application Site will involve the installation of apparatus in a phased manner along the main utility spines. Sufficient ducts, fibres and cables will be provided to permit all areas to be served and additional ducts shall be installed to allow for potential future providers. The requirements for telecommunications supply will be incorporated into infrastructure planning at an early stage and throughout the subsequent detailed design phases of the Proposed Development.

16.4.33 BT Openreach and Virgin Media apparatus surround the Application Site and it will therefore be feasible to extend the existing network into the Proposed Development from either Huntingdon Road or Madingley Road. A suitable telecommunications supply will therefore be supplied to support the initial and full quantum of Proposed Development considered within the 2014 and 2026 assessment years, respectively.

Foul Water*Existing Sewers*

16.4.34 Anglian Water is the statutory sewerage authority and is therefore responsible for the treatment and disposal of foul water from Cambridge. The Proposed Development is situated within the catchment of Cambridge Sewage Treatment Works.

16.4.35 Sewer record plans indicate that there is an existing foul sewer that extends below Huntingdon Road and Madingley Road, to the north and south of the Application Site, respectively, as defined below:-

- Huntingdon Road Sewers - Two separate networks have been identified that fall in an easterly and westerly direction from the high point, which are situated adjacent to the Reston property on the west side of the Girton Road/Huntingdon Road junction. This existing sewer is formed using vitrified clay pipes with a diameter of between 9" and 300mm.
- Madingley Road Sewers – A 1200mm diameter trunk sewer is situated to the south east of the Application Site, which accommodates the discharge from the 300mm diameter sewers situated below Madingley Road and Huntingdon Road.

Foul Water Drainage Strategy

16.4.36 The dry weather flow and total peak flow rate which will be generated within the Application Site is anticipated to be approximately 41 litres per second and 171 litres per second in 2014 and 2026 respectively, based upon the rates defined within Sewers for Adoption 6th Edition.

16.4.37 Anglian Water has been consulted to determine the available capacity within the existing sewer network. Anglian Water has supplied a Predevelopment Enquiry Report, which considers the Proposed Development alone and indicates that the Cambridge Sewage Treatment Works has sufficient capacity to serve the Proposed Development at both the 2014 and 2026 years of assessment.

16.4.38 The Phase 1 Water Cycle Strategy, which considers the cumulative effect of all major growth areas in and around Cambridge, indicates that the discharge consent at Cambridge WwTW will not require revision to accommodate the increased flow from the infill or strategic development sites within Cambridge. However, improvements will be required to the treatment works in order to maintain the quality of the effluent discharged to the River Cam due to the resulting increase in actual flow and to satisfy the requirements of the Water Framework Directive. These improvements will include increasing the hydraulic capacity of the inlet works and increasing the treatment capacity. Anglian Water will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20) to ensure that the increased discharge from the development will not cause water quality within the River Cam to deteriorate.

16.4.39 The Phase 2 Water Cycle Strategy confirms that no consent change is required for ammonia to ensure no deterioration of the current WFD status downstream of the treatment works at Cambridge WwTW, up to and including 2031. However, the BOD consent will require marginal tightening, and a revised phosphate consent would be required. In the foreseeable future, consent limits will be set with a view to meeting the requirements of the Water Framework Directive (WFD) whose aim is to ensure that good river quality standards are met throughout each waterbody. The intention will be to set the discharge consent limits based upon the quality and volume of the receiving watercourse and the volume of wastewater effluent at the point of discharge. To maintain water quality in the watercourses, the consent standards in the future on the effluent discharges from the Cambridge WwTW will need to be periodically reviewed by the EA. Improvements to the treatment works will be required as the new developments come on stream to maintain the current discharge consent standards. This has been accepted by Anglian Water and planned for in their future AMP6 programme. Therefore, water quality environmental capacity and WFD compliance should not be a constraint to growth at Cambridge WwTW.

16.4.40 Anglian Water has also indicated that whilst there is no existing foul drainage network within, or directly adjacent to the Application Site with capacity to accept the proposed discharge from the Proposed Development that there is a 1200mm diameter trunk foul sewer downstream of the junction of Madingley Road and Wilberforce Road, to the south east of the Application Site, that will currently be capable of accommodating a discharge of up to 42.4 litres per second.

16.4.41 The Application Site is generally at a higher level than existing adjacent urban area situated to the south; therefore it would be feasible to provide a gravity sewer connection to the existing sewer network. However, the provision of a full gravity system would necessitate deep excavations that would be expensive to construct, difficult to maintain and would not be capable of effectively attenuating the peak flow. Therefore it is currently proposed that foul water will be drained by gravity to the lower levels within the Proposed Development and that pumped rising mains are provided from these locations to convey foul water from the Application Site to the existing publicly owned 1200mm diameter trunk sewer located downstream of the junction between Madingley Road and Wilberforce Road, to the southeast of the Application Site. This connection location is consistent with the recommendations contained within the Phase 1 and Phase 2 Water Cycle Strategy for Major Growth Areas in and around Cambridge, which confirms that the 300mm diameter sewers that are situated in advance of the trunk sewer will not have sufficient capacity to accommodate the discharge from the Proposed Development and indicates that it will not be feasible to connect to the existing sewer nearer to the proposed access with Madingley Road.

Current topography indicates that the Application Site generally falls in a south-westerly direction from Huntingdon Road towards the M11 and the adjacent Washpit Brook. However, the area of land situated to the east of the SSSI falls gently towards the north east corner of the Application Site. A total of two foul pumping stations will be required to permit the on site foul sewerage network to be installed with minimum cover in order to minimise construction costs and ensure that the sewer can be safely maintained. The first pumping station will be situated adjacent to the Park and Ride Interchange to permit discharge from buildings in the central and eastern portion of the Application Site to be transferred off site to the existing publicly owned trunk sewer via a high level rising main. The ridgelines present within the existing topography to the west of the SSSI necessitate the provision of a further pumping station to avoid the requirement for sewers to be constructed at depth.

16.4.42 The proposed pumping stations will also be used to balance flows in order to minimise the effect of the Proposed Development on the receiving foul sewer and additional storage will be provided to ensure that the 42.4l/s capacity of the existing trunk sewer is not exceeded and that the risk of sewer flooding is not increased. Sewers for Adoption requires storage to be provided at each pumping station to ensure that the anticipated discharge may be accommodated below ground for a period of twenty four hours in the event of a pump failure. Calculations have been prepared to determine that the twenty four hour storage will have a volume of approximately 600m³ and an additional 470m³ of storage is proposed to accommodate the excess flow generated by the attenuation of foul water in 2026. Approximately 20% of the twenty four hour storage will be used in 2014, however the additional storage will not be required for the initial phase of development as the peak discharge will not exceed the capacity of the receiving sewer. Hence, the foul discharge generated by the Proposed Development in the 2014 and 2026 assessment years may be accommodated by the existing foul sewerage infrastructure without increasing the risk of sewer flooding.

Other Services

Existing Services

16.4.43 The University of Cambridge Fibre Network, entitled the Granta Backbone Network (GBN), passes through the Application Site. GTC Pipelines Ltd has indicated that it has recently installed new gas mains that will serve two new Proposed Developments situated off Huntingdon Road. Cambridgeshire County Council has indicated that they maintain adopted street lighting columns and illuminated signs along Huntingdon Road.

16.4.44 Asset location plans provided by the University of Cambridge Computing Service indicate that the GBN extends in a south-easterly through the Application Site from the northwest corner. The fibre optic network runs along existing roads and hedgerows, which follow a dog leg route.

16.4.45 Record drawings supplied by GTC Pipelines Ltd indicate that they have recently installed new gas mains that will serve the redeveloped National Institute of Agricultural Botany (NIAB) site, which is situated on the northern side of Huntingdon Road, and the redeveloped land formerly occupied by Number 193 Huntingdon Road.

16.4.46 The highway drawings supplied by Cambridgeshire County Council indicate that existing street lighting columns extend along Huntingdon Road and terminate near to the University of Cambridge Farm access where the speed limit changes.

Proposed Supplies

16.4.47 The Proposed Development will include Student Accommodation, Key Worker Housing and Academic Research facilities. The occupants of these buildings will either work for or study at the University of Cambridge and it would therefore be appropriate to extend the existing fibre optic network to serve the aforementioned tenures. The proposed extension of the existing fibre network will not affect the performance of the existing highway as it passes through the Application Site.

Enabling Works

16.4.48 Existing utility apparatus that conflicts with proposed buildings, roads or junctions with the existing highway will be diverted before the associated construction works commence to enable the Proposed Development and ensure that existing supplies will not be interrupted. This can be secured by way of planning condition.

Diversion of Existing Utility Infrastructure to permit the Proposed Development to be constructed

16.4.49 Enquiries have been issued to Statutory Undertakers to determine the extent of apparatus that is likely to be affected by the Proposed Development in order to ascertain the extent of protection or diversionary works required to enable the buildings on the Proposed Development, as defined below:-

- The existing overhead electricity lines that pass through the Proposed Development will require disconnection at the boundary where they serve existing properties that are to be demolished in the 2014 assessment year. Electrical supplies to existing properties that are to be retained should be protected until alternative supply arrangements are made as the Proposed Development expands.
- The proposed blocks within the Proposed Development will conflict with the GBN fibre optic route and it will therefore be necessary to divert the existing network along the route of the proposed primary street network before conflicting buildings are constructed in the 2014 assessment year. These diversionary works could be used as an opportunity to install a secondary diverse network through the Application Site.

16.4.50 The utility diversions identified above will take place within the Application Site and they will not affect any archaeological or ecological receptors.

16.4.51 The 200mm diameter high pressure (HP) gas main that extends through the Application Site will be retained and has been treated as a constraint within the parameter plans as buildings have been positioned with a minimum clearance of 14m to the main to ensure that it will not be adversely affected.

16.4.52 Existing utilities that serve existing properties that are to be retained should be protected and connected into new supplies that are constructed to serve the Proposed Development.

Diversion or protection of Existing Utility Infrastructure to permit Proposed Junctions to be constructed

16.4.53 Two new junctions will be constructed on Huntingdon Road and a new junction will be provided on Madingley Road to provide access to the Proposed Development for non motorised users, public transport and private vehicles. The Huntingdon Road (East) junction and Madingley Road junction will be constructed in 2014 and the Huntingdon Road (West) junction will be constructed in advance of the 2026 assessment year to permit the traffic generated by the full quantum of development to be accommodated.

16.4.54 Enquiries have been issued to Statutory Undertakers to determine the extent of existing apparatus that is likely to be affected by the proposed junctions in order to ascertain the extent of protection or diversionary works required to enable the highway works, as defined below:-

- The existing 11kV cable network that runs along Huntingdon Road is likely to be affected when the Huntingdon Road (West) junction is constructed and it will therefore be necessary to protect or lower the existing cable where it passes below the new vehicular access.
- The existing low pressure gas mains that run along Huntingdon Road and Madingley Road are likely to be affected when the three proposed vehicular accesses are constructed and it will therefore be necessary to protect or lower the existing mains where they pass below the new vehicular accesses.
- The existing BT Openreach apparatus that runs along Huntingdon Road is likely to be affected when the Huntingdon Road (East and West) junctions are constructed and it will therefore be necessary to protect or lower the existing cables where they pass below the new vehicular accesses. Virgin Media apparatus is also likely to be affected when the

Huntingdon Road West junction is constructed and it will also be necessary to protect or lower the existing cables where they pass below the new vehicular access.

- The existing 12" and 3" water mains that extend along Huntingdon Road and Madingley Road, respectively, pass below the proposed vehicular Huntingdon Road (East) access and the Madingley Road access and, depending on their depth, they may be affected. In the event that the highway construction works cause the cover to be reduced to less than 900mm, then it will be necessary to lower the existing water mains.

16.4.55 The existing electricity, gas and telecommunications apparatus lie below the existing footway and the proposed lowering is therefore unlikely to affect the operation of the adjacent carriageway.

16.4.56 The existing water mains are situated below the carriageway and it will therefore be necessary to partially close the road whilst these services are diverted or protected. The water mains could be lowered in conjunction with the construction of the highway schemes, with minimal effect on the performance of the highway network.

16.4.57 The proposed Huntingdon Road East junction will conflict with existing street lighting columns. The existing street lighting columns that surround the Huntingdon Road East junction will be reconfigured to ensure that adequate clearance is provided to the extended carriageway and that the junction is illuminated effectively. These works will take place as part of the junction improvement scheme to ensure that the performance of the highway network will not be affected.

16.5 Identification and Assessment of Likely Significant Effects

16.5.1 This section identifies the likely significant effects that could potentially occur as a result of construction and subsequent operation of the Proposed Development. Mitigation measures are identified and the significance of the effect as mitigated is then assessed.

Effects during Construction

16.5.2 The existing utilities that will require protection or diversion to avoid being affected by highway works are generally located below the footway. The protection or diversion works may therefore generally be undertaken without causing significant congestion or disruption to pedestrians and cyclists, providing that footway and cycleway diversions are provided in advance of the construction works to ensure there are no discontinuities in provision for non motorised users. Utilities that are situated below the carriageway are unlikely to be affected, as the proposed highway works tie into the existing road levels and it will therefore not be necessary to reduce the cover to utilities situated below the carriageway; therefore it is unlikely to be necessary to partially close the carriageway. It is therefore expected that utility diversion and protection works may be undertaken in advance of the 2014 assessment year, with negligible effects.

16.5.3 The connections to existing electricity, gas and telecommunications infrastructure are situated in close proximity to the proposed signalised junction on Madingley Road; therefore these supplies may be installed with minimal effect on the performance of the highway network. It is therefore expected that a suitable electricity, gas and telecommunications supply can be provided to supply the full quantum of development, in advance of the 2014 assessment year, with negligible effects.

16.5.4 The other effects from the construction phase of the Proposed Development are considered to be temporary and the main effects are likely to be related to the installation of the following utility supplies:-

- Installation of foul drainage to convey foul discharge from the Proposed Development to the Trunk Sewer;
- Construction of 3.2km long potable water ring main extension.

16.5.5 Proposed utility supplies will generally be installed along existing or proposed road corridors and will therefore not generally have any adverse effect on ecological, geological or archaeological receptors. However, it will be necessary to carefully manage traffic when the utility supplies are installed to avoid significant disruption to the local highway network. The Traffic Management Act 2004 provides a mechanism for Highway Authorities to control congestion on the road network, when works are undertaken within the

public highway. All utility connections will be installed in accordance with the Traffic Management Act 2004 to ensure that disruption is minimised.

16.5.6 The traffic management that will be provided on Huntingdon Road and Madingley Road will have the potential to slow down the speed of traffic along sections of both roads and may also lead to localised congestion during the morning and afternoon rush hour periods and will therefore have the potential to generate air quality effects. At receptors located adjacent to the work areas on Huntingdon Road and Madingley Road, the effect of this change in traffic flow may temporarily increase their exposure to emissions of NO₂, PM₁₀ and PM_{2.5}. Chapter 14 indicates that in the 2014 baseline scenario, the receptors located adjacent to the stretch of Huntingdon Road that is subject to the works are predicted to experience annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} of 27 µg/m³, 19 µg/m³ and 12 µg/m³ respectively. The receptors located adjacent to the stretch of Madingley Road that is subject to the works (R11) are predicted to experience annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} of 22 µg/m³, 19 µg/m³ and 12 µg/m³ respectively. These concentrations are well below the relative air quality objective values, which have been set for the protection of human health. Whilst the installation of traffic management during the works would increase vehicle emissions at locations on Huntingdon Road and Madingley Road, it is highly unlikely that this would increase pollutant concentrations to the extent that they would at risk of breaching their respective air quality objectives.

16.5.7 The works on Huntingdon Road and Madingley Road will consist of breaking out of the existing carriageway, installation of utilities and pavement reinstatement. These activities have the potential to result in short term significant noise effects to nearby residential properties. The utility works by their very nature are mobile. It is anticipated that the works will generally progress at a rate of approximately 20 metres per day. Chapter 13 indicates that, for any particular residential receptor on Huntingdon Road or Madingley Road, noise levels will increase as the works approach to a maximum and decrease as the works recede. Construction noise levels to a representative residential receptor have been calculated for the various likely activities associated with the utility works, assuming a closest approach distance of 15 metres. Based on the existing traffic flows on Huntingdon Road and Madingley Road, prevailing noise levels to the closest residential properties on these links will be relatively high, in the region of 65 to 68 dB(A). The estimated construction noise levels are at or below the generally accepted construction noise level of 75 dB(A) for short term works. During these works, there will be traffic management in place on Huntingdon Road or Madingley Road, which could result in a reduction in volume and speed on these links and the transfer of traffic to other roads. On Huntingdon Road or Madingley Road, the changes in traffic conditions due to the traffic management will potentially result in reduced traffic noise levels to residential properties on these links, although the significance of these reductions is assessed to be negligible/minor. Regarding the possible changes in traffic flows on other links as a result of drivers avoiding Huntingdon Road or Madingley Road, these changes have been assessed as negligible with respect to road traffic noise levels. It is noted that an increase in traffic volume of 25% is required to provide a 1 dB(A) increase in noise level to adjacent receptors, and a doubling of traffic volume is required to provide a 3 dB(A) increase. Reference to the criteria in Chapter 13 shows that increases of 1 to 3 dB(A) are assessed as minor.

Installation of foul drainage to convey foul discharge from the Proposed Development to the trunk sewer

16.5.8 The 1200mm diameter trunk sewer that forms the outfall for the foul drainage network is situated to the southeast of the Application Site, at a distance of approximately 1300m from the proposed signalised junction on Madingley Road.

16.5.9 The foul discharge from the Proposed Development will be conveyed to the trunk sewer via a shallow pumped rising main, rather than by a deep gravity sewer, in order to minimise the effect of installing this connection. The pumped rising main will be installed in advance of the 2014 year of assessment and it will have sufficient capacity to accommodate the full discharge generated by the Proposed Development as at 2026.

Construction of reinforcement to the potable water supply network

16.5.10 Cambridge Water Company has indicated that in order to allow potable water to be supplied to the Proposed Development that it will be necessary to install a new 450mm diameter ring main that would extend over a length of at least 3.2km from the 18" mains located below Barton Road and Charles Babbage Road, approximately 1.5km to the south of the Application Site, to the existing 18" water main that is located at the Histon Road/Kings Hedges Road junction, near to the Histon junction of the A14 trunk road. This reinforcement to the existing potable water supply infrastructure will be required in advance of the 2014 assessment year.

16.5.11 The new 450mm diameter ring main will be laid through the Application Site in order to minimise the extent of public highway that will be affected during the construction phase. For the remaining length, two alternative routes have been identified for the ring main. The preferred route has been identified by Cambridge Water Company and involves using powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. The alternative route extends along the existing road network, including Barton Road, Grange Road, Madingley Road, Huntingdon Road, Oxford Road and Histon Road. If the preferred route is used, then disruption to traffic will be minimised as the majority of the route will avoid the public highway. In the event that the alternative route is utilised, then the ring main will be laid within the verge or footway, wherever possible, in order to minimise the requirement for traffic management to be used to allow the road to be partially closed so that the rising main may be installed below the carriageway.

Effects during Operation

16.5.12 Most of the effects from the operational phase of the Proposed Development are likely to be permanent, unless they are mitigated as they would otherwise continue for the duration of the Proposed Development's lifespan.

16.5.13 The Proposed Development will generate an additional demand on utility infrastructure surrounding the Application Site. Calculations have been prepared to estimate the demand that the Proposed Development will impose upon the existing electricity, gas, potable water and foul sewer networks during the 2014 and 2026 assessment years.

16.5.14 Extensive consultations have been held with the Statutory Undertakers, which have indicated that a suitable electricity, gas, potable water and telecommunications supply can be provided to accommodate the full quantum of development, generally in advance of the 2014 assessment year, and that foul water generated by the Proposed Development may be treated. The Proposed Development is therefore expected to have negligible effect on utility infrastructure during the operational phase.

16.6 Measures to avoid and manage effects**Construction Phase***Installation of Utility Supplies along the Existing Highway Network*

16.6.1 To avoid or manage the effect of utility connection works, consultations will be held with the Statutory Undertakers to ensure that all new services are installed following a similar route, where possible at the same time. The new utilities will be installed below the footway, or in close proximity to the existing kerb line, to reduce the requirement for road closures. The position of utilities will be identified in advance of the works taking place through the use of non intrusive geophysical surveys and hand dug excavations to reduce the likelihood of conflicts that could cause the utility installation works programme to be increased unnecessarily.

16.6.2 Temporary signals will also be provided to enable a safe working area to be provided within the carriageway, whilst enabling vehicular traffic to continue to use the opposing carriageway. The traffic flows along Huntingdon Road and Madingley Road are tidal and it will therefore be necessary for intelligent signals to be used in order to provide extended green time for the most heavily trafficked route and thereby minimise congestion and delay.

16.6.3 The Statutory Undertakers utility installations works will be phased to ensure that temporary traffic signals are not erected on more than one road at any time and traffic diversions will be provided at strategic locations to control congestion.

16.6.4 Use will be made of local media to provide local drivers with appropriate information to assist them in making decisions regarding their choice of route.

16.6.5 Contract documents will include obligations on Contractors to maintain access to properties at all times or to agree in advance and undertake works at times when access will not be required.

16.6.6 Mobile noise barriers will be provided, where practicable, when the most noisy utility works are undertaken in order to enable the noise level to receptors on Huntingdon Road and Madingley Road to be reduced by 5 to 10 dB(A). With noise avoidance and management measures and construction traffic routing in place, as outlined in the Development Assumptions, off-site construction works for utilities will be effectively managed, minimising significant effects at off-site receptors.

16.6.7 Measures to avoid negative effects on air quality would include use of low emission vehicles running on low sulphur diesel, and damping down to avoid dust generation.

Significance Effects

16.6.8 The significance of effects is shown in **Table 16.4** below.

Table 16.4: Magnitude and Significance of Effects

Potential effect	Nature of effect	Sensitivity of Receptor	Design measures to avoid or manage effects	Magnitude of potential effect	Significance of effect
Installation of foul drainage along Madingley Road to convey foul discharge to the existing trunk sewer causing disruption to traffic and properties on Madingley Road	Temporary during construction	Traffic and receptors on Madingley Road – <i>Medium</i>	<p>The foul water will be conveyed to the receiving trunk sewer via a shallow pumped rising main, rather than via a deep gravity sewer, to minimise the effect on receptors along Madingley Road.</p> <p>The pumped rising main will be installed in close proximity to the existing kerb line to avoid the requirement for road closures. Temporary signals will also be provided to enable a safe working area to be provided within the carriageway, whilst enabling vehicular traffic to continue to use the opposing carriageway.</p> <p>The proposed measures will reduce the time that will be required to allow the new foul drainage to be installed and will thereby reduce the magnitude of the effect to traffic and properties on Madingley Road.</p>	Low Adverse	Minor Adverse

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Utilities and Services

Potential effect	Nature of effect	Sensitivity of Receptor	Design measures to avoid or manage	Magnitude of effect	Significance of effect
Installation of 450mm potable water ring main causing disruption to traffic and properties on Madingley Road, Huntingdon Road Oxford Road, Histon Road, and adjoining residential roads	Temporary during construction	Traffic and receptors on Madingley Road, Huntingdon Road Oxford Road and Histon Road – <i>Medium</i>	<p>The new 450mm diameter ring main will be laid through the Application Site in order to minimise the extent of public highway that will be affected during the construction phase.</p> <p>Two alternative routes have been identified for the remaining length of the ring main. Cambridge Water Company intend to use powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. If this route is used, then disruption to traffic will be minimised as the majority of the route will avoid the public highway and the magnitude of effect will be negligible.</p>	<p>Negligible if the potable rising main is installed on preferred route</p> <p>Low Adverse if the potable rising main is installed on the alternative route</p>	<p>Negligible if the potable rising main is installed on preferred route</p> <p>Minor Adverse if the potable rising main is installed on the alternative route</p>
		Traffic and receptors on adjoining residential roads – <i>Low</i>	In the event that it is necessary to install the ring main extension along an alternative route that utilises the public highway, then the ring main will be laid within the verge or footway, wherever possible, in order to minimise the requirement for traffic management to be used to partially close the carriageway. This proposed measure will reduce the extent of the carriageway that will be affected when the new ring main is installed and will thereby reduce the magnitude of the effect to traffic and properties on Madingley Road, Huntingdon Road, Histon Road and the adjacent side roads.	<p>Negligible if potable rising main is installed on preferred route</p> <p>Low Adverse if the potable rising main is installed on the alternative route</p>	Negligible

16.7 Cumulative Effects

16.7.1 The North West Cambridge Area Action Plan has been prepared in consultation with key stakeholders involved in the delivery of North West Cambridge and various partnership working arrangements have been in place for the Proposed Development since 2006, including Cambridgeshire County Council, Cambridgeshire Horizons, the Primary Care Trust, the Environment Agency, and the Highways Agency.

16.7.2 Cambridgeshire Horizons' key focus is on the delivery of the development strategy for the Cambridge area. As such, it is assisting the local authorities with mechanisms to ensure prompt and efficient delivery of the major developments and necessary infrastructure. This approach provides utility suppliers with the opportunity to plan and install strategic reinforcements for the utility network that will be capable of accommodating the cumulative demand of all strategic development sites, rather than providing multiple reinforcements for individual developments.

16.7.3 The Phase 1 and Phase 2 Water Cycle Strategies for the Major Growth Areas in and around Cambridge assess the potential cumulative effects associated with flood risk, water resources and supply, foul sewerage, wastewater treatment, water quality and water related ecology by considering the Proposed Development in a strategic manner alongside other proposed major development areas and infill sites. The Phase 1 and Phase 2 Water Cycle Strategies establish the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and the recommendations contained within these studies have been incorporated into the development proposals.

16.7.4 The Water Cycle Strategies also identify requirements for improvements to strategic wastewater infrastructure and thereby provide a mechanism for Anglian Water to seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20) and thereby ensure that the increased discharge from strategic development sites will not cause water quality within the River Cam to deteriorate.

16.7.5 The cumulative effect of the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement on existing services will therefore be negligible as other developments will be brought forward in line with improvements to utility infrastructure.

16.8 Summary

Introduction

16.8.1 This chapter provides a summary of the assessment undertaken to establish the potential effects on the existing utility infrastructure associated with the construction, and subsequent operation, of the Proposed Development. Potential implications with respect to the construction and operational phases have been considered and mitigation measures have been identified.

Assessment Approach

16.8.2 A baseline assessment has been undertaken to determine the location and capacity of existing utilities situated in the vicinity of the Application Site.

16.8.3 This assessment considers the capacity of existing utility infrastructure at the 2014 and 2026 assessment years, after allowing for reinforcements that are already scheduled, and identifies the likely effects of the Proposed Development on the capacity of that infrastructure. Where the requirement for reinforcement works is identified, the effects of any works necessary to deliver reinforcement are assessed.

Baseline Conditions

16.8.4 The Application Site is situated in close proximity to an existing residential area and is therefore well located to utilise residual capacity within existing utility infrastructure that surrounds the Application Site.

16.8.5 The Proposed Development aims to be exemplary in terms of best practice in sustainable design to reduce the requirement for energy and water. Standards of building construction, thermal mass and energy performance will significantly reduce energy demand. Low carbon and renewable energy sources will also be used in order to achieve high level reductions in carbon emissions, including a Gas Fired Combined Heat and Power Energy Centre that will generate electricity that may be exported back to the grid and heat that may be distributed to Key Worker Housing, Student Accommodation and Research Buildings via a District Heating (DH) network, respectively. A three stage strategy will also be employed to permit the average potable water consumption to be halved using appliances that will reduce water demand; visible water meters that will improve resident's consciousness of water use; and alternative sources of water such as rainwater harvesting and greywater recycling to supply non potable demands such as toilet flushing and irrigation.

16.8.6 The Proposed Development will generate an additional demand on utility infrastructure surrounding the Application Site. Calculations have been prepared to estimate the demand that the Proposed Development will impose upon the existing electricity, gas, potable water and foul sewer networks in 2014 and 2026 and enquiries have been issued to Statutory Undertakers to determine the location of existing apparatus and spare capacity. Responses to these enquiries indicate the presence of a new Primary Electricity Substation on Madingley Road with a spare capacity of 14MVA; High Pressure and Medium Pressure gas mains to the south east of the Application Site with available capacity to supply the Energy Centre and gas boilers within market housing; telecommunication equipment within Madingley Road and Huntingdon Road owned by BT Openreach and Virgin Media; and the University of Cambridge Fibre Network that passes through the Application Site.

16.8.7 Anglian Water has indicated that the Cambridge Sewage Treatment Works has sufficient capacity to serve the Proposed Development at both the 2014 and 2026 years of assessment. The Phase 1 and 2 Water Cycle Strategies, which consider the cumulative effect of major growth areas in and around Cambridge confirms that the discharge consent at Cambridge WwTW will not require revision to accommodate the increased flow from the infill or strategic development sites within Cambridge, but that improvements will be needed to the treatment works in order to maintain the quality of the effluent discharged to the River Cam and satisfy the requirements of the Water Framework Directive, including increasing the hydraulic capacity of the inlet works and increasing the treatment capacity. Anglian Water will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20); therefore the increased discharge from the proposed development will not cause water quality within the River Cam to deteriorate.

16.8.8 Anglian Water has also indicated that whilst there is no existing foul drainage network within, or directly adjacent to the Application Site with capacity to accept the proposed discharge from the Proposed Development that there is a 1200mm diameter trunk foul sewer downstream of the junction between Madingley Road and Wilberforce Road, to the south east of the Application Site, that will currently be capable of accommodating a discharge of up to 42.4 litres per second. Pumping stations will be provided on site to permit the on site foul sewerage network to be installed with minimum cover and to allow flows to be balanced and thereby ensure that the 42.4l/s capacity of the existing trunk sewer is not exceeded and that the risk of sewer flooding is not increased. This solution is compatible with the requirements of the Phase 1 and Phase 2 Water Cycle Strategies for Major Growth Areas in and around Cambridge.

16.8.9 Cambridge Water Company has prepared strategic plans for meeting the future demand over a 25 year period, which are detailed within their Water Resource Management Plan 2009. This plan indicates that the Cambridge Water Resource Zone has capacity within the licensed abstractions for the forecast development and natural growth; therefore the Proposed Development may be accommodated within the existing headroom. Cambridge Water Company has identified the presence of 3", 6" and 12" water mains in close proximity to the Application Site but advised that there is limited spare capacity within this local network to accommodate the Proposed Development. However, two 18" water mains are situated approximately 1.5km and 2km south of the Application Site near Charles Babbage Road and Barton Road, respectively, which do have available capacity. These existing water mains may be used to supply water to the Proposed Development, providing that a new 450mm diameter water main is extended a distance of approximately 3.2km from these mains to the existing 18" mains that is located at the Histon Road/Kings Hedges Road junction, near the Histon Junction of the A14 trunk road, and that a booster station is installed within the Application Site.

16.8.10 In order to ensure that existing utility supplies are not affected by the Proposed Development, it will be necessary to divert existing utility apparatus where they conflict with proposed buildings and roads. Enquiries have been issued to Statutory Undertakers to determine the extent of apparatus that is likely to be affected by the Proposed Development in order to ascertain the extent of protection or diversionary works required to enable the Proposed Development. Responses to these enquiries indicate that it will be necessary to lower or protect electricity, gas, potable water and telecommunications apparatus that extend below the proposed accesses to the Proposed Development. It will also be necessary to disconnect supplies to existing properties on the Application Site that are to be demolished and provide alternative supply arrangements for existing properties on the Application Site that are to be retained. The University of Cambridge Fibre Network will conflict with Proposed Development blocks and it will therefore be necessary to divert the existing network before conflicting buildings are constructed.

Measures to avoid manage or reduce effects

16.8.11 Consultations will be held with the Statutory Undertakers to ensure that new services are installed following a similar route, where possible at the same time. The new utilities will generally be installed below the footway, or in close proximity to the existing kerb line, to reduce the requirement for road closures. The position of utilities will be identified in advance of the works taking place through the use of non intrusive geophysical surveys and hand dug excavations to reduce the likelihood of conflicts that could cause the utility installation works programme to be increased unnecessarily.

16.8.12 Temporary signals will also be provided to enable a safe working area to be provided within the carriageway, whilst enabling vehicular traffic to continue to use the opposing carriageway. The traffic flows along Huntingdon Road and Madingley Road are tidal and it will therefore be necessary for intelligent signals to be used in order to provide extended green time for the most heavily trafficked route and thereby minimise congestion and delay. The Statutory Undertakers utility installations works will be phased to ensure that temporary traffic signals are not erected on more than one road at any time and traffic diversions will be provided at strategic locations to control congestion. Use will be made of local media to provide local drivers with appropriate information to assist them in making decisions regarding their choice of route.

16.8.13 Mobile noise barriers will be provided, where practicable, when the noisiest utility works are undertaken in order to enable the noise level to receptors on Huntingdon Road and Madingley Road to be reduced by 5 to 10 dB(A). With noise avoidance and management measures, dust prevention measures

and construction traffic routeing in place, as outlined in the Development Assumptions, construction works for utilities will be effectively managed, thus reducing any scope for significant negative effects..

Identification and Assessment of Likely Significant Effects

Effects during Construction

16.8.14 During the Construction Phase, it will be necessary to install new utilities to supply the Proposed Development. Proposed utility supplies will generally be installed along existing road corridors and will therefore not have any adverse effect on ecological, geological or archaeological receptors. Measures will be employed to ensure that traffic is carefully managed when the utility supplies are installed to avoid significant disruption to the local highway network.

16.8.15 Connections to the electricity, gas and telecommunications network are available in close proximity to the proposed signalised junctions on Madingley Road and Huntingdon Road and they may therefore be installed when the junctions are constructed with negligible effect on the performance of the existing highway network. The works associated with the installation of a foul drainage connection and potable water ring main extension are more extensive and the significance of the effects generated by the works has been assessed and minimised as outlined below:-

- The 1200mm diameter trunk sewer that forms the outfall for the foul drainage network is situated to the southeast of the Application Site, at a distance of approximately 1300m from the proposed signalised junction on Madingley Road. In order to minimise the effect of works in Madingley Road, the foul discharge from the Proposed Development will be conveyed to the trunk sewer via a shallow pumped rising main, rather than by a deep gravity sewer.
- The potable water ring main extension will extend over a length of approximately 3.2km from the 18" main located 1.5km to the south of the Application Site to the existing water mains situated near the Histon junction of the A14 trunk road. In order to minimise the extent of public highway that will be affected during the construction phase, the ring main extension will be laid through the Application Site. For the remaining lengths, two alternative routes have been identified for the ring main. The preferred route has been identified by Cambridge Water Company and involves using powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. The alternative route extends along the existing road network, including Barton Road, Grange Road, Madingley Road, Huntingdon Road, Oxford Road and Histon Road. In the event that the alternative route is utilised, then the ring main will be laid within the verge, wherever possible, in order to minimise the requirement for traffic management to be used to allow the road to be partially closed so that the rising main to be installed below the carriageway.

16.8.16 With the mitigation outlined above, it is expected that these utility works can be undertaken with minor adverse or negligible effects.

Effects during Operation

16.8.17 During operation, the Proposed Development will generate an additional demand on utility infrastructure surrounding the Application Site. Calculations have been prepared to estimate the demand that the Proposed Development will impose upon the existing electricity, gas, potable water and foul sewer networks during the 2014 and 2026 assessment year. Extensive consultations have been held with the Statutory Undertakers, which have indicated that a suitable electricity, gas, potable water and telecommunications supply can be provided to accommodate the full quantum of development, generally in advance of the 2014 assessment year, and that foul water generated by the Proposed Development may be treated with mitigation measures included. The Proposed Development is therefore expected to have negligible effect on utility infrastructure during the operational phase.

Cumulative Effects

16.8.18 The Northwest Cambridge Area Action Plan has been prepared in consultation with key stakeholders involved in the delivery of North West Cambridge and various partnership working arrangements have been in place for the Proposed Development since 2006, including Cambridgeshire County Council, Cambridgeshire Horizons, the Primary Care Trust, the Environment Agency, and the Highways Agency.

16.8.19 Cambridgeshire Horizons' key focus is on the delivery of the development strategy for the Cambridge area. As such, it is assisting the local authorities with mechanisms to ensure prompt and efficient delivery of the major developments and necessary infrastructure. The cumulative effect of the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement on existing services will therefore be negligible as other developments will be brought forward in line with improvements to utility infrastructure. This approach provides utility suppliers with the opportunity to plan and install strategic reinforcements for the utility network that will be capable of accommodating the cumulative demand of all strategic development sites, rather than providing multiple reinforcements for individual developments.

16.8.20 The Phase 1 and 2 Water Cycle Strategies for the Major Growth Areas in and around Cambridge considers the Proposed Development in a strategic manner alongside other proposed major development areas and infill sites. This study establishes the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and the recommendations contained within the study have been incorporated into the development proposals. The Water Cycle Strategies also identify requirements for improvements to strategic wastewater infrastructure and thereby provide a mechanism for Anglian Water to seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20) and thereby ensure that the increased discharge from strategic development sites will not cause water quality within the River Cam to deteriorate.

16.8.21 The cumulative effect of the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement on existing services will therefore be negligible as other developments will be brought forward in line with improvements to utility infrastructure.

Conclusions

16.8.22 The existing utility infrastructure will be capable of supporting the Proposed Development, providing that it is reinforced in accordance with the requirements of the relevant Statutory Undertaker.

16.8.23 The Proposed Development generally avoids conflict with existing utility infrastructure; however it will be necessary to divert the Granta Backbone Network that crosses the Application Site and to lower or protect several existing services that pass below the proposed access to the Proposed Development. Neither of these matters present any technical difficulties.

16.8.24 A number of likely significant effects that could give rise to temporary environmental effects have been identified taking account of measures to avoid or manage any adverse effects from the outset. The significance of the temporary effects identified has been found to be negligible or at worst minor adverse.

References

- Communities and Local Government (January 2005), Planning Policy Statement 1: Delivering Sustainable Development
- Communities and Local Government (December 2007), Planning Policy Statement 1 Supplement: Planning and Climate Change
- Communities and Local Government (August 2004), Planning Policy Statement 22: Renewable Energy
- Communities and Local Government (November 2010) The Code for Sustainable Homes: Technical Guide
- Government Office for the East of England (May 2008), East of England Plan
- South Cambridgeshire District Council and Cambridge County Council, Local Development Framework - Northwest Cambridge Area Action Plan, Development Plan Document Adopted October 2009.
- Phase 1 Water Cycle Strategy for Major Growth Areas in and Around Cambridge (October 2008), Halcrow Group Limited.
- Cambridgeshire Horizons Detailed Water Cycle Strategy up to 2031 Major Growth Areas in and around Cambridge Phase 2 Detailed Strategy.

- 1 Introduction and Assessment Approach
- 2 Application Site Description and Proposed Development
- 3 Phasing and Implementation
- 4 Planning Policy Considerations
- 5 Socio-Economic Assessment
- 6 Landscape and Visual Issues
- 7 Ecology and Nature Conservation
- 8 Soils and Geology
- 9 Archaeology
- 10 Cultural Heritage
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- 12 Traffic and Transport
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- 14 Air Quality
- 15 Hydrology, Drainage and Flood Risk
- 16 Utilities and Services
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17 SUSTAINABILITY CONSIDERATIONS

17.1 Introduction

17.1.1 The Applicant is committed to creating a successful, sustainable, mixed-use community at the Application Site and the result will be a significant addition to the city in terms of housing, employment and research accommodation, public amenities, and open land.

17.1.2 The Area Action Plan for the Application Site contains a range of policy drivers relating to sustainability. This is in addition to existing and emerging National policy and regulations which are increasingly aimed at reducing carbon dioxide (CO₂) emissions from buildings and activities, and improving the sustainability of developments.

17.1.3 This chapter of the ES considers the likely significant effects of the measures proposed within the Sustainability Statement (submitted separately to this ES) and the Carbon Reduction Strategy (submitted separately to this ES). These two documents outline a number of measures within the fields of sustainability and carbon emissions which are proposed to increase the sustainability of the Application Site. The Proposed Development assessed in this chapter is outlined in Chapter 2 of this ES; Site Description and Proposed Development.

17.1.4 Sustainability principles have been used to guide the design and development of the sustainability strategy for the Proposed Development.

17.1.5 The principles drive sustainability in the following key areas:

1. Energy and carbon dioxide emissions
2. Water demand
3. Waste
4. Materials and construction
5. Biodiversity and ecology
6. Pollution
7. Culture, heritage and built form
8. Transport and mobility
9. Housing, amenity, and well-being
10. Education and employment
11. Inclusion

17.1.6 Sustainability principles have been integrated into all aspects of the Proposed Development and therefore information on sustainability can be found throughout this ES and the other planning documents. **Table 17.1** provides references for issues addressed elsewhere within the ES and other documents.

Table 17.1 Summary of sections where information relating to sustainability, in accordance with the sustainability principles, can be found within this ES.

Sustainability Principle	Location within ES
Water demand	Chapter 15 Hydrology, Drainage and Flood Risk Chapter 16 Utilities and Services
Materials and Construction	Chapter 2 Site Description and Proposed Development Chapter 6 Landscape and Visual Assessment
Biodiversity and Ecology	Chapter 7 Ecology and Nature Conservation
Pollution	Chapter 13 Noise Environment Chapter 14 Air Quality Chapter 15 Hydrology, Drainage and Flood Risk Chapter 8 Geology and Soils
Culture, heritage, and built form	Chapter 9 Archaeology and Cultural Heritage
Transport and mobility	Chapter 12 Traffic and Transport
Housing, amenity and well being	Chapter 2 Site Description and Proposed Development Chapter 5 Socio Economic Issues
Education and employment	Chapter 5 Socio Economic Issues
Inclusion	Chapter 2 Site Description and Proposed Development Chapter 5 Socio Economic Issues

17.1.7 The Proposed Development is being designed to meet a variety of sustainability standards. These include:

- Achieving Code for Sustainable Homes level 5 for all homes (with the exception of the first 50 homes if built before 2013).
- Achieving BREEAM Excellent for non-domestic buildings which fall within the BREEAM scheme.
- Developing low carbon and renewable energy infrastructure including a gas-fired CHP and district heating scheme, and the inclusion of other renewable energy technologies to achieve a 20% reduction in CO₂ emissions from renewable energy across non-domestic buildings.
- Development of high efficiency buildings with consideration of orientation to reduce overheating.
- Healthy buildings which make use of natural ventilation where practicable and have good levels of natural daylighting. Narrow plan non-domestic buildings will be developed to meet these design principles, and single aspect North-facing dwellings will be minimised.
- Low water consumption, targeting 80 litres per person per day for dwellings. This will be achieved using a combination of efficient water fittings, and rain-water and grey-water recycling systems. Planting designed to have low irrigation requirements.
- Provision of allotments, and other food production areas to encourage local sustainable food production.
- Targets for construction waste to increase recycling and reduce waste to landfill.
- Provision of separate recyclables waste storage and collection in dwellings and streets.
- Provision of composting facilities in gardens and a central in-vessel composting unit for waste from public areas.
- Extensive pedestrian and cycle facilities and routes to reduce reliance on cars.

- A Site-Wide Travel Plan the primary aims of which are to achieve a modal share of no more than 40% of trips to work by car (excluding car passengers) and to increase walking, cycling and public transport use. .
- Provision of high quality public transport services with links to local and Cambridge city centre destinations.
- On-site leisure and recreation areas.

17.1.8 The remainder of this chapter addresses two important aspects of sustainability which are not addressed elsewhere, namely energy and CO₂ emissions, and waste.

17.2 Legislation and Planning Policy Context

The Climate Change Act (2008)

17.2.1 The Climate Change Act sets a legally binding target for reducing UK carbon dioxide (CO₂) by at least 80% by 2050. It also provides for a Committee on Climate Change which sets out carbon budgets binding on the Government for 5 year periods. In Budget 2009 the first three carbon budgets were announced which set out a binding 34% CO₂ reduction by 2020. The CCC also produces annual reports to monitor progress in meeting these carbon budgets. As a result of the Climate Change Act, a range of policy at national and local level has been developed aimed at reducing carbon emissions. An important impact of this is targets for the development of renewable electricity which will influence the energy strategy selected for the Proposed Development.

Fourth Carbon Budget (2011)

17.2.2 The Committee on Climate Change is an independent body established under the Climate Change Act (2008). The Committee has been tasked with advising the UK Government on preparing for Climate Change, and in particular, developing recommendations on future carbon budgets, effectively legally enforceable CO₂ reduction targets. The Committee published their recommendations on the fourth carbon budget (covering 2023 – 2027) in December 2010, and following an impact assessment, the target was set at a 50% CO₂ reduction from 1990 levels in May 2011, and adopted as law under the Climate Change Act in June 2011. This legally binding target will help drive the development of future UK policy and regulation aimed at reducing CO₂ emissions.

17.2.3 There are a number of planning policies and regulations which apply to energy generation and CO₂ emissions on the Application Site. These include:

National policy

Previously:

- PPS 1: Delivering Sustainable development
- PPS 1 Supplement: Planning and Climate Change
- Draft PPS: Planning for a Low Carbon Future in a Changing Climate
- PPS 22. Renewable Energy

Now replaced with the National Planning Policy Framework (“the NPPF”)

17.2.4 The Localism Act, enacted in November 2011, provides for the abolition of Regional Spatial Strategies; although the abolition of individual Regional Spatial Strategies is not expected to take effect until the consequence of abolition has been the subject of Strategic Environmental Assessment. Until the East of England Plan is formally abolished it remains, therefore, part of the statutory Development Plan. The current state of play is that decisions must be in accordance with the statutory Development Plan unless material considerations require otherwise. In the meantime, Local Planning Authorities are entitled to take account of the Government's intention to abolish Regional Strategies as a material consideration but the weight to be given will for the time being be limited.

17.2.5 While the NPPF is to be read as a whole in the context of sustainability the NPPF states at paragraph 6 that “the purpose of the planning system is to contribute to the achievement of sustainable development. Sustainable development means development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is central to the economic, environmental and social success of the country and is the core principle underpinning planning. Simply stated, the principle recognises the importance of ensuring that all people should be able to satisfy their basic needs and enjoy a better quality of life, both now and in the future”.

17.2.6 Paragraph 7 of the NPPF notes that “there are three dimensions to sustainable development: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

- **an economic role** – building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type, and in the right places, is available to allow growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure
- **a social role** – supporting strong, vibrant and healthy communities, by providing an increased supply of housing to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community’s needs and supports its health, social and cultural well-being; and
- **an environmental role** – contributing to protecting and enhancing our natural, built and historic environment; and as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and to mitigate and adapt to climate change, including moving to a low-carbon economy”.

17.2.7 Paragraph 8 of the NPPF goes on to note that these three roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives of people and communities. Therefore, to achieve sustainable development,

economic, social and environmental gains should be sought jointly and simultaneously through the planning system. The planning system should play an active role in guiding development to sustainable solutions”

17.2.8 One of the Core Planning Principles set out in paragraph 17 of the NPPF is that planning policies and decisions should enable the reuse of existing resources, such as through the conversion of existing buildings, and encourage, rather than restrict, the use of renewable resources (for example, by the development of renewable energy)

17.2.9 Paragraph 95 of the NPPF states that to support the move to a low-carbon economy, local planning authorities should:

- plan for new development in locations and ways which reduce greenhouse gas emissions;
- actively support energy efficiency improvements to existing buildings; and
- when setting any local requirement for a building’s sustainability, do so in a way consistent with the Government’s zero carbon buildings policy and adopt nationally described standards.

Local Policy

- AAP NW24: Climate Change and Sustainable Design and Construction.

17.2.10 The local policy for the Application Site is the Area Action Plan adopted in October 2009. This sets out a number of standards which the development must achieve in policy NW24. This policy includes the following requirements:

17.2.11 Code for Sustainable Homes. All dwellings after 2013, and over 50 dwellings before 2013 will be required to meet the Code for Sustainable Homes level 5. This requires a reduction in regulated emissions of 100%. Currently the requirement is for this to be achieved on site, although it is anticipated that the requirements will fall into line with national building regulations, and a carbon compliance limit (currently proposed at 44-60% of regulated loads depending on the dwelling type) and an “allowable solutions” mechanism (effectively a CO2 offset) will be introduced. Additional non-mandatory credits are available in the Code for providing up to 15% CO2 reduction through Low and Zero Carbon (LZC) technologies.

17.2.12 Building Research Establishment Environmental Assessment Method (BREEAM). BREEAM Excellent is required for all non-domestic buildings which can be BREEAM assessed. This means that a significant reduction in CO2 emissions from national regulations will be required. Additional credits are available in BREEAM for the inclusion of LZC technologies and community heating and / or CHP. It should be noted that the current 2011 BREEAM schemes are likely to be updated over the life of the NWC assessments and may in future use an alternative energy credit calculation procedure.

17.2.13 All non-residential development should achieve a 20% reduction in CO2 emissions using renewable energy technologies where a renewably fuelled decentralised system is not viable.

17.2.14 The main effect of policy NW24 is to advance the proposed national building regulations standards through the introduction of the requirement of the Code for Sustainable Homes Level 5 for the majority of homes.

17.2.15 The following are the main items of waste policy pertinent to the Proposed Development:

- Waste Strategy for England (2007). This presents national policy on waste management.
- Planning Policy Statement 1: Planning for Sustainable Development. PPS1 sets out the Government's ethos for using the planning system as a tool for local authorities to promote continued development in a sustainable manner now replaced by the NPPF.
- Planning Policy Statement 10: Sustainable Waste Management. PPS10 is concerned with delivering the national waste targets set at EU level and is not replaced by the NPPF.
- East of England Plan (2008). This document is still considered to form part of the Development Plan and has statutory standing, although the Government is in the process of abolishing regional powers.
- RECAP Partnership: Waste Management Design Guide The *RECAP Partnership: Waste Management Design Guide (RECAP Guide)* was written on behalf of the Cambridgeshire District Councils, Cambridgeshire County Council and the Unitary Authority of Peterborough. At present this document has been endorsed by the RECAP partners; however it has not yet been adopted as a Supplementary Planning Document (SPD) in any of the Authorities, though it is being progressed as an SPD and will be linked to the emerging Cambridgeshire and Peterborough Minerals and Waste Plan. *Cambridgeshire & Peterborough Minerals & Waste Core Strategy Development Plan Document*: Cambridgeshire County Council and Peterborough City Council have worked together to prepare this local development framework, document. The Core Strategy was adopted on 19 July 2011 and addresses the spatial planning of the authority areas in respect of the production and movement of minerals and management of waste.
- North West Cambridge Area Action Plan (2009). Policy NW 28: Construction Processes, sets objectives to maximise resource efficiency and minimise waste generation during the construction phase. Policy NW 24: Climate Change and Sustainable Design and Construction, sets requirements for all homes to meet the Code for Sustainable Homes Level 5 and BREEAM Excellent.

17.2.16 Code for Sustainable Homes. The Code for Sustainable Homes has a category for waste. This contains three environmental issues covering the storage of recyclable and non-recyclable waste, construction site waste management, and composting. Mandatory minimum performance standards are set for some issues and credits are not awarded for these. Achieving Code level 5 will require all of these

credits to be achieved where feasible. Details of the credit requirements are provided in Table A17-5.1 in Appendix 17-5.

17.2.17 Building Research Establishment Environmental Assessment Methodology (BREEAM). The BREEAM system is an environmental assessment tool used to score the environmental performance of non-residential buildings. There are a number of different schemes for different building types and the following discussion provides a simple overview to the waste credits.

17.2.18 BREEAM WST 1: Construction Site Waste Management. Up to four BREEAM credits are available through promotion of resource efficiency via management of construction site waste. In order for the development to comply with BREEAM Standards for Multi-Residential, Offices, Retail and Education it must meet criteria (taken from BREEAM Guidance) as presented in Table A17-5.2.

17.2.19 BREEAM Wst 2: Recycled Aggregates. One Credit is available for the use of secondary aggregate in the construction process providing that the amount of recycled and secondary aggregate specified is over 25% (by weight or volume) of the total high-grade aggregate uses for the building. Such aggregates can be either:

- a. Obtained on site **OR**;
- b. Obtained from waste processing site(s) within a 30km radius of the site; the source will be principally from construction, demolition and excavation waste (CD&E) – this includes road planings **OR**;
- c. Secondary aggregates obtained from a non-construction post-consumer or post-industrial by-product source

Compliance details are provided in Table A17-5.3.

17.2.20 BREEAM Occupation Phase waste credits. BREEAM contains a number of credits for the occupation phase. **Table A17-5.4** summarises these credits for a range of different schemes (note that there is some variation between schemes, but the spirit of the credits remains similar).

17.3 Energy and Carbon Dioxide Emissions

17.4 Assessment Approach

17.4.1 A number of technical options have been examined in the Carbon Reduction Strategy which accompanies the planning application for the Proposed Development which are capable of meeting current known requirements.

17.4.2 The Carbon Reduction Strategy developed for the Proposed Development follows a hierarchical approach as follows:

- Assesses the baseline energy consumption and CO₂ emissions if the Application Site was built to Building Regulations Part L 2006 levels of efficiency¹. This assessment makes use of energy calculation tools developed for Building Regulations compliance (for the domestic sector), and benchmarks taken from recently completed buildings (for the non-domestic sector). There is an acknowledged discrepancy between modelled demands and “real demands”, especially for the non-domestic sector, and so an approach using measured benchmarks is used, as approved by the Energy task force as the most appropriate baseline.
- Assesses the potential for reducing energy demand through efficient building design. Revised energy demand figures have been developed based on research of high efficiency building consumption (for non-domestic) and proposed energy efficiency standards for homes from the Zero Carbon Hub (for the domestic sector).

¹ The AAP refers to the use of Part L 2006 for baseline calculations. The Proposed Development is based on future revisions to the Part L Building Regulations which will all be referenced to the 2006 version.

- Assesses the potential for meeting the energy loads using low and zero carbon forms of energy generation. A technical analysis has been conducted of different technology types combined with potential resource limitations.
- Examines which technology and resource options can meet the policy objectives.

17.4.3 The Proposed Development includes a number of measures which aim to reduce the effect of energy demand and CO₂ emissions from a baseline development. The Application Site is designed around the hierarchy of “be mean” (energy efficiency), “be lean” (use efficient technologies), and “be clean” (use renewable sources of energy).

17.4.4 Measures proposed include:

- All homes constructed to Code for Sustainable Homes level 5 ensuring that up to 60% of regulated CO₂ emissions are reduced using on-site measures.
- All domestic buildings (from 2016) and non domestic buildings (from 2019) being net zero carbon, using a mix of on-site measures and CO₂ offsets through the proposed Building Regulations Part L “Allowable Solutions” scheme.
- Across the site, renewable energy will reduce CO₂ emissions from the non-domestic buildings by approximately 20%. Design guides are proposed to ensure that appropriate levels of renewable energy technologies are installed to achieve this target.
- Mandating minimum standards for energy efficiency. For domestic buildings, the Fabric Energy Efficiency Standard (FEES) is proposed for all homes. For non-domestic buildings, target benchmarks are proposed, and design guides for efficient building design, promoting natural ventilation and high levels of daylight.
- The use of gas-fired combined heat and power and district heating. This will provide heating to a large proportion of the buildings on the site.
- The installation of renewable energy systems potentially including photovoltaics, solar thermal, and heat pumps.
- Education of residents to stimulate behaviour change and increase awareness of energy consumption.

17.4.5 Note that all consequences of technologies on air quality are discussed in Chapter 14 of this ES

17.4.6 Measures to reduce energy consumption and CO₂ emissions will also be taken during the construction phase of the Proposed Development. Energy consumption and CO₂ emissions will be monitored throughout the process. Other measures are likely to include:

- Reduced transportation through the selection of local goods and services
- Consideration of embodied energy and CO₂ in materials along with other materials selection metrics

17.4.7 The Construction and Environmental Management Plan will be one method by which these measures will be encouraged.

17.4.8 In order to assess the likely significant environmental effects of the Proposed Development, we have considered three scenarios: two baseline scenarios and one incorporating the Proposed Development. The Proposed Development has been compared with each of the two baseline scenarios.

17.4.9 Baseline Scenario 1 assumes no further development on the Application Site and continuation of existing uses. This is an artificial and unlikely scenario in that the Application Site is designated for development in the NWC AAP in recognition of the Applicant’s needs and wider planning considerations. Were this scenario ever to arise, it is likely that alternative development would need to take place elsewhere within the Cambridge Sub-Region in order to meet the need identified.

17.4.10 Baseline Scenario 2 (“Do Minimum”) assumes development on the Application Site of the scale of the Proposed Development but in accordance with Part L 2006 Building Regulations for domestic

development and related measured benchmarks for non-domestic development rather than the most up to date standards which will apply when development commences. This is the baseline for the purpose of analysing the notional reductions in energy use required to be delivered under policy NW24 of the NWC AAP.

17.4.11 The third (“with development”) scenario assumes that the Proposed Development is carried out in accordance with the Development Parameters and in accordance with the Carbon Reduction Strategy outlined above.

17.4.12 There is no formally adopted set of criteria which enables the attribution of a scale of sensitivity of CO₂ emissions to receptors since CO₂ emissions have a cumulative impact on the planet as a whole (High sensitivity to CO₂ emissions) and it would therefore be inappropriate to identify specific receptors within the development site. As such, a table of specific receptors and their respective sensitivities is not provided. Instead the following **Table 17.2** defines magnitude of change criteria used in the assessment on overall UK emissions. Since the planet has high sensitivity to CO₂ emissions the degree of significance can be taken from the high sensitivity definition in Chapter 1.

Table 17.2: Criteria for Assessing Magnitude of Change on the Receptor

Magnitude of Change	Definition	Degree of significance
High (Adverse / Beneficial)	Where the proposed development is likely to result in a very significant increase in UK CO ₂ emissions	Major
Medium (Adverse / Beneficial)	Where the proposed development is likely to result in a noticeable increase in UK CO ₂ emissions	Major
Low (Adverse / Beneficial)	Where the proposed development is likely to result in a barely noticeable increase in UK CO ₂ emissions	Minor to Moderate
Negligible	Where the proposed development is likely to result in no discernable change in UK CO ₂ emissions	Negligible

17.5 Baseline Conditions

Baseline Scenario 1

17.5.1 The Application Site is currently predominantly farmland with minor buildings. Therefore under Baseline Scenario 1, the current energy demand from direct energy consumption associated with buildings is 71 MWh(elec) and 12.5 MWh(oil) per year resulting in CO₂ emissions of 40 tonnes which is negligible when compared with the projected fully built out emissions (see below). There will also be energy consumption and resulting CO₂ emissions from farming activities on the site including farm transportation and activities, and indirectly from the use of fertilisers. Again the current energy demand and CO₂ emissions from direct energy consumption associated with these uses can be considered negligible.

Baseline Scenario 2

17.5.2 As mentioned above, the need for the Proposed Development has been demonstrated by the Applicant leading to the release of land from the Green Belt for development. If the Proposed Development was not constructed, then the need for the facilities and homes remains and they would be likely to be built elsewhere in the Cambridge Sub-Region. For the purposes of this ES, the zone of

influence for energy and CO₂ emissions is at a national scale or larger, and therefore an alternative development within the Cambridge Sub-Region could be considered to meet this need, and therefore form a baseline for the assessment.

17.5.3 Under Baseline Scenario 2, energy and CO₂ outputs are based on Part L 2006 for domestic and measured benchmarks for non-domestic buildings. Based on the phasing assumptions set out in **Table 3.1**, it has been assessed that gas and electricity consumption and consequent CO₂ emissions for 2014 and 2026 according to Baseline Scenario 2 would be approximately as set out in **Table 17.3**.

Table 17.3. Baseline energy and CO₂ emissions under Baseline Scenario 2. Values provided are approximate derived from development parameter floor areas (shown for reference)

Baseline 2	2014 (lower estimate)	2014 (upper estimate)	2026
Residential floor space (m2)	15,000	60,000	320,000
Academic/ Commercial Research floor space (m2)			100,000
Supermarket (gross) floor space (m2)	2,800	2,800	2,000
Retail (gross) floor space (m2)		2,100	3,300
Primary School floor space (m2)	1,500	2,800	3,750
Student Housing floor space (m2)		14,700	98,000
Hotel floor space (m2)		7,000	7,000
CHP floor space (m2)		1,000	1,000
Police Station floor space (m2)		200	200
Local/ Community Centre/Indoor sports floor space (m2)			950
Nursery floor space (m2)			2,000
Primary Health Centre floor space (m2)		700	700
Senior Living floor space (m2)		6,500	6,500
Annual gas consumption (MWh)	1,200	10,500	57,000
Annual electricity consumption (MWh)	800	5,000	33,000
Associated CO ₂ emissions over 13 year lifecycle, (tonnes)	310,000		

The Proposed Development

17.5.4 In the “with development” scenario, we have assumed that a number of measures to reduce energy demand and CO₂ emissions are included as outlined in the Assessment Approach.

17.5.5 It has therefore been assessed that gas and electricity consumption and consequent CO₂ emissions for 2014 and 2026 in the “with development” scenario would be approximately as set out in **Table 17.4**.

Table 17.4. “With Development” energy and CO₂ emissions under Baseline Scenario 2. Values provided are approximate derived from development parameter floor areas (as table 17.2)

With Development	2014 (lower estimate)	2014 (upper estimate)	2026
Annual gas consumption (MWh)	1,200	11,000	53,000
Annual electricity consumption (MWh)	500	3,500	10,000
Associated CO ₂ emissions over 13 year lifecycle, (tonnes)	160,000		
Reduction in associated CO ₂ emissions over 13 year lifecycle, (%) from baseline scenario 2	48%		

17.5.6 Note that CO₂ emissions are given over a 13 year period covering the development phasing. An annual figure is not considered useful in this assessment because of the changing CO₂ intensity of the electricity grid, which is an external influence on the emissions. Over the lifetime of the development CO₂ intensity of the electricity grid is likely to reduce as a consequence of increasing replacement of carbon intensive fossil fuel based generation by low carbon renewable energy resources. Therefore a 13-year lifecycle figure provides a more useful number against which the Proposed Development can be assessed.

17.5.7 Over the 13 year phased build, the average annual CO₂ emissions are calculated to be circa 23 ktonnes of CO₂ per year. Given that the zone of influence is national (UK CO₂ emissions in 2009 were 481,000 ktonnes) or more, this is a negligible change in UK emissions.

17.6 Likely significant effects

17.6.1 As a result of energy efficiency, the carbon reduction strategy predicts there to be a 29% reduction in heating fuel demand and a 12% reduction in electricity demand by comparison with Baseline Scenario 2. The combination of these provides an 18% reduction in total CO₂ emissions. After the application of low and zero carbon energy technologies, the on-site reduction in CO₂ is predicted to be approximately 48% as shown in **Table 17.4** for the development parameters over the 13 year lifecycle.

17.6.2 With the inclusion of carbon offsetting through allowable solutions, required to meet the future Building Regulations Part L, the total effective CO₂ reduction is likely to be much higher than 47%. Allowable Solutions are a proposed Local Authority scheme whereby CO₂ emissions not able to be mitigated on-site will be mitigated through financial investment in off-site carbon reduction schemes. Allowable Solutions are still in development however and until further information is provided by Government on how a scheme may operate, it is not possible to quantify these savings.

17.6.3 The effect of energy consumption and CO₂ production at the Proposed Development as assessed by comparing the “with development” scenario with Baseline Scenario 1 is therefore theoretically high

adverse at a local level. However in practice, for reasons expressed above, this analogy is not apt since it does not reflect that in this scenario, other development to meet the Applicant's acknowledged need would be likely in the Cambridge Sub-Region in any event. Moreover at a national level, considered to be the minimum zone of influence, the effect would be negligible.

17.6.4 If the effect of energy consumption and CO₂ production at the Proposed Development is assessed by comparing the "with development" scenario with Baseline Scenario 2 the result would be minor beneficial at a local level and at a national level negligible.

17.6.5 The effect of energy consumption and CO₂ emissions on the zone of influence, at a national scale is considered negligible due to a negligible change and a negligible sensitivity.

Construction effects

17.6.6 Energy consumption and CO₂ emissions from construction activities will be incurred for the development of a baseline development at the Application Site or elsewhere. These include energy associated with the transportation of goods and services; energy used in the construction process, and embodied energy in construction materials. In general, this energy consumption and associated emissions is small compared with the lifecycle emissions of the buildings.

17.6.7 By comparison with Baseline Scenario 1, the construction effects on energy consumption and CO₂ emissions might be termed a major adverse effect at a local level but negligible if one assumes that the development and therefore construction would take place elsewhere within the Cambridge Sub-Region in any event and negligible within a national context. The local environment and national environment is deemed to have negligible sensitivity to this change in isolation, resulting in a negligible effect. However the cumulative effect of energy consumption and CO₂ emissions, and the need for climate change mitigation means that proposals should aim to reduce CO₂ emissions in line with the relevant policies

17.6.8 The effects of energy consumption and CO₂ emissions will, therefore, be addressed during the construction phase of the Proposed Development. Energy consumption and CO₂ emissions will be monitored throughout the process. A number of other measures will also be considered depending on viability:

- Reduced transportation through the selection of local goods and services
- Consideration of embodied energy and CO₂ in materials along with other materials selection metrics

The Construction and Environmental Management Plan will be one method by which these criteria will be encouraged.

17.7 Effects of Highway and Utility Works

17.7.1 As with the construction of the main Development Proposals energy consumption and CO₂ emissions from construction activities associated with the highway and utility works will be incurred for the development of a baseline development at the Application Site or elsewhere as a development of this scale would be likely to require the creation of new accesses, local highway works and the diversion and installation of utilities. As with construction of the Development Proposals the highway and utility works will include energy associated with the transportation of goods and services; energy used in the construction process, and embodied energy in construction materials in general albeit on a much reduced scale in comparison with the construction of the main Development Proposals. Again this energy consumption and associated emissions is small compared with the lifecycle emissions of the buildings and the local environment and national environment is considered to be likely to have negligible sensitivity to this change in isolation, resulting in a negligible effect. .

17.7.2 Again the effects of energy consumption and CO₂ emissions will, however, be addressed during the construction phase of the Highway and Utility Works and measures to reduce energy consumption and associated emissions for the construction of the Development Proposals will also be used on construction of the highway and the utility works.

17.7.3 Use of the Highway and Utility works will affect energy consumption and CO₂ emissions given the use of traffic signals and additional lighting. Best practice would be used in terms of sourcing the equipment to be used in terms of energy efficiency. Again this energy consumption and associated emissions is small compared with the lifecycle emissions of the Proposed Development and the local environment and national environment is considered likely to have negligible sensitivity to this change in isolation, resulting in a negligible effect.

17.8 Cumulative effects

17.8.1 The cumulative effect of CO₂ emissions and energy consumption needs to be considered at both a national scale, and also a local scale. As with the Development Proposals the need for the other sites to be developed in the Cambridge sub-region has been demonstrated and, therefore development would take place elsewhere within the Cambridge Sub-Region in any event.

17.8.2 Other sites to be developed in the vicinity of the Proposed Development include those set out below in **Table 17.5**. **Table 17.5** summarises the expected Code for Sustainable Homes ratings targeted by the developments.

Table 17.5 Code for Sustainable Homes Levels at Cumulative Developments

Site	Code Targets
Orchard Park	No Code Standard
NIAB1 & 2	Code 3 all homes
Clay Farm	Code 3 private housing Code 4 affordable housing
Glebe Farm	Code 3 private housing Code 4 affordable housing
Trumpington Meadows	Code 4 affordable Housing
Northstowe	Code 6 all homes

17.8.3 As the table shows all other development sites in the vicinity of North West Cambridge are expected to meet or exceed the national trajectory for carbon reductions from new homes. With the exception of Northstowe the scale of CO₂ emissions and energy consumption for the other sites individually can be expected to be lower than the Application Site during the assessment period given the lower scales of development assumed. In any case given that the zone of influence is national (UK CO₂ emissions in 2009 were 481,000 ktonnes) or more, taken together the effects from the Proposed Development and the other permitted schemes will result in a negligible change in UK emissions.

17.8.4 Whilst the development of the Application Site and the other development sites in the sub-region will have a negligible effect both in isolation and cumulatively, the need to mitigate energy consumption and CO₂ emissions is required from all sectors if the UK Governments target of 80% reduction from 1990 levels by 2050 is to be achieved.

17.8.5 It is not possible to state exactly the effect that climate change will have on the Application Site. However likely consequences are as follows:

- An increase in peak summer temperatures
- Reduction in annual rainfall
- Increased likelihood of adverse weather conditions.

17.8.6 The resulting effects of these changes to the climate could be long term effects on the ecology of the Application Site, and changes in ground conditions with less rainfall. Climate change will also have consequences for humans including the provision of water, maintaining healthy internal environments in buildings, and designing structures to withstand more adverse weather conditions.

17.9 Mitigation

17.9.1 The Proposed Development includes a number of measures which aim to reduce energy demand and CO2 emissions. Further mitigation is not, therefore, proposed.

17.10 Summary

17.10.1 This section examines the effects of energy consumption and CO2 emissions arising from the Proposed Development.

17.10.2 Under Baseline Scenario 1, there is negligible direct energy consumption on the current Application Site, and therefore negligible levels of CO2 emissions as a result. However under Baseline Scenario 2, baseline development meeting the needs identified for and of the same scale as the Proposed Development would result in approximate energy consumption of up to 19,000 MWh in 2014, rising to 90,000 MWh in 2026 and an average increase in CO2 emissions of circa 23 ktonnes of CO2 per year. Under the with development scenario in which the Proposed Development is assumed, the energy consumption would be up to approximately 16,500 in 2014 rising to 63,000 in 2026 and carbon emissions would be up to approximately 12.3 ktonnes average over the 13 year period. By comparison with Baseline Scenario 1, this might be termed a major adverse effect at a local level in terms of energy consumption and carbon emission but negligible if one assumes that the development would take place elsewhere within the Cambridge Sub-Region in any event and negligible within a national context. The local environment and national environment is deemed to have negligible sensitivity to this change in isolation, resulting in a negligible effect. However the cumulative effect of energy consumption and CO2 emissions, and the need for climate change mitigation means that proposals should aim to reduce CO2 emissions in line with the relevant policies.

17.10.3 Therefore the development proposals include a number of mitigation measures which result in an overall direct CO2 reduction of 48% from the baseline, with further reductions likely through offset schemes. This means that the effects of the Proposed Development are reduced further from the baseline.

17.11 Waste**Assessment approach**

17.11.1 This assessment examines waste generation in both the construction and occupation phases of the Proposed Development, and the methods of mitigating waste generation. Providing that the waste produced by the Proposed Development is disposed of in a legal manner, it is unlikely that the act of generating waste will have any effect on the local environment. The subsequent treatment of the waste, for example, whether it is recycled, re-used, land-filled, or incinerated, could have wider scale environmental effects which are outside the scope of this assessment.

17.11.2 Therefore this discussion examines overall waste generation using estimates from benchmarks, and estimates the impact that waste mitigation methods will have on overall generation levels.

17.11.3 In terms of the Construction phase of the Development Proposals methods of improving resource efficiency in the construction works so as to avoid or manage effects during the construction period are outlined in the table below. These elements have been incorporated within the CEMP. Wherever practicable it is proposed to comply with best practice techniques, only disposing through landfill as a last resort.

Table 17.6 Proposed measures for reducing waste during the construction stages.

Waste type	Waste Materials	Trade Contractor Package	<div> <div>BEST PRACTICE</div> <div>STANDARD PRACTICE</div> </div>			
			Waste Minimisation Opportunities	On Site Reuse/Recycling/Recovery	Off Site Reuse/Recycling/Recovery	Disposal
Inert	Concrete	Construction	Retention of concrete on site where possible. Only order what is required.	Use as secondary aggregate on site.	Segregate for reprocessing and reuse as recycled secondary aggregate.	Landfill and cover
	Rubble (hard core)	Construction	Only order what is required.	Reuse 'cut' material as 'fill' in proposed noise bund.	Segregate for reprocessing and reuse as recycled secondary aggregate.	Landfill and cover
Non-hazardous	Soils/ Green waste/ vegetation	Construction		Opportunities to reuse 'cut' material as 'fill' in proposed noise bund.		Landfill and cover
	Mixed waste	Construction	Use of standard sizes. Arrange take back of unused materials with the supplier.	N/A	Segregate materials to maximise potential for recycling.	Landfill/ incineration
	Metal	Construction	Made to measure, correct ordering, just in time delivery, store correctly. Arrange take back of unused materials with the supplier.		Segregate waste and send to metal recycler.	Landfill
	Timber	Construction	Avoid over-ordering. Provision of suitable storage to avoid damage. Arrange take back of unused materials with the supplier.		Re-use / Recycle if feasible.	Landfill/ incineration
	Plasterboard	Construction	Avoid over-ordering. Provision of suitable storage to avoid damage. Procure to design specifications. Arrange take back of unused materials with the supplier.	Cannot reuse.	Recycle if feasible.	Landfill
	Packaging	Construction	Ask suppliers to send product with minimal packaging / reusable containers, buy bulk not individually wrapped products. Return pallet to supplier or use plastic pallets.	N/A	Segregate materials to maximise potential for recycling.	Landfill/ incineration
	Cable & wiring	Construction	Avoid over-ordering. Arrange take back of unused materials with the suppliers.	Reuse on site if appropriate.	Segregate and recycle to reclaim plastics and metals.	Landfill
	General Office waste	Site management.	Print double sided, send documents electronically, reusable crockery and cutlery.	Reuse paper, cartridges, plastic cups, tins and cardboard.	Segregate and recycle white paper. Send for composting (food waste only).	Landfill
	Glass	Construction	Avoid over-ordering, appropriate storage to avoid accidents. Arrange take back of unused materials with the supplier.	N/A	Segregate and send for recycling.	Landfill and cover
	WEEE	Construction	N/A	Re-use elsewhere on site.	Send to dedicated recycling facility for recovery and recycling.	Landfill
Hazardous	Asbestos	Construction	N/A	N/A	N/A	Landfill
	Contaminated land	Construction	Avoid excavation where un-necessary.	Consider on-site treatment methods.	Treatment at contaminated land hubs.	Landfill
	Paint tins, line markers, mastic	Construction	Use solvent free paints that are not disposed off as hazardous waste, maximise use of mechanical fitting rather than adhesives. Arrange take back of unused materials with the supplier.	Use a lockable COSHH container for storage.	N/A	Landfill
	WEEE	Construction	N/A	Re-use elsewhere on site.	Send to dedicated recycling facility for recovery and recycling.	Landfill

17.11.4 A site waste management plan (SWMP) will commit the project to sustainability through appropriate management of the excavation, demolition and construction phase. Challenging waste minimisation and landfill diversion targets will be set via design codes with the aim of reducing the waste arisings significantly.

17.11.5 This could be achieved through:

- The use of appropriate material specification, construction methodologies and by balancing any necessary cut and fill;
- Segregation and phasing 'best practice' during demolition and construction phases to ensure BREEAM and Code for Sustainable Homes credits are achieved;
- Waste treatment on and off-site

17.11.6 Additionally, landfill diversion targets of 90% (by weight) for non-hazardous construction waste and 95% for non-hazardous demolition waste (by weight) will be considered where feasible for inclusion in the Development Briefs in line with the BREEAM Innovation Credit available during the construction phase.

17.11.7 Occupation Phase. During the occupancy stage, a number of different measures are proposed to reduce overall levels of waste generation, but also promote segregation of waste for recycling off-site and on-site:

- Most Code for Sustainable Homes and BREEAM credits covering occupancy phase waste will be achieved where feasible.
- On-site composting with local (either communal or individual garden) compost bins for individual residents to operate. This is not a requirement of the Code for Sustainable Homes as the WCA collects segregated organic waste, but by including their provision aids the development of a sustainable waste aware conscience in the population.
- For other non-university owned commercial/industrial units either individual in-vessel composters will be provided to treat food waste, or if there is insufficient space; a suitably equipped designated area will be provided to store food waste for treatment elsewhere (potentially the university facility).
- Waste storage capacity will generally be provided in line with the RECAP guide, and checked against the RECAP waste management design guide toolkit. The exception will be external waste storage where for single households a requirement for 720 litres capacity will be sufficient rather than the stated 775 litres. This is in line with the WCA's current systems, and has been agreed in the consultation process.
- For non-residential buildings (inc. Halls of Residence) storage capacities and requirements shall be in line with the Wst 3 requirements of the relevant BREEAM scheme.
- Local bring-sites for more specialist waste streams (which are not collected at a building scale) and public area recycling.

17.11.8 These measures will ensure that good opportunities are provided to assist residents with recycling, and waste treatment on-site where desirable (composting). The proposed waste storage and collection strategy will be refined with consultation with the waste collection authorities.

17.11.9 The inclusion of the proposed measures will mean that the Proposed Development will produce less waste during the occupancy and construction phases with higher levels of recycling. This will result in an improvement over the baseline situation resulting in a negligible change.

17.11.10 In order to assess the likely significant environmental effects of the Proposed Development, we have considered three scenarios: two baseline scenarios and one incorporating the Proposed Development. The Proposed Development has been compared with each of the two baseline scenarios.

17.11.11 The first Baseline Scenario assumes no further development on the Application Site and continuation of existing uses. This is an artificial and unlikely scenario in that the Application Site is designated for development in the NWC AAP in recognition of the Applicant's needs and wider planning considerations. Were this scenario ever to arise, it is likely that alternative development would need to take place elsewhere within the Cambridge Sub-Region in order to meet the need identified. A second baseline scenario is envisaged where the development is built according to the development parameters

but without any of the mitigation measures described in this document, the Site Waste Management Plan and in the Sustainable Resource and Waste Management Strategy.

17.11.12 The with development scenario assumes that the Proposed Development is carried out in accordance with the Development Parameters and in accordance with the waste strategy outlined above.

Receptor Sensitivity Criteria

The principle receptor for impacts from waste will be the local waste handling facilities at Donarbon. This plant has a throughput of around 300,000 tonnes per year, and has been designed to meet the future needs of the County (including all of the proposed residential expansion sites) with a 28 year contract. The sensitivity of this receptor to waste from North West Cambridge can therefore be said to be negligible.

Baseline conditions

Baseline 1

17.11.13 The Application Site is currently predominantly farmland with minor buildings. Therefore the current waste generation associated with buildings and non-agricultural processes can be considered negligible.

17.11.14 Farming activities on the Application Site will incur waste generation, including significant amounts of cattle slurry. These have not been quantified as part of this assessment, and are likely to remain with displacement of the farming activities, and much of the farm waste is recycled, for example through muck spreading.

Baseline 2

17.11.15 The need for the Proposed Development has been demonstrated by the Applicant leading to the release of land from the Green Belt for development. If the Proposed Development was not constructed, then the need for the facilities and homes remains and they would be likely be built elsewhere within the Cambridge Sub-Region, leading to broadly equivalent waste generation to that for the Proposed Development.

17.11.16 During the construction phase of the Proposed Development, waste will be generated from ground activities and from building and infrastructure development. **Table 17.6** sets out the unit values assumed for waste generation during the construction period expressed as a rate per cubic metre according to buildings constructed for particular uses. The rates are taken from BRE: Waste Benchmark Data. For the purposes of the assessment, we have assumed a range of floorspace within each use with a total floorspace as per **Table 17.6**.

17.11.17 In the occupation phase, domestic and commercial / academic facilities will generate different types of waste, depending on their activities. **Table 17.6** sets out the unit values assumed for waste generation during the operational phase. These are expressed as a rate per person occupying the development for particular uses. The rates are taken from

- Residential/Student Housing/Senior Living: Defra; Local Authority Municipal Waste Statistics, November 2007. <http://www.Defra.gov.uk/environment/statistics/wastats/archive/mwb200607a.xls>
- Academic/Commercial Research: Waste Watch; Resource management in the education sector, 2005. <http://www.ecocampus.co.uk/downloads/Wastewatch.pdf>
- Supermarket / Retail / Police Station / Local Community Centre : Envirowise; EN336 Reducing Waste and Utility Use in Managed Shopping Centres, March 2002
- Primary School/ Nursery: Waste Watch; Resource management in the education sector, 2005. <http://www.ecocampus.co.uk/downloads/Wastewatch.pdf><http://www.ecocampus.co.uk/downloads/Wastewatch.pdf>
- Hotel: Kiely, G. (1998) Environmental Engineering, (Singapore; McGraw-Hill)
- CHP: Based on Defra BEATv2 software

- Green / Open Spaces: Public Health Engineering; CIBSE Guide G
- Primary Health Care: Environews; Hospital Waste and Environmental Hazard and Its Management, Vol 5 No. 3, July 1999 http://isebindia.com/95_99/99-07-2.html

17.11.18 For the purposes of the assessment, we have assumed a range of floorspace within which each use consistent with that in **Table 17.7** and commensurate population levels as at 2014 and 2026.

Table 17.7: Operational Phase Waste Arisings for Development based on the development parameters

User	Building Floor Area (m ²)			Waste Generation Rate*	Units	Total waste generated (m ³)		
	Lower estimate 2014	Upper estimate 2014	2026			Lower estimate 2014	Upper estimate 2014	2026
Residential	15,000	60,000	320,000	0.1795	m ³ /m ²	2693	10770	57440
Academic/ Commercial Research			100,000	0.2666	m ³ /m ²			26660
Supermarket	2,000	2,000	2,000	0.1959	m ³ /m ²	549	549	549
Retail		2,100	3,300	0.1959	m ³ /m ²		411	646
Primary School	1,500	2,800	3,750	0.1959	m ³ /m ²	549	549	549
Student Housing		14,700	98,000	0.1795	m ³ /m ²		2639	17591
Hotel		7,000	7,000	0.1998	m ³ /m ²		1399	1399
CHP		1,000	1,000	0.1912	m ³ /m ²		191	191
Police Station		200	200	0.1912	m ³ /m ²		57	57
Local/ Community Centre/Indoor sports			950	0.2131	m ³ /m ²			181
Nursery			2,000	0.2666	m ³ /m ²			533
Primary Health Centre		700	700	0.1795	m ³ /m ²		126	126
Senior Living		6,500	6,500	0.2087	m ³ /m ²		1044	1044
Total						3,641	17,931	107,163

Table 17.7. Occupancy Phase Waste Arisings for Development based on the development parameters

User	Building Floor Area (m ²)			No. of People	Waste Generation Rate*	Units	Total waste generated (tonnes per year)		
	Lower estimate 2014	Upper estimate 2014	2026				Lower estimate 2014	Upper estimate 2014	2026
Residential	15,000	60,000	320,000	6,490	0.5	(t/person/yr)	152	608	3,245
Academic/Commercial Research			100,000	4,350	0.096	(t/person/yr)	0	0	418
Supermarket	2,000	2,000	2,000		0.03	(t/m ² /yr)	60	60	60
Retail		2,100	3,300		0.03	(t/m ² /yr)	0	63	99
Primary School	1,500	2,800	3,750	100	0.027	(t/person/yr)	1	2	3
Student Housing		14,700	98,000	2,000	0.5	(t/person/yr)	0	150	1,000
Hotel		7,000	7,000	30	0.55	(t/bed/yr)	0	17	17
CHP		1,000	1,000			(t/yr)	0	0	0
Police Station		200	200		0.03	(t/m ² /yr)	0	9	9
Green/Open Spaces	75,090	75,090	75,090		0.0005	(t/m ² /yr)	38	38	38
Local/Community Centre/Indoor sports			950		0.03	(t/m ² /yr)	0	0	29
Nursery			2,000	25	0.027	(t/person/yr)	0	0	1
Primary Health Centre		700	700	10	1.13	(t/person/yr)	0	11	11
Senior Living	0	6,500	6,500	100	0.5	(t/person/yr)	0	50	50
						Total	250	1,008	4,978

17.11.19 The product of this analysis of the range of waste volumes to be produced in connection with the Proposed Development during the Construction and Occupational Phases is set out in the **Tables 17.7** above. In summary, during the construction phase approximately 110,000 m³ are expected to be generated by 2026. During the operational phase the total expected to be generated each year is approximately 5,000 tonnes.

17.11.20 The construction phase arisings are, however, based on standard waste management practices. It is anticipated that through the use of a robust and challenging Site Waste Management Plan this can be significantly reduced. In particular the non-domestic buildings are required to achieve a BREEAM Excellent rating. Credits are awarded under BREEAM for achieving significant reductions in construction waste. The exact quantities of waste reduced through the application of BREEAM cannot be quantified at this stage since the waste credits are not mandatory and individual construction waste strategies will be adopted for each building as the development progresses to detailed design.

There will also be an opportunity to use best practice in waste segregation and phasing of the project in order to maximise reuse, and recycling opportunities during the construction phase of the development, which will be undertaken either on site or off site depending on the volume of waste produced.

Challenging waste minimisation and landfill diversion targets will be set via Development Briefs with the aim of reducing the volume of waste produced by more than half compared to the standard development of this size, thus gaining maximum BREEAM credits

17.11.21 The stakeholders responsible for the waste streams are:

- Residential development (including Student Housing) – Local Authority (likely to be Cambridge City Council);
- Public Open Space – University of Cambridge;
- Commercial / Industrial waste – Producer.

Likely Significant Effects

17.11.22 All of the waste described above will be disposed of following legal requirements and using established waste management procedures. It is anticipated that through the use of a robust and challenging Site Waste Management Plan the construction waste arisings can be significantly reduced. There will also be an opportunity to use best practice in waste segregation and phasing of the project in order to maximise reuse, and recycling opportunities during the construction phase of the development, which will be undertaken either on site or off site depending on the volume of waste produced.

17.11.23 In respect of occupational arisings a number of measures are proposed which aim to reduce waste generation, and encourage recycling and re-use. Where practicable, most BREEAM and Code for Sustainable Homes waste credits will be targeted.

17.11.24 The existing waste management facilities in the Cambridge area have capacity for processing the waste (recycling where possible, and landfill for inert waste). The County Council has recently commenced a long term contract with Donarbon Ltd who operate a Mechanical Biological Treatment (MBT) plant at their waste management site which separates streams for recycling, landfill, and composting. This plant has a throughput of around 300,000 tonnes per year, and has been designed to meet the future needs of the County with a 28 year contract. Therefore the waste generated by the Proposed Development has been accounted for strategically in the County's waste strategy and represents a negligible increase in the overall levels of waste generated in the County.

17.11.25 The assessed effect on the local environment of increased waste generation from construction and occupancy phases of the Proposed Development is negligible. However the Proposed Development will contribute to overall levels of waste generation in the local area, and therefore it is important for the Application Site to minimise waste generation as the first stage of the waste hierarchy, and provide means to ensure that the high recycling levels can be achieved.

17.12 Effects of Highways and Utility Works

17.12.1 Waste arising from the construction of the highway and utility works will be associated with the removal of existing street furniture and utility apparatus and concrete, tarmac, rubble and vegetation from the breaking out of existing carriage and kerbs. As with the Development Proposals the contractor will be expected to comply with best practice techniques, only disposing through landfill as a last resort.

17.12.2 The waste generated by these works (to the extent that such works are a natural occurrence of any major development scheme) has been accounted for strategically in the County's waste strategy and represents a negligible increase in the overall levels of waste generated in the County.

17.12.3 In terms of the use of these works no waste is expected to be generated from the use other than as a consequence of future upgrades where the same considerations as to the original construction would apply.

17.13 Cumulative Effects

17.13.1 As discussed above the waste handling facilities at Donarbon have been granted planning permission to handle waste for all of the planned expansion sites in Cambridge and therefore the

cumulative effects of waste from each of the planned development sites in the vicinity of North West Cambridge can be considered negligible.

17.14 Mitigation and enhancement

17.14.1 Due to the design of the Proposed Development including measures designed to avoid, reduce and manage effects, no further mitigation is considered.

17.15 Summary

17.15.1 This section examines the effect of waste generation on the local environment and waste handling systems.

17.15.2 Under the baseline scenario, the site is in mainly agricultural use and is considered to produce negligible waste. However were the Proposed Development not to take place, a baseline development meeting the needs identified for North West Cambridge would result in approximately 110,000m³ construction waste and approximately 5,500 tonnes per year operation waste, which represents a high magnitude of change. It is anticipated that through the use of a robust and challenging Site Waste Management Plan the construction waste arisings can be significantly reduced. There will also be an opportunity to use best practice in waste segregation and phasing of the project in order to maximise reuse, and recycling opportunities during the construction phase of the development, which will be undertaken either on site or off site depending on the volume of waste produced.

17.15.3 In respect of occupational arisings a number of measures are proposed which aim to reduce waste generation, and encourage recycling and re-use. Where practicable, most BREEAM and Code for Sustainable Homes credits will be targeted.

17.15.4 Notwithstanding the high magnitude of change given the capacity of existing resources and the fact that the waste generated by the Proposed Development has been accounted for strategically in the County's waste strategy and represents a negligible increase in the overall levels of waste generated in the County. The impact on the local environment and waste handling systems is in either event considered negligible and therefore the overall impact is negligible.

17.16 Effects of Highways and Utility Works

17.16.1 It is considered that the highway and utility works will not give rise to any significant adverse effects.

17.17 Conclusions

17.17.1 This chapter of the ES examines the sustainability considerations for the Proposed Development. The chapter highlights where other sections of this Environmental Statement consider a range of sustainability issues. The chapter also includes a more in depth assessment of energy and CO₂ emissions, and waste during construction and occupation.

17.17.2 High levels of sustainability are required through the AAP which stipulates all homes (apart from the first 50 if built before 2013) will have to meet Code for Sustainable Homes level 5, and applicable all non-domestic buildings will have to meet BREEAM Excellent. In addition, current and proposed national and local policy is improving sustainability standards, which the Proposed Development will have to meet. The Applicant has aspirations for meeting these high sustainability standards, and developing an 'exemplar' sustainable development which demonstrates how a development can be viably designed and constructed meeting these high standards.

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- 2 Application Site Description and Proposed Development
- 3 Phasing and Implementation
- 4 Planning Policy Considerations
- 5 Socio-Economic Assessment
- 6 Landscape and Visual Issues
- 7 Ecology and Nature Conservation
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- 15 Hydrology, Drainage and Flood Risk
- 16 Utilities and Services
- 17 Sustainability Considerations
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18 CUMULATIVE AND INTERACTIVE EFFECTS

18.1 Introduction

18.1.1 This chapter considers the cumulative effects from the combined effects of other committed developments at the construction or operational state of the Proposed Development. It also considers the cumulative effects of the interaction between environmental effects during the same development periods.

18.1.2 This chapter has been informed by other technical assessments set out within the ES.

18.2 Legislation, Policy and Guidance

Legislative Framework

18.2.1 There is no legislation outlining how cumulative effects should be assessed or determined as significant. However, there is a requirement in Part 1, Schedule 4 of the EIA Regulations to consider cumulative effects.

18.2.2 The guidelines for Cumulative Effects Assessment (CEA) published in 1999 define cumulative effects as:

“Impacts that result from the incremental changes caused by other past, present or reasonably foreseeable actions together with the project.”

18.2.3 Cumulative effects in this case are therefore those that arise from the combination of the Proposed Development and other existing or reasonably foreseeable proposed developments.

18.2.4 If development projects are considered individually the environmental effects may appear not likely to be significant. However, the combination of effects from the Proposed Development and those caused by other permitted developments acting together, may generate elevated levels of environmental effects. The combination of effects, which may occur in various ways, is regarded as constituting cumulative effects.

18.3 Scope of Cumulative and Interactive Effects

18.3.1 There are four types of cumulative and interactive effects which are described within the following sections namely:

- *Cumulative Effects of the Proposed Development with other committed developments*
- *Cumulative Effects arising from the Construction of the Proposed Development in combination with its operation following first Occupation*
- *Interactive Effects where a measure proposed to avoid significant adverse effects gives rise to an effect elsewhere*
- *Interactive Effects of Activities / Operations associated with the Proposed Development which affect more than one environmental medium and interactive effects where an effect on one environmental medium has an effect on another environmental medium.*

18.3.2 There is no statutory guidance which determines the methodology or approach to the assessment of cumulative effects. The EIA Regulations only require cumulative effects to be assessed if “it is reasonably required to assess the environmental effects of the development”. Guidance on EIA published by the Institute of Environmental Management and Assessment states that EIA “should assess the effects of the development cumulatively with other developments where there are likely to be significant effects”.

18.3.3 The assessment of cumulative and interactive effects relies on logical interpretation of assessments elsewhere within the assessment and on interpretation of data in relation to different developments which may not have been expressed in consistent formats or prepared using similar methodology. Nevertheless, this assessment of the cumulative effects will, however, provides an insight into the likely significant cumulative and interactive effects of the Proposed Development with other committed developments, as between different aspect of the Proposed Development itself and as between different effects on different environmental media.

18.4 Cumulative Effects in association with other Committed Developments

18.4.1 The schemes with which it is considered that the effects of the Proposed Development may be cumulative have been identified through consultation with CCC and SCDC are listed in **Table 18.1** and identified on **Figure 1.3**. The level of assessment detail has been dependent upon the information available for each of these schemes.

18.4.2 During the course of preparation of this ES the Department for Transport approved deferral of the A14 improvements and this affected the traffic forecasts from some cumulative sites based on reduced rates of build. Accordingly **Table 18.1** sets out (Column 4) the overall quantum of development expected at each of the sites in accordance with the RSS; the quantum of development expected by the 2014 assessment date (Column 5); and the reduction in development for traffic purposes agreed by the CCC (Column 6).

Table 18.1: Schemes Considered in the Assessment of Cumulative Effects

1	2	3	4	5	6
Scheme	Location	Planning Application Reference	Scheme Details	Assumed Cumulative Development Rates 2014	2026 Assumed Cumulative Development
West Cambridge	South of the Application Site		Site developed for university-related purposes. The floor space is 175,120 sqm, within academic departments, research institutes, indoor sports centre and commercial research, social amenity facilities together with improved infrastructure to include car and cycle parking, park and cycle facilities, new internal roads, ecological and landscaping improvements.	N/A	Not considered – clearly under construction
Northstowe	North-west of Cambridge, known as the former Oakington Barracks Site	SCDC: S/7006/07/O	A new town with residential development, approximately 9500 dwellings, employment development (knowledge based and other businesses, research and light industry) community uses and non-residential institutions, research institutes, retail, showrooms, financial and professional services, restaurants, snack bars and cafés, drinking establishments, hot food takeaways, hotel and guest houses, assembly (including places of worship and conference facilities), entertainment and leisure (including casino, cinema and nightclubs), education (including nursery, pre-school, primary, secondary and post 16 education), health, library, cultural facilities (including art centre), residential institutions, open space including town car park and town square, sport and recreational facilities, public transport routes, footpaths and cycleways, landscaping, cemetery / burial ground, allotments, tree nursery, household waste recycling facilities and all related infrastructure (including roads, car and cycling	Up to 250 dwellings	1,500 dwellings

ENVIRONMENTAL STATEMENT

Cumulative and Interactive Effects

1	2	3	4	5	6
Scheme	Location	Planning Application Reference	Scheme Details	Assumed Cumulative Development Rates 2014	2026 Assumed Cumulative Development
			parking, electricity and power generation plant and equipment, gas facilities, water supply, telecommunications, drainage systems, foul and surface water, flood plain compensation (including pumping station) and lighting).		
National Institute of Agricultural Botany 1	Land between Huntingdon Road and Histon Road, Cambridge	CCC: 07/0003/OUT	Mixed use development comprising up to 1593 dwellings, primary school, community facilities, retail units (use classes A1,A2,A3,A4 and A5) and associated infrastructure including vehicular, pedestrian and cycleway accesses, open space and drainage.	Up to 250-300 dwellings	1,780 dwellings NIAB 1 & 2
National Institute of Agricultural Botany 2	Land at North West Cambridge, Huntingdon Road to Histon Road	Site allocated and is detailed in Policy Sp/2 in South Cambridgeshire's Site Specific Policies DPD (Adopted January 2010) –	“will be developed as part of a sustainable housing led urban extension of Cambridge” – No application has yet been submitted.	See Phase I above	1,780 dwellings NIAB 1 & 2
Orchard/ Arbury Park	Kings Hedges Road, Cambridge	SCDC: S/7006/07/0	Development comprising residential, employment, leisure, social/community uses, open space, educational facilities and associated transport infrastructure.	Up to 450 dwellings	1,120 dwellings

18.4.3 The following paragraphs identify the cumulative effects which have been considered as significant within this ES.

Socio Economics

Employment

18.4.4 No employment displacement is expected as employment floorspace at West Cambridge is assumed to be fully built out before employment space in the Proposed Development is occupied, or otherwise specified for different types of research uses. No alternative employment locations are included in the remaining cumulative analysis (including NIAB 1, NIAB 2 and Northstowe), and therefore given the proximity to these developments the Proposed Development has the potential to provide local employment opportunities for residents of these developments as well. In cumulative terms the effect is, therefore, also expected to be major beneficial.

Demand for Healthcare Facilities

18.4.5 The cumulative healthcare effect will be negligible as local healthcare provision will be located on both the Proposed Development and NIAB developments.

Effect on Primary Education

18.4.6 Cumulatively the effects on primary school provision across NWC, NIAB 1 and NIAB 2 are also considered negligible, as primary education needs are being met locally on each of the individual developments.

Effect on Secondary Education

18.4.7 The cumulative effect of the population growth in relation to secondary school provision is considered minor beneficial (positive) as it will fully provide for the secondary school aged pupils expected to come forward from the Proposed Development, NIAB1 and NIAB2. The new school located at NIAB2 will also create additional secondary school capacity for the immediate hinterland of the developments due to its greater catchment area and geographical coverage.

Effect on Sixth Form Capacity

18.4.8 The cumulative effect is likely to be negligible as education authorities have advised that there is excess capacity in existing sixth form provision beyond that required to meet the needs of the Proposed Development, NIAB and NIAB 2.

Effect on Community Facilities

18.4.9 In cumulative terms, the effect on both library and community facility provision is expected to be negligible. Community provision is being met through facilities at both the Proposed Development and NIAB 1, and library provision is being made at NIAB 1 to meet the needs of the populations of the Proposed Development, NIAB 1 and NIAB 2.

Effect on Police / Emergency Services

18.4.10 Cumulatively there is additional demand on police services due to the populations generated on nearby sites. However, the size of the police facility at the Proposed Development has been developed specifically to meet this need, and the cumulative effect is expected to be negligible as this facility will provide emergency service provision to support the populations coming forward from the Proposed Development and both NIAB developments.

Effect on Open Land

18.4.11 In cumulative terms, there is a moderate beneficial effect on open space provision as the requirements are being met locally, on-site, across the individual developments and the Proposed Development will provide open land for formal and informal recreation in excess of that required to meet the needs of the Proposed Development itself.

Landscape and Visual

18.4.12 Cumulative effects of the Proposed Development with NIAB1, NIAB2 and West Cambridge have been assessed. Northstowe and Orchard Park are not included for the purpose of the Landscape and Visual Assessment due to their distance from the Application Site.

Construction

18.4.13 Given the scale and duration of construction activity related to the Application Site, it is predicted that the combination of further construction activity as a result of the NIAB1, NIAB2 and West Cambridge sites would result in a slight increase in magnitude during the construction period. However, cumulative construction activity is not likely to intensify the effects to such a degree that would be considered materially more significant than would be the case for the Proposed Development in isolation.

Landscape Character

18.4.14 NIAB1 and NIAB2 lie within Landscape Character Area 2A Western Fen Edge which is a different Landscape Character Area ("LCA") to the Application Site (Western Claylands). It is therefore considered that there will be no direct effect on the landscape character of the Western Claylands LCA as a result of the NIAB1 or NIAB2 development and that consequently no cumulative effects would result.

18.4.15 West Cambridge development lies within Townscape Area 2, West Cambridge (part of the wider Bespoke Houses and Colleges Townscape Type). The Proposed Development is considered to result in a Minor Adverse effect to a small, localised and peripheral part of this Townscape Character Area and not affect the integrity of it or the principal features and characteristics which define it. When considering the West Cambridge site which is under construction in combination with the proposed site it is not considered likely to result in significant cumulative effects greater than the effects of either of the individual developments.

Visual Amenity

18.4.16 There is a theoretical intervisibility between the Application Site and NIAB1, NIAB2 and West Cambridge although in practice these developments would not be viewed in combination due to the intervening urban form.

18.4.17 NIAB1, NIAB2 or the West Cambridge development would not be visible in combination with the Application Site from any of the 12 viewpoints assessed. It is therefore considered that no significant cumulative effects would be likely.

Ecology and Nature Conservation

18.4.18 In respect of cumulative effects on ecology and nature conservation:

Washpit Brook

18.4.19 None of the additional developments would be likely to give rise to cumulative effects on the Washpit Brook, given their locations and lack of direct hydrological connectivity with the Washpit Brook.

Coton Countryside Reserve

18.4.20 The development of the NIAB and West Cambridge sites would further increase the number of people living and working within a 3 mile radius of the Coton Countryside Reserve, and the potential therefore exists for a cumulative effect to occur. The West Cambridge site is located in relatively close proximity to the reserve and an increase in visitor numbers from workers at the site would be expected as a result of this development (although current visitor numbers already include visitors from this area). The NIAB development is located to the north of Huntingdon Road at some distance from the reserve, and closer to other areas of countryside and recreational facilities (including those that will be created within the Application Site). It is therefore unlikely that the NIAB development would give rise to significant increases in visitor numbers to the reserve.

18.4.21 Given the likely increases in visitor numbers at the reserve that would be expected to arise as a result of these developments, a significant cumulative effect would not be anticipated.

Mature, Veteran and Specimen Trees

18.4.22 The NIAB and West Cambridge developments were not predicted to result in significant adverse effects on mature, veteran or specimen trees. In addition, given that veteran trees will not be adversely affected, and that the losses of mature trees will be confined to the Application Site, no cumulative effects in relation to the other sites on mature, veteran or specimen trees are anticipated.

Hedgerows

18.4.23 The NIAB development will result in losses of short sections of hedgerow; the West Cambridge development will provide improved wildlife corridors and, therefore, have a potentially beneficial effect on hedgerows. Given this and the relatively small-scale losses of hedgerow habitat within the Application Site, that the hedgerows affected are species-poor, that any losses would be replaced with new hedgerows, significant effects on hedgerows cumulatively with the other developments would not be expected.

Terrestrial Invertebrates

18.4.24 Effects on the terrestrial invertebrate species of particular value within the Application Site are not predicted in relation to either the West Cambridge or the NIAB developments, and therefore cumulative effects on this receptor would not be anticipated.

Great Crested Newts

18.4.25 The NIAB and West Cambridge developments were not predicted to result in adverse effects on great crested newts. In addition, given the locations of the ponds adjacent to the sites which support great crested newts, surrounded by already developed land (as well as the Application Site), it is not considered likely that any of the additional developments could give rise to cumulative effects. Cumulative effects on the local great crested newt population are therefore not expected.

Common Toads

18.4.26 The NIAB and West Cambridge developments were not predicted to result in significant adverse effects on common toads. In addition, given the location of the pond supporting common toads, and that no adverse effects on toads are predicted as a result of the Proposed Development, it is considered unlikely that any cumulative effects will arise as a result of the additional developments identified.

Badgers

Given that the territory associated with the resident social group of badgers is likely to be approximately the same as the Application Site boundary, albeit that it may extend off-site in some locations, no significant cumulative effects associated with the other developments are likely to arise. Cumulative effects on badgers are therefore not expected.

18.4.27 The assessment has concluded that specialist farmland bird species will be lost from the Application Site, giving rise to a significant effect on the local populations. The NIAB development will also result in habitat losses for specialist farmland species, although the Environmental Statement for the scheme predicted a negligible residual effect given the provision of off-site mitigation, particularly for skylarks. The West Cambridge development is also likely to have an adverse effect on specialist farmland species but a beneficial effect for other species; the Environmental Statement did not assess the gains and losses for individual species separately. Given the location of the Application Site on the edge of Cambridge and the availability of substantial areas of farmland habitat to the north and west of the Application Site it is considered unlikely that the significance of the effect would be increased when losses associated with other developments are considered. Cumulative effects in excess of those likely in connection with the Proposed Development itself are therefore not considered likely.

Bats

18.4.28 The NIAB development is predicted to give rise to beneficial effects on bats. The West Cambridge development may also give rise to beneficial effects, as a result of the strengthening of wildlife corridors. Therefore no adverse effects on bats which are cumulative with the other developments are likely to arise and beneficial effects may be realised, although these are considered unlikely to be significant.

Brown Hare

18.4.29 The NIAB development will result in habitat losses for brown hare, although the Environmental Statement for the scheme predicted a negligible residual effect. The West Cambridge development is also likely to have an adverse effect on brown hares. Given the location of the Application Site on the edge of Cambridge and the availability of substantial areas of farmland habitat to the north and west of the Application Site it is considered unlikely that the significance of the effect would be increased when losses associated with other developments are considered. Cumulative effects in excess of those likely in connection with the Proposed Development itself are therefore not considered likely.

Soils and Geology

18.4.30 Cumulative effects are not anticipated with regards contamination as the ground investigation identified no site derived significant soil, groundwater or ground gas contamination. Hence there are no likely significant effects to add to those of any other. The investigations have also demonstrated that there is no off-site contamination that will affect the Application Site.

18.4.31 The Traveller's Rest Pit is situated towards the centre of the Proposed Development and will not be affected by any of the other developments in the vicinity of the Application Site either at 2014 or at 2026. There would not therefore be any effects from other developments on the SSSI, with which to accumulate those of the Proposed Development.

Archaeology

18.4.32 The proposed development of the Application Site, and both the NIAB and West Cambridge developments, will result in development above and around similar types of archaeological sites within the north western quadrant of Cambridge. Whilst some archaeological sites will be developed as part of this process, it is anticipated that schemes of archaeological works will be enacted in advance of and during construction operations for all of the strategic sites and the developments will adhere to industry standards and guidance so that the cumulative effect of the Proposed Development and the other strategic sites listed will be negligible. Indeed, in the light of the excavation of the High Cross and Vicar's Farm Iron Age/Roman settlements at West Cambridge, and anticipating the excavation of the two main NIAB sites of the same date, the excavation of North West Cambridge's main site complexes (Sites II, IV & V) will greatly increase understanding of the periods' settlement systems within this area of Cambridge's hinterland. Providing an unprecedented scale of understanding of late prehistoric/Roman land-use, this will result in a deeper public appreciation of the local historic landscape sequence and must therefore count as a positive heritage benefit.

Cultural Heritage

18.4.33 Cumulative effects of the Proposed Development with NIAB1, NIAB2 and West Cambridge have been assessed. The development at Northstowe is simply too far away to contribute to any cumulative effect on heritage assets in the vicinity of the Proposed Development. Likewise, the Orchard Park site has no direct relationship with the heritage assets assessed.

18.4.34 As Chapter 6 Landscape and Visual Issues describes, There is a theoretical intervisibility between the Application Site and NIAB1, NIAB2 and West Cambridge although in practice these developments would not be viewed in combination due to the intervening urban form. While these developments will cumulatively increase the density of development on the north-west side of Cambridge, this will not have any significant cumulative effect on the heritage assets assessed, which already lie within a built-up area defined by the A14, M11 and Huntingdon Road.

Agricultural Circumstances

18.4.35 Other major developments will result in the loss of best and most versatile agricultural land (which are identified in Chapter 1 of this ES), but all such developments are discrete and the loss of such land has been (or will be) considered individually when planning permission is granted.

18.4.36 The ES for the Northstowe development identified the loss of 221ha of best and most versatile land, which was considered to be an effect of major adverse significance. That for the NIAB identified the loss of nearly 40ha of best and most versatile land, which was considered to be an adverse effect of moderate significance. In overall terms when all committed developments are completed as at 2014 and 2026 there will be a significant net loss of best and most versatile agricultural land (of approximately 340ha) but this has been considered already through the forward planning process prior to allocation of each of these sites for major development.

Traffic and Transport

18.4.37 The CSRM 2026 North West Cambridge Do Minimum and Do Something highway modelling option tests have been used to inform the Without and With Development scenarios.

18.4.38 The following committed strategic development sites in the immediate area of the Application Site have been considered within the 2026 Do Minimum assessment:

- i) West Cambridge Development – as per the extant consent;
- ii) NIAB Residential Development – assuming 1,780 units;
- iii) Orchard Park – assuming 1,120 units.

18.4.39 Following the cancellation of the A14 Ellington to Fen Ditton Scheme in 2010, as agreed with the highway authorities the strategic development included within the CSRM for the NWC Option Tests has been assumed to be as listed in Table 14.1 of the Transport Assessment, having regard to the cancellation of the A14 scheme:

Planned Dwelling Growth at Strategic Sites

Strategic Site Name	December 2010 test – 2026 Committed Development. Core Scenario
Cambridge North West	4,400
<i>Huntingdon / Histon Rd</i>	<i>1,780</i>
<i>Huntingdon / Madingley Rd (North West Cambridge Development)</i>	<i>1,500 Market Houses - as per NWC Devt Schedule in Table 1</i>
<i>Arbury Camp (Orchard Park)</i>	<i>1,120</i>
Northern Fringe	0
<i>Sewage Works</i>	<i>0</i>
<i>Chesterton Sidings</i>	<i>0</i>
Southern Fringe	4,420
<i>Bell School</i>	<i>650</i>
<i>Clay Farm</i>	<i>2,300</i>
<i>Glebe Farm</i>	<i>300</i>
<i>Trumpington Meadows</i>	<i>600</i>
<i>TM / Monsanto</i>	<i>570</i>
Cambridge East	0
<i>North of Newmarket Road</i>	<i>0</i>
<i>North of Cherry Hinton</i>	<i>0</i>
<i>Airport</i>	<i>0</i>
<i>Northstowe</i>	<i>1,500</i>
<i>Loves Farm</i>	<i>1,900</i>
<i>North Bridge</i>	<i>1,250</i>
<i>Cambourne</i>	<i>1,000</i>
Alternative Sites to be applied across the County at existing development	1,500
TOTAL	15,970

18.4.40 As agreed with the highway authorities, the changes to the existing infrastructure included within the CSRMS also reflected the cancellation of the A14 Ellington to Fen Ditton scheme, and that necessary to implement the planned dwelling growth at the strategic sites.

18.4.41 The cumulative effects of the completion of the surrounding strategic developments have therefore been assumed as part of the Baseline against which the likely effects of the Proposed Development are judged, and therefore the effects of the Proposed Development cumulatively with those other developments have been taken into account in the analysis of the effects of the proposed development.

2014 Pre-Opening Scenario

18.4.42 During the 2014 Pre-Opening Scenario, in addition to Phase 1 of the Proposed Development being under development, highways and utility works on Huntingdon Road and Madingley Road associated with the Proposed Development would be underway and construction works associated with the West Cambridge and NIAB developments would also be underway. Elements of development at the West Cambridge and NIAB developments would be occupied. Construction access to Zone B of the Proposed Development would be taken from Madingley Road.

18.4.43 In the Pre-Opening scenario, the greatest peak Construction traffic effect would be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 4%, and HGVs increasing by 64% in the cumulative assessment. Of all the effects considered in this Chapter, the only ones likely to be significant are Pedestrian Amenity and (possibly) Fear and Intimidation in relation to the

short section of Madingley Road between the M11 and the site access, on the basis that HGVs may increase by 64%. Even so, applying the thresholds in the IEMA Guidelines since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 290 vehicles per day - this is well below the 1,000 vehicles per day threshold in the Guidelines. Therefore, the magnitude of change is considered to be **Negligible** or (at worst) **Minor adverse**. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists. Overall, in terms of the significance of effect, it is considered that there would be **Negligible** or (at worst) **Minor Adverse** effect on Pedestrian and Cyclist Amenity.

2014 Post Opening Scenario

18.4.44 The Post-Opening Development Construction and Phase 1 Development Operation has been assessed on local links with reference to the worst case Pre-Opening Development Construction movements and the Phase 1 Development Operation flows. Taking into account the construction activity at NIAB and West Cambridge, the greatest effect would again be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14% and HGVs increasing by 79%. Again, possibly Fear and Intimidation may be affected for this short section of Madingley Road on the basis that HGVs may increase by 79% - Even so, applying the thresholds in the IEMA Guidelines, at an increase of 290 vehicles per day the magnitude of change is considered to be **Negligible** or (at worst) **Minor Adverse**.

18.4.45 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity would be **Negligible**.

18.4.46 Although the HGV composition along Madingley Road would, due to the levels of construction traffic be higher than existing, this affects only two links with only low numbers of pedestrians and cyclists. It is considered that this would have minimal effect on Personal Injury Collision Rates. The remaining additional flows attributable to the Proposed Development would be no different to the vehicle composition on the existing links, and as the Development proposals do not alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

18.4.47 In terms of the overall effects for the 2014 Post Opening scenario, the Cumulative traffic is considered to have a **Minor to Moderate Beneficial** effect on Fear and Intimidation, and a **Negligible** effect on Driver Delay. Reflecting the pedestrian and cycling measures to be implemented, **Minor** or **Moderate Beneficial** effects were considered for Severance, Pedestrian Delay, Effect on Pedestrian and Cyclist Amenity, and Highway Safety:

2026 - Potential effects on Future Local Highway Capacity

18.4.48 It is apparent from this comparison between the 2026 Do Minimum and 2026 Adjusted Do Something model peak hour flows (ie, the direct comparison of the network without then with the Development) that:

- i) there is a minimal influence on flows on the M11. The greatest difference is a 1.1% increase, occurring to the south of Junction 12 – potentially reflecting the minimal available capacity on the M11. Indeed, several links experience reductions in flow as a consequence of the Proposed Development – possibly due to reassignment of existing trips away from the area;
- ii) similarly, there is a minimal influence on flows on the A14. The greatest difference is a 2.0% increase, occurring on Link 7 - differences for the remainder of the links are lower, or indeed reflect a reduction in flow – again, this may reflect a reassignment of existing trips away from this area;
- iii) the A428 experiences increases of flow of between 5% - 7%, albeit these percentage increases are created by a maximum two-flow increase of 163 trips;

- iv) the strategy of locating the Proposed Development main accesses to the west appears to be successful – whilst the differences in flows on Huntingdon Road and Madingley Road are positive to the west of the accesses, the flow differences are negative to the east – possibly due to non-Proposed Development movements reassigning away;
- v) the strategic route along Barton Road into Cambridge from M11 Junction 12 (from the south) experiences around 7% increases in flow;
- vi) Storey's Way experiences a reduction in flow in both peaks, implying that existing trips are assigning away from the area;
- vii) Oxford Road, and the NIAB Site Access, experience large increases in flows (45% and 12%), reflecting the influences of low base flows, and possible modelling methodology issues.

18.4.49 The peak hour capacity of the following junctions has been assessed:

- i) Huntingdon Road East / NWC Site Access / NIAB Site Access traffic signal controlled junction;
- ii) Huntingdon Road West / NWC Site Access traffic signal controlled junction;
- iii) Madingley Road / NWC Site Access / West Cambridge Site Access / Park and Ride Access / M11 Junction 11 traffic signal controlled junction / slip road access priority junction;
- iv) Madingley Road / Northampton Road / Queen Street mini roundabout;
- v) Huntingdon Road / Castle Street / Victoria Street traffic signal controlled junction;
- vi) Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction;
- vii) Girton Road / Huntingdon Road priority junction;
- viii) Barton Interchange Northern Roundabout;
- ix) M11 Junction 13 Southbound On-Slip merger lane.

18.4.50 The results of the three proposed Site Access junction capacity assessments confirm that these would operate within capacity in the 2026 Future Year. These assessments, undertaken in the context of adjacent junctions, have also confirmed that the adjacent junctions along the Huntingdon Road and Madingley Road corridors would also operate within capacity in this 2026 Future Year.

18.4.51 Where the CSRM identified that the Proposed Development has an effect in terms of increased delay on other junctions in the vicinity, assessments have been undertaken to these junctions. The results of these junction capacity assessments are contained in Section 17 of the Transport Assessment, and show that the influence of the Proposed Development is minimal, and that the existing junctions would not experience any significant additional delays when compared to the 2026 Do Minimum scenario – ie, Without the Proposed Development.

2026 - Personal Injury Collision Rates

18.4.52 As the additional flows generated by the Proposed Development would be no different to the vehicle composition on the existing links, nor would the Development proposals alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

2026 - Public Rights of Way

18.4.53 The extent of the Proposed Development would surround the line of existing Footpath 5 – this right of way routes on a south-west to north-east axis through the northern end of the site between Girton and Hardwick. This footpath will be accommodated within the development landscaping, to ensure the continuation of a quality standard route through the Proposed Development.

2026 - Overall Significance of Effects Table 12.27 shows the percentage increases in traffic flow on the roads in the area, and the potential significance of each effect is summarised below:

- i) Severance – the same guidance set out in Section 12.3 from the IEMA's Guidelines for the Environmental Assessment of Road Traffic and Volume 11, Section 3, Part 8, Chapter 6 of the Design Manual for Roads and Bridges entitled 'Pedestrians and Others and Community Effects' has been applied here. The change in traffic link flows resulting from the Proposed Development do not result in any significant increases in the level of severance in most cases – with several links experiencing decreases in severance, and increases generally well below 30% - i.e. below the level at which a change in severance is significant.

The exception to this is on Oxford Road / Windsor Road, however, whilst traffic flows do increase by around 40%, it is considered that this increase in flow may reflect more the highway modelling than the potential for flows to increase. The Proposed Development includes proposals for a cyclic traffic flow monitoring scheme of this link, with further potential traffic calming measures should an increase in movements be identified.

The increased number and quality of pedestrian and cycle crossing facilities of Huntingdon Road and Madingley Road proposed as part of the Proposed Development would deliver a positive benefit.. Overall therefore, in the context of a negligible change in severance across the network attributable to traffic movements, the overall significance of effect for Severance is therefore considered to be **Minor to Moderate Beneficial**;

- ii) Pedestrian Delay – the increase in traffic link flows due to the Proposed Development is negligible in most cases - peaking at minor - and therefore the effects on pedestrian delay are also negligible - even with the existence of some high sensitivity receptors in the area such as the retirement homes, schools and colleges.

The increased number and quality of pedestrian and cycle facilities within the area - including the crossing facilities of Huntingdon Road and Madingley Road and the Ridgeway - would deliver a positive benefit by delivering more direct quality routes for existing and future pedestrian and cyclist movements across the area. Overall therefore the effect for Pedestrian Delay is considered to be **Minor to Moderate Beneficial**;

- iii) Effect on Pedestrian and Cyclist Amenity – changes in pedestrian amenity are assumed to be significant where traffic flows (or the HGV component) double or more. This does not occur. The increased number and quality of pedestrian and cycle facilities within the area would deliver a positive benefit by delivering better quality routes for existing and future pedestrian and cyclist movements across the area. The overall significance of effect for Pedestrian and Cyclist Amenity is therefore considered to be **Minor to Moderate Beneficial**;

- iv) Fear and Intimidation –using the thresholds for Fear and Intimidation given in **Table 12.2**, and the existing levels of Fear and Intimidation given in **Table 12.11**, the links that would be likely to experience a change in these effects are also summarised in **Table 12.11** in **Appendix 12.3**..

Relatively modest increases in traffic flow are according to the assessment criteria do not generate increases in the levels of Fear and Intimidation. The significance of effect on this across the network is therefore generally considered to be Minor, albeit that the

significance of effect to the Oxford Road and Windsor Road link is considered to be Moderate. Mitigation measures in the form of traffic calming are proposed along this link to encourage traffic not to use this link, and to reassign to the more strategic links.

The increased number and quality of pedestrian and cycle crossing facilities of Huntingdon Road and Madingley Road proposed as part of the Proposed Development would deliver a positive benefit.. The measures incorporated in the Proposed Development are therefore considered in terms of Fear and Intimidation to have **Minor to Moderate beneficial** effects;

- v) Hazardous Loads – the Proposed Development will not have any effect on the level of hazardous loads on the local area;
- vi) Highway Safety – the analysis of existing data on personal injury collisions shows that in all cases the observed collision rate on the junctions and links surrounding the site are either similar to or lower than the national average for similar types of link and junctions. The magnitude of any change in flows on the surrounding links as a consequence of the Proposed Development is no greater than a Minor increase. It is therefore considered that the effect on the number of accidents would be Negligible. The Site Access proposals – providing traffic signal controlled junctions at the boundary of the built environment of Cambridge and other measures likely to be associated with the Proposed Development including a reduction in speed on Huntingdon Road, the provision of a section of off-road cycleway, and controlled pedestrian / cyclist crossing facilities – are likely to have a positive benefit in reducing personal injury collisions by reducing the speed of potential conflicts and segregating vulnerable road users. As such, it is considered that the overall significance of effect for Highway Safety would be **Minor Beneficial** on these links;
- vii) Driver Delay – the relevant guidance suggests that Driver Delay is only likely to be significant when the traffic on the network surrounding the Application Site is likely to be at, or close to the capacity of the system. The effect of additional traffic flow from the Proposed Development on driver delay has been identified as being Minor, hence it is concluded that the change in Driver Delay would be Negligible. The provision of SCOOT and MOVA traffic signal optimisation along Madingley Road and Huntingdon Road would assist in managing Driver Delay, resulting in **Negligible** effects.

18.4.54 To understand the anticipated magnitude of effects on the links with degrees of change in excess of 5% have been considered. This scale of increase is likely to be experienced on the following links:

- i) Link 15 - Huntingdon Rd – from A14 slip road to North-western NWC Site Access;
- ii) Link 18 - Huntingdon Rd between the North-eastern site Access and Storey's Way – 5.1%;
- iii) Link 27 and 28 – Madingley Road to the West of the Site Access – 7%;
- iv) Link 31 – Barton Road from M11 Junction 12 to Grange Road – 5.5%
- v) Link 36 – Oxford Road and Windsor Road – 40% - albeit it is considered that this increase is unlikely to happen in reality – the CSRM has modelled this link with higher capacity than is the case for a narrow, traffic calmed residential street, enabling more trips to pass along in theory. It is considered that this increase in flow reflects more the modelling methodology;
- vi) Link 37 – Histon Road – 7.7%;
- vii) Link 41 – Girton Road – 15.3%;

18.4.55 Only one specifically identified high and medium sensitive receptor 15 – Histon Road Recreation Ground – is located on these links, at Histon Road. As the footways and crossing facilities along Histon Road adjacent this facility are of reasonable quality, it has been concluded that the significance of effect on these sensitive receptors overall is **Negligible**.

Noise Environment

18.4.56 On-site construction works at the developments at Northstowe, Orchard/Arbury Park and NIAB2 are too distant from the Proposed Development for there to be any significant cumulative effects during the Phase 1 works completed in 2014 or the Phase 2, 3 and 4 works up to 2026.

18.4.57 There is the potential for significant cumulative effects at properties on Madingley Road and Huntingdon Road resulting from on-site construction works at West Cambridge and NIAB, when these works are at their closest approach to the Proposed Development.

18.4.58 The on-site Phase 1 works for the Proposed Development up to 2014 will generally be at considerable distances from these roads and construction noise levels will be **Negligible**. Therefore, any cumulative effect will be **Negligible**. During highways and utilities works on Huntingdon Road and Madingley Road, there is the potential for significant cumulative effects at properties on Madingley Road and Huntingdon Road. However, taking into account the speed at which the utilities works will progress (approx. 20 metres per day), the duration of these significant effects at any particular sensitive receptor will be small.

18.4.59 Taking into account the fact that noise from the West Cambridge and NIAB developments will affect the front facades of properties on Huntingdon Road and Madingley Road, whereas noise from the Proposed Development will affect rear facades, and the negligible effects of construction noise from the Proposed Development in 2026, the cumulative effect is likely to be **Negligible** in Phases 2, 3 and 4 of the construction works.

18.4.60 Construction HGV traffic from the developments at Northstowe and Orchard/Arbury Park will not access the same sections of the public road network as that for the Proposed Development. It follows that there will not be any significant cumulative effects during the Phase 1 works completed in 2014 or the Phase 2, 3 and 4 works up to 2026.

18.4.61 Employing the results provided in the traffic and access chapter, the increases in noise levels to receptors fronting Madingley Road and Huntingdon Road resulting from the combined construction traffic for the Application Site, West Cambridge and NIAB, have been calculated.

18.4.62 For the pre-2014 works, receptors fronting Madingley Road will experience noise increases of 0.5 dB(A) as a result of the additional construction traffic. Receptors fronting Huntingdon Road will experience noise increases of 0.3 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in Table 13.9, the significance of these noise increases is assessed as **Negligible**.

18.4.63 For the post-2014 works, receptors fronting Madingley Road will experience noise increases of 0.6 dB(A) as a result of the additional construction traffic. With reference to the significance of effects scheme provided in Table 13.9, the significance of this noise increase is assessed as negligible. Receptors fronting Huntingdon Road will experience no increase in noise levels as there will be no construction traffic on this road.

18.4.64 Incorporating the additional traffic on Madingley Road due to the operation of the proposed development post-2014, the increase in noise levels to receptors fronting Madingley Road is 1.0 dB(A). With reference to the significance of effects scheme provided in Table 13.9, the significance of this noise change is assessed as **Negligible/Minor Adverse**.

18.4.65 Hence, the significance of the cumulative effects of construction traffic for the Application Site, West Cambridge and NIAB, and operational development traffic post-2014, is assessed as **Negligible**.

18.4.66 The transportation modelling, undertaken as part of the Transport Assessment, has estimated the cumulative effect for operation of all the Schemes listed in Table 1.4 on traffic flows on the local road network.

18.4.67 Data has been made available to the noise and vibration assessment for a baseline scenario in 2026 with none of the Schemes in operation (nor the Proposed Development) and for a scenario in 2026 with all of the schemes and the Proposed Development in operation.

18.4.68 The developments at Northstowe, Orchard/Arbury Park, West Cambridge, NIAB and NIAB2 are too distant from the Proposed Development for there to be any significant cumulative effects resulting from on-site operational noise for both 2014 and 2026.

18.4.69 Overall the cumulative effect of the Proposed Development and the other schemes in the Cambridgeshire Growth Areas is assessed as **Negligible** in 2014 and in 2026.

Air Quality

18.4.70 Construction works only have the potential to cause significant adverse effects at receptors located within a few hundred metres and with measures, such as those required by South Cambridgeshire District Council or Cambridge City Council, the zone within which significant effects might occur reduces to less than fifty metres. The developments at Northstowe, West Cambridge, Orchard/Arbury Park or NIAB2 are too distant from each other for there to be any potential of onsite works resulting in significant cumulative effects.

18.4.71 Onsite works for the Proposed Development and the NIAB scheme both have the potential to affect rates of dust deposition at a small number of properties on Huntingdon Road. As the Proposed Development and the NIAB scheme are located on different sides of Huntingdon Road, it is highly unlikely that combined effects would occur simultaneously. Works associated with highways and utility works on Huntingdon Road have the potential for minor adverse cumulative effects but there are opportunities to reduce the potential duration and magnitude of such effects by co-ordinated scheduling of off-site works for the schemes.

18.4.72 Onsite works for the Proposed Development and the West Cambridge scheme both have the potential to affect rates of dust deposition at a small number of properties on Madingley Road. As the Proposed Development and the West Cambridge Development are located on different sides of Madingley Road, it is highly unlikely that combined effects would occur simultaneously. Offsite works associated with infrastructure and utility works have the potential for minor adverse cumulative effects but there are opportunities to reduce the potential duration and magnitude of such effects by co-ordinated scheduling of off-site works for the schemes.

18.4.73 Traffic information provided in Chapter 12 (Table 12.18 and 12.23) confirms that the majority of construction vehicle movements associated with the Proposed Development would use the stretch of Madingley Road between the site access and junction 13 of the M11. The majority of construction vehicle movements associated with other developments at the same time would be on Huntingdon Road. As such, the cumulative impacts of construction traffic on air quality sensitive receptors would be **Negligible**.

18.4.74 The transportation modelling, undertaken as part of the Transport Assessment, has estimated the cumulative effects of all the Schemes listed in Table 1.4 on traffic flows on the local network of roads. Data has been made available to the air quality assessment for use in the sensitivity analysis (Appendix 14.1) for a baseline scenario in 2026 with none of the schemes nor the Proposed Development and for a scenario in 2026 with all of the schemes and the Proposed Development.

18.4.75 The quantitative assessment of cumulative effects in 2026 also provides a point of reference for the qualitative assessment of cumulative effects in 2014. This assessment therefore considers the cumulative effects on completion and then the cumulative effects in 2014.

18.4.76 The air quality impact assessment for the Northstowe scheme (English Partnerships and Gallagher Longstanton, 2007) has a study area that extends south as far as the A14. Although the estimates of absolute concentrations in the Northstowe ES are now somewhat dated, the magnitude of

the effects of the scheme are less sensitive to changes in assessment methods and should still represent a reasonable estimate.

18.4.77 In 2025 the Northstowe scheme is reported to increase baseline annual mean concentrations by $0.7 \mu\text{g}/\text{m}^3$ at sensitive receptors near to the A14 at Girton. The magnitude of the combined effects of all the schemes including the Proposed Development in the same location (R22) is $0.0 \mu\text{g}/\text{m}^3$ indicating that vehicle movements associated with the Northstowe developments account for the majority of the total change in this location. The cumulative effect on annual mean concentration of nitrogen dioxide or PM_{10} would be **Negligible** in 2025.

18.4.78 To the south of the Application Site there is the potential for cumulative effects at receptors located along Madingley Road (R9, R11 to R13) as a consequence of additional road vehicle movements from the West Cambridge scheme and the Proposed Development. The combined changes to annual mean concentrations of nitrogen dioxide and PM_{10} would be imperceptible at receptors on Madingley Road and the cumulative effect at these receptors would be **Negligible**.

18.4.79 The situation between the A14 and city centre along Huntingdon Road and Histon Road is likely to experience additional traffic movements associated with the operation of Northstowe, NIAB, NIAB2, Orchard/Ardbury Park and the Proposed Development. Small changes are most likely to occur at properties facing onto Histon Road (R16), on Huntingdon Road nearest the junction with the new site link road (R40). The developments would give rise to small increases in annual mean concentrations of nitrogen dioxide and imperceptible increases in annual mean concentrations of PM_{10} at properties on Histon Road and Huntingdon Road close to the junction with the ring road (R28, R29 and R35-R37). In 2026 when baseline air quality is likely to be good, these effects represent would be **Negligible**.

18.4.80 In 2014 the total number of vehicle movements generated by the operation of the completed Phase 1 of the Proposed Development and the construction of Phase 2 will be significantly less than the number of vehicle movements generated by the operation of the completed development discussed above. If the other schemes begin phased construction within the next year, then effects of each scheme in 2014 would be proportional to the respect effects in 2026. Changes of this magnitude would have an effect on local air quality that is **Negligible**.

18.4.81 Overall the cumulative effect of the Proposed Development and the other schemes in the Cambridgeshire Growth Areas would be **Negligible** in 2014 and in 2026.

Hydrology, Drainage and Flood Risk

Surface Water Drainage and Flood Risk

18.4.82 The Proposed Development is situated at the headwaters of the Washpit Brook; therefore the development of other strategic sites identified will not increase flood risk to the Proposed Development.

18.4.83 The Cambridge Area Phase 1 Water Cycle Study indicates that surface water discharge from all developments within the Beck Brook/Cottenham Lode catchment shall be managed by means of flow attenuation and long term storage. This approach will ensure that flood risk will not be increased as a result of the cumulative effect of the Application Site and the development of the other strategic sites. Hence, the cumulative effect will be **Negligible**.

Wastewater Drainage

18.4.84 Wastewater generated by the Proposed Development and other strategic sites will be discharged to the Cambridge WwTW. The Cambridge Area Phase 1 and 2 Water Cycle Strategies indicate that the discharge consent at the works will not require revision to accommodate the increased flows but that improvements will be required to the treatment works in order to maintain the quality of the effluent discharged to the River Cam due to the resulting increase in actual flow and to satisfy the requirements of the Water Framework Directive (WFD). These improvements will include increasing the hydraulic capacity of the inlet works and increasing the treatment capacity. Anglian Water will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP6 (2015 – 2020). These improvements will ensure that the projected developments in the area, including the

Proposed Development will not individually or in combination cause there to be a reduction in water quality (e.g. reduced dissolved oxygen and elevated nutrient concentrations) in the River Cam due to increased discharges from the Cambridge Sewage Treatment Works and will thereby ensure that the Proposed Development will not cause the balance of aquatic species and overall biodiversity within the River Cam to be affected or for the WFD classification, River Quality Objective (RQO) status or EU Designation of the watercourse to change. The strategic development sites listed identified will not be connected to the sewerage system upstream of the four combined sewer overflows (CSOs) except that at Cambridge WwTW and therefore the discharge volume from these CSOs is not expected to increase as a result of the strategic development sites including the Proposed Development. Hence the cumulative effect will be **Negligible**.

Water Supply

18.4.85 The Proposed Development and the other strategic sites identified will impose an additional demand on existing resources. The Cambridge Water Company Water Resource Management Plan indicates that sufficient potable water is available to accommodate the Proposed Development and the other strategic sites, providing that a new 3.2km long 450mm diameter extension to the existing ring main is provided. The Proposed Development will incorporate water efficiency and recycling measures to minimise potable water demand and the same is expected of the other strategic sites. However, in light of the additional demand, unless and until water demand for the Cambridge area reduces in existing development areas, the cumulative effect on water resources has been assessed as **Minor Adverse**.

Utilities and Services

18.4.86 The North West Cambridge Area Action Plan has been prepared in consultation with key stakeholders involved in the delivery of North West Cambridge and various partnership working arrangements have been in place for the Proposed Development since 2006, including Cambridgeshire County Council, Cambridgeshire Horizons, the Primary Care Trust, the Environment Agency, and the Highways Agency.

18.4.87 Cambridgeshire Horizons' focus is on the delivery of the development strategy for the Cambridge area. As such, it is assisting the local authorities with mechanisms to ensure prompt and efficient delivery of the major developments and necessary infrastructure. This approach provides utility suppliers with the opportunity to plan and install strategic reinforcements for the utility network that will be capable of accommodating the cumulative demand of all strategic development sites, rather than providing multiple reinforcements for individual developments.

18.4.88 The Phase 1 and Phase 2 Water Cycle Strategies for the Major Growth Areas in and around Cambridge assess the potential cumulative effects associated with flood risk, water resources and supply, foul sewerage, wastewater treatment, water quality and water related ecology by considering the Proposed Development in a strategic manner alongside other proposed major development areas and infill sites. The Phase 1 and Phase 2 Water Cycle Strategies establish the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and the recommendations contained within these studies have been incorporated into the development proposals.

18.4.89 The Water Cycle Strategies also identify requirements for improvements to strategic wastewater infrastructure and thereby provide a mechanism for Anglian Water to seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20) and thereby ensure that the increased discharge from strategic development sites will not cause water quality within the River Cam to deteriorate.

18.4.90 The cumulative effect of the Proposed Development and other strategic sites listed within Chapter 1 of this Environmental Statement on existing services will therefore be **Negligible** as other developments will be brought forward in line with improvements to utility infrastructure.

Sustainability Considerations*Energy and Carbon Dioxide Emissions*

18.4.91 The cumulative effect of CO₂ emissions and energy consumption needs to be considered at both a national scale, and also a local scale. As with the Development Proposals the need for the other sites to be developed in the Cambridge sub-region has been demonstrated and, therefore development would take place elsewhere within the Cambridge Sub-Region in any event.

18.4.92 Other sites to be developed in the vicinity of the Proposed Development include those set out below in **Table 18.1**. **Table 18.2** summarises the expected Code for Sustainable Homes ratings targeted by the developments.

Table 18.2. Expected Code for Sustainable Homes ratings of Cumulative Developments

Site	Code Targets
Orchard Park	No Code Standard
NIAB1 & 2	Code 3 all homes
Clay Farm	Code 3 private housing Code 4 affordable housing
Glebe Farm	Code 3 private housing Code 4 affordable housing
Trumpington Meadows	Code 4 affordable Housing
Northstowe	Code 6 all homes

18.4.93 As **Table 18.2** shows all other development sites in the vicinity of North West Cambridge are expected to meet or exceed the national trajectory for carbon reductions from new homes. With the exception of Northstowe the scale of CO₂ emissions and energy consumption for the other sites individually can be expected to be lower than the Application Site during the assessment period given the lower scales of development assumed. In any case given that the zone of influence is national (UK CO₂ emissions in 2009 were 481,000 ktonnes) or more, taken together the effects from the Proposed Development and the other permitted schemes will result in a **Negligible** change in UK emissions.

18.4.94 Whilst the development of the Application Site and the other development sites in the sub-region will have a **Negligible** effect both in isolation and cumulatively, the need to mitigate energy consumption and CO₂ emissions is required from all sectors if the UK Governments target of 80% reduction from 1990 levels by 2050 is to be achieved.

18.4.95 It is not possible to state exactly the effect that climate change will have on the Application Site. However likely consequences are as follows:

- An increase in peak summer temperatures
- Reduction in annual rainfall
- Increased likelihood of adverse weather conditions.

18.4.96 The resulting effects of these changes to the climate could be long term effects on the ecology of the Application Site, and changes in ground conditions with less rainfall. Climate change will also have consequences for humans including the provision of water, maintaining healthy internal environments in buildings, and designing structures to withstand more adverse weather conditions.

Waste

18.4.97 The waste handling facilities at Donarbon have been granted planning permission to handle waste for all of the planned expansion sites in Cambridge and therefore the cumulative effects of waste from each of the planned development sites in the vicinity of North West Cambridge can be considered **Negligible**.

18.5 Cumulative Effects arising from the Construction of the Proposed Development in combination with its operation following first Occupation

18.5.1 The cumulative effects of the proposed development following first occupation in 2014 have been assessed within the relevant topic chapters. **Table 18.3** shows the locations within the ES where environmental effects may give rise to potentially significant cumulative effects following first occupation (2014) have been addressed.

Table 18.3 Location within ES where Potentially Significant Environmental Effects have been addressed

Topic	Location within ES
Socio-Economics	Chapter 5
Landscape and Visual	Chapter 6
Ecology and Nature Conservation	Chapter 7
Soils and Geology	Chapter 8
Archaeology	Chapter 9
Cultural Heritage	Chapter 10
Agricultural Circumstances	Chapter 11
Traffic and Transport	Chapter 12
Noise Environment	Chapter 13
Air Quality	Chapter 14
Hydrology, Drainage and Flood Risk	Chapter 15
Utilities and Services	Chapter 16
Sustainability Considerations	Chapter 17

18.6 Interactive Effects

18.6.1 The EIA Regulations refer to the need to consider “interactions” relating to effects although there is no guidance as to how interactions between effects should be assessed, how significance is reported or to what extent interactive effects assessment should be undertaken. However, interactive effects between one topic area and another have been identified and considered in this ES, where relevant. In some cases guidance on particular assessments indicates the need to address interactive effects.

18.6.2 It should be noted that in this section the assessment of interactive effects is only applied following the implementation of mitigation measures for each individual effect.

18.7 Interactive Effects where a measure proposed to avoid significant adverse effects gives rise to an effect elsewhere

18.7.1 A number of the measures have been designed into the Proposed Development in order to avoid, reduce or manage any adverse effects, however it is intended that other measures will be secured either by planning condition or S106 agreement in order to avoid, reduce or manage any adverse effects. **Table 18.4** identifies those measures listed in Table 2.1 of Chapter 2 (in summary form) where there is a potential interaction. This is followed by explanatory text to explain the nature and effect of that interaction.

18.7.2 The fact that the measures to avoid reduce or manage any adverse effects have been designed into the Proposed Development means that the effects of these items have been assessed in the main environmental topic chapters. The main environmental topic chapters have also had regard to interactions of the kind referred to below but within this section we set out examples of those interactions and how they have been taken into account.

Table 18.4: Interactive Effects of Measures to Avoid, Reduce or Manage Adverse Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Socio Economics	Provision of Primary School		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of Nursery Schools		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of Community Centre and Indoor Sports Provision		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of Primary Care Centre		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of Police touchdown space		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of formal outdoor open space		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of informal outdoor open space		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of areas for children and teenager recreation		X	X	X	X	X	X	X	X	X	X	X	X
	Provision of allotments		X	X										X

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Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Landscape and Visual	Inclusion of four typical local character landscape areas: <ul style="list-style-type: none"> Western Edge Parkland (the area of the Western Edge adjacent to the built form) Landscape fingers Girton Gap, Central Open Space and Ridge & Furrow 	X		X			X		X	X	X	X		X
	Retention of existing planting (where practicable) and extensive new planting			X										
	Forming a new network of open space	X		X		X	X							X
	Retaining / replacing existing on site footpaths and providing new connections to the existing wider footpath/ cycleway network	X		X					X					X
Ecology and Nature Conservation	Appropriate construction drainage to avoid pollution of Washpit Brook		X											

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Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	Planting of new trees and hedgerows		X											
	Protective fencing to protect retained vegetation during construction		X											
	5m wide buffer zones alongside retained hedgerows		X											
	Low level directional street lighting to minimise light spillage		X											
	Fruit bearing trees incorporated into landscape design of open space		X											X
	Enhancement of arable farmland outwith the Application Site to provide Skylark plots													
	Creation of habitat feature in field corners and in strips adjacent to ditches		X											
	Site clearance outside the nesting bird period where possible or surveys ahead of		X											

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Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	site clearance to show no nesting birds													
	Incorporation of features of value for roosting bats into a proportion of new buildings													X
	Habitat creation measures e.g. Provision of bat boxes; nest sites for swifts, provision of artificial otter holts and kingfisher nesting sites													X
	10m buffer zone around the boundary of the Travellers Rest Pit SSSI to be occupied by primary open space	X	X											
	Management of vegetation on the site. In particular removal of undergrowth, trees and shrubs from the degraded quarry slopes removed and removal of burrowing animals from the slopes and implementing measures to prevent their return		X	X										

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Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Archaeology	Scheme of archaeological works to be enacted in advance and during construction operations				X			X						
Cultural Heritage	Best practice will be following during construction to reduce noise dust										X			
Agricultural Circumstances	All works carried out in accordance with 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites		X		X				X					
Traffic and Transport	Construction haul roads will be considered in terms of effect on noise and disturbance to the local community and will avoid the Travellers Rest Pit SSSI									X	X			

ENVIRONMENTAL STATEMENT

Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	Vehicles making deliveries to the Application Site or removing spoil material will travel via designated routes, which will have previously been agreed with CCC/SCDC.									X	X			
	Reducing car parking provision across the Proposed Development, and managing the use of adjacent parking areas	X								X	X			X
	Measures directed at preserving / enhancing vehicular capacity on the network and promoting the use of sustainable transport methods									X	X			X
	Capacity enhancement scheme to the M11 Junction 13 Southbound slip road									X	X			
	Local highway measures at the Queen Street / Madingly Road / Northampton Street Junction									X	X			

ENVIRONMENTAL STATEMENT

Cumulative and Interactive Effects

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Noise	Measures centered around the orientation, massing and internal layouts to provide acceptable internal noise climates		X											X
Air Quality	Appropriate stack height required to ensure that energy plant emissions do not have a significant effect on local air quality		X				X							
Hydrology, Drainage and Flood Risk	Temporary structures/crossings over the Washpit Brook designed to appropriate standards		X	X										
	Attenuation ponds constructed		X	X										X
	Miscellaneous measures aimed at reducing the risk of ground water contamination				X									

Discipline	Measures to avoid, reduce or manage any adverse effects	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Utilities and Services	Consultations will be held with the Statutory Undertakers to ensure that all new services are installed following a similar route, where possible at the same time. The new utilities will be installed below the footway, or in close proximity to the existing kerb line, to reduce the requirement for road closures.				X	X			X					
	Mobile noise barriers will be provided, where practicable, when the most noisy utility works are undertaken in order to enable the noise level to receptors on Huntingdon Road and Madingley Road to be reduced.									X				

* Where a measure comprises built development the table indicates that there is the potential for effects across all topic chapters. Once the final location of development is settled by detailed design some elements (such as archaeology) may in fact not be affected or affected to a lower degree.

Socio Economics

18.7.3 The provision of community facilities, namely, the primary school, the nursery schools, community centre and indoor sports facilities, primary care centre, police touchdown space and provision of allotments have been in-built into the Proposed Development. As built development, the provision of these have the potential to effect all of the environmental topic considerations (albeit as individual buildings to a lesser extent than the Proposed Development as a whole) and have, therefore, been assessed in those chapters.

18.7.4 The provision of the community facilities will, for example have a beneficial effect on sustainability considerations by delivery a sustainable community; providing an attractive environment; providing opportunities for socialising and interacting and providing a healthy environment through provision of the green leisure space thereby contributing to overall wellbeing.

18.7.5 The fact that large areas of the Application Site will be set aside as open land has not only socio-economic effects but also beneficial effects on archaeology in that the majority of open land areas will not be subject to building works or substantial earth movement thereby meaning that there will be no disturbance or damage to buried archaeological remains.

18.7.6 The provision of formal and informal outdoor space (including children's play areas and allotments) as part of the new network of open land will also has a beneficial effect on the landscape and visual assessment. The provision of the new network of open land will contribute to the new landscape and visual resource as well as enhancing the use of access to the Green Belt by making that area more assessable, redefining the urban edge of Cambridge while enhancing the interface between its rich urban and rural character. The interactive effects are described in Chapter 6.

18.7.7 The overall conclusion is that in terms of landscape effects, as at 2014, the Proposed Development as a whole is likely to result in **Minor Adverse** effects at a regional level with moderate adverse effects on the more local Western Claylands character area. The likely effect on other character areas would be of **Negligible** effect. At 2026, the effects are likely to result in **Minor Adverse** effects on the regional landscape character and on a localised part of the West Cambridge townscape. **Moderate Adverse** effects are likely on a localised part of the Western Claylands Character Area.

18.7.8 Effects of the Proposed Development at 2014 and at 2026 on the landscape designations (Green Belt, Madingley Park, American Cemetery and Coton Countryside Reserve) considered within the study area are likely to be **Negligible**.

18.7.9 When viewed from each of the twelve viewpoints assessed, the Proposed Development is considered likely to have only **Negligible** to **Minor Adverse** effects as at 2014. After Development Completion at 2026, two of the twelve viewpoints are considered to result in **Major Adverse** effects due to their proximity to the Application Site and the focus which the development will newly have in their immediate views. These two viewpoints represent users of footpaths and drivers along the M11, who are temporary and transitory in their use thereby limiting the duration of the adverse visual effects experienced. The remaining viewpoints will have Negligible effects.

18.7.10 The provision of formal outdoor space has the potential to have an adverse effect in terms of the lighting associated with that provision, the effects of which have been assessed within chapter 6, in particular, flood lighting. The conclusion is that flood lighting may be partially visible from some viewpoints, resulting in a **Minor Adverse** effect. Flood lighting has been designed to reduce potential glare, sky glow, light spill and minimise visual intrusion to sensitive receptors. The likely significant effects from new lighting for the first phase of the Proposed Development on the majority of wildlife and habitat receptors will be **Moderate-Minor Adverse**. This effect would generally be realised where habitat and commuting areas are located and would not apply to the full Application Site. In 2026 the likely effects from new lighting and the majority of wildlife and habitat receptors would be **Moderate Adverse**. This effect will again be realised where habitat and commuting areas are located and would not apply to the full Application Site. Avoidance of lighting along verified commuting paths may further reduce the relative effect of the Application Site to **Minor Adverse**.

Landscape and Visual

18.7.11 The inclusion of the landscape character areas have a number of interactive effects including how the Proposed Development will effect cultural heritage assets. The landscape character areas have been inbuilt into the cultural heritage assessment in chapter 10. The restoration of the western edge to uses compatible with the landscape character including drainage, formal and informal recreation and allotments, for example, will contribute to the existing open arable character of other adjacent areas along the motorway and the green gap to be retained through the eastern part of the Application Site and the “green finger” will soften the urban edge thereby reducing the adverse effect of the Proposed Development on the wider historic landscape, built environment and setting of Cambridge.

18.7.12 The landscape and visual measures identified in Table 18.4 will also have an interactive beneficial effect on ecology and nature conservation. These interactive effects have been included in the assessment in the Ecology and Nature Conservation chapter (chapter 7). The landscaping associated with the Proposed Development will be expected to provide additional habitats of nature conservation value, which are not currently present on the Application Site or present in a degraded state. The creation of extensive area of open land on the western edge of the Application Site will provide valuable grass and habitats, as well as areas of scrub and new hedgerows, increasing the availability of habitats foraging bats, foraging amphibians, certain species of birds and reptiles.

18.7.13 Land forms that seek to balance the cut and fill from across the Application Site will modify the existing topography limiting the amount of soil needing to be moved offsite and will also, therefore, have a beneficial effect on traffic and transport. Ground works including earth moving and landscape works also, however, have the potential to disturb or damage buried archaeological remains. A scheme of archaeological works will be enacted in advance of and during construction operations. This will include further evaluations to investigate those areas where access restrictions prevent surveys that could have informed this assessment. These further evaluations will be followed by a programme of archaeological excavations. The effect of the earth works in connection with the landscaping works on archaeological remains is included in the assessment of likely significant effects in Chapter 9.

18.7.14 The retention and replacing of existing on site footpaths and providing new connections will promote walking and cycling and thereby promoting health and wellbeing of the community and reducing the traffic effects associated with the Proposed Development. This provision can, therefore, be expected to have a **Minor Beneficial** social economic effect at 2026 and a beneficial effect in terms of traffic reduction.

18.7.15 The landscape feature to the west of the Application Site between the built development and the M11 will provide additional mitigation to the open area and to the proposed buildings on the western fringe from noise from the M11. The effect of this landscape feature has been included in the noise assessments that have been undertaken and, the consequential effects are described in chapter 13.

18.7.16 The landscape measures will also have a beneficial interactive effect on sustainability considerations in terms of the principle of protecting biodiversity and ecology of the existing area and planning for a natural environment that balances the need of access with assured survival of biodiverse areas and habitats. The provision of fruit bearing trees into the landscape design will also have a beneficial effect on the sustainability consideration of “reducing the ecological footprint of the consumption of food and increasing local employment and business opportunities for food production”, both of these effects will be **Minor Beneficial**.

Ecology and Nature Conservation

18.7.17 The ecology and nature conservation measures outlined in Table 18.4 will have interactive effects on landscape and visual and sustainability considerations. In addition, the measures in relation to appropriate construction drainage avoiding pollution of the Washpit Brook will have an interactive effect on hydrology, drainage and flood risk improving water quality within the Washpit Brook. This interactive effect is considered in the hydrology, drainage and flood risk chapter of this ES (chapter 15),

18.7.18 The provision of low level direction on lighting to minimise light spillage has been incorporated into the lighting assessment in the landscape and visual chapter.

18.7.19 The effect of site clearance outside the nesting bird period between February and August will mean the ability to undertake these works while trees to be retained are in full leaf is curtailed, which means that there could be increased views of these works which would be an adverse effect of this measure.

Soils and Geology

18.7.20 In respect of the soils and geology measures, measures designed to enhance the Travellers Pit SSSI will facilitate public awareness of the importance of the Travellers' Pit site and maintain access for scientific research, which has the potential to have beneficial socio-economic effects. The measures also, however, have the potential to have an adverse interactive effect on ecology in that burrowing animals may, after consultation with Natural England, be removed from the slopes and their return prevented. Restricting access to this habitat may require mitigation by creation/enhancement of alternative areas of habitat. Management of the SSSI will also involve the removal of trees and shrubs in poor condition from the degraded quarry slopes although this will be undertaken in accordance with the guidance provided in the biodiversity strategy. The overall interactive effect of these measures on ecology is, therefore, considered to be **Negligible**.

Archaeology

18.7.21 While the scheme of archaeological works could have an interactive effect on agricultural circumstances, the reality is that all of the agricultural resource that currently exists on the Application Site will be affected by the Proposed Development and, therefore, the scheme of archaeological works will not have any additional effects over and above those of the Proposed Development. Archaeological investigation could also have an effect on soils and geology. As noted in chapter 8, however, the assessment has confirmed a general absence of significant contamination at the Application Site, which reflects its former site use status. Consequently, no significant effects have been identified and hence the effect of soil quality of the proposed developments on geology and soil qualities is assessed as **Negligible**. The same would be expected of the archaeological works.

Cultural Heritage

18.7.22 The cultural heritage based measures to avoid reduce or manage any adverse effects also have an interactive effect with air quality. The fact that these measures are aimed at avoiding effects on air quality means that they have been assessed in Air Quality chapter (chapter 14).

Agricultural Circumstances

18.7.23 While the existing farmland will be the subject to extensive earth works, these will be carried out in accordance with the DEFRA "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites", this will retain the soil resource for a variety of functions and services, including as a carbon store, a basis for biodiversity and habitats, provision of open space and a physical and psychological barrier between the development and the M11 so having an interactive effect with sustainability considerations, ecology and socio economic effects. The need to handle the soil appropriately has the potential to have adverse landscape and visual effects in terms of soil storage facilities, although these would not expect to result in effects greater than those arising from the general construction activity.

Traffic and Transport

18.7.24 The fact that construction roads and routes are to avoid the Traveller's Rest Pit SSSI and other noise sensitive sites will have a beneficial interactive effect in terms of noise and air quality. The removal of construction traffic in these areas reducing any noise or air quality effects associated with that activity.

18.7.25 The reduction of car parking provision across the Proposed Development will have a beneficial interactive effects in terms of socio economic, noise and air quality and sustainability considerations. The consequence of reduced car parking with wider controls off-site should result in less traffic generation and, therefore less effect in terms of adverse effects on noise and air quality caused by traffic. This measure has been assessed in the traffic and transport chapter (Chapter 12). The assessment of traffic

and transport has in turn fed into the noise and air quality assessments and, therefore, the effect of reduced car parking has been assessed in the air quality and noise environment chapters. In terms of the socio economic and sustainability considerations, the reduction in car parking provisions should encourage more sustainable modes of travel, including walking and cycling which will increase health and wellbeing. The interactive effect of this measure is anticipated, therefore, to be **Minor Beneficial**.

18.7.26 The off-site highway measures comprising traffic calming measures along the Oxford Road/Windsor Road link, capacity enhancement scheme to the M11 Junction 13 Southbound slip road and local highway measures at the Queen Street/Madingly Road/Northampton Street Junction will have beneficial interactive effects in terms of noise and air quality. Measures have been assessed as part of the assessment in the traffic and transport chapter which in turn has fed into the noise and air quality assessments and, therefore, the effect of these off-site works has been assessed in the air quality and noise environment chapters.

Noise Environment

18.7.27 Measures centred around the location of uses, orientation, massing and internal layouts of buildings to provide acceptable internal noise climates will have interactive effects on landscape and visual considerations and sustainability considerations. In terms of landscape and visual the effect of massing and height of the built development has been assessed in the assessment in Chapter 6. In respect of sustainability considerations the measures should enable the use of passive ventilation without compromising acceptable internal noise climates, thereby reducing energy consumption and CO2 emissions that would be associated with mechanical ventilation and having a **Minor to Moderate Beneficial** effect.

Air Quality

18.7.28 The measure to ensure that the chimney flue height is of an appropriate height to ensure that energy plant emissions do not have a significant effect on local air quality will have an adverse interactive effect on landscape and visual considerations, the effects of which have been assessed in the landscape and visual assessment in chapter 6. As noted in the landscape and visual assessment, the viewpoint selection focussed on an analysis of the effects of the Proposed Development overall and not specific to identifying effects of the potential energy centre flues. Where the flues will be visible in the original selected viewpoints, their effects have been assessed. The flues will be visible from viewpoint 1 (Cambridge Road) beyond the height of the development and will break the skyline. In other viewpoints, where the flues have the potential to be visible the conclusion is that these will be barely discernable and, therefore the effect is **Minor adverse to Negligible**.

Hydrology, Drainage and Flood Risk

18.7.29 Temporary structures/crossings over the Washpit Brook and the construction of attenuation ponds also have a potential to have an interactive effect on ecology and nature conservation, given the use of the Washpit brook as an important ecological resource. The provision of attenuation and pollution control features as part of the new drainage scheme would be expected to improve water quality within the Washpit brook and therefore deliver an ecological enhancement in relation to the watercourse. The realigned sections of watercourse with a steep bank to provide more valuable habitat for watervoles will provide increased habitat for amphibians and invertebrates and the effect of these have been assessed within the ecology and nature conservation chapter (chapter 7).

Utilities and Services

18.7.30 The installation of utilities and services have the potential to have interactive effects with all of the environmental statement topic chapters and the installation of these works (including the off-site potable water main) have been assessed as part of each topic chapter.

18.8 Interactive Effects of Activities/Operations associated with the Proposed Development which affect more than one Environmental Medium .

18.8.1 **Table 18.5** identifies where there are potential interactive effects of Activities/operations associated with the Proposed Development which effect more than one environmental medium. A large number of potential activities/operations have been considered in section 18.7 by looking at the specific measures designed to avoid, reduce or manage adverse effects. The commentary that follows Table 18.5 notes where effects have been considered in section 18.7 and comments on additional activities or operations associated with the Proposed Development which affect more than one Environmental Medium.

Table 18.5: Interactive Effects of Activities/Operations associated with the Proposed Development which affect more than one Environmental Medium

Environmental Discipline	Stage of Development	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
Socio Economics	Construction		X	X	X	X	X	X	X	X	X	X	X	X
	Pre 2014 Opening		X	X	X	X	X	X	X	X	X	X	X	X
	Post 2014 Opening		X	X	X	X	X	X	X	X	X	X	X	X
	2026 Operational		X	X	X		X		X	X				X
Landscape and Visual	Construction			X			X		X	X		X		
	Pre 2014 Opening			X			X			X		X		
	Post 2014 Opening			X			X			X		X		X
	2026 Operational			X			X			X	X	X		X
Ecology and Nature Conservation	Construction		X											
	Pre 2014 Opening		X											
	Post 2014 Opening	X	X											X

Environmental Discipline	Stage of Development	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	2026 Operational	X	X											X
Soils and Geology	Construction		X											
	Pre 2014 Opening		X											
	Post 2014 Opening		X											
	2026 Operational	X												
Archaeology	Construction							X						
	Pre 2014 Opening							X						
	Post 2014 Opening													
	2026 Operational				X									
Cultural Heritage	Construction		X						X					
	Pre 2014 Opening		X						X					

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Environmental Discipline	Stage of Development	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	Post 2014 Opening		X						X					
	2026 Operational		X						X					
Agricultural Circumstances	Construction		X	X			X							
	Pre 2014 Opening		X	X			X							
	Post 2014 Opening		X	X			X							
	2026 Operational		X				X							
Traffic and Transport	Construction	X	X	X	X	X	X	X		X	X	X		X
	Pre 2014 Opening	X	X	X	X	X	X	X		X	X	X		X
	Post 2014 Opening	X	X	X	X		X	X		X	X	X		X
	2026 Operational	X	X	X	X		X	X		X	X	X		X
Noise Environment	Construction		X	X			X							
	Pre 2014 Opening		X	X			X							

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Cumulative and Interactive Effects

Environmental Discipline	Stage of Development	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	Post 2014 Opening		X	X			X							
	2026 Operational						X							
Air Quality	Construction		X				X							X
	Pre 2014 Opening		X				X							X
	Post 2014 Opening		X				X							X
	2026 Operational		X				X							X
Hydrology, Drainage and Flood Risk	Construction		X	X				X	X					X
	Pre 2014 Opening		X	X				X	X					X
	Post 2014 Opening		X	X				X	X					X
	2026 Operational		X	X				X	X					X
Utilities and Services	Construction		X	X	X	X	X	X	X	X	X	X		
	Pre 2014 Opening		X	X	X	X	X	X	X	X	X	X		
	Post 2014 Opening		X	X	X				X	X	X	X		

Environmental Discipline	Stage of Development	Socio Economics	Landscape and Visual	Ecology and Nature Conservation	Soils and Geology	Archaeology	Cultural Heritage	Agricultural Circumstances	Traffic and Transport	Noise Environment	Air Quality	Hydrology, Drainage and Flood Risk	Utilities and Services	Sustainability Considerations
	2026 Operational		X											
Sustainability Considerations	Construction		X	X		X	X	X	X	X	X	X	X	
	Pre 2014 Opening		X	X		X	X	X	X	X	X	X	X	
	Post 2014 Opening		X	X		X	X	X	X	X	X	X	X	
	2026 Operational		X	X		X	X	X	X	X	X	X	X	

Socio Economics

18.8.2 The interactive effects associated with socio-economic considerations have largely been rehearsed in section 8.7. Additional effects stem from the increased employment population associated with the Proposed Development both during construction and the operational phase and the cumulative effect of increased traffic generation, light and noise generated by that population. The effects of which have been assessed in the individual environmental topic chapters (chapter 12, 6 and 13 respectively) and the interactive effects of noise and traffic are assessed in the noise chapter.

Landscape and Visual

18.8.3 The interactive effects associated with the Landscape and Visual effects have been largely rehearsed in section 8.7. New and improved planting may have beneficial effects on local air quality particularly in the 2026 operational phase period where planting is established.

Ecology and Nature Conservation

18.8.4 In addition to the interactive effects highlighted in section 8.7 under this heading, activities associated with ecology and nature conservation also have the potential to have socio-economic interactive effects in that the care and maintenance of ecology and biodiversity on the Application Site post opening and during the operational phases will help to create a healthy place for building occupants and wildlife, providing areas of relaxation and exercise providing an additional **Minor Beneficial Effect**.

Soils and Geology

18.8.5 The interactive effects associated with soils and geology have been rehearsed in section 8.7.

Archaeology

18.8.6 The interactive effects associated with soils and geology have been rehearsed in section 8.7.

Cultural Heritage

18.8.7 The interactive effects associated with cultural heritage have been rehearsed in section 8.7.

Agricultural Circumstances

18.8.8 In addition to the interactive effects highlighted in section 8.7 under this heading, the University Farm associated with the agricultural use is an employment generator. The effects of displacing this existing employment have been assessed in Chapter 5. Employment associated with this use is, expected to relocate to the University's other farm sites and, therefore, the effect is **Negligible**. Taking the land out of agricultural use will have a socio economic beneficial effect of opening up considerable amounts of open space for public use during the post opening and operational phases that are not currently accessible to the wider public.

18.8.9 Use of herbicides, pesticides and fertilisers for agricultural uses will be reduced across the phases as the Application Site is no longer farmed this has the potential to have a **Minor Beneficial** effect on water quality and on biodiversity.

Traffic and Transport

18.8.10 In addition to the interactive effects highlighted in section 8.7 under this heading, increased traffic from construction and operation of the Proposed Development vehicles has the potential to increase the road hazard to amphibians and mammals thereby having an interactive effect on ecology and nature conservation. Measures are proposed to minimise this effect as explained in chapter 7 and, therefore, the effect of this interaction is **Negligible**.

18.8.11 Additional traffic associated with the construction and operational phases of the Proposed Development can have an effect on noise, the effects of which have been considered in Chapter 13.

18.8.12 Construction traffic has the ability to cause dust. Measures incorporated into the Construction and Environment Management Plan will seek to avoid this effect thereby resulting in a negligible interactive effect. Additional traffic and exhaust emissions associated with the construction and Proposed Development can have an effect on air quality, the effects of which have been considered in Chapter 14.

18.8.13 Runoff from newly created roadways and driveways has the potential to be polluted from hydrocarbons and, therefore to have an interactive effect on water quality. Such runoff will be appropriately treated before the surface water is discharged to ground or to the receiving watercourse and, therefore, this interactive effect will be **Negligible**.

18.8.14 Road construction and heavy vehicular movements have the potential to disturb or damage buried archaeological remains, although written schemes of investigation are to be prepared for areas subject to building works and appropriate haul routes are to be provided to minimise compacting of soil. The effects of this interactive effect has been assessed in Chapter 9.

Noise Environment

18.8.15 The interactive effects associated with noise considerations have been rehearsed in section 8.7.

Air Quality

18.8.16 In addition to the interactive effects highlighted in section 8.7, during construction there is potential for construction and site clearance works to generate airborne particulate matter in the form of dust which could have an adverse effect on socio-economic considerations of amenity and health and wildlife. The effect of dust on air quality has been assessed in chapter 14 and the effectiveness of good working practices as a means of preventing particulate matter from construction works causing such adverse effects has been considered and found that the required standard of protection is readily achievable. The Construction Environmental Management plan provides the means of delivering the appropriate mitigation.

Hydrology, Drainage and Flood Risk

18.8.17 In addition to the interactive effects highlighted in section 8.7, the proposals in respect of hydrology and drainage will also have an effect on sustainability considerations namely by ensuring that fresh water consumption at the proposed development is reduced through water efficiency and the collection and recycling of rain water and waste water; by avoiding the risk of flooding on and off site arising from the development through land use being sequentially located and a cascading system of SUDS used to attenuate and improve the quality of run off from paved areas and replicate the natural drainage of the Application Site before development.

Utilities and Services

18.8.18 As noted in section 18.7 the installation of utilities and services have the potential to have interactive effects with all of the environmental statement topic chapters and the installation of these works including the off-site works have been assessed as part of each topic chapter.

Sustainability

18.8.19 As explained in Chapter 17 Sustainability principles have been used to guide the design and development of the sustainability strategy for the Proposed Development. The principles drive sustainability in the following key areas:

1. Energy and carbon dioxide emissions
2. Water demand
3. Waste
4. Materials and construction
5. Biodiversity and ecology

6. Pollution
7. Culture, heritage and built form
8. Transport and mobility
9. Housing, amenity, and well-being
10. Education and employment
11. Inclusion

18.8.20 Sustainability principles have, therefore, been integrated into all aspects of the Proposed Development and therefore sustainability considerations have been addressed within the individual environmental topic chapters.

1 Introduction and Assessment Approach

2 Application Site Description and Proposed Development

3 Phasing and Implementation

4 Planning Policy Considerations

5 Socio-Economic Assessment

6 Landscape and Visual Issues

7 Ecology and Nature Conservation

8 Soils and Geology

9 Archaeology

10 Cultural Heritage

11 Agricultural Circumstances

12 Traffic and Transport

13 Noise Environment

14 Air Quality

15 Hydrology, Drainage and Flood Risk

16 Utilities and Services

17 Sustainability Considerations

18 Cumulative and Interactive Effects

19 Summary

19 SUMMARY

19.1 Introduction

19.1.1 This chapter of the ES provides a summary of the assessments undertaken as part of the EIA process.

19.1.2 Likely significant effects, taking account of the measures to avoid, reduce and manage any adverse effects as integral to the Proposed Development, has been undertaken for three time periods - during construction, after occupation of Phase 1 in 2014 and after completion at 2026. In addition, for transport and transport influenced matters (noise and air quality), two 2014 scenarios (termed pre-opening and post opening) have been considered and for landscape and visual and night time artificial lighting effects an additional scenario of 2041, 15 years after completion has been considered.

19.1.3 For each of the topics, significance of effects has been assessed to a seven point scale - Major, Moderate or Minor Beneficial, Major, Moderate or Minor Adverse and Negligible.

19.2 Socio Economics

19.2.1 The Proposed Development will have a range of socio economic effects, some temporary, some longer-term. The effect analysis has addressed the following issues:

- Construction employment;
- Permanent changes in employment brought about by the development;
- The provision of new homes (market and key worker) relating to population increase; and
- The effect of increased residential population on the requirement for local services and facilities

19.2.2 . The assessment of the Proposed Development assumes that a range of social and community facilities are provided within the Proposed Development, as set out in the Description of Development.

Employment Effect

19.2.3 Upon completion, the Proposed Development will make significant contributions to the local, regional and national economies through creation of approximately 5,875 permanent jobs, principally through the academic and commercial research floorspace. These jobs will largely serve residents of the Application Site and the surrounding area, enabling positive effects on sustainable travel and local employment. The increase in employment therefore creates a **Moderate Beneficial** (positive) effect at local level, and these benefits will extend into the immediate hinterland, for both 2014 and 2026

19.2.4 In addition to the permanent employment associated with the completion of the research floorspace, the capital invested in the infrastructure and construction phase of the Proposed Development will generate a range of further local employment opportunities., it is estimated that the Proposed Development will create around 74-191 FTE construction jobs to 2014 and 858 FTE construction jobs to 2026, therefore creating a **Moderate Beneficial** effect .

Local Services and Facilities

19.2.5 The social and community demands of the anticipated 8,590 person residential population will be met through a range of facilities, including a primary school, early years provision (in three locations), a community centre, primary care facility, police facility, and the full range of formal and informal recreation provision. Secondary school and library provision will be met off-site, and a contribution will be made to swimming pool provision.

19.2.6 The effects of the Proposed Development on social and community demands range from:

- **Negligible** in relation to the effect on health services, early years and primary and secondary education capacity, community and library space, open land (at 2014) and the effect of retail provision on town centre vitality and viability

- **Minor Beneficial** in relation to the effect on police/emergency services; and
- **Moderate Beneficial** in relation to the effect on open land in 2026.

19.3 Landscape and Visual Assessment

19.3.1 The likely significant effects of the Proposed Development on landscape character and visual amenity and the from night time artificial lighting have been assessed.

19.3.2 The process of change that is proposed on the Application Site will lead to both temporary and permanent effects in how the Application Site is seen and experienced by people who live, work, visit and travel through the surrounding landscape and townscape. The Proposed Development will extend the existing urban character of Cambridge and will integrate it with the existing agricultural character of the Application Site. In most long distance views, the Proposed Development will be seen as an extension of Cambridge's urban edge. It will not result in adverse disruption to the existing views nor will it become the focus.

Landscape Character

19.3.3 In terms of landscape effects, as at 2014, the Proposed Development is likely to result in **Minor Adverse** effects at a regional level with **Moderate Adverse** effects on the more local Western Claylands character area. The likely effect on other character areas would be of **Negligible**. At Development Completion, the effects are likely to be **Minor Adverse** and not significant effects on the regional landscape character and on a localised part of the West Cambridge townscape. **Moderate adverse** effects are likely on a localised part of the Western Claylands Character Area. This effect will be limited to the more eastern urban/ rural interface of this character area and is unlikely to affect the wider integrity of this character area. Indeed the Western Claylands could arguably be redefined with the new urban edge of the Application Site providing the new boundary to this character area.

19.3.4 Effects of the Proposed Development at 2014 and at 2026 on the landscape designations (Green Belt, Madingley Park, American Cemetery and Coton Countryside Reserve) considered within the study area are likely to be **Negligible**.

Visual Amenity

19.3.5 When viewed from each of the twelve viewpoints assessed, taking account of construction and operational effects associated with the Proposed Development, the Proposed Development is considered likely to have only **Negligible to Minor Adverse** effects as at 2014. After Development Completion at 2026, two of the twelve viewpoints are considered to be subject to **Major Adverse** effects due to their proximity to the Application Site and the focus which the development will newly have in their immediate views. These comprise Viewpoint 9 (Howe Farm from Washpit Brook) and Viewpoint 10 (Howe Farm from footpath at Huntingdon Road). View 8: M11 Motorway looking east/southeast will be subject to **moderate/Major Adverse** effect. It should be noted, however, that these viewpoints represent users of footpaths and drivers along the M11, who are temporary and transitory in their use thereby limiting the duration of the adverse visual effects experienced. The remaining viewpoints would be subject to **Minor Adverse to Moderate Adverse** effects.

Night time Lighting

19.3.6 The likely significant effects from new lighting for the first phase of the Proposed Development (2014) (taking account of construction and operational effects associated with the Proposed Development and both of these effects cumulatively with the effects of the NIAB and West Cambridge developments so far as under construction and/or in operation) on the majority of sensitive residential receptors would be **Moderate to Minor Adverse**.

19.3.7 The likely significant effects from new lighting for the post-construction phase for the Proposed Development (taking account of the effects of the Proposed Development and those of the NIAB and West Cambridge developments) on the majority of sensitive residential receptors would be **Moderate to Minor Adverse**.

19.3.8 The likely significant effects from new lighting for the Proposed Development on the majority of wildlife and habitat receptors would be **Moderate Adverse**. This effect will be realised where habitat and commuting areas are located and would not apply to the full Application Site. Relocation of habitat to non-constructed zones and avoidance of lighting along verified commuting paths may further reduce the relative effect of the Application Site to **Minor Adverse**.

19.3.9 The likely significant effects from new lighting for the Proposed Development on the local observatories would be **Moderate to Minor Adverse**. In the context of the potential effect to the optical telescopes used by the observatories, which could be affected by any lighting within a 30-40 mile radius and are currently affected by existing lighting conditions, the relative effect is expected to be **Negligible**.

19.3.10 The assessment of overall likely significant effects from new lighting for the Proposed Development in conjunction with existing and consented development, with consideration of site layout, indicates sky glow as having the most variable potential effect on identified receptors.

19.3.11 The assessment of the overall effects that would result from new lighting for the Proposed Development would satisfy technical and environmental good practice guidance and give rise to **Minor/Moderate Adverse** effects .

19.4 Ecology and Nature Conservation

19.4.1 Habitat loss as a result of the Proposed Development is assessed as not likely to be significant as the majority of the area to be lost is arable land of low nature conservation value. The most valuable habitats such as the species-rich hedgerows and veteran trees will be retained and managed to preserve and enhance their nature conservation value. The creation of new habitats within the area of open land along the western edge of the Application Site will incorporate the Washpit Brook. In addition, the new balancing ponds and attenuation features will increase the wetland resource available to invertebrates, water voles and otters. New ponds will be created to provide suitable habitat for breeding great crested newts and common toads.

19.4.2 The Proposed Development will help to deliver some of the beneficial effects described in the UK Government's white paper '*Making Space for Nature: securing the value of nature*'. The large area of habitat creation along the Application Site's western edge, along with the creation of other areas of open land, will create green infrastructure, linking areas of farmland to the north and west of the Application Site allowing the creation of an ecological network on the north-western edge of Cambridge. The areas of open land will have a diverse range of functions, particularly the area along the western edge of the Application Site, which will deliver a number of ecosystem services, including improvements to water quality, filtering air and noise pollution, providing a recreational facility, and contributing towards food production. This area of open land will also provide an ideal opportunity to re-connect people to nature, by providing and encouraging access to the countryside; this would be supported by delivering nature-related education and encouraging voluntary participation in nature conservation activities, as identified in the Biodiversity Strategy.

19.4.3 Given that the Washpit Brook is to be retained and the implementation of measures described above, it is likely that there would be a beneficial effect upon this receptor and its associated species, which would be considered to be **Minor Beneficial** effect by 2026. Although some minor beneficial effects would be expected by 2014, these would be considered to be **Negligible**;

19.4.4 Residential properties and employment areas associated with the Proposed Development will be located within approximately 1.5km of the Coton Countryside Reserve, and therefore within the 3 mile radius in which the majority of its visitors live and work. Given the amount of Open Land being created within the Application Site, and the distance of the reserve from the Application Site visitor pressure on the reserve is unlikely to increase significantly. This would therefore not be considered to represent a significant adverse effect, and would be **Negligible**.

19.4.5 The veteran oak tree will be retained within the Proposed Development and new tree planting is proposed within the linear parkland. No significant effects are expected on this ecological receptor and so this would be considered to be an effect of **Negligible** significance.

19.4.6 Overall the Proposed Development will be expected to deliver an increase in the length of hedgerow present on the Application Site, as well as an enhancement through the replacement of species-poor hedgerows with species-rich planting, and the management of retained hedgerows to maximize their biodiversity value. This beneficial effect is likely to be realised in the long-term (more than 30 years beyond 2026). In the short-term there will be a loss of hedgerow habitat which would be considered to be significant at the local level, therefore, having a **Minor Adverse** effect at 2014 and at 2026. In the long-term (by 2056) a beneficial effect of local significance is predicted which is an effect of **Minor Beneficial** significance.

19.4.7 Given the retention of the most valuable habitat features for terrestrial invertebrates, significant adverse effects are not predicted at the County level. However, in the short-term (2014 to 2026) there would be a loss of habitat until new planting matures, and off-site measures deliver a measurable benefit. This would be expected to be significant at the Local level and, therefore, an effect of **Minor Adverse** significance at 2014. In the medium-term (by 2026) a beneficial effect could be realized for some of the species associated with the assemblage, which would be considered to be significant at the Local level and, therefore, a **Minor Beneficial** effect at 2026.

19.4.8 Overall the Proposed Development will be expected to increase the quality of foraging habitat available for the great crested newt population associated with the off-site ponds, as well as increasing the availability of breeding habitat, in the long-term. This is likely to deliver a significant beneficial effect for the local great crested newt population, both in terms of size and extent, which would be realised in the long-term (20-30 years), and would be significant at the District/Borough level. In the short-term, the loss of terrestrial habitat would be expected to give rise to a significant adverse effect at the District/Borough level. The short-term adverse effect would be reduced to not significant by 2026. The effects on great crested newts has, therefore, been assessed to be of **Minor Adverse** significance in the short-term (up to 2026), **Negligible** in the medium-term (2026-2036), and **Minor Beneficial** in the long-term (post-2036).

19.4.9 Overall the Proposed Development would be expected to deliver a beneficial effect for common toads in the medium-term (likely to be realized by 2026) of local significance. Significant short-term adverse effects are not predicted. and, therefore, the effects on common toads would be considered to be of **Negligible** significance in the short-term (up to 2026) and **Minor Beneficial** in the medium-term (post-2026).

19.4.10 Given the apparently fragmented nature of badger populations in the area, and their use of the Application Site, it is considered likely that the resident group of badgers would be able to survive the reduction in area of foraging habitat associated with the development proposals, and would be expected to remain as a viable social group post-development. Significant direct effects on setts are also not anticipated and an artificial sett will provide alternative shelter in a part of the site where it will be fenced off from public interference. It is therefore considered that the Proposed Development will not have a significant effect upon badgers and the effects on badgers at both 2014 and at 2026 would be considered to be of **Negligible** significance.

19.4.11 Although specialist farmland bird species and brown hare will be lost from the Application Site as a result of the Proposed Development, after allowing for off-site measures to 'enhance' the habitat on areas of farmland to improve their value for these species, the effects would be **Negligible**. In the long-term (by 2026); the Proposed Development will give rise to beneficial effects for other bird species, particularly garden species, of local significance and the effects on breeding birds (not including specialist farmland species) would be considered to be of **Minor Beneficial** significance in the long-term (by 2026).

19.4.12 Overall, significant adverse effects on bats are not predicted; some minor beneficial effects may occur, although these are unlikely to be significant and, therefore, the effects on bats would therefore be considered to be of **Negligible** significance

19.5 Soils and Geology

19.5.1 The Soils and Geology chapter provides an assessment of the likely significant effects associated with the Proposed Development (i) arising from any existing contamination of soil or groundwater or the presence of ground-gas; (ii) on the area within the Application Site which is designated a Mineral

Safeguarding Area in the Cambridgeshire and Peterborough Minerals and Waste Plan and (iii) on the area within the Application Site which is designated as a Site of Special Scientific Interest (SSSI); the Traveller's Rest Pit.

Soil, Groundwater and Ground-gas

19.5.2 During construction there are unlikely to be any significant effects as the previous and recent land use of the Application Site has resulted in only very low levels of contamination present on the Application Site in either soil or groundwater. The potential for excavated materials to be chemically acceptable for re-use, both on-site and off-site is considered high. Where demolition materials are generated, these would be re-used on site wherever practicable, thus avoiding or minimising any need to export these materials from the Application Site.

19.5.3 In the case of the potable water main extension works, Option 1 to the south of the Application Site crosses predominantly agricultural land except for a former developed plot of land 200 m south of Madingley Road. This site is recorded to have historically had at least four above ground bulk storage tanks on the site, one of which appears in the approximate proposed alignment. Further assessment will be undertaken to further quantify the potential for contamination to be present in this area. . Both Option 1 and Option 2 pass adjacent to a current and former petrol station and the potential for these sites to have impacted the soils within the proposed working areas would need to be considered, together with contingency options in the event of contamination being encountered.

19.5.4 Since there are no significant areas of contamination present on the Application Site there are not assessed to be any likely significant land contamination effects once the Proposed Development is operational either at 2014 or at 2026.

Mineral Safeguarding Area ("the MSA")

19.5.5 The MSA covers an area of approximately 15.9 hectares and the volume of mineral resource has been estimated at 239,434m³. The mineral resource is of insufficient quantity to classify the MSA as economically viable. Nevertheless, the Proposed Development will sterilise the mineral resource and has therefore been assessed as having a **Major Adverse** effect. The overriding need for the Proposed Development and the allocation of the Application Site for development in adopted local development plans, however, removes any restriction on the Proposed Development that the MSA designation might impose.

19.5.6 To reduce the adverse effect the Applicant will aim to re-use onsite any resource excavated as a consequence of the Proposed Development within the MSA. It is estimated the likely volume of sands and gravels (Head Gravel and Observatory Gravels) that might be excavated and be available for reuse on the Application Site during the construction may be of the order of 4,000 to 5,000m³.

Traveller's Pit Site of Special Scientific Interest

19.5.7 The Traveller's Pit Site of Special Scientific Interest ("SSSI") is protected under law. Any development should not significantly affect the geology of special interest, or suitable mitigation measures should be put in place where a development does affect the SSSI. Developments that enhance the protected geology and facilitate public awareness of the importance of the site while maintaining access for scientific research are beneficial. These developments typically include vegetation management to remove unwanted deep rooted vegetation and prevent its return, allowing public access to the site and provision of information points outside of the SSSI.

19.5.8 The Parameter plans indicate that the Traveller's Rest Pit site will be left as primary open land and all the built development is indicated outside the 10m buffer zone around the SSSI. Moreover no construction activities (e.g. storage of materials, access for movement of construction traffic) will take place in the SSSI.

19.5.9 The Development contractor will be required by the CEMP to avoid and prevent damage or disturbance of the SSSI. If the contractor considers it necessary, in order to meet this obligation, the Traveller's Rest Pit SSSI will be securely fenced at the start of construction and limited access only will be

allowed during Development for enhancement works and research purposes. Therefore likely effects on the SSSI will not be directly related to the creation of buildings and roads to be constructed as part of the Proposed Development.

19.5.10 During operation in the 2014 year of assessment, the phasing strategy outlined in Chapter 3, indicates that no development will have taken place on the SSSI site. With the measures described above there will be a **Negligible** effect in this year of assessment. During construction of the remainder of the Proposed Development, the measures will remain in place, resulting in a **Negligible** effect on the SSSI.

19.5.11 Appropriate measures to avoid or manage any adverse effects on the SSSI and to enhance beneficial effects have been identified and are included as part of the scheme that has been assessed. The assessment of overall significant effects in the 2026 year of assessment indicates that the Proposed Development is likely to have **Negligible** to **Minor Beneficial** effect on the Traveller's Rest Pit site.

19.6 Archaeology

19.6.1 Twelve distinct archaeological areas (Sites I – XII), have been identified. The earliest activity to be identified is Palaeolithic in date, and consisted of stone artefacts recovered from post-medieval gravel quarries situated at the eastern end of the Application Site. Similarly, a number of Mesolithic and Early Neolithic artefacts were also recovered from similar contexts within the assessment area. A single Late Neolithic and a small number of Late Bronze Age features were identified during the trial trenching (Site II). By the later/Late Iron Age, occupation was well established within the Application Site, with a minimum of five distinct settlements being present (Sites II, IV-VI & XII). Five Romano-British settlements were also identified during the trial trenching: an Early Roman period farmstead on the south side of Washpit Brook (Site VI); possibly a Late Roman period villa (Site VII), near Madingley Road; and other settlements along the southern side of the ridge's gravels (Sites II, IV & V). Of these, Site IV covers more than 9ha and exhibits both 'Early' and Late Roman period components (and with an Iron Age precursor) and is comparable in size, if not larger, to the walled settlement focus on Castle Hill. Only one archaeological feature yielded Anglo-Saxon material, a pit at Site V on the ridge gravels opposite the cemetery site of that date excavated within the grounds of Girton College. Evidence of the Howes Close medieval settlement (known from documentary records; Site IX) was found, as was evidence related to Cambridge's Medieval West Fields in the form of traces of ridge-and-furrow agriculture and a trackway (Site VIII). Upon the gravel ridge, features relating to a similar medieval routeway and a hedged paddock were found (Sites II & III). No statutory or locally designated (archaeological) important heritage assets lie within the Application Site.

19.6.2 Allowing for the implementation of industry standard measures the Proposed Development will have a **Negligible** to **Major Adverse** effect on buried archaeological remains within the Application Site. The effects range from **Major Adverse** for sites IV and V, to **Moderate Adverse** for sites I, II, X and XII, **Minor Adverse** for sites III and XI and **Negligible** for sites VI to IX inclusive. However, the Proposed Development would not conflict with national or local policy regarding the safeguarding of heritage assets and none of the identified effects are of such significance that they should preclude the Proposed Development. Furthermore the adverse effects will all occur during construction, no additional effects will occur during operation and no reduction in effects will be felt at 2014. It is considered that the highway and utility works are unlikely to give rise to significant adverse effects on archaeological unless occurring on undisturbed land and, in which, separate WSIs will be required.

19.6.3 A scheme of archaeological works will be enacted in advance of and during construction operations. The full programme of archaeological investigations will be devised in consultation with the Historic Environment Team at Cambridgeshire County Council; a requirement of national and local policy. This scheme will adhere to industry standards and guidance.

19.7 Cultural Heritage

19.7.1 The effects of construction activity on listed buildings and their settings and on conservation areas and locally listed buildings will be indirect and temporary. There will be no direct physical effects on any of these built heritage assets but indirect and temporary effects on them and their settings may arise from construction noise and dust. Similarly, there is also potential for construction activity to have an effect on

views to and from listed and locally listed buildings and conservation areas - views may be affected by the presence of construction equipment (such as cranes and other machinery) in the short to medium term. There will be similar temporary effects relating to the proposed highway and utility works on Huntingdon Road and Madingley Road and to the provision of a 450mm diameter potable water main extension.

19.7.2 It is considered that during the constructional phase of the Proposed Development, the likely effects on physical features of the historic landscape of the Application Site and the wider historic landscape will range from **Minor Adverse** to **Minor/Moderate Adverse**, while the effects on the settings of listed buildings, existing and proposed conservation areas and locally listed buildings will range from **Negligible** to **Minor/Moderate Adverse**. The **Minor/Moderate** effects will be to the Ascension Burial Ground Chapel within the Storey's Way Conservation Area and Clements End and Conduit Rise within the Conduit Head Road Conservation Area. These effects will be indirect and temporary. Permanent effects arising from this phase relate to the demolition of a small number of non-designated farm buildings of low significance within the Application Site, resulting in a **Moderate Adverse** effect.

19.7.3 During the operational phases (at years 2014 and 2026) the effects are likely to range from Negligible to a **Minor/Moderate Adverse** effect on the Ascension Burial Ground Chapel within the Storey's Way Conservation Area, arising from on-going construction activity at the 2014 stage. There will continue to be construction activity on the Application Site in 2014 and this has been taken into account in the analysis of effects. A **Minor Adverse** effect on the wider historic landscape is also identified, arising from the introduction of development on agricultural land and the creation of a new 'urban edge'.

19.8 Agriculture

19.8.1 The Application Site extends to approximately 150ha. The majority of the land within the Application Site (125ha) is in agricultural production for arable crops and grassland, and there are two sets of farm buildings located at either end of the Application Site. A single agricultural business would be affected by the Proposed Development. The University of Cambridge Farm manages over 1,000ha in the locality, with four separate farmsteads. The majority of the land farmed is planted with arable crops, but there are also sizeable livestock enterprises including a 200-cow dairy herd (expected to rise to 250 cows) and a 220-ewe sheep flock.

19.8.2 By 2026 the Proposed Development would result in the permanent loss of 125ha of land from agricultural production, albeit some 32ha would remain as open space. This land includes 79ha of land classified as best and most versatile in Grade 2 (6ha) and Subgrade 3a (73ha). Whilst the loss of this land is a **Major Adverse** effect of the Proposed Development, its loss has nevertheless already been weighed in the balance by the local planning authorities and the Planning Inspectors further to the allocation of the Application Site for redevelopment in the AAP. At 2014 some 46ha of land classified as best and most versatile would have been affected representing a **Major Adverse** effect, subject to the allocation under the AAP.

19.8.3 The University of Cambridge Farm will, over the phased lifetime of the Proposed Development, lose the use of 125ha of agricultural land. This represents 12% of the total area farmed and would normally be expected to have a marked effect on the profitability of a farm. In this instance the University has already purchased replacement land at Lolworth, and obtained replacement land near Madingley; investment in new farm buildings will be made shortly, and further investment is forecast. Taking this into account, the effect on the farming business in 2014 will be **Minor Adverse** and **Negligible** by 2026.

19.9 Traffic and Transport

19.9.1 The effect of the Proposed Development has been assessed on the categories outlined below

- severance - i.e. the perceived division that can occur within a community when it becomes separated by a major traffic artery.
- pedestrian amenity - broadly defined as the relative pleasantness of a journey;

- fear and intimidation - the effect of which is dependent upon the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths. Receptors are assessed as being pedestrians and cyclists;
- accidents and safety;
- hazardous loads; and
- pedestrian and driver delay .
- Phase.

19.9.2 A number of measures have been proposed to as part of the Transport Strategy to manage the effects of the Proposed Development and the measures have been assumed to be implemented for the purpose of the Assessment.

19.9.3 During the 2014 Pre-Opening Scenario, in addition to Phase 1 of the Proposed Development being under development, highways and utility works on Huntingdon Road and Madingley Road associated with the Proposed Development would be underway and construction works associated with the West Cambridge and NIAB developments would also be underway. Elements of development at the West Cambridge and NIAB developments would be occupied. Construction access to Zone B of the Proposed Development would be taken from Madingley Road.

19.9.4 The assumed worst case peak Daily Construction traffic flows have been calculated. Of the construction-related flows, only a limited number of car and HGV movements would usually occur during the peak hours: the working hours of most construction operatives would not coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods and delivery drivers will themselves wish to avoid being on the network at congested times of the day when drivable hours are disproportionate to quantities of goods delivered. This would be reinforced by the Construction Environment Management Plan controlling movements during peak hours.

19.9.5 In the Pre-Opening scenario, the greatest peak Construction traffic effect would be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 3%, and HGVs increasing by 60% (4% and 64% in the cumulative assessment). Of all the effects considered in this Chapter, the only ones likely to be significant are Pedestrian Amenity and (possibly) Fear and Intimidation in relation to the short section of Madingley Road between the M11 and the site access, on the basis that HGVs may increase by 64%. Even so, applying the thresholds in the IEMA Guidelines since doubling of a particular type of construction vehicle would be needed to give rise to a significant effect and (at an increase of 270 vehicles per day (290 in the cumulative assessment) - this is well below the 1,000 vehicles per day threshold in the Guidelines. Therefore, the magnitude of change is considered to be Negligible or (at worst) Minor adverse. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists. Overall, in terms of the significance of effect, it is considered that there would be **Negligible** or (at worst) **Minor Adverse** effect on Pedestrian and Cyclist Amenity.

19.9.6 The assessment of 2014 Post-Opening conditions considers:

- i) the peak daily two-way flows arising from the completed / occupied Phase 1 Development operation;
- ii) the peak daily flows from the completed / occupied Phase 1 Development and construction of the next phase of the Proposed Development;
- iii) the cumulative flows from the completed / occupied Phase 1 Development, construction of the next phase of the Proposed Development, and construction of other developments in the area.

19.9.7 Under this scenario improvements in the form of new signalised junctions, pedestrian and cycle crossings and improved pedestrian and cycle facilities on Huntingdon Road and Madingley Road are assumed to have been completed.

19.9.8 In the case of the completed / occupied Phase 1 Development operation the highest consequential traffic flow percentage increases on the surrounding network would occur on Huntingdon Road, between the A14 and Site Access. Increases of 16% would be expected.

19.9.9 The Post-Opening Development Construction and Phase 1 Development Operation has been assessed on local links with reference to the worst case Pre-Opening Development Construction movements and the Phase 1 Development Operation flows. In terms of the Post-Opening scenario, the maximum effect of the peak Construction traffic effect is again on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14%, and HGVs increasing by 68% with a further 318 2-way HGV movements. Of all the effects considered in this Chapter, the only one likely to be affected is Pedestrian Amenity (and possibly Fear and Intimidation) for this short section of Madingley Road between the M11 and the site access. Again applying the thresholds in the IEMA Guidelines doubling of a particular type of construction vehicle would be needed to give rise to a significant effect (at an increase of 270 vehicles per day - well below the 1,000 vehicles per day threshold in the Guidelines) and therefore, the magnitude of change is considered to be **Negligible** or (at worst) **Minor Adverse**. Moreover, on Madingley Road between the Site Access and the M11, there are only low sensitivity receptors, and only very few pedestrians and cyclists.

19.9.10 On all other routes in the area, the increase in traffic / HGVs resulting from construction activity would be **Negligible**.

19.9.11 Taking into account the construction activity at NIAB and West Cambridge, the greatest effect would again be on Madingley Road between the Park and Ride entrance and the M11, with daily flows increasing by 14% and HGVs increasing by 79%. Again, possibly Fear and Intimidation may be affected for this short section of Madingley Road on the basis that HGVs may increase by 79% - Even so, applying the thresholds in the IEMA Guidelines, at an increase of 290 vehicles per day the magnitude of change is considered to be **Negligible** or (at worst) **Minor Adverse**.

19.9.12 On all other routes in the area, the increase in traffic / HGVs resulting from the construction activity would be **Negligible**.

19.9.13 Although the HGV composition along Madingley Road would, due to the levels of construction traffic be higher than existing, this affects only two links with only low numbers of pedestrians and cyclists. It is considered that this would have minimal effect on Personal Injury Collision Rates. The remaining additional flows attributable to the Proposed Development would be no different to the vehicle composition on the existing links, and as the Development proposals do not alter significantly the form of the existing highway links, it is considered that the additional traffic flows on the network as a consequence of the Proposed Development would not have any significant effect upon the existing Personal Injury Collision rates.

19.9.14 In terms of the overall effects for the 2014 Post Opening scenario, the Cumulative traffic is considered to have a **Minor to Moderate Beneficial** effect on Fear and Intimidation, and a **Negligible** effect on Driver Delay. Reflecting the pedestrian and cycling measures to be implemented, **Minor** or **Moderate Beneficial** effects were considered for Severance, Pedestrian Delay, Effect on Pedestrian and Cyclist Amenity, and Highway Safety:

19.9.15 As at 2026, all construction on the Proposed Development, NIAB and West Cambridge would have been completed and each would be fully operational. In common with the 2014 Post Opening Scenario, improvements to Huntingdon Road and Madingley Road and to pedestrian, equestrian and cyclist facilities would have been completed.

19.9.16 The majority of the changes in flows as a consequence of the Proposed Development are small single figure percentage increases, many of which are less than 1% - there are indeed a number of links with flow reductions as a result of reassignments from existing roads.

19.9.17 Only four of the linkages are higher than 10% - Huntingdon Road, NIAB (Southern End), Girton Road and Oxford Road/ Windsor Road.

19.9.18 The results of the three proposed Site Access junction capacity assessments confirm that these would operate within capacity in the 2026 Future Year. These assessments, undertaken in the context of adjacent junctions, have also confirmed that the adjacent junctions along the Huntingdon Road and Madingley Road corridors would also operate within capacity in this 2026 Future Year.

19.9.19 Where the Cambridge Sub Regional Model identified that the Proposed Development has an effect in terms of increased delay on other junctions in the vicinity, assessments have been undertaken to these junctions. The results of these junction capacity assessments show that the influence of the Proposed Development is minimal, and that the existing junctions would not experience any significant additional delays when compared to the 2026 Do Minimum scenario – ie, Without the Proposed Development.

19.9.20 For the Proposed Development as completed in 2026, traffic effects would have at worst a **Negligible** effect on Driver Delay. Reflecting the full measures to be implemented, **Minor** or **Moderate Beneficial** effects were considered for Severance, Pedestrian Delay, Effect on Pedestrian and Cyclist Amenity, Fear and Intimidation and Highway Safety. The degree of Fear and Intimidation on the Oxford Road and Windsor Road link, as modelled, is considered locally to be **Moderate** so measures in the form of traffic calming are proposed along this link to encourage traffic not to use this link, and to reassign to the more strategic links.

19.10 Noise Environment

19.10.1 The assessment considers the suitability of the Application Site for the proposed uses, construction noise and vibration effects, changes in traffic noise levels on the local road network as a result of the development and operational noise generated by the proposed uses of the Application Site itself.

Suitability of the Site

19.10.2 The noise climate across the Application Site is dominated by road traffic on the M11 motorway, with smaller local contributions from the A14 and other surrounding roads.

19.10.3 For both 2014 and 2026 assessment years, noise level contours across the Application Site have been calculated for:-

- a “least favourable” scenario, assuming no noise shielding to the various building zones (in effect, an empty site)
- a “most favourable” scenario, assuming maximum building heights from the Parameter Plans and providing maximum noise shielding to the various building zones
- a “mid range” scenario based on a parameter compliant layout

19.10.4 It has been concluded that the Proposed Development, as shown in the Parameter Plans, could be developed to provide an acceptable noise climate across the Application Site.

Construction Noise and Vibration Effects

19.10.5 Noise levels resulting from on-site construction activities have been calculated at five representative off-site residential properties and it has been assessed that noise during all construction works can be effectively managed to result in **Negligible** effects to on-site and off-site receptors.

19.10.6 Vibration levels resulting from piling works have been estimated at five representative off-site residential properties assuming rotary bored piling for the closest proposed new buildings to each receptor and it has been assessed that vibration during all construction works can be effectively managed to result in **Negligible** effects to on-site and off-site receptors.

Changes in Traffic related noise levels

19.10.7 The effect of changes in road traffic noise levels resulting from the Proposed Development has been assessed. Two existing residential streets, namely Oxford Road and Windsor Road will experience increases in noise level of approximately 1.5 dB(A). The significance of this increase is assessed as **Minor Adverse for the year 2026**. Changes in noise level on all other roads in the locality will be **Negligible**.

19.10.8 With respect to residential properties on Huntingdon Road, All Souls Lane and Conduit Head Road which back on to the Application Site, the vast majority of these will experience reductions in noise levels to their rear facades with the development in place. This is as a result of the shielding provided by the development buildings to noise from the M11 motorway. This effect is assessed as **Moderate Beneficial**.

19.10.9 Four properties adjacent to the Huntingdon Road East access will experience increases in noise levels of 1 to 3 dB(A) to some facades resulting from traffic accessing and leaving the Application Site. This is assessed as a **Minor Adverse** effect. However, the strip of land immediately to the north of the Huntingdon Road East access, including Holly Nurseries is to be landscaped as part of the Proposed Development. If deemed necessary, it may be possible to tailor this landscaping to provide acoustic shielding to these properties, thus reducing a minor adverse effect to negligible.

19.10.10 Three properties adjacent to the development site access on Madingley Road will experience increases in noise levels of up to 1 dB(A) to some facades resulting from traffic accessing and leaving the Application Site. This is assessed as a **Negligible** effect.

Energy Centre, Fixed Plant, Operation of the Supermarket and Retail Units and use of Outdoor Space

19.10.11 An assessment of noise from the Energy Centre and fixed plant associated with the Proposed Development, the operation of the supermarket and retail outlets and the use of the school outdoor area and other open land has been carried out.

19.10.12 In relation to the Energy Centre, during the detailed design assessments according to the methodology provided in BS 4142: 1997 'Rating industrial noise affecting mixed residential and industrial areas' will be carried out and appropriate preventative measures specified. The Energy Centre will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be **Negligible**.

19.10.13 Fixed plant associated with the development will be designed and attenuated such that the significance of noise effects to sensitive receptors in the vicinity will be **Negligible**.

19.10.14 Effective management of HGV deliveries to the supermarket and other retail outlets, stipulating delivery times and procedures (e.g. maximum speeds and not parking up on site with engines idling) would result in the significance of these effects being **Negligible**.

19.10.15 Noise breakout from retail outlets, affecting nearby residential units, will be controlled in a similar way through the effective management of procedures (e.g. control of music levels and door management).

19.10.16 Where residential properties share a party wall or floor with retail / commercial properties, the dividing/separating partitions or structures will provide sufficient attenuation for the intended uses of the commercial properties, to provide the required internal noise levels to residential properties.

19.10.17 Activity in the areas of open land associated with the Local Centre is likely to be fairly limited for most of the time. Other activities involving outdoor entertainment and formal and informal games will require management to minimise noise disturbance to nearby residents.

19.10.18 Noise from the school outdoor area will only occur during limited times of the day during normal school hours. It is unlikely that the school play area will be considered by nearby residents as a significant disturbance.

19.10.19 Activity in the areas of open land to the west of the Application Site is likely to be fairly limited for most of the time, mainly confined to walkers and naturalists. This will not be considered by residents as a significant disturbance. Sports pitches located in this area have the potential to result in disturbance to the nearest residential properties. As for activities on other areas of open land, management should result in a **Negligible** effect.

19.11 Air Quality

19.11.1 During construction there is the potential for construction and site clearance works to generate airborne particulate matter in the form of dust and finer particulate matter that could adversely affect amenity and health at properties near to the works. The effectiveness of good working practices as a means of preventing particulate matter from construction works causing such adverse effects has been considered and found that the required standard of protection is readily achievable. The Construction Environmental Management Plan would provide the means of delivering the appropriate measures.

19.11.2 During each phase of the works, if dust generating activities are subject to the dust suppression measures proposed in the Construction Environmental Management Plan, then the effects on residential receptors would be small under normal atmospheric conditions, producing an effect of **Negligible** significance. Residential properties within 50 m of the site boundary may experience an occasional increase in local dust-soiling rates during times when activities are carried out close by in extremely dry and windy weather. Any such effects would be restricted to short-term episodes affecting a small number of properties and would be of **Minor Adverse** significance. These effects are not normally associated with a general risk to health.

19.11.3 Works to Madingley Road and to Huntingdon Road and works for utilities will affect the normal operation of Madingley Road and Huntingdon Road for the duration of the works. The phasing of works will be agreed with the local transport authority to ensure that effects on the network as a whole are managed and this in turn will manage the magnitude of any additional road traffic emissions of air pollutants.

19.11.4 During the early construction phases of the Proposed Development (Pre 2014 Opening), the majority of construction traffic would use junction 13 of the M11 and egress the site from the access point on Madingley Road (with the exception of vehicles directly associated with the utility works on Madingley Road, to the west of the site access). Between this site entrance point and junction 13 of the M11 motorway there are very few sensitive receptors, and those present are all set well back from the highway. As such, any effects on air quality associated with the additional construction related vehicle movements of the Proposed Development on Madingley Road and Huntingdon Road would be **Negligible**.

19.11.5 In the later phases (Post 2014 Opening), there would be no vehicle movements associated with the construction of this development on Huntingdon Road. Instead, all construction traffic would use the site egress on Madingley Road via junction 13 of the M11 motorway. Again, any effects on air quality associated with additional construction related vehicle movements at the sensitive areas on this route would be **Negligible**.

19.11.6 In relation to operational effects the Proposed Development has been designed to locate buildings away from the boundary with the M11 and hence limit potential receptors within buildings being exposed to any road traffic emissions from this source.

19.11.7 The Proposed Development would include plant to provide electricity and hot water by burning gas. The combined effects of emissions from the energy plant and the emissions from road traffic has been considered and the magnitude of the combined effects assessed.

19.11.8 In relation to the change in pollutant concentrations as a result of the 2014 post opening scenario, the magnitude of the effects of the additional road traffic exhaust emissions associated with the operation of Phase 1 of the Proposed Development and construction traffic for Phase 2 are unlikely to be large enough to be capable of causing a perceptible change in particulate matter concentrations.

19.11.9 The corresponding effects on annual mean concentrations of nitrogen dioxide are likely to be small to imperceptible at receptors along Madingley Road, along Huntingdon Road (save for a single receptor outside the Proposed Development), along Histon Road and at a number of locations towards the city centre (R35 – R37). A medium magnitude of change in annual mean concentrations of nitrogen dioxide is predicted to occur at a single receptor outside the Proposed Development on Huntingdon Road (R6 Hollies Nurseries) and also at two locations within the Proposed Development (R43 and R44). None of these effects are likely to raise baseline concentrations to a level ($> 36 \mu\text{g}/\text{m}^3$) where the objective could be considered to be at risk of being exceeded unless they were already above this value. The effect of changes of this magnitude on air quality sensitive receptors would, therefore, be **Negligible** at the majority of receptors although where the baseline concentrations are already elevated a **Minor Adverse** effect is predicted.

19.11.10 In 2026 no exceedances of the annual mean objective values for nitrogen dioxide, PM_{10} or $\text{PM}_{2.5}$ are likely to occur with or without the Proposed Development, at any receptor in the study area. No exceedances of the 24 hour mean objective for PM_{10} are likely to occur with or without the Proposed Development, at any receptor in the study area.

19.11.11 The magnitude of the effects of the additional road traffic exhaust emissions, associated with the operation of the Proposed Development, on particulate matter concentrations would be imperceptible at all receptors apart from two locations within the proposed development (R40 and R42). The corresponding effects on annual mean concentrations of nitrogen dioxide would also be imperceptible at receptors along Madingley Road and along the majority of Huntingdon Road). A small magnitude of change in annual mean concentrations of nitrogen dioxide is predicted to occur adjacent to the site access on Huntingdon Road (R40), at the southern end of Histon Road (R35) and at three locations within the central part of the proposed development (R42 – R44).

19.11.12 Adverse effects on annual mean concentrations of nitrogen dioxide would be low to imperceptible in magnitude at some receptors, but none of these effects would raise baseline concentrations to a level ($> 36 \mu\text{g}/\text{m}^3$) where the objective could be considered to be at risk of being exceeded. These low to imperceptible effects are most likely to occur at properties facing onto Histon Road (R16 – R19), on Huntingdon Road nearest the junction with the new site link road (R40 and R6). The completed Proposed Development in 2026 would contribute to small to imperceptible increases in annual mean concentrations of nitrogen dioxide at properties on Histon Road and Huntingdon Road close to the junction with the ring road (R28, R29 and R35-R37).

19.11.13 The baseline air pollutant concentrations in 2026 are very likely to be well below the respective objective values at all existing and proposed receptors. The effects of the additional road traffic exhaust emissions would be small to imperceptible in magnitude. Effects of this magnitude would have a **Negligible** effect at the air quality sensitive receptors within the study area.

19.11.14 The overall conclusions of the assessment are that future year baseline air quality is very likely to improve relative to current baseline conditions and that in 2014 and 2026, the effect of the completed scheme on local air quality would be **Negligible**.

19.12 Hydrology, Flood Risk and Drainage

19.12.1 The potential for significant effects on hydrology, drainage and flood risk as a result of the Proposed Development has been assessed.

19.12.2 The proposals for the Application Site involve a significant change as the existing farmland will be replaced with a large residential and mixed use scheme. There is therefore potential for changes to the hydrological and hydrogeological regime, both during construction and operation. Design work has, however, been undertaken to identify, avoid and manage the effects of the Proposed Development, including a Site Specific Flood Risk Assessment, Hydraulic modelling study and a Geo-environmental Assessment.

19.12.3 The most significant risk to local surface water bodies during construction is from development site run-off containing elevated suspended sediment levels. The attenuation ponds that will be provided as site control features to control the rate and volume of runoff from each sub-catchment will be

constructed in advance of the associated development to ensure that flood risk is not increased during the construction phase. Temporary pollution control structures will also be introduced upstream of the ponds to ensure that elevated levels of suspended solids will not be conveyed to local surface water bodies. Haul roads will be constructed to accommodate the movement of vehicles and heavy plant during the construction phase in order to minimise the potential for soil underneath to be compacted and for the runoff rate to be increased due to the soils decreased permeability. Rainfall runoff from haul roads will be directed to appropriate temporary pollution control structures before being conveyed to balancing ponds where the discharge to the watercourse will be controlled to greenfield runoff rates, or as otherwise agreed within the Construction Environmental Management Plan.

19.12.4 The development will be constructed in phases. For each phase, the SuDS will be designed and constructed such that they will not increase the flood risk downstream nor pose a flood risk to the development itself.

19.12.5 During operation in the 2014 and 2026 assessment years, the main effect is likely to be related to a potential reduction in surface water flows or groundwater levels in some parts of the region around Cambridge and potential increased stress levels on the deep aquifer due to increased abstraction to provide the potable water supply to the Proposed Development;

19.12.6 During operation in the 2026 assessment year, additional effects are likely to be related to the following:

- construction of development within Flood Zone 2, which is assessed as having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding, causing Flood Risk to the Proposed Development marginally to be increased
- use of herbicides and fertilisers in routine maintenance of agricultural areas will be reduced by the Proposed Development and could cause the nutrient and toxic concentration in surface runoff to be reduced thereby potentially reducing the likelihood of localised contamination of nearby surface or groundwater;

19.12.7 Although nearly all the predicted Flood Zone 2 and Flood Zone 3 extents occur in what are planned to be open land areas, the parameter plans indicate that a very small area of one development parcel that will be developed during the 2026 assessment year could extend into Flood Zone 2. By applying a sequential test approach to the land use on this development parcel, the least vulnerable development will be located in the flood risk areas; therefore the effect of flood risk to the development will be Negligible. This will be achieved by allocating open spaces, landscaped areas or car parking, to the region of the block affected by flooding. All main buildings would mainly be located within Flood Zone 1 (rather than Flood Zone 2). Safe and dry access is available from the site by foot or by vehicle.

19.12.8 The use of herbicides, pesticides and fertilisers for agricultural uses on the existing undeveloped site could cause contamination of nearby surface waters if used excessively and leaching from soil occurs during heavy rain. Fertilisers are typically high in nutrients; hence this could cause eutrophication (excessive nutrient concentration in waters) of Washpit Brook if leached during rainfall. Herbicides and pesticides are toxic in certain concentrations and hence they have the potential to cause mortality to aquatic life if they leach into watercourses. The Proposed Development will cause the concentration of herbicides, pesticides and fertilisers to be reduced as the Application Site will no longer be farmed.

19.12.9 Landscaped areas within the Proposed Development will only require minimal and infrequent use of herbicides. Although the concentrations of nutrients generated will be small, it is proposed that applications be undertaken during dry periods, and in accordance with EA guidelines. By adhering to the various measures mentioned above the Proposed Development will meet the requirements of the various policies and regulations and will comply with local and national planning requirements related to water resources.

19.12.10 The Proposed Development will incorporate water efficiency measures in addition to rainwater harvesting and greater recycling devices to permit the potable water demand to be approximately halved when compared to current annual potable water demand consumption figures. The use of rainwater harvesting and greywater recycling will reduce the potable water demand in order to comply with Level 5

and 6 of the Code for Sustainable Homes. Nevertheless, Cambridge Water Company has indicated that network reinforcement will still be required as there is limited capacity within the existing potable water network situated within close proximity to the Application Site. The provision of this network reinforcement will be of more general benefit and improve capacity within the local area.

19.12.11 Potential beneficial effects during the operational phase of development include the creation of improved ecological habitats when the floodplain of the Washpit Brook is remodelled to assist in the attenuation and storage of floodwater. These habitats could be created, through the provision of low flow channels with a steep bank to provide more valuable habitat for water voles than is currently present, some of which will form linear ponds that will create valuable new ecological habitats for amphibians and invertebrates, and may act as refuges for wildlife during maintenance of the main channel.

19.12.12 After allowing for the design features built into the Proposed Development and the construction methods under which it will be carried out, the likely significant effects of the Proposed Development in relation to hydrology, drainage and flood risk are considered to be **Negligible** or **Minor Adverse**. The measures will also ensure that the Proposed Development is at the forefront of sustainability with regards to water use and water management, meeting the aspirations of Level 5 & 6 of the CSH as well as meeting the requirements of PPS25 and the NPPF.

19.13 Utilities

19.13.1 During the Construction Phase, it will be necessary to install new utilities to supply the Proposed Development. Proposed utility supplies will generally be installed along existing road corridors and will therefore not have any adverse effect on ecological, geological or archaeological receptors. Measures will be employed to ensure that traffic is carefully managed when the utility supplies are installed to avoid significant disruption to the local highway network.

19.13.2 Connections to the electricity, gas and telecommunications network are available in close proximity to the proposed signalised junctions on Madingley Road and Huntingdon Road and they may therefore be installed when the junctions are constructed with **Negligible** effect on the performance of the existing highway network. The works associated with the installation of a foul drainage connection and potable water ring main extension are more extensive and the significance of the effects generated by the works has been assessed and minimised as outlined below:-

- The 1200mm diameter trunk sewer that forms the outfall for the foul drainage network is situated to the southeast of the Application Site, at a distance of approximately 1300m from the proposed signalised junction on Madingley Road. In order to minimise the effect of works in Madingley Road, the foul discharge from the Proposed Development will be conveyed to the trunk sewer via a shallow pumped rising main, rather than by a deep gravity sewer.
- The potable water ring main extension will extend over a length of approximately 3.2km from the 18" main located 1.5km to the south of the Application Site to the existing water mains situated near the Histon junction of the A14 trunk road. In order to minimise the extent of public highway that will be affected during the construction phase, the ring main extension will be laid through the Application Site. For the remaining lengths, two alternative routes have been identified for the ring main. The preferred route has been identified by Cambridge Water Company and involves using powers under the Water Industry Act 1991 to extend the ring main extension through the West Cambridge development and fields to the south of the Application Site, and through the NIAB development and fields to the north of the Application Site. The alternative route extends along the existing road network, including Barton Road, Grange Road, Madingley Road, Huntingdon Road, Oxford Road and Histon Road. In the event that the alternative route is utilised, then the ring main will be laid within the verge, wherever possible, in order to minimise the requirement for traffic management to be used to allow the road to be partially closed so that the rising main to be installed below the carriageway.

19.13.3 With the measures outlined above, it has been assessed that these utility works can be undertaken with **Minor Adverse** or **Negligible** effects.

19.13.4 During operation, the Proposed Development will generate an additional demand on utility infrastructure surrounding the Application Site. Calculations have been prepared to estimate the demand that the Proposed Development will impose upon the existing electricity, gas, potable water and foul sewer networks during the 2014 and 2026 assessment year. Extensive consultations have been held with the Statutory Undertakers, which have indicated that a suitable electricity, gas, potable water and telecommunications supply can be provided to accommodate the full quantum of development, generally in advance of the 2014 assessment year, and that foul water generated by the Proposed Development may be treated. The Proposed Development is therefore expected to have **Negligible** effect on utility infrastructure during the operational phase.

19.14 Sustainability Considerations

19.14.1 The Area Action Plan for the Application Site contains a range of policy drivers relating to sustainability. In addition, current and proposed national and local policy is improving sustainability standards, which the Proposed Development will have to meet. The Applicant has aspirations for meeting these high sustainability standards, and developing an 'exemplar' sustainable development which demonstrates how a development can be viably designed and constructed meeting these high standards.

19.14.2 The Proposed Development is being designed to meet a variety of sustainability standards. These include:

- Achieving Code for Sustainable Homes level 5 for all homes (with the exception of the first 50 homes if built before 2013).
- Achieving BREEAM Excellent for non-domestic buildings which fall within the BREEAM scheme.
- Developing low carbon and renewable energy infrastructure including a gas-fired CHP and district heating scheme, and the inclusion of other renewable energy technologies to achieve a 20% reduction in CO₂ emissions from renewable energy across non-domestic buildings.
- Development of high efficiency buildings with consideration of orientation to reduce overheating.
- Healthy buildings which make use of natural ventilation where practicable and have good levels of natural daylighting. Narrow plan non-domestic buildings will be developed to meet these design principles, and single aspect North-facing dwellings will be minimised.
- Low water consumption, targeting 80 litres per person per day for dwellings. This will be achieved using a combination of efficient water fittings, and rain-water and grey-water recycling systems. Planting designed to have low irrigation requirements.
- Provision of allotments, and other food production areas to encourage local sustainable food production.
- Targets for construction waste to increase recycling and reduce waste to landfill.
- Provision of separate recyclables waste storage and collection in dwellings and streets.
- Provision of composting facilities in gardens and a central in-vessel composting unit for waste from public areas.
- Extensive pedestrian and cycle facilities and routes to reduce reliance on cars.
- A Site-Wide Travel Plan the primary aims of which are to achieve a modal share of no more than 40% of trips to work by car (excluding car passengers) and to increase walking, cycling and public transport use.
- Provision of high quality public transport services with links to local and Cambridge city centre destinations.
- On-site leisure and recreation areas.

19.14.3 The Sustainability assessment within the ES assesses two important aspects of sustainability which are not addressed elsewhere, namely energy and CO₂ emissions, and waste. In order to assess the likely significant environmental effects of the Proposed Development, three scenarios have been

assessed: two baseline scenarios and one incorporating the Proposed Development. The Proposed Development has been compared with each of the two baseline scenarios.

19.14.4 Baseline Scenario 1 assumes no further development on the Application Site and continuation of existing uses. Baseline Scenario 2 (“Do Minimum”) assumes development on the Application Site of the scale of the Proposed Development but in accordance with Part L 2006 Building Regulations for domestic development and related measured benchmarks for non-domestic development rather than the most up to date standards which will apply when development commences. This is the baseline for the purpose of analysing the notional reductions in energy use required to be delivered under policy NW24 of the NWC AAP. The third (“with development”) scenario assumes that the Proposed Development is carried out in accordance with the Development Parameters and in accordance with the Carbon Reduction Strategy outlined above.

Energy and CO₂ emissions

19.14.5 As a result of energy efficiency, the carbon reduction strategy predicts there to be a 29% reduction in heating fuel demand and a 12% reduction in electricity demand by comparison with Baseline Scenario 2. The combination of these provides an 18% reduction in total CO₂ emissions. After the application of low and zero carbon energy technologies, the on-site reduction in CO₂ is predicted to be approximately 48% for the development parameters over the 13 year lifecycle.

19.14.6 With the inclusion of carbon offsetting through allowable solutions, required to meet the future Building Regulations Part L, the total effective CO₂ reduction is likely to be much higher than 47%. Allowable Solutions are a proposed Local Authority scheme whereby CO₂ emissions not able to be managed on-site will be offset through financial investment in off-site carbon reduction schemes. Allowable Solutions are still in development however and until further information is provided by Government on how a scheme may operate, it is not possible to quantify these savings.

19.14.7 The effect of energy consumption and CO₂ production at the Proposed Development as assessed by comparing the “with development” scenario with Baseline Scenario 1 is therefore theoretically **Major Adverse** at a local level. However in practice, this analogy is not apt since it does not reflect that in this scenario, other development to meet the Applicant’s acknowledged need would be likely in the Cambridge Sub-Region in any event. Moreover at a national level, considered to be the minimum zone of influence, the effect would be **Negligible**.

19.14.8 If the effect of energy consumption and CO₂ production at the Proposed Development is assessed by comparing the “with development” scenario with Baseline Scenario 2 the result would be **Minor Beneficial** at a local level and at a national level **Negligible**.

19.14.9 The effect of energy consumption and CO₂ emissions on the zone of influence, at a national scale is considered **Negligible** due to a negligible change and a negligible sensitivity.

19.14.10 Energy consumption and CO₂ emissions from construction activities will be incurred for the development of a baseline development at the Application Site or elsewhere. These include energy associated with the transportation of goods and services; energy used in the construction process, and embodied energy in construction materials. In general, this energy consumption and associated emissions is small compared with the lifecycle emissions of the buildings.

19.14.11 By comparison with Baseline Scenario 1, the construction effects on energy consumption and CO₂ emissions might be termed a **Major Adverse** effect at a local level but **Negligible** if one assumes that the development and therefore construction would take place elsewhere within the Cambridge Sub-Region in any event and Negligible within a national context. The local environment and national environment is deemed to have negligible sensitivity to this change in isolation, resulting in a **Negligible** effect.

Waste

19.14.12 In respect of waste the Application Site is currently mainly agricultural use and is considered to produce negligible waste. However were the Proposed Development not to take place, a baseline

development meeting the needs identified for North West Cambridge would result in approximately 110,000m³ construction waste and approximately 5,500 tonnes per year operation waste, which represents a high magnitude of change. However the effect on the local environment and waste handling systems is in either event considered **Negligible**.

19.14.13 A number of measures are proposed which aim to reduce waste generation, and encourage recycling and re-use and where practicable, most BREEAM and Code for Sustainable Homes credits will be targeted.