NORTH WEST cambridge

Transport Assessment

September 2011

Contents

Figures

Appendices

Appendix 1	Description of Development, and Parameters Plan 02 - Access
Appendix 2	Relevant extracts from the North West Cambridge Area Action Plan
Appendix 3	Cycle Infrastructure plans – NCR51, CCC's Madingley Road Enhancements, CCC's Silver Street – Burrell's Walk proposals
Appendix 4	Ward Plan and supporting Census data
Appendix 5	Traffic Survey Data
Appendix 6	Road Safety Assessment
Appendix 7	Detailed summary of current policy, guidance and emerging strategies and how these relate to North West Cambridge
Appendix 8	Background CSRM Model information
Appendix 9	Indicative Bus Service timetables
Appendix 10	CSRM Model output
Appendix 11	2026 Junction Capacity Assessment - Computer Output
Appendix 12	Site Access Plans
Appendix 13	Construction Movements
Appendix 14	2014 Junction Capacity Assesment – Computer Output

1 Introduction

1.1 Peter Brett Associates LLP (referred to from here as Peter Brett Associates or PBA) has been commissioned by The University of Cambridge to prepare a Transport Assessment to accompany an application for planning permission relating to the proposed development of a site in North West Cambridge for residential, research, education, retail and various community uses.

1.2 The promoter of the Development, the University of Cambridge, is one of the world's leading universities. It is renowned for the excellence of its teaching and research, and it makes a significant contribution to the prosperity of the city of Cambridge and the UK economy.

1.3 To maintain its reputation as a world leader, the University must continue to develop and grow. In particular the University needs to address the issues of the lack of affordable accommodation for its staff and post-graduate students, and to continue the phenomenal success of the Cambridge area for fostering high technology research and development to ensure future opportunities come to fruition within Cambridge.

1.4 In October 2009, the North West Cambridge Area Action Plan was adopted by Cambridge City and South Cambridgeshire District Councils. This plan identified the land that is to be released from the Cambridge Green Belt in order to help meet the on- going development needs of the University of Cambridge. The Development reflects the development quanta within the AAP and includes all of the open land between the edge of Cambridge and the M11, and between Huntingdon Road and Madingley Road.

1.5 The University already has a proud reputation throughout the City for promoting its travel demand management strategy, and has always been proactive in delivering improvements to it – indeed the University was founding member of the Travel for Work Partnership established in co-operation with the County Council. This philosophy will be continued at the Development, which will have significantly different travel characteristics to a typical mixed-use development in the United Kingdom, or indeed to other developments throughout Cambridge. This will be as a result of the following:

- selecting the proposed residential, employment, education and retail land uses for the Development, such as to reduce the need to travel outside of the development;
- providing a food store on the Development such as to reduce the distance to travel to alternative food stores from surrounding residential areas;
- controlling local car ownership for students living in the University's Student Accommodation by using the University's motor proctorial control;
- the majority of the occupants of the University Key Worker housing be working in the University's facilities throughout Cambridge, all within a strong non-car travel mode culture with good access to safe alternative non-car modes of travel;
- key workers and commercial research workers being able to live in close proximity not only to their place of work but also requisite community and leisure facilities;

- key worker housing having a much lower car trip generation rate than market housing;
- University-related commercial research facilities with nearby residential accommodation demonstrably having far lower car trip generation rates than equivalent commercial science park facilities;
- the car parking provision for residential accommodation being 21% lower than the levels identified in the North West Cambridge Area Action Plan;
- academic research land uses within the Development having limited parking and a lower car-based trip generation than commercial research land uses.

1.6 The Transport Assessment addresses the transport – related issues of the Development set within the context of the local planning and transport policy for Cambridge.

1.7 The Transport Assessment also identifies a transport strategy and a travel demand strategy for the Development which are designed to:

i) accord with the wider transport strategy for Cambridge;

ii) to "manage down" the number of trips made by private car;

iii) increase the capacity of the existing highway network.

1.8 This Transport Assessment considers national, regional and local planning and transport policy guidance as it relates to the development, reviews existing travel patterns in the area, and sets out mode-specific strategies and targets, aimed at promoting journeys to and from the Site (where possible) on foot, by bicycle and public transport. These will be further supported by measures set out in the Framework Travel Plan which has also been submitted to accompany the application for planning permission. Both documents specifically address the following in accordance with the Department for Transport's 'Guidance on Transport Assessment' document (dated 2007), and the Scoping agreed with the key stakeholders in 2009 and 2010:

- reducing the need to travel, especially by car;
- sustainable accessibility;
- dealing with residual vehicular trips;
- mitigation measures.

1.9 Junction and link capacity assessments have been undertaken for the highway network in the vicinity of the proposed development, to enable an assessment of potential impacts of trips generated by the Development on the surrounding local and trunk road network.

1.10 The report concludes that the Development is well located for major development in accordance with national, regional and local policy. The transport strategy defined for the proposed development is set firmly within the context of the excellent location and accessibility characteristics of the Site, based on:

i) minimising the need to travel away from the development by providing a good mix of land-uses;

ii) maximising the opportunity for non-car travel, particularly by delivering an excellent public transport system;

iii) delivering strong connectivity with the rest of Cambridge to result in a genuinely integrated urban extension.

iv) reducing the distance travelled by the University by providing significant volumes of Key Worker housing for the University's employees, and the use of car by delivering this Key Worker accommodation where non-car modes of travel can be adopted.

1.11 Overall, therefore, this Transport Assessment identifies a co-ordinated, integrated and sustainable transport strategy for the Development within which development can proceed, within the context of the wider transport and development strategy for the whole of Cambridge.

1.12 The scope of this Transport Assessment has been agreed with the highway authorities. It contains twenty sections split into five parts, as follows:

Part 1 - Background

Section 2 - Background and Development Proposals summarises the rationale and policy background supporting the Development, and provides details of the development proposals;

Section 3 - Existing Conditions summarises the transport network and conditions surrounding the Development for all modes of travel;

Section 4 - Summary of current policy, guidance and emerging strategies and how these relate to the Development lists the existing National, Regional and Local policy, guidance and emerging strategies included in this review, and provides a summary of how the Development accords with this policy;

Part 2 –Development Access and Movement Details

Section 5 - Base Person Trip Assessment details the Person Trip Analysis Base Case assessment prepared by Peter Brett Associates;

Section 6 - Access and Movement Strategy reviews the overall accessibility of the Site for pedestrians, cyclists and public transport users, and sets out the accessibility strategies for each mode to enhance connectivity and accessibility both on- and off-site to encourage local journeys by sustainable modes of travel;

Section 7 - Pedestrian, Cycle and Equestrian Access Strategy considers the Policy background, Travel Demand Management measures, the On-site infrastructure strategy and the Off-site infrastructure strategy with respect to Pedestrian, Cycle and Equestrian movement;

Section 8 - Public Transport Strategy considers the Policy background, Route Identification and Selection, Strategy Principles, Scenario Detail, On-site infrastructure, and Information and Incentives with respect to bus movement;

Section 9 - Site Layout, Vehicular Access and Parking Provision considers Parking Policy background, the Area Action Plan car and cycle parking standards, and Site Layout and Vehicular Access issues and proposals;

Section 10 - Travel Demand Management Strategy summarises how vehicle trips from the development will be "managed" down;

Section 11 - Future Mode Shift Assessment uses the Peter Brett Associates' Person Trip Analysis to assess the potential mode shift away from car driver as a result of any measures implemented as part of the Development travel demand strategy;

Section 12 - Construction Access provides greater detail of the Construction Management Strategy, and the Construction Environmental Management Plan;

Part 3 – Future Performance of the network With and Without the Development

Section 13 - Details of the Cambridge Sub Regional SATURN Model provided include the Land Use and Travel Demand Model, the Treatment of Land Uses, and the modelling of specific movements;

Section 14 - CSRM SATURN Highway Model Tests details the assumptions included within three option tests used to assess the impact of the Development;

Section 15 - CSRM SATURN Highway Model Flows reports the results of the modelling test results from the three Development SATURN model option tests;

Section 16 - Traffic Impact Analysis reviews the difference between both the 2006 and 2026 Do Minimum scenarios, and the 2026 Do Minimum and 2026 Do Something scenarios, as well as conditions in the 2026 Do Minimum and 2026 Do Something scenarios - to understand the change in conditions on the network due to the North West Cambridge Development;

Section 17 - Junction Capacity Assessment considers the potential effects of the Development on the surrounding highway network in terms of the junction capacities;

Section 18 - Construction Traffic assesses the potential Construction traffic generation from the development, and potential effects on the surrounding network;

Part 4 – Additional Management Measures

Section 19 - Further Travel Management Measures considers the proposed measures to manage any transport effects of the Development, concluding that the proposed travel demand measures would, on a conservative analysis, be able fully to manage any traffic effects of the Development, and, on a more realistic and optimistic analysis, bring about an improvement in network conditions;

Part 5 – 2014 Assessment

Section 20 – 2014 Assessment considers the likely effects of the Phase 1 of the Proposed Development, assumed to be completed by 2014. The 2014 Base and 2014 With Phase 1 Development flows reported in this section were used in the Environmental Assessment process to inform the Air Quality and Acoustics assessments.

Part 6 – Conclusions

Section 21 - Conclusions

PART 1 BACKGROUND

Part 1 of the Transport Assessment contains the following sections:

Section 2 - Background and Development Proposals

Section 3 - Existing Conditions

Section 4 - Summary of current policy, guidance and emerging strategies and how these relate to the Development

2 Background and Development Proposals

2.1 Introduction

2.1.1 This section summarises the background to and outlines the contents of the Development.

2.1.2 The section identifies that the University is fully committed to the delivery of a high quality development, a sustainable community where place is not unduly influenced by the need for provision of infrastructure for vehicles. This would, in part, be met by:

i) the extension of the University's existing travel demand management strategy to reduce vehicle demand;

ii) the incorporation of a mix of uses, selected and phased to respond to the needs of the University and to reduce the need to travel; and

iii) being compatible and integrating fully with other surrounding developments and the emerging holistic Travel Demand Management Strategy for the area.

2.2 Site Location

2.2.1 The Site is shown in Figures 1 and 2, and the Parameters Plan 02 – Access included in Appendix 1, and being located to the north-west of the existing urban conurbation of Cambridge, approximately 2km north-west of the centre of the city.

2.2.2 The Site lies within the administrative areas of both South Cambridgeshire District Council and Cambridge City Council, the boundary of between these councils bisecting the development on a north-south axis

2.2.3 The Site is bounded mainly by the M11, Madingley Road and Huntingdon Road.

2.3 Development Aim, Vision and Objectives

2.3.1 The promoter of the Development, the University of Cambridge, is one of the world's leading universities. It is renowned for the excellence of its teaching and research, and it makes a significant contribution to the prosperity of the city of Cambridge and UK economy.

2.3.2 To maintain its reputation as a world leader, the University must continue to develop and grow. In particular the University needs to address the issues of the lack of affordable accommodation for its staff and post-graduate students, and to continue the phenomenal success of the Cambridge area for fostering high technology research and development to ensure future opportunities come to fruition within Cambridge.

2.3.3 The Planning policy vision and objectives for the Development were established in detail the North West Cambridge Area Action Plan. Policy NW1: Vision. Relevant extracts are included in Appendix 2. Of particular note, one stated objective of the Area Action Plan is that the Development is to "achieve a modal split of no more than 40% of trips to work by car (excluding car passengers) and to increase walking, cycling and public transport use".

2.3.4 The University is committed to the delivery of this aspiration by a combination of:

- complementary land uses;
- creating an inherently and holistically sustainable form of development;
- focussed travel demand management measures.
- encouraging the use of non-car modes of transport;
- discouraging the use of car mode;
- ensuring that residents of the Development do not need to travel to work, reach leisure facilities, access the countryside, find community facilities or to shop for essential provisions by car.

2.3.5 As the largest single employer in Cambridge, the University is uniquely placed to influence demand for travel and choice of mode for travel within the City.

2.3.6 The University already has a proud reputation throughout the City for promoting its travel demand management strategy, and has always been proactive in delivering improvements to it – indeed the University was founding member of the Travel for Work Partnership established in co-operation with the County Council. The journey to work mode shares reviewed later in this document demonstrate the success of this strategy.

2.3.7 Extending the University's already effective travel demand management strategy to the Development would form a fundamental part of integrating the Development into the City's most sustainable travel patterns.

2.4 Development Proposals

2.4.1 The proposed development incorporates a complementary mix of uses, selected both to respond to the needs of the University and to manage and reduce the need to travel. The Transport Assessment has been based on the following development mix is as shown in Table 2.1, reflecting the Area Action Plan proposals. This reflects the Description of Development attached as Appendix 1.

Table 2.1: Development Land Use Mix

Non-residential Uses		
Land-use	**Size (m^2) / Units**	
Market Housing	Up to 1,500 units	
Key Worker Housing	Up to 1,500 units	
Academic Research	At least 60,000m^2	Total - Up to 100,000m^2
Commercial Research	Up to 40,000m^2	
Collegiate	Up to 2,000 bed spaces	
Local Centre / Community	Up to 5,300m^2 gross retail floorspace (the Food Store is not more than 2,000 m^2 net floorspace Further Local Centre / Community facilities includes: Up to 500m^2 community centre, Up to 450 m^2 indoor sports provision Up to 200m^2 Police office, Up to 700m^2 Primary Health Care	
Hotel	Hotel – Up to 7,000 m^2 (130 bed spaces)	
Nurseries	Up to 2,000m^2	
Senior Living	Up to 6,500 m^2 (75 units of Sheltered Accommodation have been assumed in the Assessment)	
School	Up to 3,750 m^2	

GFA – gross floor area

2.4.2 The Development has been formulated to ensure future flexibility in delivering the transport strategy throughout the development implementation, and reflects the following key principles for access and movement:

i) good permeability and accessibility for non-motorised users, particularly pedestrians, cyclists and equestrians;

ii) enhanced connectivity for pedestrians, cyclists and equestrians to surrounding existing areas, including to improved local recreational rights of way;

iii) excellent accessibility to public transport through the provision of bus routes through the Site;

iv) the on-site highway designed within an overall urban design context based on key principles in “Manual for Streets”, to control traffic speeds to 20mph and reduce the attractiveness of any route through the development as a rat-run;

v) non-primary vehicular routes – the ability to design these as shared surface with speeds controlled to 20mph as set out in the “Manual for Streets” would be established with reference to the bus strategy;

vi) good access for housing, academic and commercial research and student accommodation to bus routes and transport nodes to increase potential patronage.

2.5 Phasing

2.5.1 It is anticipated that the development will commence around 2012 and will take around 12 – 14 years to build out.

2.5.2 During the early stages of the Development, a proportionately greater number of Key Worker Housing units is anticipated to be delivered than Market Housing Units. Key Worker Housing will be provided early in the development programme to respond to the University's needs. By establishing Key Worker accommodation early in the development process, the benefits of being able to live and work in close proximity will be delivered from the very earliest stages of academic, collegiate and research accommodation on the Site. It will also enable travel demand and modal choice measures to be focussed on a significant number of the University's work force from an early date, thus delivering both direct and indirect benefits in terms of stimulating travel by non-car modes..

2.6 Site Access

Pedestrian / Cycle access

2.6.1 Pedestrian / cyclist access to the Development and the surrounding area is shown on Figure 3 and on the Parameters Plan 02 – Access included in Appendix 1. In summary:

i) connections will be made with Huntingdon Road to the north-east are provided at five locations:

- along the orbital site vehicular access route to the Eastern Huntingdon Road access by a combined cycleway / footway;
- along the radial site vehicular route to the Western Huntingdon Road access by a combined cycleway / footway;
- at the northern end of the Ridgeway cycleway, located on Huntingdon Road opposite the Girton Road priority junction by a combined cycleway / footway;
- Bunkers Hill, located opposite the Whitehouse Lane priority junction, by a combined cycleway / footway;
- to the south of Howes Place priority junction by a footway-only connection.

ii) connections with Madingley Road to the south are proposed at two locations:

- along the radial site vehicular access route by a combined cycleway / footway;
- along Madingley Rise by a combined cycleway / footway;

iii) a connection to Storey's Way to the south-east by a combined cycleway / footway.

2.6.2 A further connection, of a more recreational nature, is provided towards the west via a footpath running through an underpass under the M11.

2.6.3 The Ridgeway, a cycleway / footway, will provide a link through the Development between Storey's Way through to Huntingdon Road, opposite Girton Road. The Ridgeway will connect to local areas of the development, and further lower hierarchy cycleway / footways through the development to increase permeability and connectivity. This Ridgeway route will assist both existing and proposed cycle and pedestrian movement through the area by providing improved direct connectivity between major generators and attractors. In addition to the Ridgeway, further cycleway / footway routes located on north-south axes through the Development will reinforce and enhance connectivity between the north (Girton, and the NIAB Development) through to the West Cambridge Development.

Vehicle access

2.6.4 Vehicular access to the Development and the surrounding area is also shown on Figure 3 and on the Parameters Plan 02 – Access included in Appendix 1. It is proposed to provide three general vehicular accesses to the development. Father details of these preliminary junction layouts are included in Section 10. These are:

i) Huntingdon Road East - to the north-east to Huntingdon Road, a traffic signal controlled junction access to provide Development access to the south, and the NIAB Development to the north (refer to Section 2.7);

ii) Huntingdon Road West - to the north-west on Huntingdon Road, a traffic signal controlled junction;

iii) to the south on Madingley Road, a crossroad traffic signal controlled junction to provide access to the Development to the north, and to the West Cambridge Development to the south.

2.6.5 The location of the latter two access points to the Development has been carefully set to intercept the maximum number of development-bound trips on the strategic highway network before these trips travel through the residential areas of Cambridge, thus minimising the impact of the development on the local highway network.

2.6.6 Vehicular movement corridors through the Development are also shown on Figure 3 and on the Parameters Plan 02 – Access included in Appendix 1. These respond to the access strategy contained within the Area Action Plan summarised in Section 10. In summary:

i) a radial route is provided through the west of the development, between the traffic signal junctions to the north-west on Huntingdon Road West and Madingley Road. This route is relatively direct to assist in providing access for trips external to the Site to the Madingley Road Park and Ride, yet routed far enough away to the west to increase the travel distance and reduce the attractiveness of this route as a rat-run for trips external to the Site from the east;

ii) an orbital route through the east of the development, between the traffic signal junctions on Huntingdon Road East, passing around the local centre in an indirect manner, joining the radial route to meet with Madingley Road. Whilst a direct route to the east of the local centre will be provided for public transport movements, general vehicular movement will be prevented (potentially in the peak hours only) by some form of bus control - rising bollards are used for this purpose elsewhere in Cambridge.

2.6.7 All routes within the development will be designed in accordance with the principles of the Department for Transport's *Manual for Streets* design guidance to reduce the attractiveness of these routes as rat-runs, by reducing vehicle flows by restricting speeds to 20mph and incorporating suitable high-quality passive speed management measures.

2.6.8 As well as serving the existing academic research areas, the existing Madingley Rise (joining Madingley Road) would service a restricted area of proposed academic research development to the south of the Site. Through access from Madingley Rise to other areas of the Development would be prevented by physical measures and routes that are not connected.

2.6.9 Whilst pedestrian and cyclist movements will be accommodated to Storey's Way to the east, no vehicular access is to be provided to Storey's Way.

Public Transport access

2.6.10 The bus access through the Development will generally reflect the vehicle access as identified above.

2.6.11 A bus gate is proposed on the Huntingdon Road – Madingley Road Link Road in the centre of the Development to be provided in the early stages, to prevent traffic from taking a direct route between Huntingdon Road and Madingley Road (although an alternative, longer and less attractive route would be available for all vehicles).

2.6.12 Additional bus priority could be provided by the use of Selective Vehicle Detection (SVD) technology at traffic signals controlling the entrance to the Site from Madingley Road and Huntingdon Road. This would detect approaching buses, and alter signal phases accordingly to ensure the minimum of delay to the bus.

2.7 Surrounding Development

2.7.1 There are two other major consented developments in the vicinity of the Development are planned to be implemented simultaneously. These are shown on Figure 2.

NIAB Site

2.7.2 The NIAB Site is an area located to the north-east of Huntingdon Road between Girton Road and Oxford Road, and is generally referred to by the name of the current occupant (the National Institute of Agricultural Botany).

2.7.3 Cambridge City Council granted outline planning permission for the first phase of development including an access road and 187 homes on the NIAB 'frontage land' adjoining Huntingdon Road in 2004, and construction commenced in 2010.

2.7.4 A further application was submitted for the area between Histon Road and Huntingdon Road for a further 1,593 homes, a new school, community facilities, local shops, roads, footpaths and cycleways. This application was considered by the Joint Development Control Committee and approved in July 2010. It is still awaiting resolution of outstanding Section 106 issues before completion.

2.7.5 Access to the NIAB Site would be gained from Huntingdon Road to the south-west, and from Histon Road to the east. The vehicular accesses to the NIAB site are via new signal controlled junctions to accommodate the forecast increase in demand onto the local highway network, whilst enabling priority for the proposed Guided Bus route and other bus services.

West Cambridge Development

2.7.6 Between 1995 and 1999 the University of Cambridge prepared a Master Plan and Environmental Statement for its proposals to develop the West Cambridge Site for academic and research uses. Consent was granted by Cambridge City Council in 1999. Work to deliver this development has been ongoing since 2000, and likely to continue over a period of 25 years.

2.7.7 The Development site, located at the edge of the Cambridge urban area, is well defined by the M11 to the west, Madingley Road to the north, Clerk Maxwell Road to the east and the Coton Footpath to the south.

2.7.8 The West Cambridge Development site is located to the south of the Development and has two vehicle access points. These are from JJ Thomson Avenue and High Cross. Pedestrians and cyclists can access the Site via High Cross.

2.7.9 There are additionally pedestrian, cycle and equestrian routes at both the southern and western side of the West Cambridge Site.

Other Strategic Developments

2.7.10 Discussions with the Highways Agency and Cambridgeshire County Council have identified other Strategic Developments that may need to be considered as part of this assessment. These sites are summarised in Table 2.2:

Table 2.2: Development Land Use Mix

Strategic Site Name
Other Cambridge North West sites *Arbury Camp (Orchard Park)*
Southern Fringe *Bell School*
Clay Farm
Glebe Farm
Trumpington Meadows
TM / Monsanto
Northstowe
Loves Farm
North Bridge
Cambourne

2.7.11 Further details of each of the above development quanta assessed within this Report are contained in Section 14 and Table 14.1.

Summary

2.7.12 The characteristics of the NIAB and West Cambridge Developments, in conjunction with those of the Development, each deliver not only housing and employment but also necessary supporting facilities - including education, retail, leisure and community facilities - within easy travelling distance, as well as providing patronage to ensure the long-term viability of quality, high frequency public transport services.

2.8 Area-Wide Travel Demand Management Strategy context

2.8.1 The proposed Development is also considered within the context of existing travel patterns, and a series of travel demand management measures being promoted through this region.

2.8.2 Cambridge has unique Journey to Work characteristics. The 2001 Census identified that of the circa 42,000 workers who drive to work, nearly 75% live outside of Cambridge City – possibly reflecting a combination of the imbalance of accommodation and employment within the City, the modest affordable housing stock, and the limited alternative modes of transport to places outside the City. Conversely, of the workers who live and work within Cambridge, only a small percentage of the total (27%) drive to work. It is also apparent that this is representative of a culture within the City itself, related to the University's influence within the City, which favours non-car modes of travel wherever practicable and safe to do so.

2.8.3 The Cambridgeshire and Peterborough Structure Plan 2003 was born out of Regional Planning Guidance (RPG 6) and sets the vision and planning framework for the Cambridge Sub-Region, coupled with the overall growth rate for the whole County. The structure plan policies that relate to this Growth Agenda have now been taken forward in the East of England Plan.

2.8.4 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). While the Government intends to abolish Regional Strategies, it is clear, following the recent legal challenge by CALA Homes against the decision by the Rt. Hon. Eric Pickles MP to revoke Regional Strategies in July 2010, that the East of England Plan remains part of the Development Plan until it is revoked and, therefore, needs to be considered - especially as it clearly supports the progression of the Proposed Development, by virtue of Policies CRS1 – CRS 3 of this plan - albeit that the Government's intention to abolish the RSS is also a material consideration. 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.

2.8.5 This significant level of housing provision in the sub-region would reflect the relative imbalance of housing and jobs that has led to high levels of in-commuting, and would assist in reducing long distance car-based trips by improving housing accommodation more locally to Cambridge.

2.8.6 The strategy aimed to concentrate growth, with housing, jobs, services and facilities within or close to existing urban areas – principally on the edge of Cambridge and in the potential settlement of Northstowe. The locations for growth were chosen not only for their ability to reduce environmental impact and reduce travel distances between home and work, but also for their suitability to be served by sustainable transport networks.

2.8.7 The Cambridgeshire Guided Busway scheme running from Huntingdon to Cambridge, linking the strategic development areas at Longstanton / Oakington (Northstowe) is an important element in the sustainable growth strategy. The opening of this scheme is due in August 2011. Other associated proposals, such as for the Oakington Park and Ride scheme close to the A14 would assist further in reducing congestion by extracting City-destined car-borne trips from the network, and re-moding these trips to the Cambridgeshire Guided Busway.

2.8.8 Developer-funded infrastructure through-out the Cambridge area will continue to complement existing and proposed walking, cycling and public transport facilities which, in addition to LTP-funded schemes, will help to make more complete networks.

2.8.9 Other schemes and measures being developed include:

i) extension of demand management measures in Cambridge; and

ii) the upgrade of the Felixstowe to Nuneaton via Ely rail line for freight connections to extract heavy goods vehicle movements from the highway network.

Further details are provided within the Policy Section (Section 3) of this Transport Assessment.

2.8.10 As an essential part of a strategy to accommodate the large numbers of vehicle movements associated with other strategic development across the region, the Highways Agency had developed extensive proposals for the A14 between Ellington and Fen Ditton. These consisted of:

i) widening of the A14 to a dual three-lane carriageway between Fen Ditton and Fenstanton;

ii) realigning of the A14 route west of Fenstanton to Ellington;

iii) constructing a series of new parallel roads to serve existing and new developments; and

iv) improvements to the Girton, Histon and Milton Interchanges on the A14 and Junction 13 on the M11 development.

2.8.11 Following the Autumnal Spending Review, the Coalition Government announced in October 2010 that the A14 Ellington to Fen Ditton scheme as published was to be abandoned. The Highways Agency has confirmed its intention to commission further study work to indentify more cost-effective alternative measures in both the short term, and for the longer term. , As yet, no further details are available.

2.8.12 In contrast with less sustainable forms of development in less sustainable locations, the provision of additional capacity along the A14 is not necessary for the Development to progress.

2.9 Pre-application consultation and Scoping

2.9.1 Peter Brett Associates has worked in close co-operation with Cambridge City Council, South Cambridgeshire District Council, Cambridgeshire County Council and the Highways Agency from the start of the Area Action Plan Inquiry process in 2006, and through the development of these proposals.

2.9.2 In addition to the meeting the authorities, the University, supported by Peter Brett Associates, has attended a series of meetings and presentations to various groups and organisations including:

- Cambridge Cycling Campaign;
- Local Residents Community Forum.

2.9.3 Initial discussions have also been held with the Traffic Manager of one of main local bus operators, Stagecoach, to discuss the potential public transport strategy for the Site, as set out in Section 8.

Scoping

2.9.4 As agreed with the Highways Agency and Cambridgeshire County Council, this Transport Assessment has been prepared in accordance with the Department of Transport's "Guidance for Transport Assessment" (2007) and will consider the following aspects:

- Introduction and Background;
- Identified of Baseline Conditions;
- Policy Review;
- Development Proposals;
- Car Parking;
- Trip Generation Assessment;
- Site Access;
- Construction Impact;
- Vehicle Impact Assessment;
- Public Transport Assessment;
- Pedestrian and Cycling Assessment;
- Accident Analysis;
- Local Impact Mitigation;
- Travel Plan Framework / Sustainable Transport Strategy.

2.9.5 Two elements in particular have been woven into the assessment of the Development. These are:

- a 'first principles' approach to the calculation of trip generation and distribution, involving the production of a spreadsheet model incorporating various data sources such as the National Travel Survey Census, and local / material data sources;
- use of the highway authority's Cambridge Sub Regional SATURN Model. At the time of submission of the Scoping Document, this model was an AM model only.

2.9.6 During the course of the assessment process, a variety of discussions have taken place around particular topics and the authorities have been consulted on the approach proposed to be adopted. These discussions have embraced:

- Car and Cycle Parking provision;
- Person Trip Analysis;
- Transport Policy and Guidance Review;
- Public Transport Strategy;
- Mode Shift Assessment;
- CAPE Building Survey;
- Draft Framework Travel Plan.

2.9.7 In addition to this exchange of information, regular Transport Workshop Meetings have been and continue to be held with representatives from the County and City Councils and the Highways Agency. These discussions have helped to inform the preparation of this document particularly in relation to how best to deal with changes in circumstances (such as the cancellation of the A14 Ellington – Fen Ditton Scheme).

2.10 Methodology

2.10.1 The following methodology has been agreed with the stakeholders:

- that the local highway authority's Cambridge Sub Regional SATURN Model (CSRM), be used to evaluate the peak hour movements by vehicles generated by the Development on the external highway network in the future year (2026);
- Development option tests of this CSRM have been commissioned to model the committed development in the area for the first test without the Development, along with the committed transport proposals for the area;
- the impact of the Development proposals has also been tested using the CSRM, based on the proposed land use schedule and access proposals;
- that a further Person Trip Model be prepared by Peter Brett Associates, to model the internal person trip movements throughout the Development area in greater detail than within the strategic CSRM;
- that a transport strategy be derived, to manage the impact identified by the CSRM across the network.

Further details are provided in the following sections.

3 Existing Conditions

3.1 Site Location

3.1.1 The location of the proposed Development is shown in Figures 1 and 2, being located to the north-west of the existing urban conurbation of Cambridge, approximately 3km north-west of the centre of the city.

3.1.2 The Site occupies approximately 140 hectares (ha) currently in agricultural use by the University Farm. The Site is located immediately to the east of the section of the M11 motorway between Junctions 13 and 14. The Site is bordered by two Class A roads: Madingley Road (A1303) which routes between Junction 13 of the M11 and the centre of Cambridge, and Huntingdon Road (A1307) which connects Junction 14 (the Girton Interchange) of the M11 with Cambridge city centre.

3.1.3 This section identifies that:

i) the Development is well-located with respect to existing pedestrian, equestrian and cycle infrastructure to accommodate non-motorised movement, and that the existing bus services already connect to a series of popular destinations;

ii) existing journey to work trips by Cambridge residents and University employees involve a much lower car driver mode share than the United Kingdom average;

iii) that there are no existing road safety issues in the vicinity of the Site.

3.2 Existing Pedestrian, Equestrian and Cycle Routes

Walking

3.2.1 The Public Rights of Way in the vicinity of the development are shown on Figure 4. In summary:

i) Footpath 5 routes on a south-west to north-east axis through the northern end of the 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 by the American Cemetery where it terminates;

ii) Footpath 4 routes from Huntingdon Road to Duck End in Girton, north of the 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 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.

3.2.2 As shown on Figure 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.

3.2.3 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 / 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.

3.2.4 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 pedestrian crossing points along Storey's Way.

3.2.5 Figure 5 illustrates the potential 5, 10, 15 and 20 minute walk times from the location of the proposed local centre. This indicates that:

i) both the West Cambridge and the NIAB site would be accessible within a 20 minute walk time, a reasonable distance for walk to work trips; and

ii) the existing bus stops along Huntingdon Road and Madingley Road would be easily accessible from the development;

iii) Madingley Road Park and Ride site (served with a range of bus services) would be accessible within 10 minutes walk-time;

iv) existing walking conditions within the current site boundary are limited due to the rural landscape of the Site. This is evident in Figure 5 referred to above.

Cycling

Cycling route network

3.2.6 The local cycling network in the vicinity of the development is shown on Figure 6, compiled using information from Cambridgeshire County Council website.

3.2.7 A narrow off-road cycle lane 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.

3.2.8 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 at the traffic signal controlled junction with Victoria Street and cycle advance stop lines with pens. 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.

3.2.9 Cambridgeshire County Council has recently delivered the Madingley Road Phase 1 Combined Cycleway / Footway proposals, a quality cycleway along the northern verge, significantly enhancing the cycling and walking infrastructure along this route. Two plans summarising these measures along this corridor are shown in Appendix 3. In summary, these proposals consist of:

i) upgrading the existing combined footway / cycleway within the northern verge to 3m wide between the east of Lansdowne Road 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.

3.2.10 A further local cycle route runs 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 Albion Row and Grange Road there are cycle advance stop lines with pens.

3.2.11 Automatic traffic count surveys of the cyclists on Huntingdon Road and Madingley Road were commissioned in October 2009 (ie, before the completion of the County Council's scheme along Madingley Road). The results are summarised in Table 3.1:

Table 3.1: – Observed cycle movements (October 2010)

Direction	AM Peak	PM Peak	24 hour movements
Huntingdon Road – west of the Whitehouse Lane junction			
Westbound	7	99	517
Eastbound	71	28	416
Total	78	127	933
Madingley Road – west of the Clerk Maxwell Road junction			
Westbound	17	22	189
Eastbound	18	36	257
Total	35	58	446

3.2.12 It is apparent that:

i) the numbers of cyclists counted along Huntingdon Road are over double the number counted along Madingley Road – implying that Huntingdon Road, serving the Girton area, is currently the more important cycling link;

ii) the observed movements are tidal along Huntingdon Road, with a heavier inbound flow in the AM peak, and outbound flow in the PM peak – reflecting typical journey to work patterns from and to residential areas;

iii) along Madingley Road there is no pronounced tidality in either peak. As the PM eastbound flow is marginally higher, this may suggest that most cyclists observed here are accessing the employment at the West Cambridge Development.

3.2.13 The existing cycle facilities across a wider area of Cambridge are shown on Figure 4, 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.

3.2.14 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.

3.2.15 An off-road cycle path routes eastwards from the western bend of Storey's Lane, continues around the Royal Greenwich 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.

3.2.16 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 6. 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.

Cycle parking

3.2.17 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.

3.2.18 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 Madingley Rise, but this cycle parking is for the use of the university alone.

3.2.19 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.

3.2.20 Figure 6 illustrates the proposed 5 and 10 minute cycle times from the centre of the Site. This demonstrates that:

i) West Cambridge and the NIAB site would be accessible within a 5 minute cycle time;

ii) Madingley Road Park and Ride site (served with a range of bus services) would be accessible within a short 5 minute cycle time.

Equestrian

3.2.21 As shown on Figure 4, 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.

Other Development-related cycle and pedestrian infrastructure enhancement proposals

3.2.22 The West Cambridge Development, located to the south of Madingley 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 Madingley Road;

viii) improvements to the Colour Footpath Link;

ix) toucan crossing / of Madingley Road adjacent Madingley Rise / Clerk Maxwell Road junctions.

3.2.23 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. The consultation document is included in Appendix 3, the proposed route is shown on Figure 7. 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.

3.2.24 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:

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.

3.2.25 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 7.

3.2.26 The NIAB Development proposals will be entirely compatible with the Development, and would form part of a wider strategy to extend the existing good quality cyclist and pedestrian provision in this area.

3.3 Existing Bus Services

3.3.1 The Development area is well-served by a number of bus routes operating on the two principal routes into the city centre, along Madingley Road and Huntingdon Road. Figure 9 illustrates the more frequent bus services within the vicinity of the Site – current at the time of writing, but obviously subjected to periodic change.

3.3.2 As shown on Figure 9, there are a total of 8 bus stops located along the Madingley Road service routes, and a further 8 bus stops situated on Huntingdon Road.

Existing Bus Services on Madingley Road

3.3.3 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. The individual route frequencies from Madingley Road and their corresponding destinations are summarised in Table 3.1, the routes of the more frequent services shown in italics are shown on Figure 9.

Table 3.1: Madingley Road Bus Routes, Destinations and Frequencies

Service/ Operator	Route	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
***X5 -** Stagecoach*	Oxford – Bicester – Buckingham – Milton Keynes – Bedford – Great Barford – Eaton Socon – St Neots – Madingley Road P&R – Cambridge	30 mins	30 mins Sun; 60 mins eve

3.3.4 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.

3.3.5 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, and 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.

3.3.6 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.

3.3.7 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.

3.3.8 As shown on Figure 9, 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.

Existing Bus Services on Huntingdon Road

3.3.9 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. Theses route frequencies and destinations are summarised in Table 3.2, the routes of the more frequent services shown in italics are shown on Figure 9.

Table 3.2: Huntingdon Road Bus Routes, Destinations and Frequencies

Service/ Operator	Route	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 – Fenstanton – Fen Drayton – Swavesey – Over – Willingham – Longstanton – Bar Hill – Cambridge (15A/B via Bluntisham – Needingworth, 1 journey Mon-Fri peak)	60 mins	No service
***55 -** Stagecoach*	Huntingdon – Houghton – St Ives – Cambridge	20 mins	60 mins eve; No service Sun
***Citi 5 -** Stagecoach*	Bar Hill – West Cambridge – Cambridge	20 mins	60 mins Sun; no service eve
***Citi 6 -** Stagecoach*	Oakington – Girton – Cambridge	20 mins	60 mins Sun; no service eve

3.3.10 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.

3.3.11 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.

3.3.12 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.

3.3.13 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.

Future bus provision

3.3.14 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 9. 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 effected. It is currently anticipated that the Busway will start operation in August 2011.

3.4 Existing Rail Services

3.4.1 The nearest railway station is Cambridge railway station, which is approximately 4 kilometres from the Development – this is shown on Figure 1.

3.4.2 Rail services from Cambridge are summarised in Table 3.3 below, indicating general daytime frequencies and key destinations – these are current at the time of writing, but obviously subjected to periodic change.

Table 3.3: 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

3.4.3 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.

3.4.4 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).

3.4.5 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.

3.4.6 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.

3.5 Existing Road Network

3.5.1 As shown on Figure 1, the Site is located between two main radial routes leading between the M11 and the centre of Cambridge – the A1303 Madingley Road and A1307 Huntingdon Road.

3.5.2 Madingley Road is located to the south of the development, 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.

3.5.3 Huntingdon Road is situated to the north of the development site 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.

3.5.4 Madingley Rise, located to the south of the 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 Site.

3.5.5 Storey's Way, located to the east of the Site, forms a link road between Huntingdon Road and Madingley Road. It is a residential road with width restriction barriers to reduce the speed of vehicles passing through this section, hence the attractiveness of this link. The road does provide a good pedestrian and cycle link.

3.5.6 As shown on Figure 1, the local highway network provides direct access between the development and the A14 and M11 strategic highway network – Madingley Road intersects with the M11 at Junction 13, Huntingdon Road intersects with the M11 at Junction 14.

3.5.7 To the north of the Site lies the A14 on an east / west axis from Cambridge. To the east, the A14 connects to Newmarket, Bury St Edmunds, and Ipswich, terminating at the sea port of Felixstowe. To the west the A14 passes through Huntingdon, crossing the A1 before continuing around Kettering and terminating at Junction 19 of the M1, the start of the M6.

3.5.8 The M11 is located to the west of the 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 Site at the merger with the A14 at Junction 14.

3.5.9 The M11 Junction 14 also connects to the A428, a strategic road that links Coventry to Cambridge via Bedford and Northampton.

3.5.10 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 Development is via Histon Road, the A14 Junction 32;

ii) the M11 is accessed via 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.

3.6 Observed Existing Journey mode share

3.6.1 To understand current travel patterns and existing mode share in the vicinity of the Development, existing travel patterns have been reviewed with reference to three readily available sources of data for the proposed land-uses:

i) the existing Census 2001 Journey to Work data for the Castle Ward;

ii) Cambridgeshire County Council's Travel for Work Partnership from the 2009 and 2010 surveys for both the University of Cambridge, and for the Cambridge Science Park of the mode share for journeys to work made by staff;

iii) pupil journey to school trips has been taken from Cambridgeshire County Council's Sustainable School Travel Strategy Annual Monitoring Report.

These data sources are considered individually below.

2001 Census

3.6.2 Information relating to the journey to work mode, and home and work locations is available in the 2001 Census. The Site is located in both the Girton and Castle Wards of Cambridge, as shown in Appendix 4. The travel characteristics of the proposed Development is considered to reflect more closely those from the existing development within the urban Castle Ward (containing the elements of the University), rather than the travel characteristics of the more rural Girton Ward, and has therefore been considered for the assessment of the Development trips. The mode share from the 2001 Census for journeys to work in Castle Ward for both residents living within ward, and workers employed within the ward are shown in Table 3.4.

Table 3.4: Census 2001 Mode Share for Castle Ward journey to work

	Home	Tube	Train	Bus	Taxi	Car Driver	Car Pass	M ' cycle	B' cycle	Foot	Other	Total
Residents	10.6%	0.6%	3.4%	3.2%	0.3%	34.2%	2.3%	1.2%	27.0%	16.4 %	0.7%	100%
Workers	4.2%	0.1%	1.2%	6.0%	0.1%	53.6%	4.5%	1.5%	19.5%	9.0%	0.2%	100%

Source: 2001 Census Journey to Work data for Castle Ward

3.6.3 The reported use of the Tube mode may reflect the travel patterns of residents and workers associated with London on the day of the survey. Similarly, "Home" mode would reflect the economically active who did not travel to a place of work, and worked at home on the day of the survey.

3.6.4 This Census mode share data emphasises a series of significant strategic access and movement issues relating to Cambridge:

i) the car driver mode share for journey to work trips for residents of Castle Ward (53.6%) is lower than the national average identified in the Great Britain Travel to Work Statistics 2009 as being 70%;

ii) the non-car share for residents (walking, cycling, bus) is correspondingly higher;

iii) those who work in the Castle ward are more likely to use their cars to travel to work than those who live in the Castle ward and presumably work relatively locally. This possibly reflects a combination of the imbalance of accommodation and employment within the City, the modest affordable housing stock, a much stronger non-car travel culture existing within the City itself and among the University population as a whole than in outlying areas and the more limited range and frequency of alternative modes of transport to and from places outside the City.

3.6.5 Although another Census has been undertaken in 2011, the data from this is unlikely to be available until circa 2013 – the 2001 Census remains the most relevant available Census data available.

Travel to Work Partnership – University of Cambridge (Cambridgeshire County Council)

3.6.6 Information has also been obtained from Cambridgeshire County Council's Travel for Work Partnership, from the 2009 and 2010 surveys carried out to support the University of Cambridge travel planning. The responses include the mode of journey to work over seven days in October 2009 and 2010, together with the workplace postcode and home postcode.

3.6.7 The Journey to Work data has been analysed to identify the mode share for both "All University Employees" throughout the area, and more specifically for those journeys made to the adjacent West Cambridge site (shown on Figure 2). This Development contains similar Academic Research facilities as are being proposed at the Development. The mode shares for both years are shown in Table 3.5.

Table 3.5: Summary of mode shares from 2009 and 2010 University of Cambridge Travel for Work data

	Home	Train	Public Bus	Staff Bus	Drive Alone	Car Share	M' bike	Cycle	Walk	Other	Other Work place	Total
All University of Cambridge												
2009 Number of reported journeys to work	139	417	770	1	1,873	604	111	3,271	888	171	121	8,366
Mode Share	1.7%	5.0%	9.2%	0.0%	22.4%	7.2%	1.3%	39.1%	10.6 %	2.0%	1.4%	100%
2010 Mode Share	1.0%	6.6%	8.8%	0.1%	23.2%	8.1%	1.0%	40.3%	9.4%	0.2%	1.3%	100%
West Cambridge												
2009 Number of reported journeys to work	20	39	59	0	189	39	7	437	97	1	14	883
Mode Share	2.3%	4.4%	6.7%	0.0%	21.4%	4.4%	0.8%	49.5%	11.0 %	0.1%	1.6%	100%
2010 Number	16	12	36	0	205	57	6	398	50	0	20	800
Mode Share	2.0%	1.5%	4.5%	0.0%	25.6%	7.2%	0.8%	49.8%	6.3%	0.0%	2.5%	100%

Source: 2009 and 2010 TfW Survey Data for University of Cambridge, the workplace postcodes associated with the West Cambridge site are CB3 0DY, CB3 0EH, CB3 0ES, CB3 0FA, CB3 0FD and CB3 0HE.

3.6.8 The University's mode share data supports anecdotal evidence relating to movement by the University's employees:

i) the Drive Alone mode share for the University employees is lower than reported in the Census – supporting evidence of the tradition of non-car mode choice by University employees;

ii) that the restrictions on parking at the University's facilities may reduce the Drive Alone share;

iii) the non-car share for University employees (car share, cycling, bus) are significantly higher than the local Census average mode choices;

iv) the precise mode share percentages have tended to fluctuate between two adjacent years, as the turn-over of staff (including academic posts, research posts as well as the more permanent support staff) is greater than non-academic related work. Even so, it is considered that the percentages observed within the 2009 and 2010 years are not significantly different. The 2009 data has therefore been used for assessment work and provides a suitable, if conservative basis form which to work

Travel to Work Partnership – Cambridge Science Park

3.6.9 Further survey work had been carried out in 2009 by the Travel for Work Partnership within the Cambridge Science Park, the primarily Commercial Research development located to the north of Cambridge. Whilst not strictly relevant in locational terms being nearly 4km away from the Development, these results summarised in Table 3.6 also reflect issues typically relating to employment within Cambridge:

Table 3.6: Mode Share data for Cambridge Science Park

	Public Transport	Sole Occupant of Car	Car Share	Bicycle	Foot	Other
Travel for Work 2009 survey	3%	54%	10%	20%	5%	8%

Source: Cambridge Science Park website http://www.cambridgesciencepark.co.uk/

3.6.10 The Car Driver mode share for the Cambridge Science Park commercial research areas is significantly higher than that reported for the University employees and for the operation of the West Cambridge Development, which itself includes the sort of commercial research and development facilities (e.g. Microsoft and Schlumberger) expected to operate from the Development. This reflects the nature of the Cambridge Science Park Development - having been car-orientated from the outset, having greater on-site parking provision, no on-site worker accommodation, no on-site community and general absence of a non-car mode travel culture.. The University, is confident that the Development (being set up from the outset to be sustainable, bicycle and pedestrian friendly, to include a sustainable mix of uses reducing the need to travel and with a non-car travel culture form the outset, combined with an effective Site-Wide Travel Plan), will in sustainable development and transportation terms radically out-perform the Cambridge Science Park.

Sustainable School Travel Strategy Annual Monitoring Report – Cambridgeshire County Council

3.6.11 Mode share information for Pupil journey to school trips has been taken from Cambridgeshire County Council's Sustainable School Travel Strategy Annual Monitoring Report, dated 11th May 2009. This data is reported for the whole of the County only, no information is available for the Cambridge City area. The mode share for journeys to school by Primary School pupils throughout the County is shown in Table 3.7.

Table 3.7: Primary School Pupils' Mode Share for Journeys to School

	Train	School Bus	Public Bus	Taxi	Car / Van	Car Share	Cycle	Walk	Other	Total
Primary School Pupils	0.01	3.45	0.24	0.51	28.95	3.06	6.35	57.32	0.11	100

Source: Cambridgeshire County Council – Sustainable School Travel Strategy Annual Monitoring Report, 11 May 2009

3.6.12 Whilst typically car-based mode share for trips to school would be pass-by or link trip-based, it is anticipated that the car driver mode share would be lower within the City than through the whole of the County. It is also considered that the figures here represent averages across schools which are less sustainably located, operating within considerably less sustainable communities with much more of a car-use culture than would be the case with the Development.

3.7 Initial Traffic Data Review

3.7.1 Automatic traffic count surveys were commissioned by Peter Brett Associates at the following four locations, undertaken during October 2009. The results are summarised in Table 3.8, the data held in Appendix 5:

i) Huntingdon Road, west of the Grange Road junction;

ii) Huntingdon Road, west of the Whitehouse Lane junction;

iii) Madingley Road, west of the Park and Ride Access;

iv) Madingley Road, west of the Clerk Maxwell Road junction.

3.7.2 Traffic data was further obtained from Cambridgeshire County Council's Traffic Monitoring Report 2009 for links. These flows are also summarised in Table 3.8, the data held in Appendix 5.

Table 3.8: Summary of traffic count observations

		Average Weekday AM Peak	Average Weekday PM Peak	Average Weekday 12 Hr	Average Weekday 24 hr
PBA Data October 2009					
Huntingdon Road West of Grange Drive Junction	Wbd	247	683	4,623	5,868
	Ebd	460	375	4,951	6,015
	Total	707	1,058	9,573	11,883
Huntingdon Road West of Whitehouse Lane Junction	Wbd	440	1,122	7,257	9,254
	Ebd	1,193	555	7,941	9,512
	Total	1,632	1,677	15,198	18,766
Madingley Road 80m West of Park and Ride Access Junction	Wbd	427	1,239	7,243	8,663
	Ebd	1,249	474	7,329	8,542
	Total	1,676	1,714	14,572	17,205
Madingley Road West of Clark Maxwell Road Junction	Wbd	589	902	6,887	8.334
	Ebd	854	668	7,054	8,422
	Total	1,444	1,570	13,941	16,756
CCC Data					
Huntingdon Road (West of Grange Road)	Total			9,710	
Madingley Road / West of the Park and Ride Site Junction	Total			15,115	
Girton Road	Total			4,765	

AM peak taken as the network peak of 0800-0900, the PM peak as 1700-1800.

3.7.3 When the total hourly flows observed at the two more urban ATC sites along Huntingdon Road and Madingley Road (West of Whitehouse Lane and West of Clerk Maxwell Road junctions respectively), the following peak hour flow profile is apparent:

Table 3.9: Peak hour flow profiles

Location	Time (hour commencing)	Average Weekday flow	Time (hour commencing)	Average Weekday flow
Huntingdon Road West of Grange Drive Junction	0500	98	1500	757
	0600	315	1600	976
	0700	1,097	1700	1,058
	0800	707	1800	864
	0900	745	1900	597
	1000	618	2000	374
Madingley Road West of Clark Maxwell Road Junction	0500	99	1500	1,086
	0600	312	1600	1,430
	0700	1,216	1700	1,570
	0800	1,444	1800	1,248
	0900	1,311	1900	789
	1000	899	2000	478

Source – ATC from Huntingdon Road West of Whitehouse Lane, and Madingley Road West of Clerk Maxwell Road – October 2009

3.7.4 This information suggests:

i) the flows on Madingley Road are universally higher than those on Huntingdon Road;

ii) that the peak hours flows on Huntingdon Road are very pronounced, and rapidly tail off;

iii) that the peak hours flows on Madingley Road are more sustained than those on Huntingdon Road.

iv) Huntingdon Road, west of the Grange Road junction;

3.8 Road Safety Assessment

3.8.1 To understand road safety issues in the vicinity of the Site, an assessment was undertaken at key local links and junctions within 1km of the Development site boundary. Road traffic collision personal injury summary data was obtained from Cambridgeshire County Council for the five year period of January 2005 to December 2009. The accident data, the assessment area are included in Appendix 6, along with a plot showing the location of all personal injury collisions.

3.8.2 This assessment included the following links:

i) Huntingdon Road, from the A14 overbridge to Girton Road;

ii) Huntingdon Road, from Girton Road to Storey's Way;

iii) Girton Road, from the A14 overbridge to Huntingdon Road;

iv) Madingley Road, from the M11 southbound on-slip to JJ Thomson Avenue;

v) Madingley Road, from JJ Thomson Avenue to Storey's Way.

3.8.3 The following junctions were also assessed:

i) the Huntingdon Road / Girton Road priority junction;

ii) Madingley Road / JJ Thomson Avenue priority junction.

3.8.4 The number of combined link and minor junction personal injury collisions (PICs – formerly known as personal injury accidents), and major junction personal injury collisions that could be anticipated on these links and junctions were calculated with reference to the Department for Transport's Design Manual for Roads and Bridges, Volume 13. The calculations are also contained in Appendix 6, and the results are summarised and compared with the observed level of personal injury collisions in Table 3.11. Link only rates have also been calculated for roads where there are no adjoining junctions along its length, these links are identified in Table 3.11 also.

Table 3.11: Summary of Observed and Anticipated Personal Injury Collisions (5 Years)

	Observed PICs	Anticipated PICs
Links Huntingdon Road - A14 overbridge to Girton Road junction	Number (Rate – PICs per million vehicle kms) 5 (0.25)	Number (Rate – PICs per million vehicle kms) 5 - Link Only (0.23 – derestricted or 0.30 – 30 / 40mph zone)
Huntingdon Road - Girton Road junction to Storey's Way junction	23 (0.54)	32 - Link and junction (0.98)
Girton Road - Huntingdon Road junction to A14 overbridge	10 (1.26)	6 – Link and junction (0.98)
Madingley Road - M11 Southbound on-slip to JJ Thomson Road junction	2 (0.10)	5 – Link Only (0.30)
Madingley Road - JJ Thomson Road junction to Storey's Way junction	8 (0.30)	20 – Link and junction (0.84)
Junctions Huntingdon Road – Girton Road priority	Observed PICs 5	Anticipated PICs 5
Madingley Road – JJ Thomson Road junction	0	4

Notes: Collisions within 20m of the major junctions identified in this table have been allocated to the junctions. Any other collision occurring at minor unspecified junctions are allocated to the link in question. The link rates have therefore been calculated as a combined link and minor junction personal injury collision rate apart from those identified separately in the table above.

3.8.5 From the results summarised in Table 3.11 it is concluded that:

i) the number of observed collisions along Huntingdon Road and Madingley Road are equal or lower than anticipated – indicating that there are no significant road safety issues along these sections;

ii) the number of collisions along Girton Road is marginally higher than anticipated;

iii) the number of observed collisions at the Huntingdon Road – Girton Road junction and the Madingley Road – JJ Thomson Road junction are also equal or lower than anticipated.

3.8.6 A total of 43 personal injury collisions occurred on Huntingdon Road between the A14 and Huntingdon Road - Storey's Way junction, of which 35 were of slight, 8 were of serious and 1 were of fatal severity. Of all the personal injury collisions, 3 involved pedestrians and 16 involved a cyclist. There were no clusters of incidents at any one location. The one fatal personal injury collision involved a cyclist and occurred at the junction of Huntingdon Road and Girton Road due to a cyclist overtaking on the nearside of a vehicle. Two serious injuries involved cyclists at other locations.

3.8.7 A total of 10 personal injury collisions occurred on Madingley Road, of which one was of serious severity, the other nine personal injury collisions were of slight severity. Of all the personal injury collisions, none involved pedestrians and five involved a cyclist.

3.8.8 It may therefore be concluded that there are no significant road safety issues in this area.

4 Summary of current policy, guidance and emerging strategies and how these relate to the Development

4.1 Introduction

4.1.1 This section lists the existing National, Regional and Local policy, guidance and emerging strategies included in this review, and provides a summary assessment of the performance of the Development against this policy. A detailed summary is included in Appendix 7.

4.1.2 This section identifies that the Development accords well with national and regional transport policy and guidance to deliver sustainable development, as well as with the key local transport and planning policy objectives. It shows that, overall, the proposals for the Development, and the transport strategy evolving to support it, will make a substantial and significant contribution to sustainable development objectives and policies for the Cambridge area.

4.2 Policy, guidance and emerging strategy documents reviewed

4.2.1 The following documents were reviewed:

National Policy and Guidance

- PPS1 Delivering Sustainable Development – February 2005;
- Supplement to PPS1 'Planning and Climate Change';
- PPS3 - Planning Policy Statement 3, Housing - June 2011;
- Planning Policy Guidance 13: Transport – 2001;
- 'Guidance on Transport Assessment' - March 2007;
- Circular 02/2007 'Planning and the Strategic Road Network' - March 2007;

Regional Policy and Guidance

- The East of England Plan: The Revision to the Regional Spatial Strategy for the East of England - May 2008 (in conjunction with relevant sections of the Milton Keynes South Midlands Sub-Regional Strategy 2005);

Local Policy and Guidance

- Cambridgeshire and Peterborough Structure Plan – 2003;
- Cambridge Local Plan - July 2006;
- South Cambridgeshire Local Plan - February 2004;
- Emerging Cambridge Local Development Framework;
- South Cambridgeshire Local Development Framework (from 2007 onwards);
- Cambridgeshire Rights of Way Improvement Plan (2006).

Development site-specific policy

- North West Cambridge Area Action Plan - October 2009;

Local Transport Policy and Guidance

- Cambridgeshire Local Transport Plan - March 2006.

4.3 Analysis and application of current policy, guidance and emerging strategies

4.3.1 By promoting the selected land-use mixes on the Development, the University of Cambridge is actively reducing the demand to travel. This includes:

i) providing significant levels of Key Worker and post-graduate student housing to accommodate locally those who would otherwise have to travel longer distances from outside into the city;

ii) delivering a mix of both employment and residential accommodation on the development;

iii) providing a food store on the development to reduce the length and number of car-based journey to retail trips;

iv) providing a school and other community facilities within the development.

4.3.2 The Development accords well with national and regional transport policy and guidance to deliver sustainable development:

- Its sustainable location within Cambridge, and the incorporation of mixed employment and residential land-uses reducing the need to travel and supporting the aspirations and objectives of Planning Policy Statement 1, Planning Policy Statement 3, and Planning Policy Guidance 13;

- by locating the development so as to reduce the need to travel, by implementing a parking strategy, and by effecting a major shift in travel away from car use, the Development supports the policies of the East of England Plan;

- by promoting ways to reduce the traffic impact of this development and the University's other activities within Cambridge, and by "managing down" traffic generation, the Development supports the policy of the Highways Agency's Circular 02/2007.

4.3.3 The development also accords with important local transport and planning policy objectives:

- by incorporating bus route and all vehicle links between Madingley Road and Huntingdon Road, and by developing more widespread facilities to encourage walking and cycling by providing enhanced links to the surrounding network, the Development supports the saved policies within the Cambridgeshire and Peterborough Structure Plan;

- by integrating the proposed development and transport infrastructure to the adjacent existing, by implementing a rigorous travel demand management strategy and Travel Plan, and by making the development highly accessible to all residents on foot, by cycle and by high quality public transport, the Development supports the policies of the South Cambridgeshire Local Development Framework. The specific transport-related policies of the North West Cambridge Area Action Plan regarding sustainable travel, highway infrastructure, vehicular access, the provision of links between Huntingdon Road and Madingley Road, quality public transport, and walking and cycling provision are all supported by a variety of physical elements and measures inherent in the Development and its related Transport Strategy;

- by improving the local Public Rights of Way network as an integral part of a wider transport system, and providing access to the surrounding countryside.

4.3.4 Of the measures identified within the Cambridge Long-Term Transport Strategy, the Development access strategy already incorporates proposals for both the bus-only link, and the new road for all vehicles between Huntingdon Road and Madingley Road: the public transport strategy would deliver enhanced public transport services, and would be complementary and beneficial to another measure if delivered, the expanded Madingley Road Park and Ride site.

4.3.5 This Transport Assessment identifies the transport strategy and travel demand management measures to ensure that the Site will be developed in accordance with national and regional policy, as well as the broad long-term strategy for the development of Cambridge as set out in the local planning documentation.

4.3.6 Indeed, it may be concluded that, overall, the proposals for the Development, and the transport strategy evolving to support it, will make a substantial and significant contribution to the achievement of sustainable development objectives and policies for the Cambridge area.

PART 2 DEVELOPMENT ACCESS AND MOVEMENT DETAILS

This Part contains the following sections:

5 Base Person Trip Assessment

5.1 Introduction

5.1.1 To evaluate the impact of the forecast Development-generated movements, it has been agreed with stakeholders that two transport models be used, in parallel, to evaluate different aspects of the Development impact. Whilst more details are included in Sections 5 and 13, in summary these two models are:

- the local highway authority's Cambridge Sub Regional Model (CSRM) SATURN model, used to evaluate the movements by vehicles generated by the Development on the external highway network throughout the model area shown on the plan in Appendix 8. This model is owned by Cambridgeshire County Council and is an integrated land use and transport model consisting of a land use and transport demand model elements combined with a highway SATURN model. Both the AM and PM Peak periods are modelled by this strategic model;

- a parallel Person Trip Model prepared by Peter Brett Associates, modelling the internal person trip movements throughout the Development area in greater detail than within the strategic CSRM

This section considers the latter, the Person Trip Analysis by Peter Brett Associates which has been used as a comparison to the CSRM.

5.1.2 An assessment is made of the number of trips generated by each mode of travel associated with the land uses within this development. The initial assessment undertaken is what is referred to as a "Base Case", ie, without any influencing factors such as travel demand management measures, improved public transport etc. A later test considers the impact of the Development travel demand management measures, the "Future Case".

5.1.3 The basis of all the transport assessment work is the former, the CSRM, which forecasts trip generation based on predicted productions and attractions from proposed land uses within Cambridge. Travel patterns and mode shares are predicted based on available modes of transport and car occupancy rates based on Department for Transport's TAG 3.5.6 document.

5.1.4 To assess internal person trip movements and the effect of future mode shift away from single occupancy car movements, Peter Brett Associates has undertaken a Total Person Trip and Mode Shift Assessment. This same work has been replicated by WSP to understand and incorporate into the CSRM the benefit of the travel demand management strategy.

5.1.5 This section details the methodology used by Peter Brett Associates to determine the Person Trip generation by all modes from the Development.

5.1.6 The "Base" Person Trip assessment is what could be deemed to relate to a "standard" assessment of person trip generation. The later Section 6 continues to consider changes to the Base mode share that could be made to each individual mode, to create the potential "Future" mode share, and to further enhance the sustainable travel options available at the development.

5.1.7 The Person Trip information will be used for various purposes:

i) to understand the Base mode share, assuming current travel modes are adopted;

ii) to confirm compliance with the Area Action Plan's requirements for mode share for Journey to Work trips;

iii) to review independently the external trip generation of the Development identified in the Cambridge Sub Regional Model;

iv) To inform the design of the pedestrian, cycle and vehicle infrastructure required within the Site;

v) to inform the public transport frequency requirements;

vi) to provide a base from which to assess the Future mode share.

5.1.8 The Person Trip Analysis has been approved by both the Highways Agency and Cambridgeshire County Council in 2011.

5.1.9 Section 5 contains a summary of the assessment.

5.1.10 This work provides a reasonable, robust assessment of the potential trip generation from the Development should its associated travel patterns reflect existing movements

5.2 Land-Use Proposals

5.2.1 The proposed land uses forming the Development are detailed in Section 2.

5.2.2 Due to the process of refinement and evolution of the Development land use budget during the preparation of the Transport Assessment, there have been some changes to the precise quanta assessed. The land uses assigned for the Person Trip Analysis are summarised in Table 5.1 - these changes are marked in italics and in square brackets after the figures used in the model assessment. The changes are relatively minor but would tend to reduce the number of peak hour person trips, particularly in the case of reduction in hotel rooms and removal of conference facilities, The assessment reported here is therefore a conservative slight overestimate of the likely travel demands of the Development.

Table 5.1: Development Land Use assessed in the Person Trip Analysis (note- minor differences to Table 2.1)

Non-residential Uses		
Land-use	**Size (m^2) / Units**	
Market Housing	1,500 units	
Key Worker Housing	1,500 units	
Academic Research	60,000m^2	Total (100,000m^2)
Commercial Research	40,000m^2	
Collegiate	2,000 units	
Local Centre / Community	2,400m^2, consisting of: 800m^2 retail floor area local retail [*1,050m^2*] 250m^2 local centre pub, 300m^2 non-local centre potential retail 800m^2 University Mensa, Further Local Centre / Community facilities includes: 850m^2 community centre [*500m^2, 450m^2 indoor dance*] 300m^2 Police office [*200m^2*] 700m^2 PCT	
Food Store	Retail floor area –net 2,000 m^2 (Gross floor area of 2,900m^2)	
Hotel and conference facility	Hotel - 150 bed spaces Conference - 250 delegate spaces [*130 spaces and no Conference facility*]	
Nursery	Two units, totalling 2,000m^2	
Senior Care 4 storey, assumed to be Sheltered Accommodation	Plot area = 4,312 m^2, 75 units	
School – 3 form entry	Plot area of 3,745m^2 [*2.2 form entry*]	

5.2.3 Of the above land uses, reflecting their limited attraction outside of the development, all the peak hour trips to the School, Local Centre / Community and Nursery have been assumed to be generated from within the Site. It is assumed that the CHP will generate minimal trips on both the internal and external networks, these have therefore not been assessed. External person trips would be generated by the residential development, student accommodation, Academic and Commercial Research, Hotel, Senior Care facility and the food store. These are considered in the sections following.

5.2.4 The majority of the land-use proposed at the Development is for housing and research. Of the total accommodation proposed at the Development - 3,000 residential units and 2,000 student spaces, the 1,500 key worker housing units and the student accommodation – the majority of the residential proposals - are being provided by the University to deliver a sustainable development in a location which is generally accessible by a range of non-car modes, in an environment in which use of non-car modes is both part of the culture and actively encouraged. This will certainly influence the future mode share from this development, as it is known that a significant number of residents would have relatively local work activity linked to their accommodation.

5.3 Outline Methodology

5.3.1 The data sources and methodology for assessing the trips for each land-use type are discussed in detail in the sections following. The methodology may be summarised as follows:

- total person trips are identified by land-use – information obtained from various sources including the Trip Rate Information Computer System (TRICS) and local survey data; considered in Section 5.4
- mode share is also identified by land-use – information was obtained from various sources such as TRICS, and the local Cambridge Travel for Work local survey data;
- the total person trips were calculated, for each land-use, by mode and by hour using the above data, for a 12 hour period;
- the potential internal movements between the different land uses within the Site (between residential and employment, residential and retail, and residential and education) were assessed with reference to observations of the distance travelled between similar land-uses, using local data where possible. To avoid double-counting the internal movements at both ends of the trip, these internal trips were then deducted from the residential end of the trip to provide the total trip generation from all land-uses within the Site;
- to assess the total number of external trips, the internal trips were removed from both land-uses.

5.4 Person Trip Source Data

5.4.1 The person trip source data are considered by individual land-uses with respect to their particular land use attributes, the following were considered to be the most appropriate data sources:

- TRICS database for the majority of the land use person trip rates - for Market, Key Worker, and Collegiate housing, Food Store, Commercial Research, Collegiate, Hotel, Nursery, School and Senior Care land uses;
- survey of existing market flats in Cromwell Road, Cambridge – to inform the Key Worker and Market person trip flat rates;
- survey of the CAPE building in the West Cambridge Development – to inform the Academic Research area person trip rates.

5.4.2 This data is used to assess the total number of person trips generated by each land use within the Development, the person trip rates for these land uses remaining representative for all locations. Once the total number of trips is known, further data sources are considered to asses the assignment of mode to these person trips.

5.4.3 Whilst the TRICS data sources provide a reasonable assessment of the likely trip generation, TRICS provides conservative modal choice data for the Development. The TRICS data base is representative of average assessments, heavily weighted towards conventional forms of development where workers have to travel some distance to their place of work and for other facilities, in communities which do have integrated sustainability principles into their daily lives.

5.5 Modal Choice Data Sources

5.5.1 The modal choice data sources used in the Development Person Trip Analysis are also considered by individual land-uses also with respect to their individual land use attributes, the following were considered to be the most appropriate data sources:

- TRICS database - for Market and Collegiate housing, Food Store, Hotel, and Senior Care land uses;
- University of Cambridge Travel for Work Survey data for Academic Research;;
- Cambridge Science Park Travel for Work Survey data for Commercial Research;
- School Mode Share from Cambridgeshire County Council's Sustainable School Travel Strategy Annual Monitoring Report for he Primary School and Nursery mode choice;
- reference was made to the Census 2001 journey to work database, to provide a comparison to the predicted mode shares.

5.5.2 These data sets all represent conservative (over-estimate) assumptions as to the car driver mode choice. In particular, the Cambridge Science Park data are derived from a predominantly car-orientated development without on-site worker accommodation, with only limited (if any) travel demand management and where trip rates by car are significantly higher than those at the University's West Cambridge Development. Similarly, the school mode share data source - whilst the best available - is also in practice weighted towards less sustainable locations for schools and where development layouts, development components, facilities for pedestrians and cyclists and overall demographics are far less conducive to use of non-car modes of transport.

5.5.3 Overall, therefore whilst the data sets may be some of the best available, they would provide conservative over-estimates of trip generation and modal choice when applied to the Development.

5.6 Trip generation and mode share by land-use

5.6.1 The data sources for each land use were considered in conjunction to provide the trip generation and mode share by land use:

Table 5.2: Summary of data sources for the land uses

Land Use	Trip Generation	Mode share	Comments
Market Housing	TRICS – All Sites	TRICS - Chesterton Cambridge survey	Non-car mode share adjusted to reflect the Census data
Market Flats	Cromwell Road survey	Cromwell Road survey	
Key Worker Housing	Cromwell Road survey	University Travel for Work survey / TRICS	Average mode share used, to reflect part of the trip generation not being University related
Key Worker Flats	TRICS – All Sites	University Travel for Work survey	
Collegiate Accommodation	TRICS	Vehicle mode share – TRICS Non-car mode share - University Travel for Work survey	
Commercial Research	TRICS	Cambridge Science Park Travel for Work survey	
Academic Research	CAPE Building survey	CAPE Building survey	
School	TRICS	Off-peak hours – TRICS Peak hour - Cambridgeshire County Council's Sustainable School Travel Strategy Annual Monitoring Report	
Hotel	TRICS	TRICS	
Local centre	TRICS	TRICS	
Senior Care	TRICS	TRICS	

5.7 Assessment of the Internal Development movements

5.7.1 When the trip generation from each land use within the Site is assessed independently by land-use, the trips with an origin and destination within the Site (eg between residential and employment, or residential and retail) would be identified twice. To avoid double-counting these internal movements at both ends of the trip, the number of these internal trips were identified, then deducted from the total trip generation from all land-uses within the Site.

5.7.2 Internal movements are anticipated between the following land uses:

- Housing (all types) and Academic / Commercial Research – journeys to work;
- Market Housing and Key Worker Houses and School – linked journey to work or other purpose trips;
- All Housing (including Student Accommodation) and Food store;
- Market Housing and Hotel;
- Market Housing and Senior Care.

5.8 Assessment of Total Internal and External Base Case person trips

5.8.1 The Total Person trips generated by the Development have been calculated with reference to the land-use and appropriate trip rates; any internal trips have been removed from the Residential (i.e., the Housing and the Student Accommodation) end to avoid double counting. This is summarised in Tables 5.3 and 5.4.

5.8.2 Similarly, the Total External person trip generation has been calculated by removing all the internal trips both from the accommodation end, and the employment / retail / education end.

5.8.3 Table 5.3 summarises the total 12 hour Base Case trip generation by mode from the Development by land-use.

Table 5.3: Total 12 hour Base Case Person Trip generation by land-use by mode (includes Internal trips from the non-accommodation end only)

	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		PSV		Total Person Trips	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Market Private Housing	132	128	1496	1744	598	683	1123	1086	642	620	49	81	0	0	4040	4343
Market Flats	82	95	652	716	139	171	108	165	159	184	13	19	0	0	1153	1349
Key Worker Flats	281	328	834	973	110	129	1193	1392	324	378	30	46	0	0	2773	3246
Key Worker Houses	61	65	315	336	88	94	318	340	123	131	11	18	0	0	916	985
Student Accommodation	402	471	422	448	136	174	1704	2008	463	545	6	6	4	6	3137	3658
Total - All Accommodation and Housing	*958*	*1086*	*3720*	*4217*	*1072*	*1251*	*4447*	*4991*	*1710*	*1859*	*109*	*170*	*4*	*6*	*12019*	*13581*
Academic Research	402	351	1209	1057	157	138	1706	1491	463	405	108	94	0	0	4046	3535
Commercial Research	68	62	1336	1223	113	104	453	415	113	104	33	36	0	0	2117	1943
School	49	31	355	366	254	263	82	82	827	835	2	2	1	1	1570	1578
Hotel	38	42	155	162	58	58	4	3	125	144	4	4	0	0	384	413
Care Home	6	7	74	70	23	23	5	5	38	35	2	2	0	0	148	141
Food Store	26	36	2448	2372	1214	1163	13	14	394	361	9	10	5	5	4110	3960
Total	1547	1615	9298	9466	2891	2999	6710	6999	3670	3742	266	318	10	13	24394	25151

5.8.4 Table 5.4 shows the External 12 hour Base Case Person Trip generation by mode from the Development by land use.

Table 5.4: External 12 hour Base Case person trip generation by land-use and mode (excludes Internal trips)

	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		PSV		Total Person Trips	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Market Private Housing	131	127	1128	1353	217	292	996	960	225	235	49	81	0	0	2746	3048
Market Flats	81	94	492	555	64	90	95	146	74	100	13	19	0	0	819	1003
Key Worker Flats	281	328	653	781	62	79	1124	1310	230	265	30	46	0	0	2381	2809
Key Worker Houses	61	65	246	269	32	41	293	313	53	57	11	18	0	0	696	763
Student Accommodation	402	471	331	360	82	107	1605	1889	328	383	6	6	4	6	2757	3222
All Accommodation and Housing	*956*	*1085*	*2849*	*3317*	*457*	*608*	*4113*	*4618*	*910*	*1040*	*109*	*170*	*4*	*6*	*9399*	*10845*
Academic Research	402	351	1209	1057	157	138	1421	1242	224	196	108	94	0	0	3522	3077
Commercial Research	66	61	1294	1184	111	101	409	374	85	78	33	36	0	0	1998	1835
School	44	26	59	68	82	90	0	0	27	34	2	2	1	1	215	220
Hotel	38	42	155	162	58	58	3	3	94	108	4	4	0	0	353	377
Care Home	6	7	56	52	23	23	4	4	28	26	2	2	0	0	118	114
Food Store	26	36	1616	1565	728	698	3	3	79	72	9	10	5	5	2466	2389
Total	1539	1607	7238	7406	1617	1716	5953	6242	1448	1556	266	318	10	13	18072	18857

5.8.5 Table 5.5 shows the External 12 hour Base Case trip generation by mode from the Development by each hour.

Table 5.5: External hourly Base Case person trip generation by mode (excludes internal trips)

	PT Pass		Car Driver		Car Pass		Bicycle		Peds		OGV		PSV		Total Person Trips	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
07:00-08:00	30	106	402	511	45	73	192	237	49	118	9	13	0	0	726	1058
08:00-09:00	129	157	899	817	90	85	325	929	96	106	27	15	3	5	1568	2114
09:00-10:00	86	118	753	504	98	97	534	696	103	111	51	23	3	3	1630	1551
10:00-11:00	105	128	557	413	122	103	452	251	69	131	11	20	1	0	1317	1045
11:00-12:00	106	97	590	430	156	106	399	292	104	88	56	70	1	1	1412	1084
12:00-13:00	118	146	536	703	132	181	392	546	99	118	14	30	1	1	1292	1724
13:00-14:00	134	125	625	527	181	155	328	484	154	116	10	32	1	1	1434	1440
14:00-15:00	112	83	465	522	127	134	493	372	103	76	53	41	1	0	1354	1229
15:00-16:00	183	147	451	537	123	162	681	577	119	154	25	17	0	1	1583	1595
16:00-17:00	202	134	580	716	182	198	607	454	198	152	7	16	0	0	1776	1671
17:00-18:00	179	240	812	923	203	212	662	862	192	238	3	22	1	0	2052	2497
18:00-19:00	156	126	569	802	156	209	888	542	161	148	1	19	0	0	1930	1847
07:00-19:00	1539	1607	7238	7406	1617	1716	5953	6242	1448	1556	226	318	10	13	18072	18857
Mode Share																
AM Peak	8%	7%	57%	39%	6%	4%	21%	44%	6%	5%	2%	1%	0%	0%	*100%*	*100%*
PM Peak	9%	10%	39%	36%	10%	8%	33%	34%	9%	10%	0%	1%	0%	0%	*100%*	*100%*
12 hour	9%	9%	40%	39%	9%	9%	33%	33%	8%	8%	1%	2%	0%	0%	*100%*	*100%*

5.8.6 The North West Cambridge Area Action Plan Policy NW11 "Sustainable Travel" requires a modal share of no more than 40% of trips to work by Car Driver. Table 5.4 shows that the total 12 hour Base Case trip generation for the Development for all purposes has a car driver mode share of less than 40% overall. For the purposes of this initial assessment, the trips to school, the Hotel and the Food Store have been excluded, it being assumed that all trips from the housing and research land-uses are journeys to work. The remaining Base Case total trips, assumed to be journey to work trips, are summarised in Table 5.6 External Person Trips only.

Table 5.6: External Base Case Journeys to Work - 12 hour period (excludes Internal trips)

	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		Total Person Trips	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
All Housing	956	1085	2849	3317	457	608	4113	4618	910	1040	9286	10669
Academic Research	402	351	1209	1057	157	138	1421	1242	224	196	3414	2983
Commercial Research	66	61	1294	1184	111	101	409	374	85	78	1965	1798
Total	**1425**	**1497**	**5353**	**5558**	**726**	**847**	**5943**	**6233**	**1219**	**1315**	**14666**	**15450**
	9.7%	**9.7%**	**36.5%**	**36.0%**	**4.9%**	**5.5%**	**40.5%**	**40.3%**	**8.3%**	**8.5%**	**100.0%**	**100.0%**

5.8.7 As shown in Table 5.6, the predicted Car Driver percentage complies with the Area Action Plan requirements.

5.8.8 This Base Case Mode Share and person movement assessment has been used to assess the Future Case Mode Share – further details are given in Section 6. Changes to the Base Case Mode Share have been assessed by individual mode, to create the Future Case Mode Share assessment. As expressed in Section 5.5, the data sources relied upon to generate a Base Case mode share and Person Movement Assessments represent a conservative over-estimate of the likely external trips and vehicle mode share at the Development. Even after adjustment as set out in Section 5.8, the data set out in Tables 5.3 and 5.6 are likely therefore to represent a conservative over-estimate as a consequence of assumptions inherent in the data sets used to arrive at them.

6 Access and Movement Strategy

6.1 Introduction

6.1.1 As summarised in Section 4, both national and local planning / transport policy have objectives to integrate planning and transport at all levels, through the promotion of mixed used developments that provide excellent levels of accessibility by non-car modes of transport.

6.1.2 This policy context for sustainable travel is established within Policy NW11 : Sustainable Travel of the North-West Cambridge Area Action Plan, adopted in October 2009, and contained in Appendix 2. This emphasises that at North West Cambridge, development and transport systems be planned in order to reduce the need to travel and increase the use of sustainable transport modes to encourage people to move about by foot, cycle and bus.

6.1.3 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.

6.1.4 The Access and Movement Strategy set out in the following five sections reviews of the overall accessibility of the Site for pedestrians, cyclists and public transport users, which enables the mode use targets stated in Section 11 to be set. It also sets out the accessibility strategies for each mode to enhance connectivity and accessibility both on- and off-site to encourage local journeys by sustainable modes of travel.

6.1.5 The basis for the access and movement strategy for the Development is set out on “Parameters Plan 02 – Access” for the development prepared by Aecom, reproduced in Appendix 1.

6.1.6 This strategy provides public transport connections for the major residential and employment areas along a high density development public transport priority route.

6.1.7 The elements of this Development Access and Movement Strategy are considered individually in the following sections:

- Section 7 – Pedestrian, Cycle and Equestrian Strategy;
- Section 8 – Public Transport Strategy;
- Section 9 – Site Layout, Vehicular Access and Parking Provision;
- Section 10 – Travel Demand Management Strategy;
- Section 11 – Assessment of Future Mode Shift;
- Section 12 – Construction Access Strategy.

7 Pedestrian, Cycle and Equestrian Access Strategy

7.1 Introduction

7.1.1 Walking forms the most important mode of travel for local trips, and offers the greatest potential to replace short distance car trips of less than 2km. Similarly, cycling offers the greatest potential to replace short- and medium-distance car trips up to 5km. As such, walking and cycling form essential elements of the Access and Movement Strategy for the Development.

7.1.2 Whilst Equestrian movements will not contribute in any measurable degree towards the stated objectives of reducing car-based journeys to work, The provision of Equestrian facilities across the Site will form part of the delivery of a quality development environment for all.

7.1.3 This section considers further the following aspects of Pedestrian, Cycle and Equestrian movement:

i) Summary of the Policy background;

ii) Travel Demand Management measures to promote walking, cycling and equestrian usage;

iii) On site infrastructure strategy;

iv) Off-site infrastructure strategy.

7.1.4 This section identifies that the Development is well-located for walking and cycling with respect to existing pedestrian and cycle facilities, and to connect to other emerging developments in the area. The Development will deliver safe, high-quality walking and cycling infrastructure in the area further to support and encourage walking and cycling modes. As such, it is concluded that walking and cycling will form a significant percentage of the mode share for local trips, reflecting and responding positively to local and national policy guidance and strategies.

7.2 Policy background

7.2.1 PPG13 (Transport) states that walking is the most important mode of travel at the local level, and offers the greatest potential to replace short car trips, particularly those under 2km. PPG13 also states that cycling has the potential to reduce short car trips, for distances under 5km.

7.2.2 The policy context for walking and cycling is established within Policies NW17 : Cycling Provision and NW18 : Walking Provision of the North West Cambridge Area Action Plan, adopted in October 2009 as contained in Appendix 2. This policy context is supported by the objectives of the Cambridgeshire Rights of Way Improvement Plan, ie, an emphasis of the need to improve and promote the public rights of way network in the area, give priority to cyclists and walkers throughout the Site, and to provide quality links to the surrounding walking and cycling network.

7.2.3 The proposed Development walking and cycling strategy further reflects fully the policy identified within the Area Action Plan by:

i) implementing travel demand management strategy techniques to enhance the status of pedestrian and cycling modes;

ii) providing enhanced infrastructure where necessary to assist pedestrian and cyclist movements.

7.2.4 Even though it would not affect the Journey to Work trip mode share, the Development will accommodate and enhance, where practicable, the future equestrian infrastructure. This would be inherently consistent with and integral to the University's desire to deliver a quality development, accommodating movement for all modes.

7.3 Measures to promote walking, cycling and equestrian usage

7.3.1 Details of the Travel Demand Management Strategy are provided within the Framework Travel Plan, submitted separately, a summary is provided later in this section. The measures that are to be implemented at the Development to encourage walking and cycling include:

Design concept – a principal objective is to deliver a compact mixed-use development that would encourage sustainable travel choices, particularly walking and cycling – as emphasised in the Department for Transport's Manual for Streets (2007);

Site Design and Layout – the following principles have been incorporated in the Development design to reduce the number of car trips to and from the Site by encouraging walking and cycling:

- to ensure that the focus of the accessibility strategy for the Site remains strongly in favour of sustainable modes of transport, the Site has been provided with permeable footways and pedestrian crossings delivered along the desire lines;
- provision of a cross-site cycle route, The Ridgeway, that enters at the northern end of the Site (via Huntingdon Road) and routes through the Site in a south easterly direction towards Storey's Way;
- provision of footpaths and cycleways throughout the development creating links to existing public rights of way. Footways would be provided on both sides of the main street and at the Site access locations. Controlled crossing points would be provided, and traffic calming measures would be present at key junctions close to the schools, neighbourhood and local centres to reduce traffic speed and to ease pedestrian movement;
- design of on-site main traffic routes to reduce traffic speeds to 20mph – whilst this measure is primarily to improve safety for all users of the Development and to reduce the attractiveness of this route for rat-running, the increased vehicle journey times will reduce the attractiveness of making car journeys from the Development;
- design of secondary vehicular routes will be designed to keep traffic speeds at 20mph or less also using passive speed management measures such as constrained width and alignment and the use of shared surface areas;

Services and Facilities – a series of measures will be implemented within the Development site to encourage walking and cycling:

- high levels of cycle parking at least to the adopted North West Cambridge Area Action Plan minimum cycle parking standards will be provided within covered, secure, lit and well-located areas;
- all major employers would be required to provide associated shower and changing room facilities for cyclists after cycle journeys;

- application of a Cycle Parking Provision and Management Strategy – see Section 11. Residential and residential collegiate cycle parking will be provided within a covered lockable enclosure, either in a shed or garage, or within lockers or stands within lockable covered enclosures. Cycle parking for the Retail and Hotel areas will be provided as near as possible to the main entrance of the buildings, and will be covered by natural surveillance or CCTV.

7.4 On-site Infrastructure

7.4.1 The pedestrian and cycle infrastructure strategy for the Development has been determined to respond to the following three aspirations:

i) to provide full permeability throughout the Development;

ii) to provide connectivity between the Development and the surrounding area; and

iii) to enhance existing connectivity between surrounding areas.

7.4.2 Pedestrian / cyclist connectivity between the Development and the surrounding area is shown on Figure 3 and on the Parameters Plan 02 – Access shown in Appendix 1. In summary:

i) connections with Huntingdon Road to the north-east are provided at five locations:

- along the orbital site vehicular access route to the Eastern Huntingdon Road access by a combined cycleway / footway;
- along the radial site vehicular route to the Western Huntingdon Road access by a combined cycleway / footway;
- at the northern end of the Ridgeway cycleway, located on Huntingdon Road opposite the Girton Road priority junction by a combined cycleway / footway;
- Bunkers Hill, located opposite the Whitehouse Lane priority junction, by a combined cycleway / footway;
- to the south of Howes Place priority junction by a footway only connection.

ii) connections with Madingley Road to the south are provided at two locations:

- along the radial site vehicular access route by a combined cycleway / footway;
- along Madingley Rise by a combined cycleway / footway;

iii) connections to Storey's Way to the south-east by a combined cycleway / footway.

7.4.3 To increase the patronage of the Development Food Store from commuters using the Park and Ride Site, and to offer access to the Park and Ride bus services to residents and employees on the Development, there is the potential to provide a footpath connection to the Park and Ride site - subject to the occupier of the Park and Ride agreeing to this provision.

7.4.4 The Ridgeway, a quality combined cycleway / footway, will provide a link through the Development between Storey's Way through to Huntingdon Road, opposite Girton Road. The Ridgeway will connect to local areas of the development, and further lower hierarchy cycleway / footways through the development to increase permeability and connectivity. This Ridgeway route will assist both existing and proposed cycle and pedestrian movement through the area by providing improved direct connectivity between major generators and attractors.

7.4.5 All routes within the Development will be designed in accordance with the principles of the suite of *Manual for Streets* design guidance to reduce the attractiveness of this route as a rat-run by containing vehicle speeds and flows, and to provide a quality streetscape.

7.4.6 These pedestrian and cycle connections through the Development will ensure quality accessibility and connectivity to the surrounding areas. They will also significantly enhance and improve the linkages between existing developments – such as Girton and the West Cambridge Development, and Girton and the south of the City – by providing direct quality links on desire lines.

7.4.7 As identified earlier, an isolated bridleway (Bridleway 30) is located to the south of the development to the south of Huntingdon Road – there is no bridleway link between Bridleway 30 and other bridleways to the north of Huntingdon Road. Subject to the highway authorities resolving all outstanding issues off-site, the University would be willing to consider the delivery of an equestrian link through the Development alongside the M11 through open land areas.

7.4.8 The cycle parking standards within the North West Cambridge Area Action Plan will be applied as a minimum. Further details are provided later in this section.

7.5 Off-site infrastructure enhancements

7.5.1 The Development is anticipated to generate increased levels of cycling and walking trips across the network. To enhance pedestrian and cyclist connectivity further, the following pedestrian and cyclist infrastructure enhancements will be provided by the Development. These proposals are entirely compatible with the proposals of the County Council and other developers in the area referred to previously, and are shown on Figure 10:

i) demand-responsive pedestrian and cyclist crossings will be incorporated into the proposed vehicular traffic signal controlled Western Huntingdon Road – Development radial access junction. This will particularly assist cyclist movements to the orbital cyclepath to the north-west of the access point;

ii) in the south verge of Huntingdon Road, a length of 560m of combined unsegregated cycleway / footway - to extend the existing footpath from Girton Road to the vehicular Western Huntingdon Road – Development radial access, and to tie into the end of the north-westbound on-road cyclepath. It is anticipated that this combined cycleway / footway would generally be a minimum of 2.5m in width, therefore (save in limited locations) meeting or exceeding the absolute minimum widths identified in Sustrans' "National Cycle Network - Guidelines and Practical Details";

iii) a demand-responsive pedestrian and cyclist crossing incorporated into the vehicular Eastern Huntingdon Road – Development orbital access. This proposed crossing will complement the further crossing facility incorporated into the NIAB Site Access traffic signal controlled junction – which will replace the existing pelican crossing;

iv) a toucan crossing on Huntingdon Road between the Huntingdon Road East and NIAB accesses to the north-west of Whitehouse Lane, to facilitate cyclist movements along the Cyclist Commuter route;

v) a toucan crossing on Madingley Road adjacent to Madingley Rise;

vi) a traffic signal controlled pedestrian and cyclist crossing incorporated into the vehicular Madingley Road – Development junction;

vii) a toucan crossing on Madingley Road adjacent to Clerk Maxwell Road;

viii) improved pedestrian measures at the Huntingdon Road / Victoria Road / Castle Street junction (see below).

7.5.2 The Development will generate additional cyclist and pedestrian movements along the Huntingdon Road corridor towards the town centre. The Huntingdon Road / Victoria Road / Castle Street junction has existing issues with non-car movements through this junction. Hence a series of minor enhancements have been proposed to respond to these, this strategy having been formulated to have minimal or nil impact in highway capacity terms on this junction. The proposed enhancements are shown on Figure 11 and include:

i) widened central island at the Victoria Road pedestrian crossing;

ii) advanced cyclist stopline at the junction stopline of Castle Street / Mount Pleasant, with extended central island;

iii) advanced cyclist stopline at the junction stopline of Huntingdon Road / Victoria Street, with extended central island;

iv) advanced cyclist stopline at the junction stopline of Histon Road / Victoria Street.

7.5.3 It is considered that these infrastructure proposals would:

i) deliver quality cycle and pedestrian connectivity throughout the Development;

ii) enhance pedestrian and cyclist safety off-site ;

iii) deliver connections to important local destinations - such as the secondary school to the north of Huntingdon Road, the employment opportunity to the south of Madingley Road, and towards the facilities within the City;

iv) significantly enhance the existing pedestrian and cycle provision to the surrounding area by providing direct routes across the Development;

v) overall, preserve and enhance the attraction of pedestrian and cyclist modes of travel.

7.5.4 The County Council has requested the University consider the provision of an enhanced equestrian corridor to the east of the M11 to form an extension of the existing Bridleway 30 - including a new Pegasus crossing of Madingley Road: this is shown on Figure 10. This aspiration is undeliverable or undesirable for a number of reasons. It would require third party land to the north of Madingley Road. A crossing point on Madingley Road in close proximity to the M11 On-Slip junction would be undesirable in safety terms.

7.5.5 The measure would also be unnecessary. High quality routes through the Development and crossings of Madingley Road are being provided, which would, in conjunction with the footway / cycleway provision through West Cambridge Development, deliver an accepatable route for equestrians.

7.5.6 In addition to improving the off-site footpath and cycleway infrastructure stated above, the University would make contributions towards the upgrade of the M11 Underpass to assist in enhancing pedestrian links from the Development to the surrounding countryside. Indeed, should the potential Bridleway 30 link extension referred to in paragraph 7.4.7 be implemented to the east of the motorway, the highway authority could itself consider upgrading the underpass and existing Footpath 3 / 5 to the west of the motorway to enhance the equestrian links in this area.

7.6 Conclusions

7.6.1 The Development is well-located for walking and cycling with respect to existing pedestrian and cycle facilities, and to connect to other developments in the area. The Development will deliver safe, high quality walking and cycling infrastructure in the area further to support and encourage the walking and cycling mode. In addition, further infrastructure will be provided to enhance the connectivity to the surrounding countryside. As such, it is considered that walking and cycling will form a significant percentage of the mode share for local trips, reflecting local and national policy guidance and strategies.

8 Public Transport Strategy

8.1 Introduction

8.1.1 Whilst walking and cycling offer the greatest potential to replace short- and medium distance car trips, bus travel also offers another option to replace car travel over these distances. A quality bus and rail system particularly offers the greatest potential to replace car travel over longer distances, both locally (such as to adjacent developments), to other destinations across Cambridge, and to further afield. As such, public transport forms a further essential element of the Access and Movement Strategy for the Development.

8.1.2 This section considers in detail the following aspects of Public Transport movement:

i) Policy background;

ii) Route Identification and Selection;

iii) Strategy Principles;

iv) Scenario Detail;

v) On-site infrastructure;

vi) Information and Incentives.

8.1.3 This section shows that the Development is well-located, being adjacent to well-frequented existing bus routes connecting to a range of destinations through the city. It identifies that the Development will contribute towards additional bus services further to enhance these existing services to increase bus usage, as well as providing quality infrastructure through the development. It concludes that bus usage will form a significant percentage of the mode share for short, medium, and longer distance trips, and would reflect local and national policy guidance and strategies.

8.2 Policy background

8.2.1 The policy context for public transport is established within Policy NW16 : Public Transport Provision of the North West Cambridge Area Action Plan, adopted in October 2009.

8.2.2 This policy states that high quality public transport provision should be provided to support development, including:

i) segregated bus priority routes through the development;

ii) links of bus routes within the development to the wider bus network;

iii) and the provision of bus stops and shelters equipped with real time passenger information.

8.3 Route Identification and Selection

8.3.1 Reflecting the strategy identified within the Area Action Plan for public transport, the Site would need to be well served by local bus routes to deliver the Area Action Plan's indicated maximum 40% target mode split for Journey to Work car trips. The University's already active travel policy has encouraged staff and students to use public transport, cycle or walk wherever possible; to date this has been a highly successful measure and the future development of bus services in this corridor would enable this to be further enhanced.

8.3.2 At this stage, it is thought that the preliminary public transport provision for the completed development would be in the order of:

i) a service - reflecting the preliminary person trip analysis - that provides six buses per hour between the Development and the city centre during Monday to Friday daytimes, four buses per hour during Saturday daytimes and two buses per hour in the evenings and on Sundays;

ii) the service would be delivered with high-quality, low-emission vehicles with low floor, step free access for the elderly, pushchairs and wheelchairs;

iii) to increase the potential for bicycle use, the operators are being approached to consider cycle carriers on buses on this route; and

iv) the ability to offer network ticketing, allowing for passengers from destinations other than Cambridge city centre to make journeys on other services and transfer using the same ticket.

8.3.3 These objectives may be delivered by one single route or a combination of routes, provided that tickets are available for use on all services and they all meet the necessary quality criteria.

8.3.4 The strategy for public transport access into the Site includes the following:

i) for the early stage of the development, accessing from Madingley Road via the new Madingley Road site access road link to the east of the Park and Ride site;

ii) during the development, accessing via the proposed Huntingdon Road East site access; and

iii) in the last stage of the development, accessing via the proposed Huntingdon Road West access.

8.3.5 Reflecting the phased adoption of these access points, the strategy has been developed for both the alteration of existing bus services to operate via the Site, and to provide new links where this is considered necessary. Table 8.1 indicates the potential for eight routes operating on either Madingley Road or Huntingdon Road to be altered to meet the requirements of the Site. All services with a frequency of hourly or better have been included - with the exception of Service X5 as this is a long distance express coach service.

8.3.6 The scope for diversion or alteration of existing routes to meet the public transport requirements of the Development has been considered. The results are set out in Table 8.1:

Table 8.1 – Potential services to be diverted to serve the Development

Route	Diversion	Advantages	Disadvantages	Suitability
1A	From Huntingdon Road, via site, to Madingley Road/return to Huntingdon Road (later phase)	Provide direct links from areas north-west of city	Insufficient frequency Run by independent operator (ticket and combination problems)	×
15/15A	Divert from Huntingdon Road, via site, to Madingley Road/return to Huntingdon Road	Provide direct links from areas north-west of city	Insufficient frequency To be withdrawn after Busway opening	×
55	Divert from Huntingdon Road, via site, to Madingley Road/return to Huntingdon Road	Provide direct links from areas north-west of city	To be withdrawn after Busway opening Longer journey times for existing passengers	×
77	From Madingley Road, via site, to Huntingdon Road	Sufficient frequency High capacity vehicles	Conflicting passenger needs Increased P&R journey time Could not serve north-western phase	×
Citi 4	From Madingley Road, via site, to Huntingdon Road	Provide direct links from areas west of city Simple to integrate with Uni 4	Longer journey times from rural area	×
Citi 5	Divert from Huntingdon Road, via site, return to Huntingdon Road	Cost effective Fast journey time to city Sufficient frequency	Potential impact on competitiveness Journey time increase for existing passengers	✓
Citi 6	Divert from Huntingdon Road, via site, return to Huntingdon Road	Sufficient frequency	Could not serve north-western phase	×
Uni 4	Extend from current Madingley Road terminus to site	Cost effective No journey time impacts for existing passengers Links to other University sites	Potential impact of frequency increase on Citi 4 Circuitous journey	✓

8.3.7 The majority of routes in the table have been excluded from further analysis for the following reasons:

i) insufficient frequency;

ii) impact on journey time for inter-urban passengers;

iii) inability to serve the whole of the development in the later phases

iv) detrimental effects on combined frequencies of more than one route on certain corridors; and

v) inability to offer wider ticketing arrangements.

8.3.8 It has been concluded that the following two Services are suitable for diversion or extension:

i) Citi 5;

ii) Uni 4.

8.3.9 These services are frequent urban routes designed for maximum penetration into residential areas. The issues relating to these services are considered further.

Service Citi 5

8.3.10 Service Citi 5 currently operates along Huntingdon Road between Bar Hill and the city centre. The service takes the most direct route into Cambridge, and combines with the Citi 6 Service route south of Girton to provide an enhanced frequency.

8.3.11 The provision of public transport services to the Site would be expected from development commencement in 2012, with the opening of the Development Site Access road link between Huntingdon Road and Madingley Road. However, in the initial discussions with Stagecoach, they have agreed that they do not consider that diversion of the Citi 5 Service into the Site at that time is a practical proposition as this would only provide a one way route to and from Huntingdon Road. Stagecoach considers that the extended journey time and requirement to "double back" would lessen their competitive position on this corridor during these earlier stages. As a significant proportion of the northernmost elements of the Site would be within 400 metres of a bus stop on Huntingdon Road, it is not considered that the Citi 5 Service need be diverted at this time.

8.3.12 In the later stages of development, the Citi 5 Service could access the Site to and from Huntingdon Road using both accesses to form a loop within the Site, ie, leaving close to Howe Farm and proceeding through the development to the central square before turning north to return to Huntingdon Road. It is estimated that the diversion through the development would add 1.1km in the later phases, which equates to approximately 4-5 minutes at an average urban bus speed of 18kph.

Service Uni 4

8.3.13 Service Uni 4 provides a complementary service to Citi 4 along Madingley Road, and is designed to provide a link for University students and staff between the Park and Ride site, the West Cambridge campus, the various departments across the fringe of the city centre and Addenbrooke's Hospital. The reliance on University patronage is reflected by the fact this service runs Monday to Friday daytimes only, at a frequency of every 20 minutes. This service is financially supported by the University.

8.3.14 Currently this service terminates at the Madingley Road Park and Ride site. Given that the proposed Development access from Madingley Road is located to the east of the Park and Ride site, there are two options for continuing to serve the Park and Ride site whilst also allowing access to the development:

i) development-bound buses would continue as per their current route to the Park and Ride site, then exit the Park and Ride site and turn north into the access road to the development; or

ii) buses would turn north directly into the Development from Madingley Road. Whilst the bus would avoid driving into the main Park and Ride site, the bus would serve a new pair of bus stops on the access road connected by a footpath to the Park and Ride site.

8.3.15 Despite its increased infrastructure requirements, the second of these options is preferred as it would allow the bus to avoid the main Park and Ride site, whilst still delivering bus access within 400 metres from all the car park spaces within the Site. A total travel distance of 0.8km - 2 to 3 minutes journey time - would be saved by avoiding the terminus, keeping journey time to a minimum and increasing the attractiveness of the service. It is thought that the attractiveness of a direct access to the Park and Ride for Uni 4 users would not be significantly affected: some car park spaces to the east of the facility would be as close to the new stops as they are to the current terminal building, and the separation of the Uni 4 and 77 Service routes is not an issue as they serve two separate markets. A quality, lit footpath connection will be required to link through to the Development Site Access road, with quality bus shelters provided on site.

8.3.16 The extension of the Uni 4 Service would add a total of 0.4km to the route in the early phases, and up to 1.5km in the later phases, with an increased overall journey time of up to 5 minutes at an average speed of 18kph.

8.3.17 It is proposed that the service operates via Emmanuel Street in the city centre on journeys towards the Development. This will aid passengers in their route selection, as it enables services Uni 4, Citi 4 and Citi 5 to all depart from the same street. It is recognised however that there may be some stand allocation pressures which will need to be resolved as a result. This arrangement offers the maximum frequency of service to and from West Cambridge and the Development, as there will be no requirement for passengers to choose between Emmanuel Street and Silver Street as their city centre stop. Buses towards Addenbrooke's Hospital will serve Downing Street, offering greater penetration into the city centre.

8.3.18 It is an aspiration shared with both the University and the Joint Authorities to provide a direct service linking between the Development, and the Rail Station. It would be more appropriate for this to be delivered by the Uni 4 Service than any of the other services considered. However, several issues would need to be resolved for the Rail Station to be accessed:

i) to continue the service on its existing route to Addenbrooke's Hospital from the Rail Station would impact upon the number of buses required to deliver this service, and the cost of providing this level of service – with an associated increased fare cost;

ii) there are stand allocation pressures around the Station – this may, of course, change following the opening of the new Guided Busway facilities there;

iii) whilst terminating the Uni 4 service at the Rail Station would impact less upon the costs of delivering this service, it would reduce the level of connectivity to the University facilities to the south – a main purpose of the Uni 4 Service.

8.3.19 Further work is ongoing to enable the delivery of such a direct Station service link. If such a service cannot be appropriately delivered (the resulting service route from West Cambridge and the Development to the Station / Addenbrooke's Hospital would be relatively indirect), it is likely that an equally quick journey could be provided between the Rail Station and Development by an interchange between the Citi 5 and city-bound services in the city centre.

8.4 Development Service Principles

8.4.1 Following initial consultation with Stagecoach, the Development will in the long term provide a further 320 additional seats to the existing situation in the peak hours to/from the development, through a combination of extension of and improvement to the existing Uni 4 and Citi 5 services, followed by an enhanced service to/from the Science Park. This strategy allows for future growth, travel plan measures and allows for a general increase in capacity to cater for the wider market in a flexible manner should this be shown to be necessary.

8.4.2 It is anticipated that a lower level of bus infrastructure will be implemented initially, with a view to increasing the service frequencies to the final levels when the demand has increased proportionately.

8.4.3 The key to this approach is the extension of Service Uni 4 to serve the Site from earlier stages in the Development programme, with an increase in service frequency as the development progresses. This is accompanied in later stages by diversion of Service Citi 5, which would provide short journeys between the Site and the city centre at certain points over the development build-out period.

8.4.4 Table 8.2 indicates the progression of bus service delivery to the Site, as illustrated in the accompanying Figure 12:

Table 8.2 – Proposed Bus service frequencies

Citi 5	Uni 4	Science Park
10 min Citi 5 in North West Cambridge	10 min Uni 4 via West Cambridge Citi 4 operates direct via Madingley Road	30 mins between West Cambridge and the Development, and Science Park

8.5 Scenario Detail

8.5.1 The Bus Service provision is summarised in this section, and shown in the accompanying Figure 12. Indicative service pattern timetables are contained in Appendix 9.

8.5.2 By the end of development, the Huntingdon Road (West) access would be implemented, enabling Service Citi 5 journeys to / from Bar Hill to divert from their current route and serve the Site. Initially, the frequency of Service Citi 5 can be increased to provide 10 minutes frequency during Monday to Saturday daytimes between the Development and the city centre. The evening and Sunday service provide a 30 minute frequency throughout on service Citi 5 to Bar Hill, with the exception of Sunday evenings when the frequency is reduced to every 60 minutes.

8.5.3 The later phases of development at the Site would include a greater emphasis on commercial and academic research facilities. At this time enhanced links between the West Cambridge and the Development would be advantageous, and consideration of improvements to the Service Uni 4 would be appropriate.

8.5.4 By development completion, it is intended that there would be an increased frequency on Service Uni 4 to every 10 minutes during Monday to Friday daytimes between the Development and the city centre, with the same 30 minute extension to Brooklands Avenue and the Railway Station / Addenbrooke's Hospital. This maintains the existing frequency to the West Cambridge site, and allows Service Citi 4 to operate direct from Cambourne via Madingley Road. At this stage of development, Service Uni 4 would terminate at a point in the north-western corner of the Site. Provision would be made in this area for a bus to manoeuvre safely. .

8.5.5 Overall service frequency by development completion is anticipated to be:

i) a 10 minute frequency during Monday to Saturday daytimes on Service Citi 5 to Bar Hill and Cambridge city centre;

ii) a 30 minute frequency in the evening and on Sundays on Service Citi 5 (except Sunday evenings when the frequency is every 60 minutes);=

iii) a 10 minute frequency service on Service Uni 4 on Mondays to Fridays to Cambridge city centre, with a 30 minute service to the Railway Station / Addenbrooke's on Mondays to Fridays. A 30 minute frequency service on Saturdays as far as the city centre only; and

iv) a 30 minute frequency service between West Cambridge and the Development, NIAB, Orchard Park, the Regional College and the Science Park on Mondays to Fridays.

8.6 On site bus Infrastructure

8.6.1 In order to facilitate an attractive bus service with good, safe headway through the Site and hence to users to the service, the following would be provided:

i) high quality bus stops;

ii) bus priority measures such as bus lanes or bus gates;

iii) measures to allow buses to turn on site;

iv) sections of dedicated bus-only routes; and

v) selected vehicle detection for buses to improve the flow of buses or enable passengers to access facilities.

Bus Stops

8.6.2 High quality bus stops act as the gateway to the network, and as such are the 'shop window' that are seen by travellers on all modes as they make their journeys. Bus stops would be equipped at this development with the following:

i) a high quality, 3 sided shelter;

ii) seating and lighting;

iii) comprehensive timetable information, including network maps and fare details;

iv) a flag indicating services calling at the stop;

v) off-bus ticketing facilities to speed boarding times;

vi) Real Time Passenger Information (RTPI) screens indicating departure times of the next bus;

vii) a raised kerb to assist the less mobile or those with pushchairs to access the bus;

viii) litter bins in close proximity but not obstructing access to and from the bus;

ix) cycle stands to allow cycle-bus interchange; and

x) 'Bus stop' cage markings and an associated clearway order to keep bus stops free of other parked vehicles.

8.6.3 Provision of these facilities, and their prompt maintenance and repair by the bus operator or Development management, would ensure that the point of access to bus services is kept to a high standard, and would act as an attractor to public transport services within the development.

8.6.4 It is considered that six pairs of bus stops would be required on the development site. The provision of these would be phased to reflect the progress of the emerging development.

Bus priority measures

8.6.5 A bus gate is proposed on the Huntingdon Road – Madingley Road Link Road through the centre of Development in the early stages, to prevent traffic from taking a direct route between Huntingdon Road and Madingley Road (although an alternative, longer and less attractive route would be available for all vehicles). Service Uni 4 would make use of this, as would the proposed shuttle service to the Science Park.

8.6.6 Additional bus priority could be provided by the use of Selective Vehicle Detection (SVD) technology at traffic signals controlling the entrance to the Site from Madingley Road and Huntingdon Road. This would detect approaching buses, and alter signal phases accordingly to ensure the minimum of delay to the bus.

Off-site infrastructure enhancements

8.6.7 In terms of off-site enhancements that would provide benefits to the Site, it is considered that the following would be necessary:

i) improvement to three pairs of bus stops on Huntingdon Road located close to pedestrian accesses to the development, including provision of crossing facilities where necessary; and

ii) a new pair of bus stops on Huntingdon Road to be provided to the east of the access to Girton College.

8.6.8 These improvements could enhance access to the bus network on the Service Citi 5 route before the service starts to operate through the Site. It would be important to enhance these bus stops to the same standard as those on the Site (where practical) to allow a continuous journey experience to be delivered.

8.7 Information and Incentives

8.7.1 The provision of tailored information and incentives is now a mainstream method of attracting additional patronage to public transport networks around the UK. Research has indicated that a lack of understanding of the travel options available acts as a significant barrier to travel by more sustainable modes. In recent years a number of high profile projects have been undertaken to provide residents with targeted, specific information about the public transport services in their vicinity. Results have been encouraging in areas ranging from cities such as London, Peterborough and Nottingham, to smaller sized towns such as Bracknell and rural areas such as the Truro area.

8.7.2 To increase the use of public transport at the Development, information on the services will be made readily available to residents, visitors, students and employees at the Development, be it at the bus stop, by telephone, SMS text messaging or the Internet. Portals are already available for remote access to bus information, for example through http://www.travelineeastanglia.co.uk which provides details of timetables, or http://www.cambridgeshirebus.info which provides Real Time Passenger Information. Traveline also operate a telephone service.

8.7.3 The management of the Development will ensure the bus stop information will be well-maintained. Any alterations to services will be advertised in advance and correct timetables inserted at stops as close as possible to the change date. This includes alterations to the wider network as shown on timetable panels in the shelters.

8.7.4 The Household Travel Packs are proposed for households and workplaces from first occupation as part of the Travel Demand Management Strategy (see Section 10). These would include relevant bus information such as:

i) timetables and network maps for bus services;

ii) summarised rail timetables from the nearest station (in this case Cambridge);

iii) motivational messages to encourage use of sustainable transport modes;

iv) stickers, key rings, air fresheners etc with sustainable travel messages;

v) details of bus services and access points;

vi) passes for free travel (see paragraph 8.7.5 below); and

vii) travel diaries (if appropriate) to record before and after travel habits and measure the success of the project.

8.7.5 Stagecoach has a good record of providing incentives to developments in the area to encourage early usage, and they have indicated that they would be willing to provide these incentives for the Development. These could include:

i) a travel pass allowing one month's free travel on the Cambridge bus network, provided by Stagecoach;

ii) a pack of information containing timetables pertinent to the development, plus a summary of the Cambridge network as a whole.

8.7.6 This could be enhanced by further information such as detailed above. The project could be monitored to test the effectiveness of such methods in this location and with the mix of uses.

8.8 Conclusions

8.8.1 The Development is well-located, adjacent to well-frequented existing bus routes connecting to a range of destinations through the city.

8.8.2 The Development will contribute towards additional bus services further to enhance these existing services to increase bus usage, as well as providing quality infrastructure through the Development.

8.8.3 As such, it is considered that bus usage will form a significant percentage of the mode share for short, medium, and longer distance trips, reflecting local and national policy guidance and strategies.

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9 Site Layout, Vehicular Access and Parking Provision

9.1 Introduction

9.1.1 Appropriate levels of car and cycle infrastructure form an essential element of the travel demand management strategy. Providing for the necessary vehicular and cycle trips associated with the development will help manage travel by car, and reflect the need to promote the use of other sustainable modes of travel.

9.1.2 This section considers in detail the following aspects:

i) Parking Policy background;

ii) Area Action Plan car parking standards;

iii) Area Action Plan cycle parking standards;

iv) Site Layout and Vehicular Access.

9.1.3 This section identifies the car and cycle parking provision in accordance with the Area Action Plan standards. It shows how the Development access strategy and site layout have been designed to ensure the focus of the accessibility strategy for the Site remains strongly in favour of sustainable modes of transport.

9.2 Parking Policy background

9.2.1 The policy context for car and cycle parking is established within the North West Cambridge Area Action Plan, contained in Appendix 2. This provides maximum car parking and minimum cycle parking standards. It emphasises that the overall aim will be to contain the amount of car parking and to increase the amount of cycle parking in order to encourage the use of more sustainable modes.

9.2.2 The Area Action Plan supports a pragmatic approach to the incorporation of an appropriate number of parking spaces within the development, and that the parking provision identified within the Area Action Plan has been set to achieve this. Application of this level of parking and the proposed accessibility measures for the Development would reflect the Area Action Plan policy, both providing for the necessary vehicular trips associated with the development, whilst managing the need to travel by car and promoting the use of other sustainable modes of travel.

9.3 Area Action Plan car parking standards

9.3.1 The maximum car parking standards to be applied in the Development are stated in Appendix 1 of the adopted Area Action Plan, summarised in Table 9.1.

9.3.2 The Area Action Plan does not include a stated car parking standard for Conference facilities, nor for the University Mensa (a student café). The rates for what are considered to be the most similar land-uses, “Places of Assembly” and “Food and Drink – Takeaway” are included as proxies.

Table 9.1: – North West Cambridge Area Action Plan maximum car parking standards

Land use type		Parking provision
Residential :	1 to 2 bedrooms: 3 or more bedrooms:	1 space 2 spaces
	In addition, visitor parking should be provided at a rate of 1 space per 4 units, provided that off-street parking would not be above 1.5 spaces per dwelling	
Academic and Research:	B1 Offices, General Industry	1 space per 40m^2 GFA
	Non-residential higher education	2 spaces for every 3 staff
Residential Collegiate :	Student residential accommodation subject to proctorial control	1 space every 10 beds + 1 space for every resident warden (For the purposes of this assessment, the number of wardens is assumed to be 1 per 40 students)
Retail :	Food store Local Centre Store	1 space per 50m^2 up to 1,400m^2 GFA + 1 per additional space per 18m^2 1 space per 50m^2
PCT	Clinics and Surgeries	1 space per professional member of staff, + two spaces per consulting room
Local Centre	Public hall / community centres	1 space per 20m^2
University Mensa	Food and Drink Takeaways	1 space per 20m^2 drinking / dining area
Hotel:	Guest houses and hotels	2 space per 3 bedrooms, and 1 space per resident staff
Nursery	Crèche	2 spaces per 3 staff
Senior Care	Retirement home	1 space per 4 units 1 space per 2 staff
School	Non-residential schools	2 spaces per 3 staff

9.3.3 In accordance with the Area Action Plan, at least 5% of the total number of car parking spaces will be reserved for disabled people - calculated as 5% of the AAP maximum for each land use. These dedicated disabled car parking spaces will be:

i) located adjacent to entrances (or if not provided within the Site, to be located within 100m of the Site);

ii) be convenient to use;

iii) have dimensions that conform to Part M of the Building Regulations;

iv) and be suitably marked.

9.3.4 To comply with the requirement within the standard for visitor car parking, additional car parking spaces have been allocated for this purpose. The AAP car parking standards state that "visitor (*car*) parking should be provided at a rate of 1 space per 4 units, provided that off-street parking would not be above 1.5 spaces per dwelling". For the purposes of this assessment, it has been assumed that visitor car parking spaces are provided at a rate of 1 space per 4 units for both Terrace Housing units, and the other 1 and 2 bedroom units (the units with parking provision below 1.5 spaces per dwelling), giving a further 515 spaces - providing further spaces for the units provided with 2 parking spaces would provide car parking provision in excess of the provision of 1.5 spaces per unit.

9.3.5 Applying the car parking provision as stated in the Area Action Plan, summarised in Table 9.1, to the Development land-use budget summarised in Table 2.1, would result in the maximum car parking requirement identified in Table 9.2. To provide the initial assessment of the car parking space demand for the residential element, the following numbers of units in each of the bed space categories have been assumed, reflecting the Description of Development included in Appendix 1.

Table 9.2: – AAP Maximum car parking provision for the Development

Residential Spaces					
	4 and 5 bed	**3 bed**	**2 bed**	**1 bed**	**Total**
Unit numbers (approximate)	409	570	1,139	884	**3,000**
Residents' parking	818	1,140	1,139	884	**3,981**
Additional visitor parking	0	0	286	221	**507**
Total Residents Parking	**818**	**1,140**	**1,425**	**1,105**	**4,488**
Non-Residential Uses					
Land-use	**Size (m2)**				**Spaces**
Academic Research	60,000m^2				1,500
Commercial Research	40,000m^2				1,000
Collegiate	2,000 units				250
PCT	700m^2 (assumed to be 9 professionals, 8 rooms)				25
Local Centre Community Hall	500m^2				26
Local centre store	1,100m^2 GFA				22
Food Store – GFA	2,900m^2 GFA				147
University Mensa	800m^2 GFA (assumed to be 500m^2 drinking / dining area)				25
Police Office	200m^2				5
Hotel	130 bed spaces (assuming 25 resident staff)				111
Nursery	Assuming 62 staff				41
Senior Care	75 units (assuming 1 member of staff)				20
School	60 staff				40
Total Non Residential					**3,212**
Total across the Development					**7,700**

Disabled parking will be provided at a rate of 5% of the total maximum for each land use.

9.3.6 The maximum car parking provision identified in Table 9.2 has been calculated with respect to the AAP car parking standards. The University is committed to delivering a high quality development. Under-provision of parking within the Site could be detrimental to the streetscene. The maximum car parking provision has been reviewed in Section 19.3 to derive a revised car parking strategy for the Development as part of the mitigation strategy.

9.3.7 This AAP maximum level of car parking has been assumed within the CSRM modelling work, to assess the potential levels of car driver trips generated by the Development. Should a lower level of car parking be provided, this would cause a consequential reduction in the levels of car driver trip generation.

9.4 Area Action Plan cycle parking standards

9.4.1 The cycle parking strategy is also intended to support the travel demand management strategy for the Development. The Cambridge area already has a strong cycle culture, and the Development is well-located with respect to existing and proposed cycle facilities.

9.4.2 The minimum cycle parking standards within the North West Cambridge Area Action Plan are summarised in Table 9.4.

9.4.3 Other cycle parking standards are potentially appropriate in this case. The Code for Sustainable Homes does not specify a particular level of cycle parking – instead, credits are awarded for various features, and the sustainability of any particular dwelling is assessed with respect to the total number of credits. Cycle parking is such a measurement criteria within Category 1 Energy / CO_2, and the criteria are included in Table 4. The Code for Sustainable Homes cycle parking standards for 4 bedroom houses would provide one more cycle space than the Area Action Plan standard, hence have been applied to ensure that all units achieve two credits.

9.4.4 The Building Research Establishment's Environment Assessment Method Office Building Assessment (2008) should also be considered in this instance for the Research areas. Credits are awarded for various features, and the sustainability of any particular building is assessed with respect to the total number of credits. In Issue Tra 3, Cyclist Facilities, the BREEAM assessment specifies:

"For First credit
1. The number of compliant cycle storage spaces provided as follows:
   a) 10% of building users up to 500 PLUS
   b) 7% of building users in the range of 501 – 1000 PLUS
   c) 5% for building users over 1000

For Second credit
1. The first credit must be achieved.
2. At least two of the following facilities must be provided for the building users:
   a) Compliant showers
   b) Compliant changing facilities and lockers for clothes
   c) Compliant drying space for wet clothes

9.4.5 Based on typical employee occupancy information provided by Creative Spaces of a maximum density of Research land-use occupation of around 1 employee per 23m^2, there would be around 2,610 occupants in the Academic Research areas. Applying this same occupancy rate to the Commercial Research area, there would be around a further 1,740 occupants. This suggests that there would be a total of around 4,350 employees within the Research land uses at the Development. The provision of the AAP maximum standard of one cycle parking space per 30m^2 would provide parking in excess of 10% of building users, and as such would qualify for the maximum award of two credits. The sufficiency of this level of cycle parking provision would be kept under review.

9.4.6 Survey work will be commissioned and undertaken by the University to inform further the cycle parking requirements.

9.4.7 The cycle parking spaces within these Research areas will be provided in covered, lockable, lit and well-located shelters within the individual development plots. Associated with good cycle parking, sufficient lockers, wet clothing drying areas and showers will be provided within the individual larger buildings. These facilities, in addition to the cycle parking at the AAP standards would result in the award of the second BREEAM credit, as identified earlier.

Table 9.3: – Cycle parking standards

North West Area Action Plan Standards		
Residential	1 to 3 bedrooms: 4 bedrooms 5 or more bedrooms:	1 space per bedroom 3 spaces 4 spaces
Academic and Research	B1 Office Storage and Other B use classes	1 space per 30m^2 GFA On merit
	Non-residential higher education	Cycle parking for all students and 1 for every 2 members of staff
Residential Collegiate	Student residential accommodation subject to proctorial control	2 space every 3 beds 1 visitor space per 5 beds
Retail	Food store and Local Centre Store	1 space per 25m^2 GFA up to 1,500m^2, thereafter 1 space per 75m^2
PCT	Clinics and Surgeries	2 spaces per consulting room, 1 space for every 3 professional members of staff
Local Centre	Public hall / community centres	1 space per 15m^2 of public floor area
University Mensa	Food and Drink Takeaways	1 space per 10m^2 dining area
Hotel	Guest houses and hotels	2 spaces per 10 bedrooms, 1 space per 2 members of staff
Nursery	Crèches and Nurseries	1 space per 2 members of staff 1 visitor space per 5 children
Senior Care	Retirement home	1 space per 6 residents 1 space per 2 members of staff
School	Non-residential higher and further education	1 space for 50% of children between 5 and 12
"Code for Sustainable Homes" – DCLG – for 2 Credits		
Residential	Studios / 1 bed dwellings 2 / 3 bed dwellings 4+ bed dwellings	1 spaces per unit 2 spaces per unit 4 spaces per unit

9.4.8 Residential and residential collegiate cycle parking will be provided within covered lockable enclosures, either in a shed or garage, or within lockers or stands within lockable covered enclosures. Cycle parking for the Retail and Hotel areas will be provided as near as possible to the main entrance of the buildings, and will be covered by natural surveillance or CCTV.

9.4.9 Using the same housing unit mix assumptions stated above for the Car Parking provision, the overall proposed cycle parking provision for the Development is summarised in Table 9.4.

Table 9.4: – North West Cambridge Residential and Mixed-Use Cycle Parking Ratios

Density of Development	Cycle parking Provision	Cycle parking space ratio (number per unit)		Approximate number of Dwellings / Area	Number of spaces
Residential Land-Use					
1 bed	North West Area Action Plan	1 space per bedroom	1 space	884	884
2 bed			2 spaces	1,139	2,278
3 bed			3 spaces	570	1,710
4 bed		4 spaces		373	1,492
5 bed		4 spaces		36	144
Total				3,002	6,508
Non-Residential Land-Uses					
Academic Research	North West Area Action Plan	1 space / 30m^2		60,000m^2	2,000
Commercial Research				40,000m^2	1,333
Collegiate		2 spaces / 3 bedrooms 1 visitor space / 5 bedrooms		2,000	1,733
PCT		2 spaces per consulting room, 1 space for every 3 professional members of staff		9 professionals, 8 rooms	19
Local Centre Community Hall		1 space per 15m^2 public floorspace		850m^2	57
Local centre store		1 space per 25m^2 GFA up to 1,500m^2, thereafter 1 space per 75m^2		800m^2	32
Food Store				2,900m^2	79
Mensa		1 space per 10 m^2 dining area		500m^2 dining area	50
Police Office		1 space / 30m^2		300m^2	10
Hotel		2 spaces per 10 bedrooms, 1 space per 2 members of staff. (assumed to be 25 staff)		130 bed spaces	43
Nursery		1 space per 2 members of staff 1 visitor space per 5 children		62 staff, 355 pupils	102
Senior Care		1 space per 6 residents 1 space per 2 members of staff		75 units – 1.25 occupancy, assumed 1 member of staff	17
School		1 space for 50% of children between 5 and 12		500 children	250
Total Non Residential					5,808
Total across the Development					12,316

9.5 Site Layout and Vehicular Access

9.5.1 Vehicular connectivity between the Development and the surrounding highway network is shown on Figure 3 and on the Parameter Plan 02 – Access included in Appendix 1. It is proposed to provide the following three general vehicular accesses to the development:

i) on Huntingdon Road, to the north-west of the Site, a traffic signal controlled junction;

ii) on Huntingdon Road, to the north-east of the Site, a crossroad traffic signal controlled junction to provide access to the Development to the south, and the NIAB Development to the north;

iii) on Madingley Road, to the south of the Site, a crossroad traffic signal controlled junction to provide access for the Development vehicular access route to the north, and to the West Cambridge Development to the south at High Cross.

9.5.2 The location of these access points to the Development is designed to intercept the maximum number of development-bound trips on the strategic highway network before these trips travel through the residential areas of Cambridge, thus minimising the impact of the development.

9.5.3 The road hierarchy for the Development is illustrated indicatively on Figure 3. In summary:

i) a primary radial route is provided through the west of the development, between the traffic signal to the north-west east on Huntingdon Road and Madingley Road. This route is relatively direct to assist in providing access to the Madingley Road Park and Ride, yet routed far enough away to the west to increase the travel distance and reduce the attractiveness of this route as a rat-run;

ii) a secondary orbital route through the east of the development, between Huntingdon Road, passing the local centre, joining the radial route to meet with Madingley Road. A direct route will be provided for public transport movements and general vehicular movement will be prevented (potentially during the peak hours only) by some form of bus control to the east of the local centre - rising bollards are commonly used elsewhere in Cambridge for this purpose.

9.5.4 All routes within the Development will be designed to reduce their attractiveness for rat-running by containing vehicle speeds and flows to a maximum of 20mph, and to provide a quality streetscape. This would be achieved primarily through the adoption of the design philosophies of the Department for Transport's 'Manual for Streets' for all roads. The adoption of these principles would not only encourage traffic speeds to reduce on these routes and increase car journey times relative to public transport, but would also help to provide a more desirable environment for pedestrians and cyclists as a result of the lower vehicle speeds and lower overall traffic levels.

9.5.5 The Site layout has been designed to ensure that it strongly favours sustainable modes of transport, the road hierarchy of the Site has been designed to limit the permeability of the Site for vehicles and to enhance accessibility for pedestrians and cyclists.

9.5.6 Minor vehicular accesses would provide limited access to selected elements of the development. As well as serving the existing academic research areas, the existing Madingley Rise (linking to Madingley Road) would service a restricted area of proposed academic research development to the south of the Site. Access from Madingley Rise to other areas of the Development would be prevented.

9.5.7 Pedestrian and cyclist movements will be accommodated via Storey's Way to the east of the Development, but no vehicular access is to be provided to Storey's Way.

9.6 Summary

9.6.1 This section considers aspects of car and cycle infrastructure associated with the Development.

9.6.2 The maximum car and minimum cycle parking provision on the Development has been calculated with reference to the North West Cambridge Area Action Plan.

9.6.3 The University is committed to delivering a high quality development. Under-provision of car and cycle parking within the Site could be detrimental to the streetscene. The maximum car parking provision will be reviewed as part of the mitigation measures, as part of the strategy to address car trip generation.

9.6.4 The Development Access Strategy and site layout have been designed to ensure the focus of the accessibility strategy for the Site remains strongly in favour of sustainable modes of transport over the private car.

10 Travel Demand Management Strategy

10.1 To support the objectives of the transport strategy to maintain the existing low car-based mode share, and to achieve mode shift away from private car use, a comprehensive travel demand strategy has been developed for the Development to 'manage down' the number of vehicular trips generated by the Site. This will be achieved by the promotion of alternative means of travel, and on the locational and accessibility advantages of the Site as well as features integral to the Development itself.

10.2 Among the most significant factors of the Development itself are:

i) inclusion of a sustainable and comprehensive mix of uses on site such as to reduce the need to travel to work to buy provisions or in order to enjoy leisure time:

ii) inclusion of on-site hotel facilities such that academic or research facilities at the Development or at West Cambridge or Girton do not need to travel great distances;

iii) the provision of Key Worker housing to accommodate University staff, researchers and visiting academics locally, where the wide choice of non-car forms of transport would assist both in reducing journey distances, and car usage;

iv) the implementation of a Development Site-wide framework travel plan will promote and encourage sustainable travel across the Site. Its success will be monitored by frequent monitoring and the setting of relevant mode shift targets.

10.3 A central element of the travel demand management strategy for the Development is the implementation of a site-wide Framework Travel Plan for the Site. Due to the scale of the development, an overall Framework Travel Plan has been developed by the University to cover travel demand management issues for the whole Development site. This Transport Assessment is therefore supported by the Framework Travel Plan which should be read in conjunction with this document. The Framework Travel Plan sets out the overall travel demand management strategy and framework for the Development. The purpose of the Framework Travel Plan is to reduce the quantum of single occupancy private car trips associated with all activities at the Development.

10.4 The overall broad objectives of the travel demand management strategy for the Development are:

- to reduce reliance on the private car with a long-term strategy of mode shift away from single occupancy car use;
- to build upon good urban design principles that improve the permeability of the development for promoting walking, cycling and public transport use;
- to provide more appropriate (i.e., lower) levels of parking than were identified in the North West Cambridge Area Action Plan for Academic Research areas and Key Worker housing.
- to promote the use of car sharing where appropriate;

- to reduce costly road traffic congestion and further damage to the environment in the context of sustainable development which is consistent with Government policy; and

- to encourage a high level of community involvement in travel behaviour change initiatives.

10.5 The main objective is to reduce the reliance on the private car and reduce the quantum of private car trips. In order to assess whether this objective is being met, the Framework Travel Plan reflects the aspirations of the Area Action Plan, with a long-term strategy of a maximum 40% car driver mode share for journey to work trips.

10.6 The Framework Travel Plan also provides the over-arching framework within which more site-specific plans and systems will operate, such as individual commercial Workplace Travel Plans, Residential Travel Plans, and School Travel Plans.

10.7 To ensure effective implementation and management of the Framework Travel Plan and transport strategy, the University will provide and support the following:

- sufficient staff resource be allocated to provide a Development Transport Coordinator – supported in this role by:

  - individual Sustainable Travel Behaviour Champions identified from within the community to assist in delivering sustainable travel proposals; and

  - individual workplace, residential and school Travel Plan Coordinators to implement and manage their own measures and strategies;

- the establishment and running of the Transport Stakeholders' Group consisting of key stakeholders - including the University, planning and highway authorities, public transport operators, and representatives of the Development;

- a one-off fall-back Fund for the implementation, management, monitoring and review of the Framework Travel Plan and funding necessary measures in the event of significant variation from the forecast traffic impact for a sustained period of time.

10.8 The Travel Plan is under discussion with the authorities. It is anticipated that the Framework Travel Plan would have the following structure:

- a summary of the development proposals for the Development;

- a review of the local and national policy context for travel planning;

- a review of the current transport-related context for the development;

- a summary of the overall travel demand management strategy for the Development;

- details of the management structure, mode shift targets and monitoring arrangement of the Development Framework Travel Plan strategy;

- details of the individual developer / occupier Travel Plan obligations;

- a preliminary implementation and programme for the strategy.

10.9 The Framework Travel Plan has been prepared in accordance with current national guidance and best practice on travel planning, in particular, the Department for Transport's 'Good Practice Guidelines: Delivering Travel Plans through the Planning Process' (April 2009), and 'Making Residential Travel Plans Work: Good Practice Guidelines for New Development' (September 2005).

10.10 The Framework Travel Plan is the first issue of a working document that will be consistently monitored, reviewed and revised by the University's Travel Plan Co-ordinator. Given the length of time over which the development will be implemented, changing transport and planning policies, and the potential for different outcomes to that set out in this Transport Assessment, the Framework Travel Plan and the transport measures need to be flexible and able to adapt to changing circumstances. Mechanisms for periodic review are therefore proposed so that outcomes can be compared with forecast.

10.11 In the event of significant variation from forecast values for a sustained period of time, the Development Transport Coordinator, working with the Transport Stakeholders Group, will consider the need for (and if necessary implement) measures designed to help meet the forecast outcomes over time.

11 Assessment of Future Mode

11.1 Introduction

11.1.1 This section considers the potential mode shift away from the private car driver as a result of any measures implemented as part of the Development travel demand strategy.

11.1.2 The Base person trip generations referred to previously are an assessment of person trip generation based on conservative standard assumptions derived from developments which have characteristics in common with the Development so far as uses are concerned but not necessarily as to development ethos, levels of sustainability and non-car travel culture that is a feature of the University's developments. This section considers changes to the Base mode share for each individual mode to create the potential Future mode share, and to further enhance the sustainable travel options available at the development. Since the measures contemplated by the Transport Strategy for the Development would be implemented from the outset of the Development, the term "Future Case" is something of a misnomer. The University's anticipation is that the "Future Case" (or better) would be achieved from the point that the development begins properly to be established around the proposed local centre.

11.1.3 As reported previously, Cambridge has unique Journey to Work characteristics. The 2001 Census identified that of the circa 42,000 workers who drive to work, nearly 75% live outside Cambridge City Council's boundary – possibly reflecting a combination of the imbalance of accommodation and employment within the City and the modest affordable housing stock, and the limited alternative modes of transport. Conversely, of the workers who live and work within the Cambridge City Council boundary, only a small percentage of the total (27%) drive to work. It is also apparent that this is representative of a culture within the City itself related to the University's influence within the City, which favours non-car modes of travel wherever practicable and safe to do so.

11.1.4 The land uses within the Development generating the greatest number of car-based trips are the Residential, Commercial and Academic Research uses. These would be the target groups best focussed upon to achieve a significant mode shift away from private car use for the Journey to Work car trip movements.

11.1.5 Although all other land use types within the Development would be subjected to the full travel demand management strategy and Framework Travel Plan measures - and would achieve some level of mode shift away from car use - the predicted mode shift from those uses is relatively limited. These other land uses have not therefore been assessed individually in this assessment.

11.1.6 The impact of the Travel Plan measures upon the mode share of each of the Residential, Commercial and Academic Research area land uses are considered individually in the context of published information relating to the success of individual Travel Plan measures.

11.1.7 The North West Cambridge Area Action Plan Policy NW11 "Sustainable Travel" states that: "Development and transport systems will be planned in order to reduce the need to travel and maximise the use of sustainable transport modes to encourage people to move about by foot, cycle and bus, to achieve a modal share of no more than 40% of trips to work by car (excluding car passengers)".

11.1.8 The Car Driver base mode share of all journeys to the Residential and Research land-uses are shown to be around 36% for the Development. The car-based Base Case mode share for the Commercial Research land is higher. The focus of the travel demand management strategy is therefore to reduce the Car Driver mode share from the Development, and specifically to reduce the Car Driver mode shares from the research land uses to below this 40% target.

11.1.9 This section concludes by summarising the justified, reasonable and robust assessment of the potential trip generation from the Development following the application of the proposed travel demand management measures.

11.2 Future Mode Share – Residential element

11.2.1 The effects of the proposed travel demand measures on residential development are considered by individual modes. This review informs the Future Case mode share for the Development.

11.2.2 These Base and “Future” Case mode shares for the All Housing land uses are identified in Table 11.1. These numbers are compared later to the results of the corresponding person trip analysis from the CSRM model:

Table 11.1: Base Case and Future Case External Person Trip Mode Share targets for the Development – Residential element – 12 hour flows

Base Mode	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		Total	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Market Private Housing	131	127	1,128	1,353	217	292	996	960	225	235	49	81	2,746	3,048
Market Flats	81	94	492	555	64	90	95	146	74	100	13	19	819	1,003
Key Worker Flats	281	328	653	781	62	79	1,124	1,310	230	265	30	46	2,381	2,809
Key Worker Houses	61	65	246	269	32	41	293	313	53	57	11	18	696	763
Student Accommodation	402	471	331	360	82	107	1,605	1,889	328	383	6	6	2,757	3,222
TOTAL BASE TRIPS	**956**	**1,085**	**2,849**	**3,317**	**457**	**608**	**4,113**	**4,618**	**910**	**1,040**	**109**	**170**	**9,399**	**10,845**
TOTAL BASE HOUSING MOVEMENTS	**1,020 10.1%**		**3,083 30.5%**		**532 5.2%**		**4,366 43.2%**		**975 9.6%**		**140 1.4%**		**10,122 100.0%**	

Future Mode	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		Total	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Market Private Housing	148	144	955	1,777	224	302	1,070	1,034	237	249	49	81	2,682	2,987
Market Flats	92	107	443	492	66	93	109	167	78	105	13	19	800	853
Key Worker Flats	318	372	464	561	64	81	1,207	1,411	242	281	30	46	2,325	2,751
Key Worker Houses	69	73	196	216	33	42	315	337	56	61	11	18	680	748
Student Accommodation	465	545	263	280	86	113	1,605	1,889	328	383	6	6	2,757	3,222
TOTAL FUTURE TRIPS	**1,091**	**1,240**	**2,320**	**2,726**	**473**	**631**	**4,305**	**4,838**	**941**	**1,078**	**109**	**170**	**9,244**	**10,690**
TOTAL FUTURE HOUSING MOVEMENTS	**1,165 11.7%**		**2,523 25.3%**		**553 5.5%**		**4,572 45.9%**		**1,009 10.1%**		**138 1.4%**		**9,967 100.0%**	
CHANGE IN PERCENTAGE OF THE BASE MODE SHARE	**+ 1.6%**		**-5.2%**		**+0.3%**		**+2.7%**		**+0.5%**		**No Change**		**-1.5%**	

Notes
1. The Home working trips, (155 No Arrival and 155 Departures) do not appear in the above table
2. There are some minor discrepancies in the percentages for non-car movements in the above table, due to the differing sources of information used to derive the mode share, and the total number of person-movements.

11.3 Future Mode Share – Employment elements

11.3.1 Accepting that assumptions concerning car use associated with Commercial Research facilities represent an over-estimation based on Cambridge Science Park figures rather than those for West Cambridge - the latter being a closer match with the characteristics of the Development - the car use from the Development Commercial and Academic Research land use areas generates around a third of the total car movements.

11.3.2 To obtain the greatest reduction in mode share, and to achieve a significant mode shift away from private car use for the Journey to Work car trip movements, travel demand management should be focussed on the Research areas.

11.3.3 The effects of Travel Plan measures upon each mode share of the Commercial and Academic Research area mode shares are considered individually in the context of published information relating to the success of individual Travel Plan measures.

11.3.4 The Base and "Future" Mode Shares for Academic and Commercial Research areas are summarised in Table 11.2. These numbers are compared later to the results of the corresponding person trip analysis from the CSRM model:

Table 11.2 – Base and Future Case External Person Trip - Mode Share targets for the Development Commercial and Academic Research areas – 12 hour flows

Base Mode	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		Total	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Academic Research	402	351	1,209	1,057	157	138	1,421	1,242	224	196	108	94	3,522	3,077
Commercial Research	66	61	1,294	1,184	111	101	409	374	85	78	33	36	1,998	1,835
TOTAL BASE TRIPS	**469**	**412**	**2,503**	**2,241**	**268**	**239**	**1,830**	**1,616**	**310**	**274**	**141**	**131**	**5,520**	**4,912**
TOTAL BASE RESEARCH MOVEMENTS	**440 8.4%**		**2,372 45.4%**		**254 4.9%**		**1,723 33.0%**		**292 5.6%**		**136 2.6%**		**5,216 100%**	

Future Mode	PT passengers		Car Driver		Car Passenger		Bicycle		Pedestrians		OGV		Total	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Academic Research	547	478	863	754	265	231	1,502	1,312	238	208	108	94	3,522	3,077
Commercial Research	90	83	976	893	300	275	497	454	102	93	33	36	1,998	1,835
TOTAL FUTURE TRIPS	**637**	**561**	**1,839**	**1,647**	**565**	**506**	**1,999**	**1,767**	**340**	**301**	**141**	**131**	**5,520**	**4,912**
TOTAL FUTURE RESEARCH MOVEMENTS	**599 11.5%**		**1,743 33.4%**		**535 10.3%**		**1,883 36.1%**		**320 6.1%**		**136 2.6%**		**5.216 100%**	
Mode shift from the Base Mode Share	+159		-629		+281		+160		+28		No Change		No Change	
CHANGE IN PERCENTAGE OF THE BASE MODE SHARE	**+3.1%**		**-12.0%**		**+5.4%**		**+3.1%**		**+0.5%**		**No Change**		**No Change**	

11.3.5 This Future Mode Share for the Research areas after assuming the success of the Travel Plan measures would now (even allowing for the over-estimates of car usage inherent in the Base figures) accord with the North West Cambridge Area Action Plan Policy NW11 "Sustainable Travel" requiring "Development and transport systems will be planned … to achieve a modal share of no more than 40% of trips to work by car (excluding car passengers)". The achievability of a single occupancy car driver mode -share even lower than that projected is evidenced by that which has been observed in connection with the West Cambridge Development.

11.4 Future Mode Share – Other land use elements

11.4.1 By considering the Residential and Employment elements, 75% of the total car driver Base trip generation from the Development are accounted for.

11.4.2 Of the remaining car driver trips, the majority (around 22%) are generated by the Food Store. It is noted about Food Store trips that:

i) historically, only limited success has been reported in reducing Food Store-generated car driver trips by the application of travel demand measures;

ii) even so, there is likely to be some reduction in total car driver trips to this land use as a consequence of the Development Access and Movement Strategy – the Atkins North West Cambridge Retail Transport Study (June 2010) predicted that of the trips attracted to a Food Store within the Development, around 50% would be trips from that store's local catchment area. As such, there is a greater opportunity for and likelihood of non-car modes of travel or of shared trips;

iii) of the predicted External car driver trips to the Food Store, these trips are existing trips currently accessing alternative venues - hence the additional number of car driver trips on the network would be minimal, if any. Due to the distant proximity of these alternative existing Food Store venues, these existing trips would be far longer than the Future situation trips made to the proposed Food Store on the Development. As such, the Development Food Store would also assist in reducing the total distance travelled across the network;

iv) the Base person trip analysis would therefore, consistently with other base person trip figures for the Development, represent a conservative over-estimate of likely generation even after application of travel plan measures.

11.4.3 With respect to the School, Hotel and Care Home land uses, there is likely to be some reduction in total car driver trips to these land uses as a consequence of the Development Access and Movement Strategy, the Base person trip analysis movements generated by these land uses are relatively small - around 3% of the total Development generation. Whilst this will provide a further over-estimate, they have not been considered further.

11.5 Conclusion

11.5.1 This section has considered the Future Mode Share as a result of the measures to be implemented as part of the Development travel demand management strategy.

11.5.2 It concludes that the Future Mode Share data for both the Residential and Employment land uses (even applying an approach involving conservative over-estimates of likely trip generation for car modes) would accord with the North West Cambridge Area Action Plan Policy NW11 “Sustainable Travel” requiring “Development and transport systems will be planned … to achieve a modal share of no more than 40% of trips to work by car (excluding car passengers)”.

11.5.3 These results will be used as a comparison with the results from the CSRM, to ensure the appropriateness of the CSRM modelling.

12 Construction Access Strategy

12.1 Until Contractors are appointed by the University, the details of the Construction Access Strategy will, perforce, be limited. The strategy will be defined in greater detail upon appointment.

12.2 As part of the Construction Access Strategy, a Construction Environmental Management Plan (CEMP) will be prepared. The CEMP will set out the University's aim to reduce the transport impacts of the construction traffic servicing the Site, and the movements associated with construction waste. It will apply to all the individual construction sites within the Development. The strategy consists of the following main elements:

i) design:

- minimising the requirement for material to be imported or exported. For example, the movement of earthworks material off-site will be reduced to a minimum by maximising the use of raised material into the landscaping;
- specifying materials and construction techniques that are resource-friendly.

ii) using locally sourced materials where possible, to reducing haulage lengths;

iii) managing effectively the supply of goods to construction sites - this can significantly reduce both road vehicle mileage and construction costs and wastage;

iv) encouraging the development of sustainable supply chains for construction materials;

v) managing the movement of workers into the development - all construction sites within the Development will have comprehensive Construction Travel Plans, detailing how their workforce will travel to the Site.

12.3 Construction Environmental Management Plans will be prepared to provide details of all Construction traffic movements during the life of a construction project - i.e. from design to demobilisation. The Construction Environmental Management Plan will consider the following elements:

i) Design;

ii) On-site logistics;

iii) Access Strategy;

iv) Procurement strategy;

v) Operational Efficiency;

vi) Delivery Practice;

vii) Demand Smoothing;

viii) Managing Construction Traffic;

ix) Targets and Monitoring;

x) Waste Management

12.4 The CEMP will also identify approaches that can be used to improve the efficiency of the logistics management for the development. It also considers ways to link with and/or exploit construction activity and practices taking place on other parts of Cambridge. These measures would reduce the Site traffic, and the number of movements removing the generated waste.

PART 3 PERFORMANCE OF THE NETWORK IN THE FUTURE YEAR

This Part contains the following sections:

13 Details of the Cambridge Sub Regional SATURN Model (CSRM)

13.1 Introduction

13.1.1 The analysis of the likely effects of the Development has been undertaken, as agreed with the Stakeholders, using Cambridgeshire County Council's Cambridge Sub Regional Model (CSRM).

13.1.2 The CSRM is an integrated land use and transportation model used to assess and appraise proposals for the introduction of an integrated package of transport measures in Cambridge (referred to as Cambridge Transport Innovation Fund or CTIF) and the A14 Ellington to Fen Ditton Enhancements Scheme. The model is known as the Cambridge Sub Regional Model (CSRM).

13.1.3 The CSRM is an integrated land use, transport demand and network assignment model that allows stand-alone testing of road, PT, cycle, walk schemes, standard economic benefit tests using the highway and demand model with fixed trip ends, as well as complex tests of strategic policy options incorporating land use responses. The CRSM responds interactively within an option test to demand constraints emerging in the model in a number of ways including:

i) reassigning trips around any specific congested link on the network, to less congested corridors that provide an equally quick or quicker route;

ii) remoding car trips within the model to non-car modes to reflect quicker journey time alternatives;

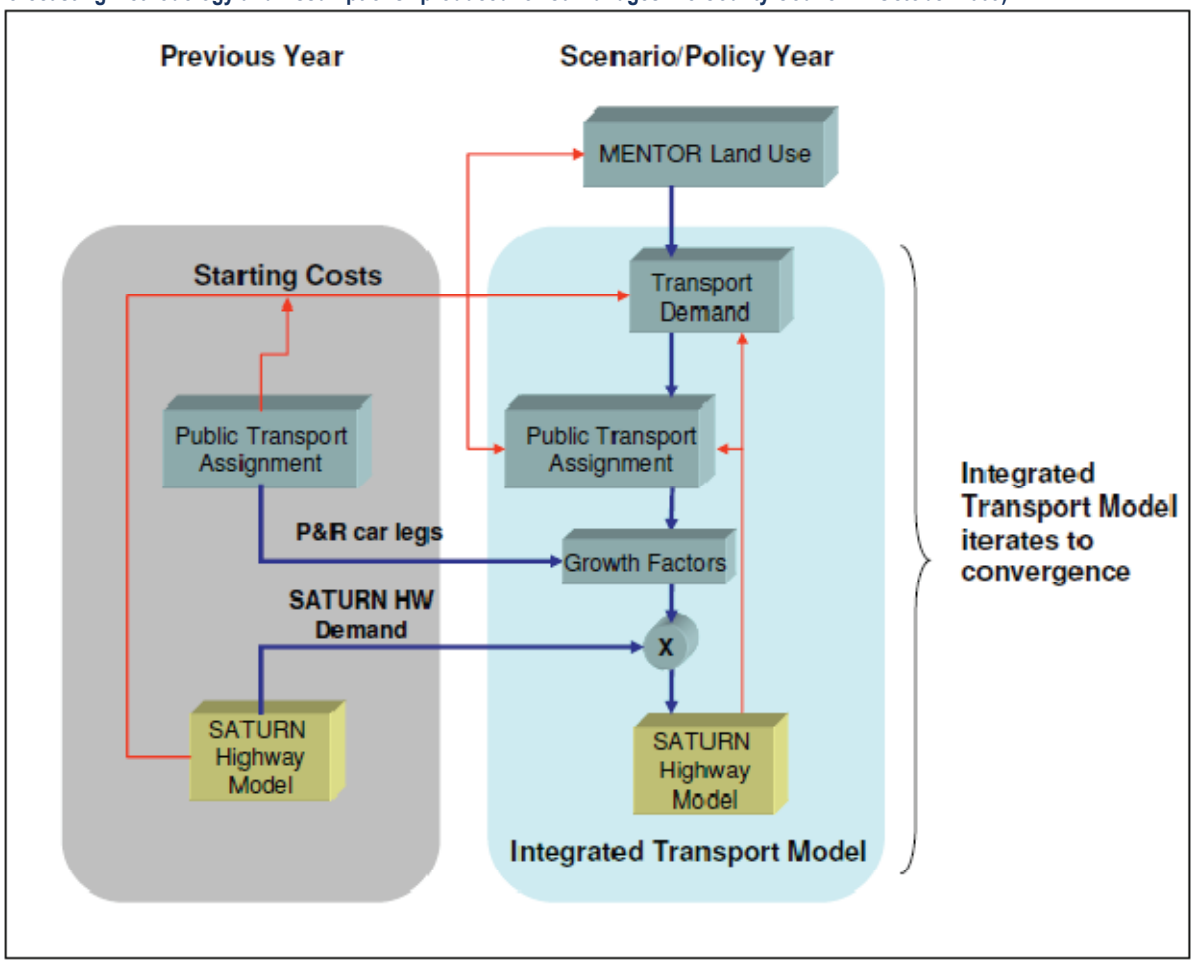
iii) re-allocating origin / destination locations of trip pairs – as travel times and costs increase, it will influence home / work location choices. This would reduce the trip length and car mode share, reducing the number of vehicle trips within the model.

13.1.4 Further details of this model are included in the CSRM Model Development and Validation Report, contained in Appendix 8.

13.1.5 The main features of the CSRM model structure, shown in Figure 13.1 are:

- a linked land use model to generate trip ends from forecast planning data and travel accessibilities;
- a detailed Transport Demand Model (TDM), using WSP's *MEPLAN* software. It includes traveller responses including choice of mode/sub-mode, change of macro time period of travelling, and trip redistribution among destinations. Travellers are segmented by income, trip purpose and car ownership. This model is compliant with current Department for Transport guidance for variable demand modelling including the assessment of road pricing schemes.
- a public transport, walk and cycle assignment sub-model (PT-Walk-Cycle) also implemented in *MEPLAN*.
- a highway assignment sub-model (LHM) using Atkins' SATURN software for light and heavy good vehicle (HGV) assignment.

Figure 13.1 – CSRM modelling framework (taken from WSP Report "Cambridge Sub Regional Model (CSRM) Forecasting Methodology and Assumptions" produced for Cambridgeshire County Council in October 2009)



13.1.6 The CSRM provides a means to determine what the demand for travel will be in the future, given a particular set of assumptions about population, employment, GDP, fuel cost, transport infrastructure, scope and cost of public transport services.

13.1.7 This section provides further details of the following:

i) the Land Use and Travel Demand Model elements;

ii) treatment by the model of land uses;

iii) the link between the Land Use Model and the Transport Demand Model;

iv) Highway Demand Pivoting;

v) Goods Vehicles and through trips.

13.2 Land Use and Travel Demand Model

13.2.1 The CSRM utilises a Land Use model which allows the model to explicitly respond to planned land use developments, and to reflect the influence of transport availability on future land use decisions.

13.2.2 The application of the Land Use model is in line with WebTAG unit 3.1.3. This states that some studies may require the use of a land-use/transport interaction model to generate forecasts of land-use dependent on input land-use policies and the changes in accessibility brought about by conditions on the transport system.

13.2.3 WebTAG defines 'Land Use' in this context as a range of human activities, the state of the built environment, and also some aspects of the natural environment. In the context of CSRM, this corresponds to:

i) activities: all trip-generating activities - categorised as employment, education, shopping, leisure, visiting friends/relatives and personal business trips;

ii) built environment: Representing dwellings available, and commercial floorspace categorised by industry type. Transport connectivity represented through generalised costs imported from CSRM transport model;

iii) natural environment: Not represented.

13.2.4 WebTAG states that such 'Land-use' is relevant to 'transport' for three reasons:

i) land-using activities and the interactions between them generate the demands for transport;

ii) those activities and interactions are to a greater or lesser extent influenced by the availability of transport; and

iii) the linkages between transport and activities may be important to the appraisal of transport strategies - especially when trying to consider whether the transport system is providing the kinds of accessibilities that activities (i.e. people and businesses) require, rather than simply providing mobility.

13.2.5 In the CSRM these aims are addressed by using the land use model to simulate residential location, employment location and related activity locations in order to produce a comprehensive set of trip origins and destinations to pass to the Transport Demand Model.

13.3 Treatment of land uses

Dwellings

13.3.1 For each modelled future year, the Land Use model is provided with an absolute number of dwellings in each modelled zone. The Land Use model allocates households to dwellings within each zone according to demand, and based on employment opportunities and proximity to services. The cost of a household locating within a given zone will increase if demand is high, and fall if demand is low, relative to the number of dwellings available.

13.3.2 The model therefore requires the growth in dwellings by zone to be specified, throughout the modelled period (2006-2031). The dwellings growth input to the model has been produced by merging data from CCC relating to strategic sites around Cambridge and within Cambridgeshire, CCC estimates of development at ward level outside strategic sites and the Trip End Model Presentation Computer Programme (TEMPRO) projections of total dwellings development in the sub-region. Table 14.1 provides further details of some of the data assumed concerning strategic sites.

13.3.3 In merging the datasets, the locally sourced Cambridgeshire County Council data has been applied to determine spatial distribution and rate of development to 2021. These have been scaled to meet TEMPRO totals for the sub-region in 2021. In the full run of the CSRM model for 2026 and 2031, developments are again assumed to match TEMPRO totals, with spatial detail applied on the assumption that distribution of dwellings in 2021 is maintained, plus development of any remaining capacity at strategic sites.

Employment

13.3.4 For the purposes of land use modelling, employment is divided into:

i) endogenous employment, which is generated by the model based on the needs of the local population for services (Education, Retail, Services);

ii) exogenous employment (sometimes known as Basic employment) which is defined to be those jobs related to markets that are external to the study area. This includes all Industrial, Transport/Warehousing, Agriculture, and Government jobs, and varying proportions of other employment.

13.3.5 The base year employment is taken from Census 2001, which provides a breakdown of employment into 20 factors (10 industrial classifications, each divided into full-time and part-time).

13.3.6 These factors are further divided into exogenous and endogenous parts, based on analysis of the Annual Business Inquiry (ABI) data and observation activity descriptions provided with Valuation Office Floorspace data.

13.3.7 For future years, growth in total employment and exogenous employment are input to the model from TEMPRO at study area level:

13.3.8 In forecasting mode, the model is free to locate all types of employment according to availability of suitable floorspace and workforce. In addition, future year levels of endogenous employment are generated by the model based on the requirements of the local residents.

13.3.9 In summary:

i) 2001 base year employment is derived from the 2001 Census;

ii) the model determines the demand for endogenous employment (services), and hence the mix and locations of these services;

iii) the exogenous (basic) employment is input into the model (from TEMPRO), but the locations are determined within the model itself;

iv) the total employment within the study area is an input (from TEMPRO) which constrains the overall total of exogenous plus endogenous employment by industry.

13.3.10 Within the land use model, certain types of employment can only be located where floorspace is available to accommodate business activities:

i) industrial / manufacturing employment requires factory floorspace;

ii) warehousing / storage / transport requires warehouse floorspace;

iii) retail employment requires retail floorspace;

iv) finance / business employment requires office floorspace;

v) leisure / health / recreation / other employment requires floorspace of those types, categorised as 'miscellaneous' or 'other'.

13.3.11 The requirement for floorspace to be available provides a realistic constraint on employment location. However, the constraint is not absolute as the density of occupation (jobs per square metre) can vary if demand for floorspace is high (and hence floorspace costs rise) within a zone.

13.3.12 This also allows commercial planning data to be entered into the model in the form of floorspace forecasts, which control the areas of employment growth. Floorspace is additionally used as an attractor for destination choice for singly constrained trip types (all discretionary trips and non-home based trips).

13.3.13 The model therefore requires a planning estimate of floorspace changes (increases and decreases) by model zone and floorspace type (industrial, warehouse, retail, office and other), for each model year.

13.3.14 Estimates of future floorspace changes were provided by Cambridgeshire County Council, who liaised with planning officers in individual districts. The data was compiled by the Council's Strategic Planning department and is based on planning applications received by the Districts and allocations in the Local Development Frameworks.

Students

13.3.15 In the Land Use model, students are located in both households and in communal establishments (i.e. halls of residence). Student growth has been assumed based on informal advice from the University of Cambridge, Anglia Ruskin University and Cambridgeshire County Council.

13.3.16 Based on the 2001 Census, 55% of students live in communal establishments, and the remaining 45% in households (this is a general figure representing students at all institutions throughout the city, and is not necessarily representative of the University's data). This proportion is assumed to be constant through time, which provides the total number of students in halls of residence. Growth in students in halls of residence has been provided by the universities, covering planned developments in the north-west of Cambridge (2,500 places and at Cambridge railway station (1,300 places). The remaining growth in places in halls has been spread across Cambridge based on 2001 patterns.

13.3.17 The total number of student households is calculated using an assumption that the household size remains constant at 3.5 students per household. Student households are free to locate in any dwellings across the study area.

13.4 Link between land use model and Transport Demand Model

13.4.1 The outputs from the base Land Use Model are utilised as trip ends (productions and attractions) within the Transport Demand Model. The mechanism for future years is essentially the same, with the following exceptions:

i) for "Discretionary" and "Employer's Business" trips, the external trip ends (both production and attraction) cannot be derived from the model. The base year numbers are simply scaled according to growth in study area population;

ii) the zone-matching relationships used to convert trip ends from Land Use Model Zones to Transport Demand Model Zones are altered in future years based on projected changes within the Land Use zones. The proportions used vary by trip type as well as by year and are calculated based on the land-use assumptions specified at Transport Zone level.

13.5 Highway Demand Pivoting

13.5.1 The Transport Demand Model incorporated within CSRM produces synthetic matrices in an *absolute* form (that is the absolute number of trips is forecast in each year, rather than being expressed as a change from the previous year), for highway trips as well as public transport and slow modes (walk and cycle).

13.5.2 Because the synthetic highway matrices are not suitable for direct assignment within SATURN, a matrix pivoting process has been developed whereby the base year (2006) SATURN matrices are scaled in line with growth in the synthetic growth forecast by CSRM.

13.5.3 In future years (as in the base year), the scaling process is constrained so that the district level scaling is maintained (i.e. the scaling for zone pairs within a district-district pair are adjusted so that the district-district scaling is always correct).

13.5.4 Exogenous adjustments are added to account for external-external trips and goods vehicle trips not dealt with by CSRM.

13.5.5 Where transport or land use developments in the Reference Case will radically alter demand for specific zones, special steps have been taken to ensure the impacts are passed to SATURN.

13.6 Goods Vehicles and Through Trips

13.6.1 LGVs are scaled with reference to the traffic demand model. HGVs excluding external – external trips are scaled with reference to National Road Traffic Forecasts. External - external trips are modified using absolute changes in external - external trips for all modes (UC 1 to 10) taken from the East of England Regional Model (EERM), as supplied by Aecom for this purpose on behalf of the Highways Agency. The figures applied in the Reference Case run correspond to an EERM forecast which includes A14 widening.

14 CSRM SATURN Highway Model Tests

14.1 Introduction

14.1.1 The analysis of the likely impact of the Development has been undertaken by comparing the results from the Cambridgeshire County Council's Cambridge Sub Regional Model (CSRM), using various option tests, some commissioned for the Development following agreement with the highway authorities to the CSRM Model Scoping.

14.1.2 Reference has been made to three option tests of the CSRM:

i) the 2006 Base Model – the model of the traffic movements on the network in 2006;

ii) NWC 2026 Do Minimum Option Test – a test commissioned by the University including all existing, committed and consulted development and transport infrastructure in 2026, but excluding all the trip generation or infrastructure derived from the Development;

iii) NWC 2026 Do Something Option Test – a second test commissioned by the University including all existing, committed and connected development and transport infrastructure in 2026, including all the trip generation and infrastructure derived from the Development.

14.1.3 This section summarises the work undertaken on these option tests.

14.1.4 This section concludes that the planned development growth within the Cambridge area originally included in the CSRM was unrealistically high, and that the Committed Development assumed in the North West Cambridge option tests is appropriate. It also concludes that the projected trip generation and transport effects of the Development reported to the North West Cambridge Area Action Plan EIP by the County Council - of 2% across the network – is representative of this recent modelling work.

14.2 Base SATURN model

14.2.1 The current highway model has been updated from previous highway models used to assess the A14 Ellington to Fen Ditton proposals, Huntingdon viaduct and Cambridge TIF funding proposals. The model was updated in 2009 as part of the CSRM and included the following improvements:

i) the demand segmentation is now carried through all the way from the base model;

ii) the demand matrices have been completely rebuilt;

iii) the network has been refined across the study area;

iv) additional zones have been incorporated, primarily for A14 study purposes;

v) the focus of model validation has been balanced between the needs of the A14 Ellington –Fen Ditton study (with regard to the A14 and trunk roads) and the needs of CTIF (focused on Cambridge), with separate final calibration and validation for each study.

14.2.2 The 2006 base model incorporates data from Roadside Interview Surveys (RSIs) collected in 2006 on a cordon around the city of Cambridge and at 6 sites across the centre of the city. In addition a range of traffic counts undertaken in 2006 and 2007 were used within the model development.

14.2.3 The modelled area is focused on Cambridgeshire and includes Cambridge and Huntingdon and the M11 and A14 between Cambridge and Huntington in detailed simulation coding.

14.2.4 The highway model has three time periods – morning peak (08:00-09:00), inter-peak (14:00-15:00) and pm peak (17:00-18:00). Eight user classes of light vehicles (cars and LGVs) and two user classes of heavy vehicles (HGVs) are modelled.

14.2.5 Matrices were built from the RSI data collected in Cambridge and also from RSI data collected from a cordon around Huntingdon in 2005.

14.2.6 Data from the demand component of the CSRM and census data was used in the matrix development to seed movement which was not observed in the RSI cordons and to smooth the distribution of other movements.

14.2.7 Data from the East of England Regional Model (EERM) was used for external movements with origins and destinations outside the study area and for movements having an origin or destination outside the study area not crossing the RSI cordons.

14.2.8 Calibration of the model included

i) matrix estimation to improve link flows against observed flows

ii) link speed checks

iii) checks of delay calculations at junctions

iv) checking routing through network

14.3 North West Cambridge option tests

14.3.1 A 2026 future assessment year reflects the “Guidance for Transport Assessment” comments as to the assessment period where development takes place “over a longer period than the horizon of the Regional Transport Strategy”, and the completed development assessment year for the Environmental Assessment.

14.3.2 The adoption of 2026 as the future year assessment date is acceptable to both Cambridgeshire County Council and the Highways Agency and is used for this assessment.

14.3.3 The following amendments have been made to the Base CSRM model by WSP and Atkins to form the North West Cambridge option tests, some made in consequence of cancellation of the A14 Ellington to Fen Ditton Enhancements:

i) the TEMPRO version 6.1 growth factors as released in 2010 (rather than the superseded TEMPRO version 5.4) are applied to existing vehicular movements to generate the Future Year base flows to replace the TEMPRO v5.4 factors used previously;

ii) residential planning parameters incorporated within the model have been reduced to those listed in Table 14.1, in order better to reflect the reality following the cancelation of the A14 scheme;

iii) a review and reduction in the level of employment across the same region to reflect the above reduced levels of residential development;

iv) increases in highway capacity attributable to the A14 Enhancement proposals have been removed, so as to reflect the existing situation;

v) the number of through movements along the A14 has been amended to reflect the results of a new run of the East of England Regional Model removing the A14 Ellington - Fen Ditton Enhancement additional capacity measures;

vi) the Development quanta shown in Table 2.1 was included in the CSRM for testing.

14.3.4 The major developments within the CSRM (such as the full Northstowe or East Cambridge Developments) requiring delivery of the A14 Ellington to Fen Ditton Enhancement and related highway improvements have been excluded from the CSRM for the Development option tests – this has been agreed with the Highways Agency and Cambridgeshire County Council. These amendments reflect the Web TAG 3.15.5 guidance issued by the Department for Transport that states the model and development included within the model "should be unbiased, coherent and self consistent, free-standing, realistic and plausible". Indeed, should any major development come forward at a later date, then these developments would be obliged to assess their own impact within their own Transport Assessments

14.3.5 The following residential growth listed in Table 14.1 has therefore been included for at the local strategic sites:

Table 14.1: Planned Dwelling Growth at Strategic Sites

Strategic Site Name	Total previously included within the CSRM to 2021	December 2010 test – 2026 Committed Development. Core Scenario
Cambridge North West *Huntingdon / Histon Rd*	**4,740** *1,780*	**4,400** *1,780*
Huntingdon / Madingley Rd (North West Cambridge Development)	*1,550*	*1,500 Market Houses - as per NWC Devt Schedule in Table 1*
Arbury Camp (Orchard Park)	*1,400*	*1,120*
Northern Fringe *Sewage Works*	**0** *0*	**0** *0*
Chesterton Sidings	*0*	*0*
Southern Fringe *Bell School*	**4,420** *650*	**4,420** *650*
Clay Farm	*2,300*	*2,300*
Glebe Farm	*300*	*300*
Trumpington Meadows	*600*	*600*
TM / Monsanto	*570*	*570*
Cambridge East *North of Newmarket Road*	**7,250** *3,050*	**0** *0*
North of Cherry Hinton	*2,700*	*0*
Airport	*1,500*	*0*
Northstowe	8,150	1,500
Loves Farm	1,900	1,900
North Bridge	1,250	1,250
Cambourne	2,000	1,000
Alternative Sites to be applied across the County at existing development	**0**	**1,500**
TOTAL	**29,700**	**15,970**

14.3.6 The following planned infrastructure improvements attributable to the sites in Table 14.1 were also fed into the model, as summarised in Table 14.2:

Table 14.2: Planned infrastructure at Strategic Sites

Strategic Site Name	Infrastructure
Cambridge North West *Huntingdon / Histon Rd*	Low capacity, low speed Huntingdon Road – Histon Road link road (included already in the SATURN model)
Huntingdon / Madingley Rd (ie, North West Cambridge Development)	Low speed Radial and Orbital link roads Site Access junctions (included already in the SATURN model)
Arbury Camp (Orchard Park)	HA / CCC to provide details of the agreed s106 junction enhancements for inclusion in the SATURN model
Southern Fringe *Bell School*	All approved link and junction infrastructure enhancements - already included in the SATURN model.
Clay Farm	
Glebe Farm	
Trumpington Meadows	
TM / Monsanto	
Northstowe	For 1,500 development – infrastructure assumed to be P+R only, but Atkins to advise whether further should be assumed For 8,150 development – infrastructure already included in the SATURN model.
Loves Farm	HA / CCC to provide details of the agreed s106 A428 Rbt junction enhancements for inclusion in the model
North Bridge	HA / CCC to provide details of the agreed s106 junction enhancements for inclusion in the model
Cambourne	No infrastructure requirements identified within the consent.

14.3.7 It has been agreed with the highway authorities that the later inclusion of any of these developments in full (such as the 8,150 units at Northstowe) would require additional mitigation measures to off-set any increased trip generation across the network. As such, the conditions across the network as modelled with reduced levels of strategic development (and related infrastructure) are reasonably representative of the situation should other development proceed, since should any additional development come forward, it would be reasonable to assume that it would be on condition that its effects on the network would have to be contained to represent no worse situation than that (as modelled) existing previously.

14.3.8 To assess the vehicle trip generation of the Development with the proposed travel demand management measures and public transport proposals, the Framework Travel Plan document and proposed public transport strategy (summarised in Sections 8 and 10 of this Assessment) were modelled as part of the planned infrastructure. This modelled result is conservative in a number of respects for reasons already given. Among other things, it has been acknowledged by the highway authority's modelling consultant that the beneficial impact of a car parking provision lower than that stated in the AAP had not been assessed as part of the model run.

14.3.9 The AM and PM peak hour car person trips from the CSRM analysis was compared to those from Peter Brett Associates' independent person trip analysis summarised in Section 5. The results for the three hour peaks are summarised in Table 14.3. (Reflecting the manner of the respective model constructions, the WSP Person Trip Model considered Origins and Destinations, whilst the PBA considered Departures and Arrivals. For the purpose of this review, these terms are considered to be identical.)

Table 14.3: Comparison of total vehicle movements from the Development in the PBA and WSP Person Trip models

WSP – CSRM		PBA – Person Trip Analysis		WSP - CSRM		PBA – Person Trip Analysis	
Origins		Departures		Destinations		Arrivals	
AM	PM	AM	PM	AM	PM	AM	PM
2,010	2,672	1,801	2,752	2,252	2,184	2,089	2,164

(Note – PBA vehicle trip generation includes Car Driver and OGV trips)

14.3.10 The percentage differences between the WSP and PBA Person Trip Models are compared in Table 14.4 (a positive percentage reflects where the PBA assessment is higher than the WSP results):

Table 14.4: Comparison of total vehicle movements from the Development in the PBA and WSP Person Trip models

Origins / Departures		Destination / Arrivals	
AM	PM	AM	PM
-11.6%	3.0%	-7.8%	-0.9%

14.3.11 It was agreed with the highway authorities that these two independent analyses have predicted reasonably similar two-way traffic flow volumes, and such, confirm the validity of the traffic flows applied in the Cambridge Sub-Regional Model.

14.3.12 The SATURN model total vehicle flows generated in the 2026 North West Cambridge Development Do Minimum and Do Something option tests that were assigned to the matrix are summarised for the AM and PM peaks in Tables 14.5 and 14.6 (these figures include intra-zonal trips, some of which would not enter the model network).

Table 14.5: Summary of total vehicle movements from the Development Do Minimum and Do Something option tests – AM peak hour (matrix totals)

AM Peak Hour Do Minimum				
To / From	NWC	Rest of Cambridge	Outside Cambridge	Totals
NWC	7	93	119	219
Rest of Cambridge	49	6,477	8,008	14,534
Outside Cambridge	85	13,888	78,086	92,059
Totals	141	20,459	86,213	106,813
AM Peak Hour Do Something				
To / From	NWC	Rest of Cambridge	Outside Cambridge	Totals
NWC	85	372	508	965
Rest of Cambridge	290	6,396	7,917	14,603
Outside Cambridge	683	13,514	77,778	91,975
Totals	1,058	20,282	86,202	107,542

Table 14.6: Summary of total vehicle movements from the Development Do Minimum and Do Something option tests – PM peak hour (matrix totals).

PM Peak Hour Do Minimum				
To / From	NWC	Rest of Cambridge	Outside Cambridge	Totals
NWC	4	74	110	188
Rest of Cambridge	106	6,742	13,021	19,869
Outside Cambridge	122	8,982	80,301	89,405
Totals	231	15,799	93,432	109,462
PM Peak Hour Do Something				
To / From	NWC	Rest of Cambridge	Outside Cambridge	Totals
NWC	81	342	750	1,173
Rest of Cambridge	389	6,627	12,688	19,703
Outside Cambridge	535	8,869	80,073	89,478
Totals	1,005	15,838	93,511	110,353

14.3.13 The results in Tables 14.5 and 14.6 indicate:

i) in the AM peak, the total number of vehicle trips generated by the Development changes from 353 in the Do Minimum test to 1,938 in the Do Something test – an increase of 1,585 trips. These figures are, however, based on a series of conservative over-estimates of car trips inherent in trip rates and mode choice data used in the model run;

ii) the total number of vehicle trips on the AM network only increases from 106,813 to 107,542, an increase of 728 vehicle trips. This reflects that some existing vehicle trips within the Do Minimum scenario do not appear in the Do Something scenario;

iii) similarly, in the PM peak, the total number of vehicle trips generated by the Development changes from 415 in the Do Minimum test to 2,097 in the Do Something test – an increase of 1,682 trips. This also reflects that some existing vehicle trips within the Do Minimum scenario do not appear in the Do Something scenario;

iv) the total number of vehicle trips on the network only increases from 109,462 to 110,353, an increase of 891 vehicle trips – this is lower than the increased number from Development.

14.3.14 The vehicle movements within the CSRM peak hour in Tables 14.5 and 14.6 are reported from / to three sources: the Proposed Development, Rest of Cambridge, and Outside of Cambridge, giving a 9 cell movement matrix. Accepting that the movements involving the Proposed Development increase, the following Origin - Destination pair movements experience the following reductions in the AM / PM peaks:

i) between Rest of Cambridge to / from Rest of Cambridge - by 81 / 115 trips;

ii) between Outside of Cambridge to / from Rest of Cambridge - by 465 / 446 trips;

iii) between Outside of Cambridge to / from Outside of Cambridge - by 308 / 228 trips;

iv) whilst the numbers within the individual cells change, there are only relatively minor changes to the total movements for all three.

14.3.15 These results identify that:

i) the Rest of Cambridge to / from Rest of Cambridge cell vehicle trip reduction appears to reflect the improved PT alternatives being provided by NWC attracting and re-moding vehicle trips;

ii) the Outside of Cambridge to / from Rest of Cambridge cells vehicle trip reduction reflects the attractiveness of residents / employees based within Cambridge to the increased residential and employment offer by NWC - there being a significant additional number of residential units and employment spaces. The number of these trip pairs changing from non-NWC movements to NWC-based Origin or Destination trip pair movements reflects a general trend to obtain more local residences / employment, with the resulting allocation of some of these trips to non-car modes due to the shorter journey distances;

iii) similarly, the Outside of Cambridge to / from Outside of Cambridge cell vehicle trip reduction reflects both the attractiveness of residents / employees originally not based within Cambridge to the increased residential and employment offer by NWC. In addition, the shift of existing residents / employment into Cambridge would reduce these numbers employed / resident in the surrounding non-Cambridge area, allowing non-Cambridge residents to fill these positions - with the opportunity to use non-car modes.

14.3.16 The matrix total trips summarised in Table 14.5 and 14.6 include trips within individual zones that do not enter the model network. The trips that have assigned and enter the network are summarised in Table 14.7:

Table 14.7: Summary of Total Assigned vehicle movements from the North West Cambridge Development Do Minimum and Do Something option test

	AM Peak		PM Peak	
	Do Minimum	So Something	Do Minimum	Do Something
Total Trips Assigned to the network	100,393	101,085	103,104	103,951
Increase in trips	692 trips		847 trips	

14.3.17 The Total Assigned vehicle movements summarised in Table 14.7 reflect similar characteristics to those summarised in Table 14.6, albeit that these figures are lower.

14.3.18 The Cambridge North West Transport Study (July 2007), prepared by Atkins and submitted by Cambridgeshire County Council to inform the North West Cambridge Area Action Plan, made reference to the assessment undertaken on an earlier highway authority SATURN model (later incorporated into the CSRM). This work commented that two developments - NIAB and North West Cambridge - would result in a 2% increase of traffic levels in the County, and that the Preferred Highway Option (reflecting the proposed Development highway strategy) could accommodate the vehicular traffic generated by the Development. From the evidence summarised in Table 14.7 from the latest CSRM model, it is concluded that the increase in total traffic levels across the model area reflects that reported by Atkins - less than 1% in both peaks from the Development alone.

15 CSRM SATURN Highway Model flows

15.1 Introduction

15.1.1 Details of the modelling assumptions incorporated within the North West Cambridge SATURN model option tests, agreed with the highway authorities, are provided in Section 14.

15.1.2 The flows from the North West Cambridge SATURN model option tests are reported in this Section.

15.1.3 To reflect the separate access arrangement for a small area of the development not modelled in the CSRM, a minor manual adjustment has been undertaken. This is also reported in this section.

15.1.4 The following option tests of the CSRM have been reported:

i) Base Model – the model of the situation is 2006;

ii) NWC Option Test Do Minimum – a test including all existing, committed and consulted development and transport infrastructure in 2026, but excluding all the Development trip generation or infrastructure;

iii) NWC Option Test Do Something – a test including all existing committed and connected development and transport infrastructure in 2026, and including all the trip generation and infrastructure from the Development.

15.1.5 The results reported in Section 15 are analysed in subsequent sections.

15.1.6 An assessment of the likely effects of the Proposed Development as at 2014 appears within Chapter 20.

15.2 2006 Base Year Flows

15.2.1 The 2006 AM and PM Peak Hour Base Year flows were derived from the Cambridge Sub Regional Model, the output is contained in Appendix 10. These flows are summarised in Table 15.1 (refer to Figure 13 for the link reference plan).

Table 15.1: 2006 Base Year Flows

No	Link	Movement	2006 Base Year Flow	
			AM Peak	PM Peak
1	M11 – Junction 14 to M1 / A604 Merger	Nbd Sbd Two Way	2861 2240 5101	2649 2206 4856
2	M11 – from Junction 13 to Junction 14	Nbd Sbd Two Way	2888 3061 5949	3159 2942 6101
3	M11 – from Junction 12 to Junction 13	Nbd Sbd Two Way	3498 3471 6969	3617 3806 7423
4	M11 – from Junction 11 to Junction 12	Nbd Sbd Two Way	3057 3038 6095	3282 3098 6380

No	Link	Movement	2006 Base Year Flow	
			AM Peak	PM Peak
5	A14 – NW of B1050 Junction	Nbd Sbd Two Way	3199 3544 6743	3786 3584 7370
6	A14 – from B1050 Junction to Dry Drayton Road Junction	Nbd Sbd Two Way	3537 4538 8075	4808 4190 8998
7	A14 – from Dry Drayton Road to M11 Merge	Nbd Sbd Two Way	3484 4589 8073	4582 4156 8738
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip	Two Way	1699	1579
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip	Two Way	1379	1464
9	Southbound Slip Road from A428 to M11	Two Way	628	747
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Ebd Wbd Two Way	3669 2836 6505	3108 2904 6012
11	A14 – from B1049 Junction to A10 Junction	Ebd Wbd Two Way	3199 2908 6107	3239 3077 6316
12	A14 – from Junction to Horningsea Road	Ebd Wbd Two Way	2329 3549 5878	3273 2842 6115
13	A428 – west of Madingley Road Junction	Ebd Wbd Two Way	1404 934 2338	963 1414 2377
14	A428 – from Madingley Road Junction to M11 Junction	Ebd Wbd Two Way	819 628 1447	609 748 1357
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	986	1121
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	986	1121
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1558	1754
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	1558	1754
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1212	1388
20	Lady Margaret Road and Mount Pleasant	Two Way	773	1117
21	Shelly Row and Albion Row	Two Way	448	184
22	Madingley Road – from Queens Road to Grange Road	Two Way	1033	1143

No	Link	Movement	2006 Base Year Flow	
			AM Peak	PM Peak
23	Madingley Road – from Grange Road to Storey's Way	Two Way	1033	1143
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1551	1623
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1555	1620
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1552	1623
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1552	1625
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1552	1625
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1221	1055
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1152	1207
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1036	1295
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	773	988
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	716	923
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1518	1269
35	Storey's Way	Two Way	835	652
36	Oxford Road and Windsor Road	Two Way	370	542
37	Histon Road	Two Way	1377	1510
38	Bridge Road (Histon)	Two Way	1370	1326
39	Victoria Road	Two Way	1021	847
40	A10	Two Way	2177	2178
41	Girton Road	Two Way	517	571
42	Grange Road	Two Way	254	258

15.3 2026 Do Minimum flows

15.3.1 The 2026 AM and PM Peak Hour NWC Option Test Do Minimum flows were derived from the Cambridge Sub Regional Model, the output is contained in Appendix 10. The results are summarised in Table 15.2.

Table 15.2: NWC Option Test 2026 Do Minimum Flows

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
1	M11 – Junction 14 to M1 / A604 Merger	Nbd Sbd Two Way	2357 3131 5488	2709 2765 5474
2	M11 – from Junction 13 to Junction 14	Nbd Sbd Two Way	3334 3814 7148	3506 3318 6824
3	M11 – from Junction 12 to Junction 13	Nbd Sbd Two Way	3867 4182 8049	4152 4158 8310
4	M11 – from Junction 11 to Junction 12	Nbd Sbd Two Way	3396 4179 7575	4088 3867 7955
5	A14 – NW of B1050 Junction	NWbd SEbd Two Way	3759 4158 7917	4221 4144 8365
6	A14 – from B1050 Junction to Dry Drayton Road Junction	NWbd SEbd Two Way	4676 5522 10198	5355 5072 10427
7	A14 – from Dry Drayton Road to M11 Merge	NWbd SEbd Two Way	4542 5519 10061	5178 5159 10337
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip	Two Way	1580	1724
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip	Two Way	1517	1647
9	Southbound Slip Road from A428 to M11	Two Way	683	553
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Ebd Wbd Two Way	3735 3445 7180	3648 3833 7481
11	A14 – from B1049 Junction to A10 Junction	Ebd Wbd Two Way	3518 3538 7056	3562 3972 7534
12	A14 – from Junction to Horningsea Road	Ebd Wbd Two Way	2893 3984 6877	4063 3913 7976
13	A428 – west of Madingley Road Junction	Ebd Wbd Two Way	1926 1661 3587	1820 2598 4418
14	A428 – from Madingley Road Junction to M11 Junction	Ebd Wbd Two Way	1172 1253 2425	1083 1721 2804
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	1474	1444

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	1474	1444
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1871	1902
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	2043	2100
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1358	1546
20	Lady Margaret Road and Mount Pleasant	Two Way	965	1178
21	Shelly Row and Albion Row	Two Way	463	266
22	Madingley Road – from Queens Road to Grange Road	Two Way	1328	1203
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1720	1838
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1668	1820
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1664	1814
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1694	1816
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1786	2020
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1462	1419
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1482	1727
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1382	1573
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	1096	1515
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	992	927
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1868	1472
35	Storey's Way	Two Way	1263	992
36	Oxford Road and Windsor Road	Two Way	548	430

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
37	Histon Road	Two Way	1943	1659
38	Bridge Road (Histon)	Two Way	1608	1749
39	Victoria Road	Two Way	1138	1119
40	A10	Two Way	2326	2101
41	Girton Road	Two Way	520	536
42	Grange Road	Two Way	761	553
101	NIAB Southern End	Two Way	188	167
102	NIAB Northern End	Two Way	190	231

15.4 2026 Do Something flows

15.4.1 The 2026 AM and PM Peak Hour NWC Option Test Do Something flows were derived from the Cambridge Sub Regional Model, the output is contained in Appendix 10, and is summarised in Table 15.3

Table 15.3: 2026 Do Something Flows as extracted from the CSRM

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
1	M11 – Junction 14 to M1 / A604 Merger	Nbd Sbd Two Way	2372 3118 5490	2652 2782 5434
2	M11 – from Junction 13 to Junction 14	Nbd Sbd Two Way	3337 3807 7144	3439 3336 6775
3	M11 – from Junction 12 to Junction 13	Nbd Sbd Two Way	3928 4181 8109	4169 4159 8328
4	M11 – from Junction 11 to Junction 12	Nbd Sbd Two Way	3429 4182 7611	4114 3913 8027
5	A14 – NW of B1050 Junction	NWbd SEbd Two Way	3786 4178 7964	4257 4162 8419
6	A14 – from B1050 Junction to Dry Drayton Road Junction	NWbd SEbd Two Way	4740 5568 10308	5403 5120 10523
7	A14 – from Dry Drayton Road to M11 Merge	NWbd SEbd Two Way	4619 5604 10223	5196 5212 10408
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip	Two Way	1548	1665

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip	Two Way	1511	1646
9	Southbound Slip Road from A428 to M11	Two Way	689	554
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Ebd Wbd Two Way	3759 3489 7248	3646 3851 7497
11	A14 – from B1049 Junction to A10 Junction	Ebd Wbd Two Way	3547 3591 7138	3603 4011 7614
12	A14 – from Junction to Horningsea Road	Ebd Wbd Two Way	2918 3997 6915	4092 3961 8053
13	A428 – west of Madingley Road Junction	Ebd Wbd Two Way	2011 1739 3750	1879 2662 4541
14	A428 – from Madingley Road Junction to M11 Junction	Ebd Wbd Two Way	1238 1300 2538	1148 1734 2882
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	1738	1720
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	1407	1290
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1755	1778
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	2190	2269
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1472	1662
20	Lady Margaret Road and Mount Pleasant	Two Way	937	1168
21	Shelly Row and Albion Row	Two Way	463	220
22	Madingley Road – from Queens Road to Grange Road	Two Way	1320	1143
23	Madingley Road – from Grange Road to Storey's Way	Two Way	1514	1432
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1540	1656
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1386	1650
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1384	1651
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1758	2023

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1848	2230
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1428	1368
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1454	1699
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1450	1667
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	1131	1542
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	967	902
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1885	1497
35	Storey's Way	Two Way	1090	795
36	Oxford Road and Windsor Road	Two Way	715	654
37	Histon Road	Two Way	2082	1796
38	Bridge Road (Histon)	Two Way	1572	1729
39	Victoria Road	Two Way	1220	1128
40	A10	Two Way	2330	2134
41	Girton Road	Two Way	591	626
42	Grange Road	Two Way	759	603
101	NIAB Southern End	Two Way	210	187
102	NIAB Northern End	Two Way	182	252

15.5 Manual adjustment to the 2026 Do Something Model flows

15.5.1 One manual adjustment has been undertaken to the Development model flows, to respond to the area of 38,822m^2 academic research development that would be accessed only from Madingley Rise. The flows accruing to this area are currently included in the model within the general Development-generated flow accessed by the main three vehicular entrances. As the reassignment of these Madingley Rise flows would only affect a small area, a manual adjustment is considered appropriate.

15.5.2 The total peak hour external vehicular flows generated by the Development, as assessed by Peter Brett Associates in the Person Trip Analysis reported in Section 5, are summarised in Table 15.4.

Table 15.4 – Total Development – Vehicular Trips in the Person Trip Analysis by Land Use

	AM				PM			
	Car Driver		OGV		Car Driver		OGV	
	In	Out	In	Out	In	Out	In	Out
Market Private Housing	65	228	5	8	165	98	2	3
Market Flats	31	132	0	0	99	19	0	0
Key Worker Flats	39	147	0	0	110	2	0	0
Key Worker Houses	13	42	1	2	34	17	0	1
Student Accommodation	51	22	0	0	23	34	0	0
Academic Research	212	14	16	2	47	135	0	17
Commercial Research	269	18	4	2	19	209	0	1
School	0	0	0	0	8	14	0	0
Hotel	13	21	0	0	20	14	0	0
Care Home	4	2	0	0	4	8	0	0
Food Store	78	55	1	1	162	176	1	1
Total	776	682	27	15	690	726	3	22
Total Peak Hour Vehicles (Car Driver and OGV)	**803 In Trips**		**697 Out Trips**		**693 In Trips**		**748 Out Trips**	

15.5.3 The land uses accessed off Madingley Rise are summarised in Table 15.5, and are considered as percentages of the total of each such individual land use development within the Development:

Table 15.5: Academic Research Areas Accessed from Madingley Rise

Land Use		Madingley Rise Total	Development Total	% of Total NWC Land Use
Academic Research	Area	38,842	60,000	64.7%

15.5.4 The vehicular generation of the land uses accessed off Madingley Rise area is calculated with respect to the total of the individual land use development generation as assessed in the Person Trip Analysis for the Development in Table 15.6.

Table 15.6: Madingley Rise Development trip generation

Land Use	% of Total NWC Land Use	Trips											
		AM						PM					
		Car Driver		OGV		Total Trips		Car Driver		OGV		Total Trips	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Academic Research	64.70%	137	9	10	1	147	11	30	87	0	11	30	98
Total from NWC Development						**803**	**697**					**693**	**748**
Total as percentage of total NWC Development generation						**18.82%**	**3.54%**					**5.91%**	**13.15%**

15.5.5 This vehicular trip generation of Madingley Rise is then assigned with reference to the assignment of the Development entry and exit flows taken from the CSRM, as summarised in Table 15.7 (there are differences between the two sets of figures, as these are from independent assessments):

Table 15.7: Assignment of vehicular trips to / from the Development

	AM Peak		PM Peak	
	In	Out	In	Out
Vehicular Trip Generation from the Development - CSRM				
Huntingdon Road West	236	243	155	378
Huntingdon Road East	298	233	237	280
Madingley Road	286	293	336	335
	820	769	728	993

15.5.6 As a proxy, the Madingley Rise Development flows are distributed pro rata to the assignment of the total Development flows as shown in the CSRM. These are summarised in Table 15.8:

Table 15.8: Distribution of the Madingley Rise Development Flows

Via Access	AM Peak		PM Peak	
	In	Out	In	Out
Huntingdon Road West	42	4	6	37
Huntingdon Road East	54	3	10	28
Madingley Road	51	4	14	33
Total	**147**	**11**	**30**	**98**

15.5.7 For the purposes of this assessment, it is assumed that the trips to / from the Madingley Rise Development would reassign to the most direct route. Trips currently assigning via the Huntingdon Road East access would reassign to Madingley Road, and trips using the Huntingdon Road East access would reassign to Huntingdon Road West where appropriate. The additive flows are shown on Figure 14, along with the revised assignment of Development trips (the flows shown on Figure 14 are only the alterations to the 2026 Do Something flow patterns, and are not the trips assigning to Madingley Rise).

15.5.8 The Adjusted 2026 AM and PM Peak Hour Do Something flows are shown on Figure 15, the flows are summarised in Table 15.9.

Table 15.9: Adjusted 2026 Do Something Flows

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
1	M11 – Junction 14 to M1 / A604 Merger	Nbd Sbd Two Way	2372 3118 5490	2652 2782 5434
2	M11 – from Junction 13 to Junction 14	Nbd Sbd Two Way	3337 3807 7144	3439 3336 6775
3	M11 – from Junction 12 to Junction 13	Nbd Sbd Two Way	3928 4181 8109	4169 4159 8328
4	M11 – from Junction 11 to Junction 12	Nbd Sbd Two Way	3429 4182 7611	4114 3913 8027
5	A14 – NW of B1050 Junction	NWbd SEbd Two Way	3786 4178 7964	4257 4162 8419
6	A14 – from B1050 Junction to Dry Drayton Road Junction	NWbd SEbd Two Way	4740 5568 10308	5403 5120 10523
7	A14 – from Dry Drayton Road to M11 Merge	NWbd SEbd Two Way	4619 5604 10223	5196 5212 10408
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip	Two Way	1548	1665
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip	Two Way	1511	1646
9	Southbound Slip Road from A428 to M11	Two Way	689	554
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Ebd Wbd Two Way	3759 3489 7248	3646 3851 7497
11	A14 – from B1049 Junction to A10 Junction	Ebd Wbd Two Way	3547 3591 7138	3603 4011 7614
12	A14 – from Junction to Horningsea Road	Ebd Wbd Two Way	2918 3997 6915	4092 3961 8053
13	A428 – west of Madingley Road Junction	Ebd Wbd Two Way	2011 1739 3750	1879 2662 4541
14	A428 – from Madingley Road Junction to M11 Junction	Ebd Wbd Two Way	1238 1300 2538	1148 1734 2882
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	1738	1720
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	1407	1290
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1755	1778
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	2128	2228

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1410	1621
20	Lady Margaret Road and Mount Pleasant	Two Way	937	1196
21	Shelly Row and Albion Row	Two Way	518	233
22	Madingley Road – from Queens Road to Grange Road	Two Way	1382	1184
23	Madingley Road – from Grange Road to Storey's Way	Two Way	1576	1473
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1653	1754
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1499	1748
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1384	1651
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1758	2023
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1848	2230
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1428	1368
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1454	1699
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1450	1667
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	1131	1542
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	967	902
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1885	1497
35	Storey's Way	Two Way	1090	795
36	Oxford Road and Windsor Road	Two Way	715	654
37	Histon Road	Two Way	2082	1793
38	Bridge Road (Histon)	Two Way	1572	1729
39	Victoria Road	Two Way	1220	1128

No	Link	Movement	2026 Base Year Flow	
			AM Peak	PM Peak
40	A10	Two Way	2330	2134
41	Girton Road	Two Way	591	626
42	Grange Road	Two Way	759	603
101	NIAB Southern End	Two Way	210	187
102	NIAB Northern End	Two Way	182	252

15.6 Summary

15.6.1 The flows identified in this section from the CSRM – the 2006 Base Year, the 2026 Do Minimum and the 2026 Do Something assessments – are used in the following sections to assess the potential transportation effects of the Development.

16 Traffic Impact Analysis

16.1 Introduction

16.1.1 This section reports the following:

i) a review of the differences between both the 2006 and 2026 Do Minimum scenarios, and the 2026 Do Minimum and 2026 Do Something scenarios;

ii) a review of conditions in the 2026 Do Minimum and 2026 Do Something scenarios to understand the change in conditions on the network due to the the Development.

16.1.2 This section concludes that:

v) the differences between the 2006 Base Year and 2026 Do Minimum scenarios (ie, Without the Development) indicate that M11, A14 and A428 strategic highway corridors surrounding Cambridge will experience significant increases in peak hour flows. In addition, the local highway – such as Huntingdon Road and Madingley Road – will also experience significant flow increases;

vi) the differences between the 2026 Do Minimum and 2026 Do Something scenarios (ie, the impact of the Development) on the M11 and A14 strategic highway corridors would be minimal. The flow increases across the local highway are also minimal, and are negative in some cases;

vii) the comparison of the Volume to Capacity results for the 2026 Do Minimum and 2026 Do Something scenarios indicates that there are minimal changes in network conditions as a consequence of the Development.

16.2 Differences between 2006 Base and 2026 Do Minimum

16.2.1 The CSRM 2006 Base Year and 2026 Do Minimum (i.e., Without the Development) peak hour flows are compared in Table 16.1, and the percentage differences are reported:

Table 16.1: Comparison of the 2006 and 2026 Do Minimum model flows

No.	Link	Movement	2006 Base		2026 Do Minimum		Percentage difference	
			AM	PM	AM	PM	AM	PM
1	M11 – Junction 14 to M1 / A604 Merger	Two Way	5101	4855	5488	5474	8%	13%
2	M11 – from Junction 13 to Junction 14	Two Way	5949	6101	7148	6824	20%	12%
3	M11 – from Junction 12 to Junction 13	Two Way	6969	7423	8049	8310	15%	12%
4	M11 – from Junction 11 to Junction 12	Two Way	6095	6380	7575	7955	24%	25%
5	A14 – NW of B1050 Junction	Two Way	6743	7370	7917	8365	17%	14%
6	A14 – from B1050 Junction to Dry Drayton Road Junction	Two Way	8075	8998	10198	10427	26%	16%
7	A14 – from Dry Drayton Road to M11 Merge	Two Way	8073	8738	10061	10337	25%	18%

No.	Link	Movement	2006 Base		2026 Do Minimum		Percentage difference	
			AM	PM	AM	PM	AM	PM
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip		1699	1579	1580	1724	-7%	9%
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip		1379	1464	1517	1647	10%	13%
9	Southbound Slip Road from A428 to M11		821	736	683	553	-17%	-25%
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Two Way	6505	6012	7180	7481	10%	24%
11	A14 – from B1049 Junction to A10 Junction	Two Way	6107	6316	7056	7534	16%	19%
12	A14 – from Junction to Horningsea Road	Two Way	5878	6115	6877	7976	17%	30%
13	A428 – west of Madingley Road Junction	Two Way	2338	2377	3587	4418	53%	86%
14	A428 – from Madingley Road Junction to M11 Junction	Two Way	1447	1357	2435	2804	68%	107%
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	986	1121	1474	1444	49%	29%
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	986	1121	1474	1444	49%	29%
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1558	1754	1871	1902	20%	8%
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	1558	1754	2043	2100	31%	20%
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1212	1388	1358	1546	12%	11%
20	Lady Margaret Road and Mount Pleasant	Two Way	773	1117	965	1178	25%	5%
21	Shelly Row and Albion Row	Two Way	448	184	463	266	3%	45%
22	Madingley Road – from Queens Road to Grange Road	Two Way	1033	1143	1328	1203	29%	5%
23	Madingley Road – from Grange Road to Storey's Way	Two Way	1033	1143	1511	1448	46%	27%
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1551	1623	1720	1838	11%	13%
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1555	1620	1668	1820	7%	12%
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1552	1623	1664	1814	7%	12%
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1552	1625	1694	1816	9%	12%
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1552	1625	1786	2020	15%	24%
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1221	1055	1462	1419	20%	35%
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1152	1207	1482	1727	29%	43%
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1036	1295	1382	1573	33%	21%
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	773	988	1096	1515	425	53%
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	716	923	992	927	39%	0%
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1581	1269	1868	1472	18%	16%

No.	Link	Movement	2006 Base		2026 Do Minimum		Percentage difference	
			AM	PM	AM	PM	AM	PM
35	Storey's Way	Two Way	835	652	1263	992	51%	52%
36	Oxford Road and Windsor Road	Two Way	370	542	548	430	48%	-21%
37	Histon Road	Two Way	1377	1510	1943	1659	41%	10%
38	Bridge Road (Histon)	Two Way	1370	1326	1608	1749	17%	32%
39	Victoria Road	Two Way	1021	847	1138	1119	11%	32%
40	A10	Two Way	2177	2178	2326	2101	7%	-4%
41	Girton Road	Two Way	517	571	520	536	1%	-6%
42	Grange Road	Two Way	254	258	761	553	200%	114%
101	NIAB Southern End	Two Way	-	-	188	167		
102	NIAB Northern End	Two Way	-	-	190	231		

16.2.2 It is apparent from this comparison between the 2006 and 2026 Do Minimum model peak hour flows (ie, the impact of the background growth on the network without any of the additional trips generated by the Development) that:

i) the M11 and A14 strategic highway corridors surrounding Cambridge experience significant increases in peak hour flow – the increases observed on the M11 vary between 8% – 25%, the increases on the A14 by up to 30%;

ii) the A428 experiences significant increases in excess of 53% - this appears to reflect strategic reassignment caused by the constraints to capacity on the A14;

iii) the Huntingdon Road corridor experiences flow increases along its length, varying between 49% to the north west and 11% to the south-east;

iv) the Madingley Road corridor also experiences general flow increases of between 46% to the west of Grange Road (Link 23), to 7% adjacent the Park and Ride Entrance;

v) Grange Road experiences significant increases of flow of over 100%.

16.3 Differences between 2026 Do Minimum and 2026 Revised Do Something

16.3.1 To gauge the influence of the Development in 2026, the 2026 Do Minimum and 2026 Revised Do Something peak hour flows are compared. These flows are summarised in Table 16.2, the percentage differences are reported:

Table 16.2: Comparison of the 2026 Do Minimum and 2026 Revised Do Something model flows

No.	Link	Movement	2026 Do Minimum		2026 Do Something		Percentage Impact	
			AM	PM	AM	PM	AM	PM
1	M11 – Junction 14 to M1 / A604 Merger	Two Way	5488	5474	5490	5434	0.0%	-0.8%
2	M11 – from Junction 13 to Junction 14	Two Way	7148	6824	7144	6775	-0.1%	-0.8%
3	M11 – from Junction 12 to Junction 13	Two Way	8049	8310	8109	8328	0.9%	0.2%
4	M11 – from Junction 11 to Junction 12	Two Way	7575	7955	7611	8027	0.6%	1.1%
5	A14 – NW of B1050 Junction	Two Way	7917	8365	7964	8419	0.7%	0.7%
6	A14 – from B1050 Junction to Dry Drayton Road Junction	Two Way	10198	10427	10398	10523	1.4%	1.1%
7	A14 – from Dry Drayton Road to M11 Merge	Two Way	10061	10337	10223	10408	2.0%	0.8%
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip		1580	1724	1548	1665	-1.9%	-3.7%
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip		1517	1647	1511	1646	-0,4%	-0.1%
9	Southbound Slip Road from A428 to M11		683	553	689	554	0.7%	0.1%
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	Two Way	7180	7481	7248	7497	1.0%	0.3%
11	A14 – from B1049 Junction to A10 Junction	Two Way	7056	7534	7138	7614	1.3%	1.3%
12	A14 – from Junction to Horningsea Road	Two Way	6877	7976	6915	8052	0.6%	1.3%
13	A428 – west of Madingley Road Junction	Two Way	3587	4418	3750	4541	7.0%	5.2%
14	A428 – from Madingley Road Junction to M11 Junction	Two Way	2425	2804	2538	2882	7.8%	5.7%
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	Two Way	1474	1444	1738	1720	26.8%	24.6%
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	Two Way	1474	1444	1407	1290	-6.8%	-13.7%
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	Two Way	1871	1902	1755	1778	07.4%	-7.1%
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	Two Way	2043	2100	2190	2269	9.4%	9.6%
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	Two Way	1358	1546	1410	1621	4.3%	5.4%
20	Lady Margaret Road and Mount Pleasant	Two Way	965	1178	937	1196	-3.6%	1.6%
21	Shelly Row and Albion Row	Two Way	463	266	518	233	12.3%	-17.9%
22	Madingley Road – from Queens Road to Grange Road	Two Way	1328	1203	1382	1184	5.2%	-1.7%
23	Madingley Road – from Grange Road to Storey's Way	Two Way	1511	1448	1576	1473	6.3%	2.2%
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	Two Way	1720	1838	1653	1754	-4.3%	-5.2%
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	Two Way	1668	1820	1499	1748	-10.9%	-4.4%

No.	Link	Movement	2026 Do Minimum		2026 Do Something		Percentage Impact	
			AM	PM	AM	PM	AM	PM
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	Two Way	1664	1814	1384	1651	-18.0%	-10.0%
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	Two Way	1694	1816	1758	2023	4.1%	12.7%
28	Madingley Road – from Unnamed Road to M11 Junction 13	Two Way	1786	2020	1848	2230	4.0%	12.9%
29	Madingley Road – from M11 Junction to Cambridge Road	Two Way	1462	1419	1428	1368	-2.8%	-4.8%
30	Madingley Road – from Cambridge Road to A428 Junction	Two Way	1482	1727	1454	1699	-2.4%	-2.3%
31	Barton Road – from M11 Junction 12 to Grange Road	Two Way	1382	1573	1450	1667	6.6%	7.3%
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	Two Way	1096	1515	1131	1542	4.5%	2.7%
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction	Two Way	992	927	967	902	-3.5%	-2.7%
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	Two Way	1868	1472	1885	1497	1.1%	2.0%
35	Storey's Way	Two Way	1263	992	1090	795	-20.7%	-30.2%
36	Oxford Road and Windsor Road	Two Way	548	430	715	654	45.1%	41.3%
37	Histon Road	Two Way	1943	1659	2082	1796	10.1%	9.1%
38	Bridge Road (Histon)	Two Way	1608	1749	1572	1729	02.6%	-1.5%
39	Victoria Road	Two Way	1138	1119	1220	1128	8.0%	1.1%
40	A10	Two Way	2326	2101	2330	2134	0.2%	1.5%
41	Girton Road	Two Way	520	536	591	626	13.7%	15.8%
42	Grange Road	Two Way	761	553	759	603	-0.8%	19.4%
101	NIAB Southern End	Two Way	188	167	210	187	11.7%	12.0%
102	NIAB Northern End	Two Way	190	231	182	252	-4.2%	9.1%

16.3.2 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 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 Development main accesses to the west appears to be successful – the differences in flows on Huntingdon Road and Madingley Road are positive to the west of the accesses, and negative to the east – this may be due to the additional Development trips increasing congestion on the western links, with the non-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.

16.4 Review of Conditions across the network

Introduction

16.4.1 There are a number of differing ways to assess how the Development car trips impact on the surrounding highway network. In consultation with Cambridgeshire County Council, it was agreed that the Velocity to Capacity output should be reviewed, along with journey times for the adjacent links to the site - Huntingdon Road and Madingley Road. These are reported in this section.

Review of the Volume to Capacity output

16.4.2 To understand the conditions on any link with respect to the available link capacity, the volume of flow is reported with reference to the available capacity – the Volume over Capacity (VoC) output - a ratio of 100% reflects a link at capacity. The Volume to Capacity results for the 2026 Do Minimum and 2026 Do Something models (ie, without and with the Development) for the AM and PM peaks are summarised in Table 16.3:

Table 16.3: Comparison of the 2026 Do Minimum and 2026 VoC results

No	Link / Notes	VoC Do Minimum		VoC Do Something	
		AM Peak	PM Peak	AM Peak	PM Peak
1	M11 – Junction 14 to M1 / A604 Merger - Nbd	76	80	56	63
1	M11 – Junction 14 to M1 / A604 Merger - Sbd	90	76	90	77
2	M11 – from Junction 13 to Junction 14 - Nbd	79	83	79	82
2	M11 – from Junction 13 to Junction 14 - Sbd	38	33	38	33
3	M11 – from Junction 12 to Junction 13 - Nbd	93	100	94	100
3	M11 – from Junction 12 to Junction 13 - Sbd	100	100	100	100
4	M11 – from Junction 11 to Junction 12 - Nbd	77	93	78	93
4	M11 – from Junction 11 to Junction 12 – Sbd	101	93	101	95

No	Link / Notes	VoC Do Minimum				VoC Do Something			
		AM Peak		PM Peak		AM Peak		PM Peak	
5	A14 – NW of B1050 Junction - NWbd	86		97		87		98	
5	A14 – NW of B1050 Junction - SEbd	99		99		100		99	
6	A14 – from B1050 Junction to Dry Drayton Road Junction - NWbd	73		84		74		84	
6	A14 – from B1050 Junction to Dry Drayton Road Junction - SEbd	88		81		88		81	
7	A14 – from Dry Drayton Road to M11 Merge – NWbd	72		82		73		82	
7	A14 – from Dry Drayton Road to M11 Merge – SEbd	81		76		83		77	
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip	79		86		77		83	
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip	76		82		76		82	
9	Southbound Slip Road from A428 to M11	80		57		80		58	
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction - Ebd	110		103		110		104	
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction - Wbd	82		93		83		93	
11	A14 – from B1049 Junction to A10 Junction – Ebd	85		85		86		86	
11	A14 – from B1049 Junction to A10 Junction – Wbd	85		95		86		96	
12	A14 – from Junction to Horningsea Road - Ebd	69		97		70		96	
12	A14 – from Junction to Horningsea Road - Wbd	96		94		97		96	
13	A428 – west of Madingley Road Junction- Ebd	44		42		46		43	
13	A428 – west of Madingley Road Junction- Wbd	40		62		41		63	
14	A428 – from Madingley Road Junction to M11 Junction - Ebd	42		39		44		41	
14	A428 – from Madingley Road Junction to M11 Junction - Wbd	35		48		36		48	
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	37		32		51	57	46	65
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	50	36	43	40	47	35	41	38
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access	52	29	40	38	49	28	38	36
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	90	45	58	69	93	51	69	70
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction	58	20	48	30	61	22	52	31
20	Lady Margaret Road and Mount Pleasant	25	85	47	52	25	84	44	51
21	Shelly Row and Albion Row	19	7	3	32	18	10	3	26
22	Madingley Road – from Queens Road to Grange Road	83	65	83	64	83	65	80	63
23	Madingley Road – from Grange Road to Storey's Way	68	16	48	27	70	16	48	27
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	66	57	70	62	60	50	65	54

No	Link / Notes	VoC Do Minimum				VoC Do Something			
		AM Peak		PM Peak		AM Peak		PM Peak	
25	Madingley Road – from JJ Thomson Avenue to South NWC Site Access	39	37	29	56	31	27	27	45
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance	88	21	62	39	72	37	59	75
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	67	26	46	47	95	27	82	50
28	Madingley Road – from Unnamed Road to M11 Junction 13	52	16	46	37	53	17	53	39
29	Madingley Road – from M11 Junction to Cambridge Road	92	28	61	53	90	28	64	50
30	Madingley Road – from Cambridge Road to A428 Junction	63	26	44	60	62	26	44	58
31	Barton Road – from M11 Junction 12 to Grange Road	44	36	39	52	46	38	41	55
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction	45	13	47	27	45	14	47	29
33	Newham Rd – from Barton Rd / The Fen Causeway Jn to Queens Rd / Silver St Jn	59	31	22	17	58	31	58	59
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road	96	54	57	90	96	55	59	90
35	Storey's Way	73	24	33	37	64	20	23	31
36	Oxford Road and Windsor Road	27	14	13	17	34	19	29	20
37	Histon Road	64	37	37	71	42	66	49	43
38	Bridge Road (Histon)	62	38	50	59	60	38	50	58
39	Victoria Road	34	46	34	52	36	49	35	50
40	A10	73	62	53	74	62	73	76	54
41	Girton Road	20	9	11	18	11	22	22	13
42	Grange Road	5	46	16	16	6	47	17	19
101	NIAB Southern End	2	57	6	27	3	62	7	29
102	NIAB Northern End	3	14	2	9	3	15	2	10

Note – VoC - Value over Capacity

16.4.3 The following is apparent from this comparison between the 2026 Do Minimum and 2026 Do Something VoC plots (ie, the direct comparison of the network Without, then With the Development generation).

M11 Links

16.4.4 There are two links on the M11 with VoC over 85% in the Do Minimum case that experience increases in VoC when compared to the Do Something case. These links are summarised in Table 16.4:

Table 16.4 - Increases of Volume over Capacity along the M11

No.	Link	Peak	Two-way Link Flow increase	VoC Increase
3	Jn 12 to 13 Nbd	AM	61 (1.6%)	1% - 93% to 94%
4	Jn 12 to 11 Sbd	PM	46 (1.2%)	2% - 93% to 95%

16.4.5 With respect to these links experiencing increased flows along the M11:

i) neither link that is experiencing increased VoC is projected to have a VoC of more than 100% - therefore these links still have reserve capacity;

ii) that no other link on the M11 with VoC over 85% in the Do Minimum case experiences an increase in VoC in the Do Something scenario – therefore conditions on these links would not be made worse by the Development.

It is therefore concluded that there would be no or minimal changes to the conditions on these links as a consequence of the Development.

A14 Links

16.4.6 On the A14 there are seven links with VoC over 85% in the Do Minimum case that experience increases in VoC when compared to the Do Something case. These are summarised in Table 16.5:

Table 16.5 - Increases of Volume over Capacity along the A14

No.	Link	Peak	Two-way Link Flow increase	VoC Increase
5	A14 – NW of B1050 NWbd	AM	27 (0.7%)	1% - 86% to 87%
5	A14 – NW of B1050 NWbd	PM	36 (0.9%)	1% - 97% to 98%
5	A14 – NW of B1050 SEbd	AM	20 (0.5%)	1% - 99% to 100%
10	A14 – A428 to B1049 - Ebd	PM	-2 (-0.1%)	1% - 103% to 104%
11	A14 – B1049 to A10 - Ebd	AM	29 (0.8%)	1% - 85% to 86%
11	A14 – B1049 to A10 - Ebd	PM	41 (1.2%)	1% - 85% to 86%
11	A14 – B1049 to A10 - Wbd	AM	53 (1.5%)	1% - 85% to 86%
11	A14 – B1049 to A10 - Wbd	PM	39 (1.0%)	1% - 95% to 96%
12	A14 – A10 to Horningsea Rd – Ebd	PM	29 (0.7%)	1% - 97% to 98%
12	A14 – A10 to Horningsea Rd – Wbd	AM	13 (0.3%)	1% - 96% to 97%
12	A14 – A10 to Horningsea Rd – Wbd	PM	48 (1.2%)	2% - 94% to 96%

16.4.7 With respect to these links experiencing increased VoC along the A14:

i) the increase in two-way link flows are less than one additional vehicle every minute;

ii) Link 10 has a VoC has a VoC over 100%, but experiences a reduction in flow as a consequence of the NWC – this may be as a consequence of increased flows through the B1049 junction restricting exiting movements from the A14;

iii) no other links experiencing a projected increase in the VoC is projected to have a VoC over 100% in the Do Something scenario - these links therefore still have theoretical reserve capacity;

iv) no other links with VoC over 85% in the Do Minimum case experience an increase in VoC – conditions on these links are not made worse by the Development;

v) only one link experiences an increase in VoC of more than 1% - and that increase is only to 2%;

vi) the largest 2 way increase in flows is only 1.5% - and only three links along the A14 exceed 1% increase in flow.

It is therefore concluded that there would be minimal changes to the conditions on these A14 links as a consequence of the Development.

Other Links

16.4.8 On all the other links, there are two links that experience increases in VoC to over 85% in the Do Something case. This is summarised in Table 16.6:

Table 16.6 - Increases of Volume over Capacity across the network

No.	Link	Peak	Two-way Link Flow increase	VoC Increase
18	Huntingdon Rd – Eastern NWC Site Access – Storey's Way NWbd	AM	147 (7.2%)	3% - 90% to 93%
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	AM	138 (8.9%)	28% - 67% to 95%

16.4.9 With respect to these two links experiencing increased VoC:

i) the capacity on both the Huntingdon Road and Madingley Road links would be affected by the proposed development accesses, and by the additional inbound development-generated trips in the morning peak to the development;

ii) the link has a VoC below 100% - these links still have reserve capacity;

iii) no other links experiencing increased VoC have a VoC over 100%;

iv) no other links with VoC over 85% in the Do Minimum case experience an increase in VoC – conditions on these links are not made worse by the Development.

It is therefore concluded that there would be minimal changes to the conditions on these links as a consequence of the Development.

Journey Time Review

16.4.10 Typical journey times for the Huntingdon Road and Madingley Road links have been provided, to indicate how the operation of the accesses to Proposed Development may affect them.

16.4.11 The typical journey times were extracted from the CSRM in both directions for the 2026 AM and PM peaks, using the SATURN "joy ride" technique, for the following links adjacent to the site:

i) Madingley Road - from the M11 Junction 13 Northbound Off Slip through to the Madingley Road / Northampton Road / Queen Street junction;

ii) Huntingdon Road – from the A14 diverge taper to Huntingdond Road through to the Huntingdon Road / Histon Road / Victoria Road / Castle Street / Mount Pleasant linked traffic signal controlled junctions.

16.4.12 The results for these Journey Time assessments are summarised in Table 16.7:

Table 16.7 – Results of the 2026 Journey Time Assessment

Link	Direction	Do Minimum		Do Something	
		AM	PM	AM	PM
Madingley Road	Inbound	324	299	373	312
	Difference	-	-	49 (15%)	13 (4%)
	Outbound	228	246	240	262
	Difference	-	-	12 (5%)	16 (6%)
Huntingdon Rd	Inbound	366	389	410	443
	Difference	-	-	44 (12%)	54 (14%)
	Outbound	395	414	432	464
	Difference	-	-	37 (9%)	50 (12%)

16.4.13 The provision of a new traffic signal controlled junction will incur a journey time delay, this delay reflecting the junction design, the cycle time and the green time provided for an individual aspect. The increases in journey time reported along these corridors in Table 16.7 are typical for routes that have new traffic signal controlled junctions and changes in speed limits to reflect the increasing urban context for Huntingdon Road and Madingley Road - and are not necessarily only due to additional traffic movements. Whilst through traffic journey times along Huntingdon Road and Madingley Road may marginally increase, these would be improvements in pedestrian and cyclist safety and an improved ability to join Huntingdon Road and Madingley Road from adjoining side roads.

16.5 Conclusions

16.5.1 The comparison between the 2006 and 2026 Do Minimum model peak hour flows (ie, the impact of the background growth on the network without any of the additional trips generated by the Development) demonstrates that the M11, A14 and A428 strategic highway corridors surrounding Cambridge will experience significant increases in peak hour flow. Similarly, the local highway network along Huntingdon Road, Madingley Road and Grange Road will experience significant increases.

16.5.2 The 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) indicates that:

i) there would be a minimal effect on the M11;

ii) similarly, there would be a minimal effect on the A14;

iii) the strategy of locating the Development main accesses to the west would be successful – the impacts on Huntingdon Road and Madingley Road are positive to the west of the accesses, and negative to the east;

iv) Storey's Way experiences a reduction in flow in both peaks, implying that existing trips are assigning away from the area, or out of the peak hours.

16.5.3 The comparison of the Journey Times along Huntingdon Road and Madingley Road are typical for routes that have been subjected to new traffic signal controlled junctions and changes in speed limits to reflect the increasing urban context.

17 Junction Capacity Assessment

17.1 Introduction

17.1.1 This section considers the potential influence of the Development on the surrounding highway network in terms of the junction capacities.

17.1.2 As well as the Site Access junctions, other junctions identified as being stressed in the CSRM are considered individually.

17.2 Junction Capacity Assessment Methodology

17.2.1 The capacity of the junctions surrounding the Site have been assessed assuming the future year flows, and using appropriate modelling software including:

- JCT Consultancy's LINSIG computer program - utilised to model signal controlled junctions, including paired T junctions;
- the Transport Research Laboratory's (TRL) TRANSYT computer program - for small networks that with both signal and priority control;
- TRL's PICADY program - to assess the capacity of priority junctions; and
- TRL's ARCADY program – to assess the capacity of roundabouts.

The modelling assessment work is contained in Appendix 11.

17.2.2 The following junctions were assessed:

Site Access junctions

i) Huntingdon Road East / NIAB Site Access traffic signal controlled junction (modelled with LINSIG);

ii) Huntingdon Road West Site Access traffic signal controlled junction (modelled with LINSIG);

iii) the Madingley Road Corridor Junctions - Madingley Road with the access to the Development, West Cambridge Access, the Park and Ride access, and the slip road access junctions for the M11 Junction 11 (modelled with TRANSYT);

Local highway network junctions

iv) Madingley Road / Northampton Road / Queen Street Roundabout (modelled with ARCADY);

v) Histon Road / Victoria Road / Huntingdon Road / Castle Street / Mount Pleasant traffic signal controlled junction;

vi) Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction (modelled with LINSIG);

vii) Girton Road / Huntingdon Road priority junction (modelled with PICADY);

Strategic highway junctions

viii) Barton Interchange Northern Roundabout (modelled with ARCADY);

ix) in addition, the design of the M11 Junction 13 Southbound On Slip was reviewed with reference to the appropriate Design Manual for Roads and Bridges standard, TD 22/06.

17.2.3 The junctions have been assessed using the flows from the 2026 Do Minimum and 2026 Revised Do Something models. Existing junctions have been assessed for both scenarios, the proposed access junctions have been assessed for the 2026 Do Revised Something flows only.

17.2.4 The illustrative proposals for the three traffic signal controlled NorthWest Cambridge Site Access junctions are shown on the following drawings enclosed in Appendix 12:

i) D127313-700-103 - Huntingdon Road East;

ii) D127313-700 -106 - Huntingdon Road West;

iii) D127313-700-104 - Madingley Road.

17.3 Site Access Junctions

Huntingdon Road East / NIAB Site Access traffic signal controlled junction

17.3.1 The Huntingdon Road East / NIAB Site Access traffic signal controlled junction arrangement were assessed with LINSIG, as linked junctions (sic), using the 2026 Revised Do Something flows shown on Figure 15.

17.3.2 The NIAB and Access junctions to the Development include pedestrian facilities across the Site Accesses, the former includes a crossing of Huntingdon Road. As the pedestrian crossings require the junction operation to cease to provide green time for these pedestrian movements, these stages will be called only if there has been a demand. For the assessment of the NIAB junction, the results reported assume that the pedestrian phase would be called every other cycle.

17.3.3 The results are summarised in Table 17.1:

Table 17.1 – Summary of LINSIG Assessment - Huntingdon Road East / NIAB Site Access traffic signal controlled junction - 2026 Adjusted Do Something SATURN model flows

Junction	Arm/ Lane	Link Description	AM		PM	
			Degree of Saturation	Mean Maximum Queue	Degree of Saturation	Mean Maximum Queue
Junction 1 – NWC Huntingdon Road East Access	1/1+1/2	Huntingdon Road Northbound – Straight and Left	72%	12	91%	19
	2/1+2/2	Site Entrance right and Ahead	64%	7	91%	11
	3/1+3/2	Huntingdon Road Southbound - Right and Ahead	82%	24	52%	10
Junction 2 - NIAB Access	1/1+1/2	NIAB entrance left and right	50%	3	14%	1
	2/1+2/2	Huntingdon Road Northbound – Straight and Right	59%	13	93%	42
	3/1+3/2	Huntingdon Road Southbound - Left and Ahead	90%	21	72%	13
		Cycle Time	120 secs		120 secs	

Note – Degree of Saturation – the ratio of the predicted flow to pass through each arm of this junction, to the theoretical capacity

17.3.4 With respect to the results reported in Table 17.1:

i) the large volume of flows assigning along this route can be accommodated through this junction, albeit that this junction would be operating near capacity;

ii) the queue on the Huntingdon Road Northbound approach of the NWC Site Access Junction in the PM peak was reported as being 19 vehicles (a maximum length of 146m). The available stacking space to queue between the Access junctions to NIAB and the Development before blocking occurs is around 200m, sufficent for 26 vehicles. There is therefore no blocking between these two junctions in the northbound direction. The maximum queue on this link in the AM peak is lower, and can be accommodated within the available stacking space;

iii) the queue on the Huntingdon Road Southbound approach of the NIAB Site Access Junction in the AM and PM peak was reported as being 21 vehicles (a maximum length of 161m). The available stacking space to queue between the Access to the Development and to NIAB before blocking is around 200m (sufficent for 26 vehicles). There is therefore no blocking back between these two junctions in the southbound direction;

iv) the Huntingdon Road northbound approach to the NIAB junction has a degree of saturation of 93%, with a queue length in excess of 300m – this queue would not interfere with any other junction. This assessment has assumed that the pedestrian phase has been incorporated every cycle, but would in reality only be included if pedestrians have called this. Therefore capacity assessment may be assumed to represent a worst case scenario for this junction..

17.3.5 This junction appears to be operating close to capacity, particularly at access to NIAB, where saturations of 93% have been reported. Even so, this situation is considered to be acceptable as:

i) this relates to the 2026 Do Something situation, with growth across the network, and future development;

ii) there are alternative exits from the Development, trips could assign away to less constrained junctions;

iii) the number of trips assigning via this junction from the Development has been determined by the CSRM, which, being a strategic model, would not have modelled the assignment of these development flows that precisely;

iv) delivering a larger junction to respond to peak hour flow scenarios only would not reflect current policy, that significant levels of highway capacity would be provided;

v) the flows from the Development would be subjected to further travel demand measures, hence would be lower than those assessed;

vi) the benefits of car-parking reduction have not been factored in and those of other travel management measures may well have been under-estimated;

vii) the University will provide funding to a MOVA / SCOOT signal optimising system along the Huntingdon Road corridor to reduce delays to traffic movements on this corridor, hence the likelihood of creating obstruction to the A14 – the beneficial effect of this has not been considered in this LINSIG assessment, but typical reductions in delaying of 5 - 15% would be anticipated.

17.3.6 To ensure enhanced public transport priority, the traffic signals at this junction would be select vehicle detection-activated, so that an approaching bus would be provided with a green aspect. I

17.3.7 This junction is therefore considered to operate within capacity in the 2026 Future Year.

Huntingdon Road West traffic signal controlled junction

17.3.8 The Huntingdon Road West traffic signal controlled junction arrangement was assessed using the 2026 Adjusted Do Something flows shown on Figure 15. This is an isolated signalised junction, hence LINSIG was used to assess this junction.

17.3.9 The Access junction arrnagement for the Development includes pedestrian crossing facilities across the Site Access and Huntingdon Road. As the latter pedestrian crossings require the junction operation to cease to provide green time for these pedestrian movements, these stages will be called only if there has been a demand. For this assessment, this was assumed to be called every other cycle.

17.3.10 The right turning inbound movement has been provided with a separate phase, to understand that the right turning lane has sufficient capacity to store the waiting demand.

17.3.11 The results are summarised in Table 17.2:

Table 17.2 – Summary of LINSIG Assessment - Huntingdon Road West Site Access traffic signal controlled junction - 2026 Adjusted Do Something SATURN model flows

/ Lane	Link Description	AM		PM	
		Degree of Saturation	Mean Maximum Queue	Degree of Saturation	Mean Maximum Queue
1/1+1/2	Huntingdon Road Northbound - Straight and Left	57%	5	68%	5
2/1+2/2	Site Entrance right and Ahead	59%	3	67%	5
3/1	Huntingdon Road Southbound - Right and Ahead	72%	8	68%	7
3/2	Huntingdon Road Southbound Right Turn		3		2
	Cycle Time	48 secs		48 secs	

17.3.12 With respect to the results reported in Table 17.2:

i) all arms operate with degrees of saturation well below 100% in the 2026 Future Year, confirming that the junction operates within capacity;

ii) the maximum queue for the right turning inwards movement is 3 vehicles in the AM peak, a length of 23m – this can be accommodated within the 54m length available wihout impacting upon the southbound movements of Huntingdon Road;

iii) the maximum queue for the Huntingdon Road Southbound arm being 8 vehicles, a length of 61m. The back of this queue would be compatible with the approach speeds of vehicles following the relocation of the 40mph speed limit towards the A14;

iv) the benefits of car-parking reduction have not been factored in and those of other travel management measures may well have been under-estimated;

v) the University will provide funding to a MOVA / SCOOT signal optimising system along the Huntingdon Road corridor to reduce delays to traffic movements on this corridor hence the likelihood of creating obstruction to the A14 – the beneficial effects of this has not been considered in this LINSIG assessment.

17.3.13 The assessment has therefore confirmed that the design would operate within capacity in 2026.

Madingley Road Corridor junctions - North West Cambridge Site Access / Park and Ride traffic signal controlled junction / M11 J13

17.3.14 Because of the interaction between the various junctions along the Madingley Road corridor, the following junctions have been modelled in TRANSYT:

i) M11 Junction 13 Northbound Off Slip

ii) M11 Junction 13 Southbound On Slip

iii) Park and Ride Site

iv) North West Cambridge / West Cambridge Site Access

17.3.15 The proposed arrangement for this corridor used in the assessment assumed:

i) the existing alignment between the M11 Junction 13 Off and On Slips;

ii) the section of Madingley Road between the M11 On Slip and the Park and Site access is subject to improvements associated with the West Cambridge Development, and includes for 2 lane operation. Sketches of this are included on the Site Access plans in Appendix 12;

iii) the North West Cambridge / West Cambridge Site Access is shown on D127313-700-104 - Madingley Road enclosed in Appendix 12.

17.3.16 The results of the 2026 Do Something assessment are summarised in Table 17.3:

Table 17.3 – Summary of TRANSYT Assessment – Madingley Road Corridor traffic signal controlled junction - 2026 Adjusted Do Something SATURN model flows – including for pedestrian phases on each arm

	Arm/Lane	Link Description	AM		PM	
			Degree of Saturation	Mean Maximum Queue	Degree of Saturation	Mean Maximum Queue
Junction 1 - M11 J13 Northbound Off slip / A1303	Arm J / Stream 1	A1303 Eastbound - ahead	83%	15	50%	6
	Arm K / Stream 1	A1303 Westbound - ahead	28%	2	59%	9
	Arm If / Stream 1	M11 Off Slip – left	25%	2	34%	3
	Arm If / Stream 2	M11 Off Slip – right	74%	7	71%	7
Junction 2 - M11 J13 Southbound On slip / A1303	Arm F / Stream 1	A1303 - right turn to M11 On Slip	9%	0	8%	0
	Arm H / Stream 1	A1303 - left turn to M11 On Slip	20%	0	53%	0
Junction 3 - A1303 / Park and Ride Junction	Arm Cf / Stream 1	A1303 Eastbound – left	12%	2	2%	0
	Arm Cf / Stream 2	A1303 Eastbound – ahead	89%	30	82%	25
	Arm E west f / Stream 1	A1303 Westbound - ahead	38%	0	81%	7
	Arm E west f / Stream 2	A1303 Westbound - right	0%	0	0%	0
	Arm Bf / Stream 1	Park and Ride exit – left	1%	0	3%	0
	Arm Bf / Stream 2	Park and Ride exit – right	5%	0	53%	8
Junction 4 - A1303 / NWC site access	Arm E east f / Stream 1	A1303 Eastbound - ahead and left	93%	33	78%	28
	Arm E east f / Stream 2	A1303 Eastbound – right	56%	4	9%	0
	Arm Af / Stream 1	A1303 Westbound - ahead and left	53%	11	91%	32
	Arm Af / Stream 2	A1303 Westbound – right	12%	1	44%	2
	Arm Df / Stream 1	NWC Access - left	89%	9	88%	8
	Arm Df / Stream 2	NWC Access - right	69%	5	79%	7
	Arm Gf / Stream 1	WC Access - left	0%	0	2%	0
	Arm Gf / Stream 2	WC Access - ahead and right	6%	0	21%	1
		Cycle Time	120		120	

17.3.17 With respect to the results reported in Table 17.3, the junction would be operating within capacity in 2026, with noteable results as follows;

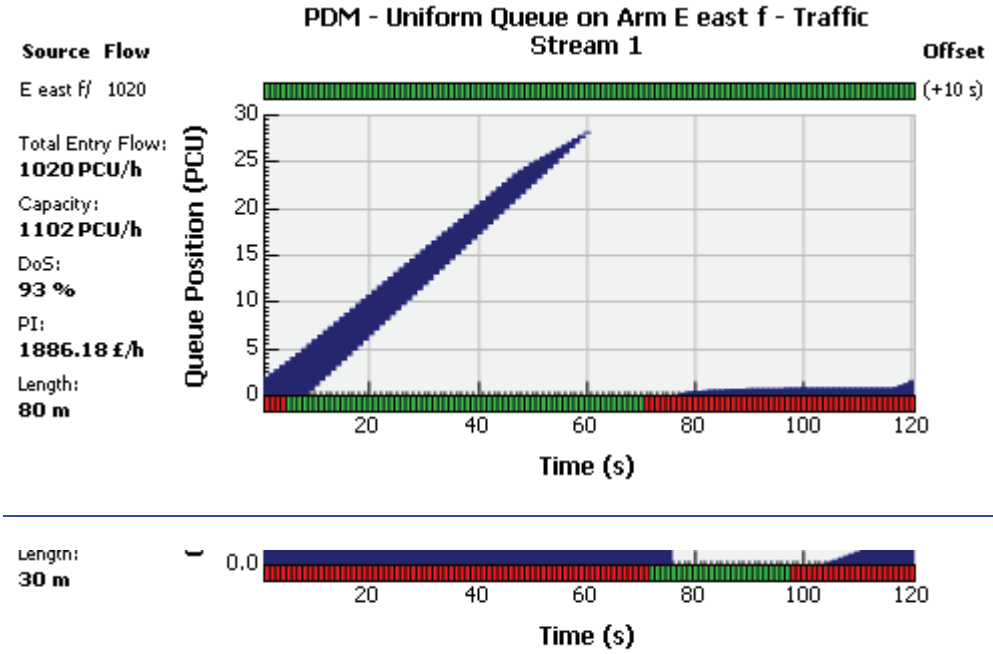
i) the M11 Off Slip junction is estamated to have a mean maximum queue of 10 vehicles in the PM peak, the higher peak hour. As the stacking space available is over 300m, this arm operates well within capacity, which can accommodate the queues;

ii) the higher peak hour mean maximum queue on Madingley Road Eastbound at the Park and Ride Junction (Arm Cf) is in the AM peak, reported as being 30 vehicles - a maximum queue length of 230m. The stacking space available between the Park and Ride Site and the M11 Junction 13 On Slip junction is in excess of 260m. There is sufficient room for vehicles to queue at the Park and Ride Access without blocking the M11 On Slip junction;

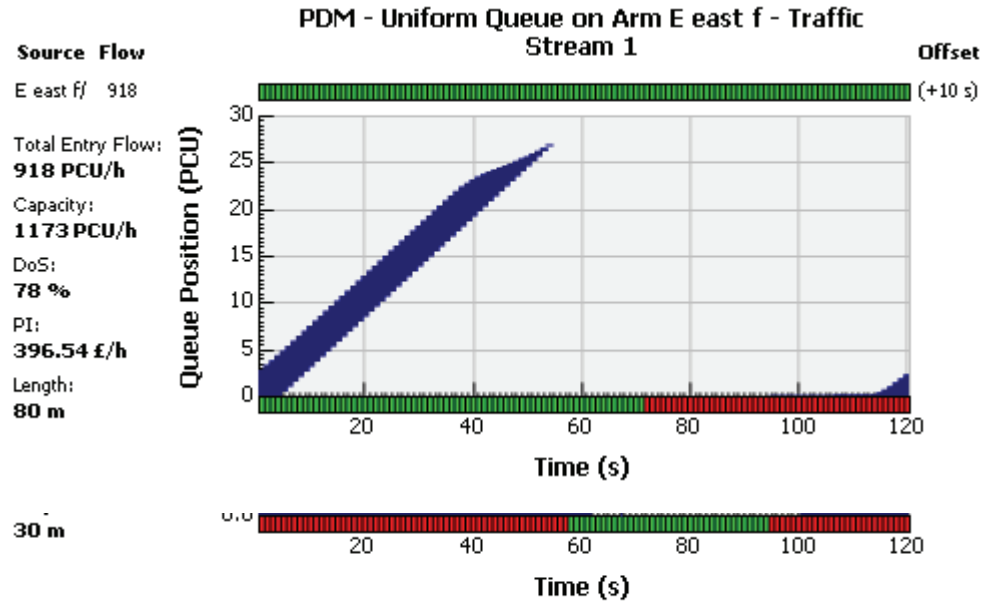
iii) the higher peak hour mean maximum queue on Madingley Road Westbound at the Park and Ride Junction (Arm E west f1) was reported as being a maximum 7 vehicles in the PM peak, a length of 54m. This movement has one lane avalaible for storage, the available length to queue between the Park and Ride Site before blocking the Site Access junction being 85m (11 vehicles). There is sufficient room for Westbound vehicles to queue at the Park and Ride Access without blocking the High Cross junction;

iv) the higher peak hour mean maximum queue on the Madingley Road Eastbound arm ahead and left movement at the Site Access Junction (Arm E east f1) was reported as being 33 vehicles in the AM peak, a distance of 251m. The available queue length between the Park and Ride Site junction and the Site Access stopline is 85m for one lane, hence this queue would theoretically encroach into the upstream Park and Ride junction. However, with reference to the Queue Graph option in the TRANSYT program for this lane, shown in Graph 17.1, this queue remains below 4 vehicles for the majority of the cycle, only increasing briefly above this as a ‘sliver’ queue – a queue which is degenerating from the front as vehicles pass the stopline, whilst increasing in length at the back as further vehicles join. The queue of 33 vehicles completely disappears whilst the stopline is receiving green time. This is not therefore considered to be an issue, as the queue will fit within the storage area, with a momentary queue increasing as the upstream signals on Madingley Road provide a green aspect. As shown in Graph 17.2, a similar, less pronouced effect happens in the PM peak, again without affecting operation of the Park and Ride Access;

Graph 17.1 – "Queue" Graph extract from the TRANSYT Assessment – Madingley Road / North West Cambridge Development Site Acces junction, Madingley Road Eastbound - 2026 Adjusted Do Something SATURN model flows – AM Peak (P+R Site Access timings shown below)



Graph 17.2 – "Queue" Graph extract from the TRANSYT Assessment – Madingley Road / North West Cambridge Development Site Acces junction, Madingley Road Eastbound - 2026 Adjusted Do Something SATURN model flows – PM Peak (P+R Site Access timings shown below)



17.3.18 With this signal setting arrangement, provision is made within the cycle for pedestrian movements across all arms of the High Cross junction.

17.3.19 To ensure the integrity of the M11, a MOVA / SCOOT signal optimising system along the Madingley Road corridor would reduce delays to traffic movements on this corridor, hence may be considered. This would also obviate any likelihood of creating obstruction to the M11 – the beneficial effects of this have not been considered in this TRANSYT assessment.

17.3.20 To ensure enhanced public transport priority, the traffic signals at this junction would be select vehicle detection-activated, so that an approaching bus would be provided with a green aspect.

17.3.21 It is therefore concluded that the junctions along the Madingley Road is corridor would operate within capacity in the 2026 Future Year.

17.4 Local highway network junctions

Madingley Road / Queen Street / Northampton Road Roundabout Junction

17.4.1 The Madingley Road / Queen Street / Northampton Road Roundabout was assessed using the TRL's ARCADY sotware, and the 2026 Do Minimum, and 2026 Adjusted Do Something flows shown on Figure 15. The results for the Do Minimum and Do Something situations are summarised in Tables 17.5 and 17.6.

Table 17.5 – Summary of ARCADY Assessment - Madingley Road / Queen Street / Northampton Street Roundabout junction - 2026 Do Minimum SATURN model flows

Link Description	AM		PM	
	Ratio of Flow to Capacity	Mean Maximum Queue	Ratio of Flow to Capacity	Mean Maximum Queue
Madingley Road Approach	67%	2	56%	1
Northampton Road Approach	89%	7	54%	1
Queen Street Approach	47%	1	64%	2
Total Inclusive Queuing Delay (Mins / Veh)	0.13		0.08	

Note – Ratio of flow to capacity– the ratio of the predicted flow to pass through each arm of this junction, to the theoretical capacity (similar to the Degree of Saturation)

Table 17.6 – Summary of ARCADY Assessment - Madingley Road / Queen Street / Northampton Street Roundabout junction - 2026 Adjusted Do Something SATURN model flows

Link Description	AM		PM	
	Ratio of Flow to Capacity	Mean Maximum Queue	Ratio of Flow to Capacity	Mean Maximum Queue
Madingley Road Approach	69%	2	59%	1
Northampton Road Approach	90%	8	54%	1
Queen Street Approach	48%	1	64%	2
Total Inclusive Queuing Delay (Mins / Veh)	0.14		0.08	

17.4.2 The results show that the influence of the Development is minimal.

Huntingdon Road / Histon Road / Victoria Road / Castle Street / Mount Pleasant traffic signal controlled junctions

17.4.3 The Do Minimum and Do Something flows passing through the Huntingdon Road / Histon Road / Victoria Road / Castle Street / Mount Pleasant linked traffic signal controlled junctions were reviewed and compared. As these show that the numbers of vehicles passing through this junction would reduce, and as the Delay Difference plots for both AM and PM peaks show that there would be no change in delays, no assessment has been undertaken of this junction.

Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction

17.4.4 The Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction arrangement was assessed using the 2026 Adjusted Do Something flows shown on Figure 15. The flows for the Madingley Rise arm incorporate the observed existing movements, as well as the additional Development movements shown on Figure 15. The results are summarised in Table 17.7:

Table 17.7 – Summary of PICADY Assessment - Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction - 2026 Adjusted Do Something SATURN model flows

	AM Peak		PM Peak	
	Ratio of Flow to Capacity	Queue	Ratio of Flow to Capacity	Queue
JJ Thomson Avenue (S) to Madingley Road (W) – B – C	0.024	0	0.139	0
JJ Thomson Avenue (S) to Madingley Road (E) – B – AD	0.172	0	0.351	0
Madingley Road (W) to JJ Thomson Avenue C – B	0.117	0	0.013	0
Madingley Rise (N) to Madingley Road (E) – FD – A	0.085	0	0.585	1
Madingley Rise (N) to Madingley Road (W) – D – BC	0.238	0	0.639	2
Madingley Road (E) to Madingley Rise (N) – A – D	0.501	1	0.080	0
Inclusive Queue Delay	0.04		0.07	

17.4.5 It is concluded that the existing priority junction arrangement would provide sufficient capacity to cater for the additional Development flows.

Girton Road / Huntingdon Road priority junction

17.4.6 The Girton Road / Huntingdon Road priority junction arrangement was assessed with both the 2026 Do Minimum flows, and the 2026 Adjusted Do Something flows shown on Figure 15. The results are summarised in Tables 17.8 and 17.9:

Table 17.8 – Summary of PICADY Assessment - Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction - 2026 Adjusted Do Minimum SATURN model flows

Do Minimum	AM Peak		PM Peak	
	Ratio of Flow to Capacity	Queue	Ratio of Flow to Capacity	Queue
Girton Road B – AC	0.712	2	0.355	1
Huntingdon Road Westbound C – AB	0.37	0	0.622	2
Inclusive Queue Delay per vehicle	0.06		0.05	

Table 17.9 – Summary of PICADY Assessment - Madingley Road / Madingley Rise / JJ Thomson Avenue priority junction - 2026 Adjusted Do Something SATURN model flows

Do Something	AM Peak		PM Peak	
	Ratio of Flow to Capacity	Queue	Ratio of Flow to Capacity	Queue
Girton Road B – AC	0.839	4	0.429	1
Huntingdon Road Westbound C – AB	0.329	0	0.742	3
Inclusive Queue Delay per vehicle	0.09		0.05	

17.4.7 It is concluded that the existing priority junction arrangement would provide sufficient capacity to cater for the additional Development flows.

17.5 Strategic highway junctions

M11 Junction 12 Junction Barton Interchange Northern Roundabout

17.5.1 The CSRM Delay Difference plots for both AM and PM peaks has identified that the delay incurred at the Northern Roundabout at the M11 Junction 12 (the Barton Interchange) increases as a consequence of the Development. Although this is a County Road, a junction assessment has been requested by the Highways Agency to safeguard the operation of the M11 – this was supported by the County Council.

17.5.2 Roundabout capacity assessments have been undertaken using the TRL's ARCADY computer program, all the traffic flow data being entered using the "ODTAB" option. The computer output for the 2026 Do Minimum and 2026 Do Something options are included in Appendix 11, and summarised in Tables 17.10 and 17.11:

Table 17.10 – Summary of ARCADY Assessment - M11 J12 Barton Interchange Northern Roundabout - existing geometrics – 2026 Do Minimum flows

	AM (0800 - 0900)		PM (1700 – 1800)	
	RFC	Queue	RFC	Queue
A - A603 – Barton Rd –NE	0.36	1	0.52	1
B - Coton Road – SE	0.23	0	0.41	1
C - A603 Cambridge Rd – SW	0.52	1	0.35	1
D - Grantchester Rd – NW	0.73	3	0.86	6
Inclusive Queuing Delay (min/veh)	0.07		0.09	

Table 17.11 – Summary of ARCADY Assessment - M11 J12 Barton Interchange Northern Roundabout - existing geometrics – 2026 Do Something flows

	AM (0800 - 0900)		PM (1700 – 1800)	
	RFC	Queue	RFC	Queue
A - A603 – Barton Rd -NE	0.38	1	0.55	1
B - Coton Road – SE	0.24	0	0.39	1
C - A603 Cambridge Rd – SW	0.52	1	0.37	1
D - Grantchester Rd - NW	0.73	3	0.86	6
Inclusive Queuing Delay (min/veh)	0.07		0.09	

17.5.3 When the Do Minimum and Do Something assessment results summarised in Tables 17.10 and 17.11 are compared, it is considered that:

i) with reference to the RFCs on all arms, these are either equal to or no more than 0.03 higher in the Do Something scenario than the Do Minimum situation;

ii) the Inclusive Queuing Delay experienced by all vehicles remains exactly identical in the Do Something scenario to that experienced in the Do Minimum scenario;

iii) the queue lengths in the Do Minimum scenario are identical to the queue lengths in the Do Something scenario.

17.5.4 It is therefore concluded that the influence of the Development on this junction is negligible.

M11 Junction 13 Southbound On Slip Assessment

17.5.5 The M11 Junction 13 Southbound On Slip has been reviewed, as the CSRM Delay Difference plots between the 2026 Do Minimum and Do Something cases has identified increases in delays for southbound vehicle trips joining the M11. The following trip increases were reported in the CSRM:

Table 17.12: Changes in southbound vehicle trips and delays through the M11 Junction 13 area

Link		AM Peak		PM Peak	
		Do Minimum	Do Something	Do Minimum	Do Something
M11 Southbound - Junctions 14 and 13	Flow (vehs)	3814	3807	3318	3336
	Delay (secs)	31	31	28	28
	Change in delay (secs)	0		0	
M11 J13 - Southbound On Slip	Flow (vehs)	380	393	841	835
	Delay (secs)	133	172	51	76
	Change in delay (secs)	39		25	
M11 Southbound - Junctions 13 and 12	Flow (vehs)	4182	4181	4158	4159
	Delay (secs)	65	64	62	62
	Change in delay (secs)	-1		0	

17.5.6 The indicated scale of increases in delay are disproportionate to the minor changes in vehicle trips on the slip road. A maximum increase of 13 vehicle trips along the M11 J13 Southbound On-slip results in an increase in delay of 39 seconds in the AM peak. Even though there is a decrease of 6 vehicle trips in the PM peak, there is an increase in delay of 25 seconds. Most likely these increases in delay are a consequence of marginally higher mainline flows rather than flows attributable to the Development.

17.5.7 An assessment of the slip road requirements has been undertaken with the Design Manual for Roads and Bridges TD 22/06 - Layout of Grade Separated Junctions. This design standard identifies the required slip road arrangement with reference to the predicted mainline flows, and the joining flows. These flows, and the resulting merge lane layouts are summarised in Table 17.13:

Table 17.13: M11 Junction 13 Southbound On Slip

Scenario	Mainline flow (Vehicles per hour)	Merge flow (Vehicles per hour)	On Slip Merge Land Layout requirement
Existing Situation			A – 2 Lane Taper Merge
AM Peak Do Minimum	3,814	380	A – 3 Lane Taper Merge or
AM Peak Do Something	3,807	393	A – 3 Lane Taper Merge or
PM Peak Do Minimum	3,318	841	E – Lane Gain from 2 Lanes to 3 lanes
PM Peak Do Something	3,336	835	E – Lane Gain from 2 Lanes to 3 lanes

17.5.8 It is noted that:

i) the M11 Junction 13 Southbound On Slip is currently a 2 lane Taper Merge arrangement;

ii) the predicted 2026 Do Minimum flows for the AM Peak suggest that this on slip standard would need to be a 3 lane Taper Merge (ie, the on slip should join a 3 lane carriageway, one lane wider than is existing);

iii) the predicted 2026 Do Something flows for the AM Peak are nearly identical, and repeat the standard requirement – of a 3 lane Taper Merge arrangement;

iv) the predicted 2026 Do Minimum flows for the PM Peak suggest that this on slip standard would need to be a 2 lane to 3 lane Lane Gain arrangement (ie, the on slip joins the 2 lane motorway, and continues, forming a 3 lane carriageway);

v) the predicted 2026 Do Something flows for the PM Peak are nearly identical, and repeat the standard requirement – of a 2 to 3 lane Lane Gain arrangement.

17.5.9 It is concluded that:

iv) to cater for the potential Future Year excluding the Development flows, the existing junction arrangement would already be operating beyond its current design standard;

v) the influence of the Development on this junction in terms of additional vehicles is minimal;

vi) the junction arrangement standard following the Development implementation would not require any further upgrade;

vii) considering the above, it would be unreasonable and disproportionate to require the Development to contribute towards significant improvements to the M11 and its associated slip roads.

17.6 Conclusions

17.6.1 This section considers the potential influence of the Development on the Site Accesses, and adjacent junctions identified in the CSRM requiring further analysis.

17.6.2 It has been demonstrated that all the three proposed Site Access junctions would operate within capacity in the 2026 Future Year. These assessments, undertaken in the context of adjacent junctions, have also confirmed that the junctions along these corridors would also operate within capacity in this 2026 Future Year. To provide greater certainty as to the integrity of the M11 and the A14, the University may consider providing funding to MOVA / SCOOT signal optimising systems along the Madingley Road and Huntingdon Road corridors.

17.6.3 Where the Development has an impact in terms of increased delay, assessments have been undertaken to other junctions on the local and strategic highway network. These assessments show that the influence of the 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 Development.

18 Construction Traffic (2014 – "Pre Opening" scenario)

18.1 Introduction

18.1.1 This section identifies the potential peak Construction Movements associated with the Development, and assesses the effects of these movements on the surrounding highway network.

18.2 Assessment of the peak Construction movements

18.2.1 The activities that generally generate the highest volume of trips normally relate to the construction of the carriageway. As the majority of the on-site carriageway construction works will be implemented during Phase 1, the construction movements generated during this phase have been considered. An assessment of these movements is included in Appendix 13.

18.2.2 It has been assumed that the following major elements of the development will be constructed in Year 1 of Phase 1 (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, Huntingdon Road East and Madingley Road Site Accesses

iii) approximately 100 residential units;

iv) 2,900m^2 gross floor area Food Store;

v) 2,500m^2 Primary Care Trust, Mensa, and Police Office within the Local Centre

vi) Madingley Road and Huntingdon Road East Site Accesses

18.2.3 The traffic generation of the remainder of the development to be implemented in other phases would be less, hence the traffic generation would be lower.

18.2.4 The on-site earthworks would have limited effects 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).

18.2.5 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.

18.2.6 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.

18.2.7 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 these flows would be generated on carriageway construction work on around 20 days in total across the whole project.

18.2.8 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 (15 ground-workers, 15 brick layers, 10 roofing contractors, 15 plasterers, 5 plumbers, 10 decorators, 7 electricians, and 10 remedials operatives, with 2 administrators) – 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.

18.2.9 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 (5 ground-workers, 5 decorators, 5 fittings, 3 electricians, and 5 finishing / remedials operatives, with 2 administrators) – 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.

18.2.10 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 (5 ground-workers, 5 brick layers, 10 fittings and decorators, 5 electricians, 5 plumbers, with 4 administrators) – 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.

18.2.11 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 works on Huntingdon Road and those on Madingley Road.

18.2.12 The assumed peak Daily Construction traffic flows are summarised in Table 18.1:

Table 18.1: Summary of Construction traffic flows

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 (Zones A and C)	10	10	20	20	20	40	30	30	60
Total	137	137	274	135	135	270	272	272	544

18.2.13 These flows are used to assess the impact of the Development on the surrounding highway network.

18.3 Assessment of the peak Construction impact

18.3.1 Of the Construction flows summarised above, only a limited number of car and HGV movements would typically occur during the peak hours: the working hours of most 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. As there would be only a limited number of Construction movements in the peak hours, no peak hour assessment has been made.

18.3.2 On the basis of the worst case flow relating to the construction activities, a worst case assessment of the likely impact on daily flow is shown in Table 18.2 with respect to the predicted 2010 Base Year flows. The flows in this table assume that all access will be from M11 Junction 13 and Madingley Road:

Table 18.2: Construction traffic impacts – 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%

18.3.3 In terms of construction of the development, the largest increase in flows would be in terms of HGV flows on Madingley Road between the M11 and the Site Access, where there would be a circa 60% increase in HGVs. Nevertheless, this would remain well within the overall capacity of the road – and subsumed within the negligible 2.8% All Vehicle increase.

18.3.4 On all other routes, the increase in general traffic resulting from the construction activity is considered to be negligible.

PART 4 ADDITIONAL MANAGEMENT MEASURES

This Part contains Section 19:

19 Further Travel Management measures

19.1 Introduction

19.1.1 This section of the report considers all the proposed measures to manage any transport effects of the Development.

19.1.2 Previous sections of the Transport Assessment set out the most likely outcome in terms of trip generation and traffic impact in the context of current and planned conditions.

19.1.3 As there may be a degree of variability in future projections (which can be attributed to a number of factors including fuel prices, Government policy etc), a pragmatic management strategy has been formulated and which is designed to be resilient to change. This strategy would:

- reduce vehicular trips across the network;
- where necessary, provide measures to preserve and / or enhance capacity on particular links.
- manage demand along some sensitive strategic links; and
- improve pedestrian and cyclist infrastructure.

19.1.4 The North West Cambridge Do Something option tests have been run incorporating the benefit of the Development travel demand management strategy summarised in Section 10 (incorporating the proposed public transport strategy). The results from this assessment identified there is a minor residual impact on the network.

19.1.5 Further to discussions with the Highways Agency and Cambridgeshire County Council on receipt of these CSRM model results, it was agreed that the Transport Assessment would look at ways to minimise the impact of trips on the strategic highway network – particularly in the first instance concentrating on the 200 trips that use the A14 to the north-west of Cambridge in the AM peak.

19.1.6 This section provides further information as follows:

i) a summary of the transport management strategy measures already incorporated within the CSRM modelled outputs;

ii) a summary of the proposed further transport management measures;

iii) details and consideration of the effects of these further transport management measures:

- directed at vehicle trip reduction;
- physical interventions to preserve and / or enhance capacity across the network;
- to manage demand;
- to enhance pedestrian and cyclist facilities;

- trip reduction by the implementation of a City-Wide Travel Plan by the University;

iv) summary of the likely effects of the transport management measures outlined.

19.1.7 This section concludes that the overall effects of the proposed travel demand measures would offset the additional traffic generated by the Development.

19.2 Summary of the transport management strategy incorporated within the CSRM

19.2.1 As detailed in Section 14, the North West Cambridge Do Something option tests have been run incorporating the benefit of the Development travel demand management strategy (summarised in Section 10). The measures inherent in that assessment include:

- the proposed land-uses within the development;
- the Framework Travel Plan (see separate document);
- the proposed public transport strategy summarised in Section 8.

19.2.2 These measures were formulated in order to:

- increase the internalisation of trips by providing complementary land uses;
- providing conveniently located accommodation that enhances the opportunities to utilise non-car modes (particularly for the University Key Workers and students);
- provide regular bus services to popular destinations to provide for as many longer distance movements as possible;
- reduce the total vehicular trip generation associated with the development.

19.2.3 As noted in Section 14, assumptions in relation to the vehicular trip generation were considered to be robust. Therefore, it can be considered that the likely effects of the measures described in 19.2.2 above are conservative.

19.2.4 Taking account of the above conservative assumptions, vehicle trips on the A14 generated by the Development have been estimated as up to 200 vehicle trips in the AM Peak, with a total increase in vehicle trips across the network of around 728 (AM Peak) and 891 (PM Peak).

19.2.5 In addition to the travel demand management measures already included in the modelling exercise referred to in Section 14, there are further measures that could be implemented to reduce further the vehicular trip generation of the Development, to reduce vehicle use on the network. These are described later in this section.

19.3 Summary of further transport management measures

19.3.1 The elements of the network identified in the CSRM that requires some further assessment have been identified in Section 16. Following discussions with the Highways Agency and Cambridgeshire County Council, consideration of additional transport management measures for the 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 impacts 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.

19.3.2 It has been agreed in principle with the highway authorities that the following additional measures would, in combination, form part of the transport strategy for the Development:

- measures directed at **vehicle trip reduction** across the strategic and local highway network:
  - a reduction the car parking provision across the 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 Street / 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 Madingley 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 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 development;
  - a monitoring scheme, potentially with further traffic calming measures along the Oxford Road / Windsor Road link;

- measures to improve conditions for **pedestrian and cyclists**:
  - targetted 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.
- potential further measures directed at **vehicle 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 vehicle 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.

19.3.3 In order to test the effectiveness of the above measures it was agreed with the Highways Agency and Cambridgeshire County Council that:

- the flows from the CSRM model - without the benefit of these further measures - would be used within the local junction capacity assessments;
- as this provides a robust test, that further runs of the CSRM including the effects of the additional measures would not be required.

19.3.4 The individual elements of this strategy are summarised further in this section.

19.4 Measures directed at Vehicular Trip Reduction

19.4.1 A series of measures are being considered that would reduce the total number of vehicle trips on the highway network – whether generated by the Development, or on the highway network in any event. These include the following:

- reducing the car parking provision across the Development;
- funding of a promotional campaign for the guided busway, to increase the patronage from communities along the route and thereby to extract vehicle trips from the A14 and M11;

19.4.2 These measures are considered further below.

Reducing the car parking provision across the Development

19.4.3 The provision of appropriate **levels of car parking** within the Development, lower than the Area Action Plan maximum, combined with a series of **parking management measures** to reinforce the efficacy of this approach, are central to the Development travel demand management strategy.

19.4.4 Within the context of this strategy, delivery of a high quality development is a fundamental pre-requisite and therefore under-provision of parking within the Site with consequential detriment to the streetscene should be avoided.

19.4.5 The Development parking strategy, would complement the range of measures to manage demand and to enhance the attraction of non-car modes of transport and would hence reduce the demand for parking.

Reduced levels of car parking

19.4.6 Using the same land use mix assumptions as stated in Section 9 for the initial parking requirement assessment, the proposed parking provision is summarised in Table 19.1.

Table 19.1: – Proposed car parking provision for the Development

Residential Spaces				
	2, 3, 4 and 5 bed Semi- and Detached Houses	**1, 2, 3,4 bed flats and apartments**	**2, 3 and 4 bed Terrace**	**Total**
Unit numbers (approximate)	249	1,812	941	**3,002**
Residents' parking	484	1,257	1,114	**2,855**
Additional visitor parking	3	293 (including 17 No. Car Club spaces)	192	**488**
Total Residents Parking	**487**	**1,550**	**1,306**	**3,343**
Non-Residential Uses				
Land-use		**Size (m2)**		**Spaces**
Academic Research		60,000m^2		1,000
Commercial Research		40,000m^2		1,000
Collegiate		2,000 units		250
PCT		700m^2 (assumed to be 9 professionals, 8 rooms)		25
Local Centre Community Hall		500m^2		26
Local centre store		1,100m^2 GFA		22
Food Store – GFA		2,900m^2 GFA		147
University Mensa		800m^2 GFA (assumed to be 500m^2 drinking / dining area)		25
Police Office		200m^2		5
Hotel		130 bed spaces (assuming 25 resident staff)		111
Nursery		Assuming 62 staff		41
Senior Care		75 units (assuming 1 member of staff)		20
School		60 staff		40
Total Non Residential				**2,712**
Total across the Development				**6,055**

Disabled parking will be provided at a rate of 5% of the total maximum for each land use.

19.4.7 The 6,055 spaces proposed, would be 1,645 lower than the Area Action Plan provision of 7,700 spaces, a 21% reduction in the AAP number. This lower provision is considered appropriate in the context of the reductions in demand for car travel that would result from the accessibility of Development to non-car modes; other travel demand management measures; and the proposed mix of land uses.

Management of parking within the Development

19.4.8 Management of car parking would be delivered through a combination of design and management measures.

Design

19.4.9 As part of delivery of the reduced levels of car parking referred to above, the University would:

i) provide appropriate levels of car and cycle parking carefully located to contain inconsiderate parking, encourage non-car modes of travel - such as cycling - and avoid the need for unsightly double yellow lines to be applied retrospectively with the associated restrictive and hostile impact to the environment;

ii) incorporate appropriate road widths for the development street hierarchy - to ensure both that parking is focussed to designated locations, and that inconsiderate parking is so apparent and obvious to contain any transgression.

Management

19.4.10 The University would implement a combination of car parking space allocation, control and monitoring measures. These would include:

i) for the Research land-uses, encouraging the occupiers to apply the agreed Travel Plan measures to their staff;

ii) for the Research land uses, providing sufficient car parking spaces to an appropriate, agreed, level of parking;

iii) for the academic research areas, extending the University's centrally-controlled existing car parking permit scheme;

iv) reviewing the occupation of the University's car parks;

v) identifying within all residential units sales the allocated car parking provision;

vi) identifying within the Key Worker unit leases the allocated car parking provision;

vii) in conjunction with the implementation of the designation of parking for the Research areas and student accommodation areas, considering the implementation of a residents' parking scheme, to prevent the migration of parking across the development;

viii) reviewing the need to support the extension of any residents parking scheme into the surrounding existing residential areas – such as Storey's Way;

ix) as part of the regular review of the Travel Plan, undertaking for the Travel Plan Co-ordinator to review parking conditions throughout the Development, for all times of day and for all conditions.

19.4.11 It is considered that the delivery of appropriate levels of parking in the context of good design would be self-policing, and hence reduce the need for active policing or other intervention by the University.

Parking summary

19.4.12 The proposed residential and commercial cycle parking strategy for the Development is based upon the minimum parking standards identified within the North West Cambridge Area Action Plan.

19.4.13 The proposed residential and commercial car parking strategy for the Development has been established with reference to data collected from the surrounding area, and is lower than the parking provision identified within the Area Action Plan. The Development parking provision levels have been set sufficiently robustly to ensure the delivery of a quality development whilst also contributing to achievement of the modal shift sought by the Area Action Plan.

19.4.14 The University will commit to apply and manage the agreed Parking Strategy on a long-term basis.

19.4.15 No allowance has been made in the CSRM for potential reductions in vehicle trips as a consequence of reducing the numbers of car parking spaces by 21%, a reduction in vehicle trips from the base situation would, however, undoubtedly result. Lower parking levels would mean lower accessibility to vehicles with a resulting lower usage. The lower number of parking spaces would therefore, in practice reduce the numbers driving to work and increase the number of car shares and numbers of those using non-car modes of transport.

19.4.16 The CSRM has incorporated vehicle trip rates based on developments with parking provision potentially higher than that proposed within the Development – the modelled outputs would not therefore include any reduction in vehicle trips to reflect a reduced parking quantum. Adopting a simplistic approach, a reduction of car parking spaces would result in an equal percentage reduction of car trips in the AM peak across the network – ie, 407 car trips, assumed to be the upper range of the potential reduction.

19.4.17 Consistently with the conservative approach adopted elsewhere, for the purposes of this assessment, it has been assumed that the range would be within 78% to 100% of this figure (reflecting the predicted typical car driver reductions reported in the Peter Brett Associates Person Trip Analysis in Section 11).

19.4.18 This is summarised in Table 19.2.

Table 19.2: Potential benefit of the demand management and car trip reduction measures

Measure	Potential reduction in the AM peak hour vehicle trips
Reduction in parking provision	Upper range - 21% of 1,938 = 407 trips Lower range – 78% of 407 trips = 317 trips

Funding the promotional campaign for the Cambridge Guided Busway

19.4.19 Cambridgeshire County Council has promoted and implemented the Guided Busway System as part of their wider strategy of intercepting car-based trips along the A14 and re-moding them to bus. The first element of the Guided Busway to be delivered forms the section between Huntingdon to Cambridge. Two Park and Ride Sites are to be formed to encourage interception of car trips along the A14, the first located at St Ives, the second at Longstanton.

19.4.20 Further to earlier consultations with the Highways Agency and Cambridgeshire County Council, mitigating the effects of the Development on the A14 is a key objective of the Development's mitigation strategy.

19.4.21 The modelling results from the CSRM appear to indicate only a limited transference of car trips to the Guided Busway from the A14 Corridor. Therefore to enhance the patronage numbers on the Guided Busway system, and to reduce the numbers of vehicle trips along the A14, the Development would make significant contributions towards the promotion of it. The increased Guided Busway patronage would be drawn from both an increase in the predicted number of trips made purely by bus from Huntingdon, as well extracting car-based trips at the Longstanton Park and Ride to re-mode them as bus trips for the journey into Cambridge. This would fully support the County Council's strategy of intercepting car trips southbound on the A14 towards the Park and Ride Site at Northstowe, and usage of the Guided Bus.

19.4.22 To ensure that the promotion of the Guided Busway is successful, the Development would contribute to measures such as:

- road signs on the A14 approaching the A14-Longstanton turning, advertising the Guided Busway;
- support towards regular, comprehensive city-wide leaflet campaigns;
- support towards advertising campaigns in the newspaper / press;
- support towards advertising campaigns on local radio / tv;
- supporting travel advisers' visits to major employees within the City to promote the Guided Busway;
- branding campaign of "I'm on the Guided Busway" bags, mugs, balloons, tee shirts etc;
- running costs and prizes for passenger competitions;
- subsidising Guided Busway tickets for University staff peak hour travel;
- dedicated University Travel Advice webpage incorporating Guided Busway as the mode of choice from the west;
- support towards residents associations;
- free tea / coffee / breakfast days;
- support towards extending and continuing the provision of free Wi-Fi enhancements on the buses.

19.4.23 Excluding the University-related car trip conversions to the Guided Busway identified above, it is considered that of the predicted number of additional car-based trips passing along the A14 into Cambridge has been assumed to be in the order of:

i) 20% of those travelling towards the City would use the Park and Ride / Guided Busway in the future; and

ii) 10% of those travelling to the north of the City would use the Park and Ride / Guided Busway in the future.

19.4.24 This would result in a reduction of **60** car-based trips currently on the A14.

19.4.25 Even this conservative assessment of the potential reduction in car trips can be considered to be an under-estimate, as it considers only the potential reduction in predicted car-based trips along the A14 as further drivers use the Park and Ride service. It does not consider any complete re-moding from car-based trips to Guided Busway trips from settlements along the proposed Guided Busway route as a consequence of the increased promotion of the Guided Busway services.

19.5 Physical interventions directed at preserving / enhancing capacity across the network

19.5.1 The analysis of the CSRM included within Section 16 has identified some areas requiring a review of the highway infrastructure. These are:

i) M11 Junction 13 Southbound On Slip;

ii) Madingley Road / Northampton Street / Queen Street Roundabout;

iii) M11 Junction 12 Barton Interchange Northern Roundabout.

19.5.2 The junction capacity assessments for the latter two junctions summarised in Section 17.4 and 17.5 identified that the model had over-estimated the level of congestion in the future. No measures are being proposed for the latter junction, limited measures are being considered later in this section for the Madingley Road / Northampton Street / Queen Street Roundabout.

19.5.3 With respect to the M11 Junction 13 Southbound On Slip, the CSRM model outputs suggest disproportionate increases in congestion in 2026 considering the negligible changes of traffic flows through this junction. Nevertheless, the University has expressed a willingness to consider a contribution towards enhancement measures at this location.

19.5.4 These measures would be additional to the travel demand management measures, and are being progressed within the context of the wider transport strategy for the area and the highway infrastructure enhancement strategy proposed for the Development, reflecting:

i) the context set for Cambridge – acknowledging the need for some infrastructure enhancements to support individual developments and the continued growth of the city;

ii) the need to strike a balance between managing congestion in the city whilst, in accordance with current transport policy, not “predicting and providing” for unlimited traffic growth;

iii) the need to work together with the highway authorities – Cambridgeshire County Council and the Highways Agency - to deliver any necessary infrastructure in the optimum way.

Enhancements to the M11 Junction 13 Southbound On Slip

19.5.5 As detailed in Section 17, the CSRM has identified very minor increases in delays in both peaks for southbound vehicle trips joining the M11 at Junction 13 during 2026.

19.5.6 According to guidelines within the Design Manual for Roads and Bridges, these Do Minimum peak hour mainline and slip road flows would trigger consideration of either a merge similar to the existing onto a three lane section of motorway, or a lane gain merge. Neither of these enhancement measure schemes appear to be within planned network enhancements the Highways Agency, and would be inconsistent with the ethos underlying the range of cost-cutting measures currently being implemented by Government. Based upon such low contributions to overall flows there would be no justification for the University to be expected to contribute toward such enhancement measures.

19.5.7 The University may consider contributing towards the cost of "ramp metering" in this location – ie, traffic lights on the slip road. This would enable the Highways Agency to control entering traffic flows and protect the downstream M11 link.

19.5.8 In addition, the University could also contribute towards the delivery of a merge lane enhancement from the existing direct taper to a parallel merge. This would provide some additional capacity along the merge, the longer merging assisting the smoother flow of vehicles. Such a scheme is shown on the attached Figure 16.

Enhancements to the Madingley Road / Queen Street / Northampton Street Roundabout

19.5.9 Cambridgeshire County Council has expressed concerns about the future operation of the Madingley Road / Queen Street / Northampton Street junction.

19.5.10 A traffic signal controlled scheme at this junction was considered as part of the agreed series of West Cambridge Section 106 Enhancement measures, but at the request of the local authorities, this scheme was not progressed.

19.5.11 The CSRM has been interrogated to understand the trip flow changes on the approach arms:

Table 19.3 – Changes in vehicle trips through the Madingley Road / Queen Street / Northampton Street Roundabout

Link		AM Peak		PM Peak	
		Do Minimum	Do Something	Do Minimum	Do Something
Northampton Street	Flow (vehs)	985	909	706	691
	Delay (secs)	16	15	16	14
	Change in delay (secs)	-1		-2	
	Change in VoC (%)	-4		-1	
Queen Street	Flow (vehs)	671	685	901	904
	Delay (secs)	13	14	13	13
	Change in delay (secs)	1		0	
	Change in VoC (%)	0		-1	
Madingley Road	Flow (vehs)	962	986	755	782
	Delay (secs)	14	13	15	13
	Change in delay (secs)	-1		-2	
	Change in VoC (%)	-2		-1	

19.5.12 This junction would be operating towards capacity in the 2026 Future Year Do Minimum scenario, ie, without the additional Development vehicle trips. With the 2026 Do Something scenario, there are no predicted significant increases in the number of vehicle trips on any link – the greatest increase relates to the Madingley Road arm with a predicted increase of 27 vehicle trips. The total junction inflow decreases by 36 vehicle trips in the AM peak, and increases by 15 trips in the PM peak. This level of difference is (given the inherent conservatism of the inputs into the model) likely to be an over-estimate and would not arise in any event if the travel demand measures described above are successful. Even were this level of difference to arise, it would be unlikely to have any significant effect upon the junction operation.

19.5.13 Following a review of the road markings, it is considered that low-key minor capacity enhancements can be provided without detrimentally affecting cyclist movements through the junction by:

i) reviewing the white lines on the Northampton Street approach, to increase the flare length whilst reducing the width of the exit arm – this arm currently experiences the greatest delay of all approach arms;

ii) reviewing the location of the white painted dome in the centre of the junction – its current location allows easy exiting from Northampton Street and Madingley Road, yet partially obstructing the Queen Street exit.

Both these measures would increase capacity through this junction.

19.6 Measures directed at demand management

Introduction

19.6.1 Measures have been considered to manage vehicle trip demand at sensitive locations of the network. These comprise:

i) provision of traffic signal optimisation apparatus – a relatively low-cost technique to reduce the total queuing and delays at the signals:

- along the Madingley Road Corridor ; and
- along the Huntingdon Road Corridor;

ii) potential traffic calming to the Oxford Road / Windsor Road Corridor.

These are considered further below.

SCOOT and MOVA traffic optimisation to the Madingley Road Corridor signals

19.6.2 The Highways Agency has concerns that increased vehicle trips along the Madingley Road corridor may increase the potential for queues blocking the M11 Junction 13 Northbound Off Slip, then ultimately backing on to the main Northbound M11.

19.6.3 A TRANSYT assessment has been undertaken of the linked traffic signal controlled junctions along this Madingley Road Corridor - the M1 Junction 13 Northbound Off Slip, M1 Junction 13 Southbound On Slip, Park and Ride Junction and the Access Crossroads junctions to the Development and West Cambridge. The results are contained in Appendix 11, and are summarised in Table 17.4.

19.6.4 The results do not support the Highways Agency's concerns. The M11 Off- and On-Slip junctions on Madingley Road are predicted to continue to work well within capacity in the 2026 Do Something scenario, and no queue is predicted to extend upstream to these junctions to block traffic exiting the M11.

19.6.5 Even so, to provide certainty of the future continued efficient operation of the M11, the University proposes that MOVA and SCOOT traffic signal optimisation systems be provided along this route to reduce delays to traffic movements on this corridor, and hence obstruction to the operation of the M11 is unlikely. Typically, across the network, the MOVA and SCOOT optimisation systems are designed to reduce any potential queuing and delay more than to increase stopline saturations.

19.6.6 In addition, and as requested, the existing Madingley Road - M11 Junction 13 On-Slip ghost island priority junction provision has been reviewed, with a view to providing a traffic signal controlled enhancement here. This has been discounted as:

i) the predicted peak hour right turning movements are minimal, and can be accommodated within the opposing westbound flow along Madingley Road - there would therefore be minimal queuing;

ii) as the eastbound straight ahead movements at the traffic signal controlled junction would never be opposed, this movement would receive a full-time green – this is not desirable on safety grounds;

iii) any red time to the eastbound movements would increase the likelihood of queues obstructing the Off-slip;

19.6.7 Rather than provide traffic signal control at this junction , it is suggested that a better option would be to use the MOVA system to assist the right turning movement onto the M11 On-Slip. Further MOVA detection loops could be provided in the right turn ghost island lane to detect any stationary traffic. The MOVA system could then provide additional red time at the adjacent Park and Ride Junction to stop all westbound traffic, and allow queue of right turning vehicles to clear.

SCOOT and MOVA traffic optimisation to the Huntingdon Road Corridor signals

19.6.8 MOVA and SCOOT traffic signal optimisation systems may also be provided along this route to reduce delays to traffic movements on this corridor, hence the likelihood of any obstruction to the operation of the A14. As highlighted previously, the MOVA and SCOOT optimisation systems typically will reduce queuing and delay across the network by more than any increase in stopline saturation.

Traffic calming along the Oxford Road . Windsor Road corridor

19.6.9 The CSRM has identified increases in vehicle trips through the Oxford Road / Windsor Road residential estate, presumably from vehicle trips reassigning around the Huntingdon Road / Victoria Road / Castle Street junction. The following trip increases have been reported:

Table 19.4 – Changes in vehicle trips through the Oxford Road / Windsor Road Estate

Link		AM Peak		PM Peak	
		Do Minimum	Do Something	Do Minimum	Do Something
Oxford Road (flows)	Northbound	291	365	122	290
	Southbound	257	350	308	364
Windsor Road (flows)	Northbound	291	365	122	290
	Southbound	257	350	308	364
Change in delay (secs)	Northbound	-		-	
	Southbound	17 seconds		19 seconds	

19.6.10 It is noted that:

i) the number of vehicle trips on both the Oxford Road and Windsor Road links remain constant – this implies that no vehicle trips have been loaded for the residential areas surrounding these links;

ii) as there are no vehicle trips loaded for the residential areas, it would appear that the CSRM has under-reported the delay and congestion, and over-reported the available capacity on these links;

iii) it has been confirmed by the County Council that this link has been modelled as a 30km/hr link. In reality, both links are narrow links with parking on both sides, both provided with traffic calming schemes - there are 4 speed humps along Oxford Road, and a further speed hump and on-line give way throttle. It is certain that speeds of 30km/hr along this link would not be achieved, and that any increase in vehicle trips along this route would have a consequential reduction in the available capacity;

iv) the data collection exercise that informed the 2006 CSRM Base model did not include either of the Histon Road / Windsor Road or Huntingdon Road / Oxford Road junctions, nor the links – the flow on this link was assessed using the roadside interviews along Huntingdon Road and Histon Road, and validated against link flows. While this would validate and work for the lower 2006 flows, as it is an unconstrained link it appears to have accepted too much traffic.

The CSRM is resilient (although potentially over-stating effects) in modelling the effects of the Development across the network area, but the modelling of this particular small area is potentially insufficiently sensitive.

19.6.11 To be able to identify increases in movements along this link, a cyclic monitoring strategy is proposed. Should this survey work identify that an increase in vehicle trips is actually happening, a fund will be provided to be expended on enhancing the traffic calming scheme to ensure that any increase in movement can be contained.

19.6.12 The monitoring would be undertaken biennially and consist of:

i) two automatic traffic counts for a week - one located on the southern end of Oxford Road, the second on the eastern end of Windsor Road. These results would enable a better understanding of daily and hourly variation of flows along this route;

ii) two automatic number plate recognition surveys for one day at the same points as the ATC locations. These results would establish definitively how many vehicles are passing through the estate.

19.6.13 The precise details of any additional traffic calming measures would be decided following consultation with the residents.

19.7 Measures directed at improving conditions for Pedestrians and Cyclists

Introduction

19.7.1 Whilst the CSRM would have assumed some improvement in the pedestrian and cyclist facilities, it is considered that specific measures would improve conditions for pedestrians and cyclists on links between the Site and popular destinations. These measures comprise:

i) enhancements to cycle movements along Huntingdon Road;

ii) improvements to pedestrian and cyclist movements at the Huntingdon Road / Victoria Road / Castle Street / Mount Pleasant junction;

iii) Whitehouse Lane Commuter Cycle Route crossing of Huntingdon Road;

These are considered in greater detail within this Section (some of these measures have been referred to in Section 7).

Provision of enhancements to the movement of cyclists along Huntingdon Road

19.7.2 The main route for cyclists from the Development to the City Centre would be to the south of the West Cambridge Development and along the Coton Cycle Route. Cycle movements will increase along Huntingdon Road towards the north of the city centre area.

19.7.3 A new section of cycleway / footway would be provided where currently there is no provision. As shown on Figure 10, in the south verge of Huntingdon Road, a length of 560m of cycleway / footway would extend the existing footpath from Girton Road to the vehicular Western Huntingdon Road Site Access, and to tie into the end of the existing north-westbound on-road cyclepath. It is anticipated that this cycleway / footway would be generally 2.5m in width, albeit there are some constraints that may require the width to reduce marginally in a few places;

19.7.4 In addition, the following measures would be provided to improve existing and future movement of cyclists along Huntingdon Road:

i) demand-responsive pedestrian and cyclist crossings will be incorporated into the proposed vehicular traffic signal controlled Western Huntingdon Road – Development Site Access junction – this will particularly assist cyclist movements to the orbital cyclepath to the north-west of the access point;

ii) demand-responsive pedestrian and cyclist crossing incorporated into some of the arms of the vehicular Eastern Huntingdon Road – Development Site Access. (This proposed crossing will complement the further crossing facility incorporated into the NIAB Site Access traffic signal controlled junction – which will replace the existing pelican crossing);

iii) a further toucan crossing on Huntingdon Road between the Huntingdon Road East and NIAB accesses to the north-west of Whitehouse Lane, to facilitate cyclist movements along the Cyclist Commuter route;

iv) a further sum to be expended on enhancements to the existing cycling facilities along the Huntingdon Road corridor – this money to be expended upon renewing cyclepath road markings and improving cycle signage along this corridor.

Measures to improve movements of pedestrians and cyclists at the Huntingdon Road / Victoria Road / Castle Street / Mount Pleasant junction

19.7.5 The Development will generate additional cyclist and pedestrian movements along the Huntingdon Road corridor towards the town centre. The County Council has identified that the Huntingdon Road / Victoria Road / Castle Street junction has existing issues with non-car movements through this junction, and has suggested that the University provide measures to encourage increases in cyclist and pedestrian usage for city-bound trips.

19.7.6 The following pedestrian and cyclist infrastructure could be provided to enhance the junction, as shown on Figure 11:

i) provision of an advanced cyclist stop lines and pens for south-east - and south-westbound cyclists at the junction stopline of Castle Street / Mount Pleasant;

ii) provision of advanced cyclist stop lines and pens for north-west- and northbound cyclists at the junction stopline of Huntingdon Road / Victoria Road;

iii) provision of an advanced cycle stopline at the head of the Victoria Road stopline at the Victoria Road / Histon Road junction stopline;

iv) at the pedestrian crossing of Huntingdon Road / Victoria Road junction, widening the central island from 1.7m to 2.5.

19.7.7 These minor enhancements would have minimal, if any effect on vehicular capacity at this junction, whilst providing betterment to the non-motorised users..

Whitehouse Lane Commuter Cycle Route crossing of Huntingdon Road.

19.7.8 The location of the Whitehouse Lane Commuter Cycle Route crossing, shown on the Huntingdon Road East Site Access drawing in Appendix 12, was determined by the highway boundaries, the consented location of the adjacent NIAB Development Site Access Junction, and the proposed location of the Huntingdon Road East Site Access Junction. This was agreed following discussions between Scott Wilson, Cambridgeshire County Council, and Peter Brett Associates in Autumn 2010, set in the context of the committed NIAB Site Access Junction arrangement.

Conclusions

19.7.9 Collectively the measures to improve conditions for cyclists and pedestrians will ensure that conditions for those walking and cycling along highways surrounding the Site will be improved. In practice, this is likely to increase the number of those choosing walking or cycling as their mode of travel. Nevertheless, consistently with the conservative assumptions adopted in this assessment, no reduction in vehicular movements has been made for these effects. A more realistic assumption would allow for at least some degree of reduction.

19.8 Measures directed at enhancing the University's Travel Plan (the "University-Wide Travel Plan")

19.8.1 The University of Cambridge operates many facilities across the Cambridge City area. As shown in Table 3.5, nearly 2,500 responses identified that they drove to work in Cambridge in 2009, a significant number of car-based trips.

19.8.2 There is already a University Travel Plan is in existence. The University has commited to augment this document, and implement a series of measures throughout their facilities across the City in a targeted manner to reduce the existing number of vehicle trips in order potentially to reduce the impact of the Development. This process is referred to as "Trip Banking". The suite of measures to be considered in conjunction with the County Council, and could include the following:

i) implementing a car sharing scheme;

ii) extending the existing Car Club scheme;

iii) incentivising Guided Busway usage with subsidised passes;

iv) incentivising bus usage with subsidised passes;

v) car parking review;

vi) car park barrier controls;

vii) marketing and promotion of the travel plan.

Details are provided of the potential attractiveness of these schemes.

19.8.3 The above elements are explained further below. The home address post codes of the University's current car parking permit holders have been analysed to inform the assessment of the success of the University-Wide Travel Plan measures.

Car sharing scheme

19.8.4 The 2010 Travel to Work Partnership survey of the University facilities in 2010 reported 8% already car sharing of a total 6,766 travelling (550 people), with 1,569 Driving Alone.

19.8.5 The University has access to the "Camshare" car sharing scheme, provided by the County Council in association with the Travel for Work Partnership. The University would use its intranet system to publicise details of the car sharing scheme for all employees – how to be become a car sharer, and the financial and social advantages of such a scheme.

19.8.6 Research into employment car passenger mode share where a car share scheme has been established shows that with strong support, between 15% and 50% of car driver movements by employees involve car sharing, an average of 34% of all movements.

19.8.7 Assuming the range varying between the lowest observed percentage of 15% and the average of 34% would be applied to the 6,766 daily journey to work trips to the University's facilities, this would result in between 1,015 to 2,300 car sharing trips, of which 550 currently car share - an increase of between 85% and 300%. Applying conservative assumptions that some existing cyclists and bus users might also be attracted to car share, and that not all of these vehicle trips would be made during the peak hour, the reduction in Car Driver trips might be around a quarter to a half of the figures quoted above and therefore between **230 to 440** car movements.

Car Club

19.8.8 The University currently operates a Car Club. An agreement would be reached with the car club provider to have an on site presence, and this scheme would be extended. Again, this is a conservative approach, as it would be reasonable to assume a reduction in car usage for journey to work trips where workers would only require use of a car during working hours. The reduction here could be as high as **15 to 30** existing car driver trips, 1% to 2% of the existing car driver numbers.

Subsidised passes for the Guided Busway

19.8.9 A review of the University's car parking permit holders estimated 173 holders live along the Guided Busway corridor, 6% of the total permit numbers. Assuming that this percentage is reflected in the total numbers of University employees living along the Guided Busway corridor, of the University's total number of 6,766 travellers, this would give 406 living here. Due to the limited alternative modes of travel along this corridor and the distance to be travelled, these residents would be unlikely to use any other travel mode than car, the majority of these car trips being made along the A14 Corridor.

19.8.10 Applying a conservative assumption, it has been assumed that around 15% - 25% of those around the Guided Busway route could / would accept the offer of free / subsidised Guided Busway tickets and convert from other vehicular modes to Guided Bus use. On this basis, **60 to 100** travellers would be converted to use of non-car modes away from the A14 Corridor.

Subsidised Bus Season Tickets

19.8.11 The 2010 Transport for Work Partnership survey for the University reported 593 of the 6,766 travelling by bus - 8.9%.

19.8.12 Research throughout the UK demonstrates that by improving the quality and frequency of bus services, average increases of bus usage of 33% can be achieved. The bus services throughout Cambridge are generally of a high quality and a subsidised ticket offer is likely further to increase bus usage.

19.8.13 A review of the University's car parking permit holders estimated that a total of 824 live within the city, 31% of the total permit holders. It is suggested that there would be only a few other city-resident non-permit holders driving, due to the availability and cost of parking around the University's sites.

19.8.14 Applying a conservative assumption that only 10% to 15% of these permit holders would be prepared to exchange their permits for subsidised season tickets, and allowing for some remoding of other modes of transport, a reduction of existing car driving trips of around **80 to 125** trips could be anticipated. Take up of the offer of season tickets would be likely in practice to be higher, especially with Car Club vehicles being available on site for business use.

Car Park Charging, and Car Park Barrier controls

19.8.15 The University issued 2,626 car permits in the academic year of 2010 - 2011 - these permits are free. Other parking within Cambridge is generally charged (or associated with the park and ride). Only permit holders would be affected by the Car Park charging / barrier control measure.

19.8.16 Levying a car parking charge would reduce the attractiveness of driving and improve the attractiveness of non-car modes. Nevertheless, applying a conservative assumption (since in practice further conversion would be likely), no additional reduction has been assumed for this measure over and above the adjusted mode share that would be achieved by subsidised season tickets and other initiatives.

19.8.17 The Car Parking Barrier controls would ensure full effectiveness of the other measures.

Marketing and Promotion

19.8.18 The University would allocate sufficient staff resource to ensure the University-Wide Travel Plan measures are given appropriate publicity. Use would be made of the University's existing intranet system to ensure details are available to all University members.

Summary of the University-Wide Travel Plan Measures

19.8.19 With the application of the above measures, even allowing for the conservative assumptions employed, the AM peak hour car movement reductions summarised in Table 19.5 could be achieved:

Table 19.5: Potential benefit of the University-Wide Travel Plan measures

Measure	Potential reduction in the AM peak hour vehicle trips
Car Sharing Scheme	230 to 440 car trips
Car Club	15 to 30 car trips
Subsidised passes for the Guided Busway	60 to 100 car trips
Subsidised Bus Season tickets	80 to 125 car trips
TOTAL	**385 to 695 car trips**

19.8.20 These potential measures could represent a substantial proportion of the potential increased number of vehicle trips across the network in the AM peak due to the Development.

19.9 Summary

19.9.1 The following travel demand management measures have been considered.

19.9.2 The following measures have been assumed within the CSRM North West Cambridge option tests:

i) the Development Framework Travel Plan;

ii) proposed land-uses within the Development;

iii) the proposed public transport strategy.

19.9.3 The following additional measures have not been included in the CSRM assessment, but could be considered:

Trip Reduction measures:

i) reduced car parking provision;

ii) implementation of University-Wide Travel Plan measures;

iii) funding a promotional campaign for the Guided Busway;

Highway capacity preserving / enhancement measures:

iv) M11 Junction 13 Southbound Slip Enhancement;

v) Madingley Road / Queen Street / northampton Street junction;

Demand management measures:

vi) SCOOT / MOVA traffic signal optimisation of the Madingley Road Corridor signals;

vii) SCOOT / MOVA traffic signal optimisation of the Huntingdon Road Corridor signals;

viii) traffic calming along the Oxford Road / Windsor Road corridor

Improvements to Pedestrian / Cyclist measures:

ix) enhancements along Huntingdon Road;

x) improvements to pedestrian / cyclists at Huntingdon Road / Victoria Road / Castle Street junction

xi) Whitehouse Lane Commuter cycle route crossing of Huntingdon Road

19.9.4 The assessment of the effects of the Development has been based upon the initial CSRM model test which included certain travel demand management measures. The benefit of the measures considered in this section were not included in the CSRM modelled outputs. Even employing the conservative assumptions applied above, then measures could readily achieve the following reduction in vehicle trips, summarised in Table 19.6.

Table 19.6: Potential benefit of the demand management and car trip reduction measures

Measure	Potential car trip reduction In the AM peak hour trip
Reduction in parking provision	317 to 407 trips
Funding the promotion campaign of the Guided Busway	circa 60 trips
Implementation of a Travel Plan across the University's facilities (if fully delivered)	*circa 385 – 695 trips*
TOTAL	**762 – 1,162 trips**

19.9.5 It has therefore been shown that a suite of measures aimed at mode shift, demand management and improvement of conditions on the network would manage the transport effects of the Development. By applying conservatively low assumptions of the effects of travel reduction measures, the number of additional trips in the network (730 in the AM peak and 890 in the PM peak) would be at least offset by the effects of additional University-wide travel plan measures even before the further demand management measures and physical improvements are taken into account.

Reduction in trips on the A14

19.9.6 As identified in Section 16, the impact on the A14 of the Development has been estimated as up to 200 vehicle trips in the AM peak hour.

19.9.7 Of the potential reduction in car trips identified in Tables 19.3 19.6 and above, it is considered that the following trips would be extracted from the A14:

i) from the funding the promotion campaign of the Guided Busway - circa 60 trips;

ii) of the reduction in trips from the Car Parking – circa 407 trips), based on the review of the home addresses of the University's car parking permit holders, around 20% would use the A14 Corridor from the west – approximately 80;

iii) in order to offset fully the 200 trips along the A14, the University will consider City-Wide Travel Plan measures as described further in Section 9.8.

19.9.8 It is suggested that as a consequence of these measures, the impact of the Development would be completely offset by these "trip banking" measures described above.

PART 5 2014 ASSESSMENT

This Part contains the 2014 Assessment:

20 2014 Assessment

20.1 Introduction

20.1.1 This section considers the likely effects of the Phase 1 of the Proposed Development. It has been assumed that Phase 1 will be completed and occupied by 2014. The 2014 Base and 2014 With Phase 1 Development flows reported in this section were used in the Environmental Assessment process to inform the Air Quality and Acoustics assessments.

20.1.2 Reference has been made to two highway models in part to inform the 2014 Phase 1 trip generation:

i) the County Council's Cambridge Sub Regional Model (CSRM), used to provide AM and PM link flows from 2006, and the AM and PM Complete Development flow assignment for 2026;

ii) Peter Brett Associates' North West Cambridge Person Trip Analysis Spreadsheet, approved by Cambridgeshire County Council and the Highways Agency in 2010, used to assess the number of external person trip movements generated by both Phase 1 and the Complete Proposed Development quanta.

20.1.3 This section reports:

i) the derivation of the peak hour 2014 Base flows;

ii) the contents of Phase 1 of the Development proposals as assumed in this assessment;

iii) the resulting peak hour Phase 1 trip generation;

iv) the derivation of the peak hour Phase 1 link flows;

v) a peak hour 2014 With Phase 1 Development link flow assessment;

vi) the peak hour junction capacity assessments of the two Site Accesses;

vii) a consideration of the potential peak hour construction movements from adjacent developments as well as from the Proposed Development.

20.2 Derivation of the 2014 Base flows

20.2.1 The CSRM undertakes a series of Future Year option test timelines in 5 year intervals. There is no 2014 scenario, however, the closest year for the CSRM being 2016.

20.2.2 The methodology applied to derive the 2014 Base flows is as follows:

i) the 2006 link flows were obtained from the Cambridge Sub Regional Model;

ii) TEMPRO growth factors for 2006 - 2014 were applied to the 2006 flows to synthesise the 2014 Base Year flows.

20.2.3 The flows synthesised by this process were compared to the link flows observed in 2009.

20.2.4 The 2006 flows obtained from the Cambridge Sub Regional Model are summarised in Table 20.1.

Table 20.1 – 2006 CSRM Base flows

Link ID Ref – See Fig 12.3	Link	2006 CSRM AM Peak Combined directions	2006 CSRM PM Peak Combined directions
1	M11 – Junction 14 to M11 / A604 Merger	5,101	4,855
2	M11 – from Junction 13 to Junction 14	5,949	6,101
3	M11 – from Junction 12 to Junction 13	6,969	7,423
4	M11 – from Junction 11 to Junction 12	6,095	6,380
5	A14 – NW of B1050 Junction	6,743	7,370
6	A14 – from B1050 Junction to Dry Drayton Rd Junction	8,075	8,998
7	A14 – from Dry Drayton Rd to M11 Merge	8,073	8,738
8	A14 – from M11 Merge to A14 Eastbound Slip	1,699	1,579
8A	A14 – from A14 Wbd Slip to M11 merge	1,379	1,464
9	Sbd Slip Road from A14 to M11	821	736
10	A14 – from A428 Merger to B1049 (Cambridge Rd) Jn	6,505	6,012
11	A14 – from B1049 Junction to A10 Junction	6,107	6,316
12	A14 – from A10 Junction to Horningsea Rd	5,878	6,115
13	A428 – west of Madingley Rd Junction	2,338	2,377
14	A428 – from Madingley Rd Junction to M11 Junction	1,447	1,357
15	Huntingdon Rd – from A14 slip road to North-western NWC Site Access	986	1,121
16	Huntingdon Rd – from North-western NWC Site Access to Girton Rd	986	1,121
17	Huntingdon Rd – from Girton Rd to North-eastern NWC Site Access	1,558	1,754
18	Huntingdon Rd – from North-eastern NWC Site Access to Storey's Way	1,558	1,754
19	Huntingdon Rd – from Storey's Way to Victoria Rd / Castle St Junction	1,212	1,388
20	Lady Margaret Rd and Mount Pleasant	773	1,117
21	Shelly Row and Albion Row	448	184
22	Madingley Rd – from Queens Rd to Grange Rd	1,033	1,143
23	Madingley Rd – from Grange Rd to Storey's Way	1,033	1,143

Link ID Ref – See Fig 12.3	Link	2006 CSRM AM Peak Combined directions	2006 CSRM PM Peak Combined directions
24	Madingley Rd – from Storey's Way to JJ Thomson Avenue	1,551	1,623
25	Madingley Rd – from JJ Thomson Avenue to South NWC Site Access	1,555	1,620
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	1,552	1,623
27	Madingley Road – from Park and Ride Entrance to Unnamed Rd	1,552	1,625
28	Madingley Rd – from Unnamed Rd to M11 Junction 13	1,552	1,625
29	Madingley Rd – from M11 Junction to Cambridge Rd	1,221	1,055
30	Madingley Rd – from Cambridge Rd to A428 Junction	1,152	1,207
31	Barton Rd – from M11 Junction 12 to Grange Rd	1,036	1,295
32	Barton Rd – from Grange Rd to Newham Rd / The Fen Causeway Junction	773	988
33	Newham Rd – from Barton Rd / The Fen Causeway Junction to Queens Rd / Silver St Junction	716	923
34	Queens Rd – from Newham Rd / Silver St Junction to Madingley Rd	1581	1,269
35	Storey's Way	835	652
36	Oxford Rd and Windsor Rd	370	542
37	Histon Rd	1,377	1,510
38	Bridge Rd (Histon)	1,370	1,326
39	Victoria Rd	1,021	847
40	A10	2,177	2,178
41	Girton Rd	517	571
42	Grange Rd	254	258

20.2.5 The 2014 flows have been synthesised from the 2006 flows by the application of the Trip End Model Presentation Programme (TEMPRO) version 6.2 software – incorporating the National Trip End Model (NTEM) dataset 5.4 and the latest NTM dataset, AF09. These factors for 2006 – 2014 are summarised in Table 20.2.

Table 20.2 – TEMPRO growth factors

Road Classification	2006 – 2014	
	AM Peak (0700 – 0959)	PM Peak (1600 – 1859)
All road types in Cambridge	1.1280	1.1306

20.2.6 The resulting 2014 Base flows are summarised in Table 20.3. These flows have been incorporated into the Air Quality and Acoustics Assessment as part of the 2014 Base flows within the Environmental Statement.

Table 20.3 – 2014 Base flows

Link No.	Link	2014 Base AM Peak Combined directions	2014 Base PM Peak Combined directions
1	M11 - Junction 14 to M11/A604 Merger	5,754	5,489
2	M11 - from Junction 13 to Junction 14	6,710	6,898
3	M11 - from Junction 12 to Junction 13	7,861	8,392
4	M11 - from Junction 11 to Junction 12	6,875	7,213
5	A14 - NW of B1050 Junction	7,606	8,333
6	A14 - from B1050 Jn to Dry Drayton Road Jn	9,109	10,173
7	A14 - from Dry Drayton Road to M11 Merge	9,106	9,879
8	A14 and A14 Service Rd – from M11 Merge to A14 Eastbound Slip	1,916	1,785
8A	A14 and A14 Service Rd – from A14 to M11 Merge Westbound Slip	1,556	1,655
9	Sbd Slip Road from A14 to M11	926	832
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	7,338	6,797
11	A14 - from B1049 Junction to A10 Junction	6,889	7,141
12	A14 - from A10 Junction to Horningsea Road	6,630	6,914
13	A428 - west of Madingley Road Junction	2,637	2,687
14	A428 - from Madingley Road Jn to M1 Jn	1,632	1,534
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	1,112	1,267
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	1,112	1,267
17	Huntingdon Road – Girton Road to North-eastern NWC Site Access	1,757	1,983
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	1,757	1,983
19	Huntingdon Road – from Storey's Way to Victoria Road – Castle Street Junction	1,367	1,569
20	Lady Margaret Road and Mount Pleasant	872	1,263
21	Shelly Row and Albion Row	505	208
22	Madingley Road – from Queens Road to Grange Road	1,165	1,292
23	Madingley Road – from Grange Road to Storey's Way	1,165	1,292
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	1,750	1835
25	Madingley Rd – from JJ Thomson Ave to South NWC Site Access	1,754	1,832
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	1,751	1,835
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	1,751	1,837

Link No.	Link	2014 Base AM Peak Combined directions	2014 Base PM Peak Combined directions
28	Madingley Road – from Unnamed Road to M11 Jn 13	1,751	1,837
29	Madingley Road – from M11 Junction 23 to Cambridge Road	1,377	1,193
30	Madingley Rd – from Cambridge Road to A428 Junction	1,299	1,365
31	Barton Road – from M11 Junction 12 to Grange Road	1,169	1,464
32	Barton Rd – from Grange Rd to Newham Rd / Fen Causeway Jn	872	1,117
33	Newham Rd – from Barton Rd / Fen Causeway Jn to Queens Rd / Silver St Jn	808	1,044
34	Queens Rd – from Newham Rd / Silver St Jn to Madingley Rd	1,783	1,435
35	Storey's Way	942	737
36	Oxford Road and Windsor Road	417	613
37	Histon Road	1,553	1,707
38	Bridge Road (Histon)	1,545	1,499
39	Victoria Road	1,152	958
40	A10	2,456	2,462
41	Girton Road	583	646
42	Grange Road	287	292

20.2.7 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 traffic count flows in Table 20.4:

Table 20.4 – Comparison of 2009 traffic count observations against the predicted 2014 Model results

Location	Data source	Average Weekday AM Peak	Average Weekday PM Peak
Huntingdon Road - West of Grange Drive Junction (Link 15)	ATC – 2009	707	1,058
	2014 Base	1,112	1,267
Huntingdon Road – West of Whitehouse Lane Jn (Link 18)	ATC – 2009	1,632	1,677
	2014 Base	1,757	1,983
Madingley Road – 80m W of Park and Ride Jn (Link 27)	ATC – 2009	1,676	1,714
	2014 Base	1,751	1,837
Madingley Road – West of Clark Maxwell Rd Jn (Link 24)	ATC – 2009	1,444	1,570
	2014 Base	1,750	1,835

20.2.8 The predicted 2014 Pre Opening AM and PM peak hour flows are consistently in excess of the observed 2009 flows. This excess varies between 4% and 17%. The 2014 Pre Opening Base flows used in this assessment therefore represent an over-estimate and hence a robust basis for assessment.

20.2.9 Whilst the predicted 2014 Base flows appear to be robust, this manual approach does not make adjustments and reassign flows as a consequence of any diminution in available capacity of any road corridor. Any additional delay generated, should links and junctions become more congested, would reduce the relative attractiveness of a route when compared to alternatives. Whilst a capacity constrained highway model (such as the CSRM) would reassign vehicle trips to alternative routes with less congestion, no assessment is made of the relative attractiveness or the potential reassignment to alternative routes with this manual assessment. Thus, the implications of 2014 flows would be, if anything, be over-estimated

20.3 Development proposals

20.3.1 For the purposes of this assessment, it has been assumed that Phase 1 will be completed and occupied by 2014. Following discussions within the Team, the following development quanta will form the Phase 1 Development quanta:

Table 20.5 – Phase 1 Development quanta

Land Use	Development Quanta
Open market dwellings Key Worker dwellings	50 - 200 units 150 - 400 units
Collegiate Accommodation	300 units
School	1 form entry (assumed to be 167 pupils)
Retail	2,900m^2 - 5,000m^2 , of which 2,900m^2 gross area is food store
Other residential uses	7,000 m^2 Hotel 5,000m^2 Senior Living

20.3.2 The Phase 1 vehicular access arrangements have been set to maximise the potential for non-car trip making, and to be compatible with the future Full Development access strategy. It is proposed to provide two vehicular accesses to the Proposed Development when completed. These are:

i) Huntingdon Road East - to the north-east to Huntingdon Road, a traffic signal controlled junction access, to provide access to the Proposed Development to the south, and the NIAB Development to the north (refer to Section 2.7);

ii) to the south on Madingley Road, a crossroad traffic signal controlled junction to provide access to the Proposed Development to the north, and to the West Cambridge Development to the south;

iii) the future orbital route will be provided as part of Phase 1 through the east of the development - between the traffic signal junction on Huntingdon Road East, passing around the local centre in an indirect manner, joining the southern section of the radial route meeting with Madingley Road.

20.3.3 The third access, the Huntingdon Road West Access, whilst constructed prior to 2014, will not come into use until later in the development. The omission of this access at this stage will concentrate traffic between the A14 and Phase 1 of the Proposed Development on that part of along Huntingdon Road from the A14 to the new Huntingdon Road East access.

20.4 Phase 1 trip generation – "Post Opening" Scenario

20.4.1 Reference has been made to Peter Brett Associates' spreadsheet-based Person Trip Analysis referred top previously in Sections 5 and 11, to understand the comparative differences between the 2014 Phase 1 and 2026 Full Development scenarios in terms of total Car Driver generation.

20.4.2 The Development Travel Plan - identifying the full travel demand management strategy - will be delivered from the first occupation of the Development – resulting in the Future Mode Share.

20.4.3 The Person Trip Analysis-based Car Driver External Future Mode Share person trip 12 hour movements are summarised in Table 20.6 for both the Phase 1 Development, and the 2026 Full Development:

Table 20.6 – NWC Phase 1 Development - External person trip movements - Future Mode Share targets – 12 hour Car Driver flows

Scenario	12 hour (0700 – 1900)	
	Arrs	Deps
Phase 1 Development - Car Driver	3,002	3,017
Complete Development - Car Driver	6,949	7,117
Ratio of Phase 1 to Complete Development Car Driver trips	42.8%	

20.4.4 As the vehicle flows predicted by this Person Trip Model are not directly comparable with the CSRM, the Full Development-generated vehicle trips assessed by the CSRM have been factored to reflect the comparative differences in the 2014 Phase 1 / 2026 Full Development vehicle flows as assessed by the Person Trip Analysis.

20.5 2014 Phase 1 Development ("Post Opening" Scenario) trip assignment

20.5.1 The following methodology was applied to derive the 2014 Phase 1 Development trip assignment across the network:

i) the assignment of the trips generated by the 2026 Full Proposed Development was provided with reference to a "Select Zone Analysis" of the NWC Zone within the CSRM;

ii) the total number of trips generated by the 2014 Phase 1 and the 2026 Complete NWC Development in the AM and PM peaks were derived from the Peter Brett Associates' North West Cambridge Person Trip Analysis Spreadsheet – the total Car Driver trips are summarised in Table 20.6;

iii) the 2014 Phase 1 trip assignment across the network was derived by factoring the number of trips identified within the CSRM for the 2026 Full Development by 42.8%;

iv) a minor amendment was made to reflect that the Huntingdon Road West Access would not be provided at this stage, and that trips would need to reassign to the Huntingdon Road East Access.

20.5.2 The resulting assignment of the 2014 Phase 1 Development flows is shown on Table 20.7.

Table 20.7 – North West Cambridge Phase 1 Development flows (2014)

Link ID Ref – See Fig 12.3	Link	NWC Phase 1 Devt Flows AM Peak Combined directions (Select Zone Analysis)	NWC Phase 1 Devt Flows PM Peak Combined directions Select Zone Analysis)
1	M11 – Junction 14 to M11 / A604 Merger	0	0
2	M11 – from Junction 13 to Junction 14	2	0
3	M11 – from Junction 12 to Junction 13	105	151
4	M11 – from Junction 11 to Junction 12	91	123
5	A14 – NW of B1050 Junction	86	88
6	A14 – from B1050 Junction to Dry Drayton Rd Junction	144	143
7	A14 – from Dry Drayton Rd to M11 Merge	150	152
8	A14 – from M11 Merge to A14 Eastbound Slip	0	0
8A	A14 – from A14 Wbd Slip to M11 merge	0	0
9	Sbd Slip Road from A14 to M11	0	0
10	A14 – from A428 Merger to B1049 (Cambridge Rd) Jn	0	0
11	A14 – from B1049 Junction to A10 Junction	59	69
12	A14 – from A10 Junction to Horningsea Rd	38	43
13	A428 – west of Madingley Rd Junction	46	55
14	A428 – from Madingley Rd Junction to M11 Junction	0	0
15	Huntingdon Rd – from A14 slip road to North-western NWC Site Access	180	199
16	Huntingdon Rd – from North-western NWC Site Access to Girton Rd	154	169
17	Huntingdon Rd – from Girton Rd to North-eastern NWC Site Access	232	246
18	Huntingdon Rd – from North-eastern NWC Site Access to Storey's Way	181	196
19	Huntingdon Rd – from Storey's Way to Victoria Rd / Castle St Junction	59	66
20	Lady Margaret Rd and Mount Pleasant	2	27
21	Shelly Row and Albion Row	2	3
22	Madingley Rd – from Queens Rd to Grange Rd	45	35
23	Madingley Rd – from Grange Rd to Storey's Way	68	72
24	Madingley Rd – from Storey's Way to JJ Thomson Avenue	65	72
25	Madingley Rd – from JJ Thomson Avenue to South NWC Site Access	73	78

Link ID Ref – See Fig 12.3	Link	NWC Phase 1 Devt Flows AM Peak Combined directions (Select Zone Analysis)	NWC Phase 1 Devt Flows PM Peak Combined directions Select Zone Analysis)
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	74	81
27	Madingley Road – from Park and Ride Entrance to Unnamed Rd	164	205
28	Madingley Rd – from Unnamed Rd to M11 Junction 13	164	205
29	Madingley Rd – from M11 Junction to Cambridge Rd	61	54
30	Madingley Rd – from Cambridge Rd to A428 Junction	41	32
31	Barton Rd – from M11 Junction 12 to Grange Rd	2	0
32	Barton Rd – from Grange Rd to Newham Rd / The Fen Causeway Junction	1	18
33	Newham Rd – from Barton Rd / The Fen Causeway Junction to Queens Rd / Silver St Junction	22	6
34	Queens Rd – from Newham Rd / Silver St Junction to Madingley Rd	39	9
35	Storey's Way	3	0
36	Oxford Rd and Windsor Rd	94	103
37	Histon Rd	77	90
38	Bridge Rd (Histon)	0	7
39	Victoria Rd	51	37
40	A10	10	13
41	Girton Rd	62	48
42	Grange Rd	21	33
200	NWC Site Access Road – from NW Access	0	0
201	NWC Site Access Road – from S Access	239	286
202	NWC Site Access Road – from NE Access	429	484

20.6 2014 With Phase 1 Development Link flows

20.6.1 The 2014 With Phase 1 Development link flows have been synthesised by combining the 2014 Base flows in Table 20.3 with the Phase 1 Development flows in Table 20.7. These are summarised in Table 20.8.

Table 20.8 – 2014 With Phase 1 Development flows

Link No	Link	2014 With Development AM Peak Combined directions	2014 With Development PM Peak Combined directions
1	M11 - Junction 14 to M11/A604 Merger	5,754	5,489
2	M11 – from Junction 13 to Junction 14	6,713	6,898
3	M11 – from Junction 12 to Junction 13	7,966	8,543
4	M11 - from Junction 11 to Junction 12	6,965	7,337
5	A14 - NW of B1050 Junction	7,692	8,420
6	A14 - from B1050 Jn to Dry Drayton Road Jn	9,252	10,316
7	A14 - from Dry Drayton Road to M11 Merge	9,256	10,031
8	A14 and A14 Service Rd – from M11 Merge to A14 Eastbound Slip	1,916	1,785
8A	A14 and A14 Service Rd – from A14 to M11 Merge Westbound Slip	1,556	1,655
9	Sbd Slip Road from A14 to M11	926	832
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction	7,338	6,797
11	A14 - from B1049 Junction to A10 Junction	6,947	7,211
12	A14 - from A10 Junction to Horningsea Road	6,668	6,957
13	A428 - west of Madingley Road Junction	2,684	2,742
14	A428 - from Madingley Road Jn to M1 Jn	1,632	1,534
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access	1,292	1,466
16	Huntingdon Road – from North-western NWC Site Access to Girton Road	1,267	1,436
17	Huntingdon Road – Girton Road to North-eastern NWC Site Access	1,989	2,229
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way	1,939	2,179
19	Huntingdon Road – from Storey's Way to Victoria Road – Castle Street Junction	1,427	1,636
20	Lady Margaret Road and Mount Pleasant	874	1,289
21	Shelly Row and Albion Row	507	211
22	Madingley Road – from Queens Road to Grange Road	1,210	1,327
23	Madingley Road – from Grange Road to Storey's Way	1,233	1,365
24	Madingley Road – from Storey's Way to JJ Thomson Avenue	1,814	1,907
25	Madingley Rd – from JJ Thomson Ave to South NWC Site Access	1,827	1,910
26	Madingley Rd – from South NWC Site Access to Park and Ride Entrance	1,825	1,916

Link No	Link	2014 With Development AM Peak Combined directions	2014 With Development PM Peak Combined directions
27	Madingley Road – from Park and Ride Entrance to Unnamed Road	1,915	2,042
28	Madingley Road – from Unnamed Road to M11 Jn 13	1,915	2,042
29	Madingley Road – from M11 Junction 23 to Cambridge Road	1,438	1,247
30	Madingley Rd – from Cambridge Road to A428 Junction	1,340	1,397
31	Barton Road – from M11 Junction 12 to Grange Road	1,170	1,465
32	Barton Rd – from Grange Rd to Newham Rd / Fen Causeway Jn	873	1,135
33	Newham Rd – from Barton Rd / Fen Causeway Jn to Queens Rd / Silver St Jn	829	1,049
34	Queens Rd – from Newham Rd / Silver St Jn to Madingley Rd	1,822	1,443
35	Storey's Way	945	737
36	Oxford Road and Windsor Road	512	715
37	Histon Road	1,631	1,797
38	Bridge Road (Histon)	1,546	1,506
39	Victoria Road	1,202	994
40	A10	2,466	2,476
41	Girton Road	646	693
42	Grange Road	307	325

20.6.2 These flows were incorporated into the Air Quality and Acoustics Assessment as the 2014 With Phase 1 Development scenario.

20.7 Junction capacity assessments

20.7.1 Junction capacity assessments of the two Site Access junctions were undertaken using the 2014 With Phase 1 Development flows to demonstrate that both worked in this year.

20.7.2 Due to the coarseness of the 2014 base data, the following has been assumed in this modelling exercise:

i) the Proposed Development flows modelled in this assessment are taken from the above calculation, and represent 42.8% of the final development flows;

ii) the Proposed Development flows that were shown using the Huntingdon Road West access in 2026 have been reassigned to the Huntingdon Road East access, as the former access would not be constructed by 2014;

iii) to provide a worst case assessment, all other development flows (NIAB and West Cambridge) are taken from the 2026 Do Something CSRM model, assuming full construction of these developments;

iv) the 2014 link flows, reported as combined two-way for the purposes of the Acoustics and Air Quality Assessments have been factored to reflect the tidality of the 2026 flows;

v) that the junction arrangements as contained in Appendix 12 would be constructed.

20.7.3 As identified above, as no reassignment effects have been considered this adopted methodology would result in a robust over-assessment of the 2014 With Phase 1 Development flows. The effects of the potential reassignment not being included are most noticeable to the east of the Madingley Road Site Access junction, after the flows assigning to the West and Proposed Developments would have left Madingley Road. To provide a junction capacity assessment in this Future year that reflects the flows used for the Air Quality and Acoustic Assessment has required some pragmatic assumptions relating to the treatment of flows. The link flows to the west of the Site Access junction applied in the junction capacity assessment reflect the Air Quality and Noise Assessments, those tested to the east are lower – the higher link flows reported in the Air Quality and Noise Assessments to the east of the junction would not materialise without assuming a heavier through-flow through the junction. As such, it is considered that the flows used to inform both the Air Quality and Noise Assessments and the junction capacity assessments are robust and, if anything, over-estimate any traffic related air quality and acoustic effects.

Huntingdon Road East / NIAB Site Access traffic signal controlled junction

20.7.4 As reported for 2026, the Huntingdon Road East / NIAB Site Access traffic signal controlled junction arrangement were assessed with LINSIG, as linked junctions, using the 2014 With Phase 1 Development flows.

20.7.5 The NIAB and Access junctions to the Development include pedestrian facilities across the Site Accesses, the former includes a crossing of Huntingdon Road. Reflecting the methodology incorporated within the Transport Assessment for the 2026 With Development Scenario, as the pedestrian crossings require the junction operation to cease to provide green time for these pedestrian movements, these stages will be called only if there has been a demand. For the assessment of the NIAB junction, the results reported assume that the pedestrian phase would be called every other cycle.

20.7.6 The computer output is contained in Appendix 14, and are summarised in Table 20.9:

Table 20.9 – Summary of LINSIG Assessment - Huntingdon Road East / NIAB Site Access traffic signal controlled junction - 2014 With Development flows

Junction	Arm/ Lane	Link Description	AM		PM	
			Degree of Saturation	Mean Maximum Queue	Degree of Saturation	Mean Maximum Queue
Junction 1 – NWC Huntingdon Road East Access	1 / 1+ 1 / 2	Huntingdon Road Northbound – Straight and Left	86%	19	85%	11
	2 / 1+ 2 / 2	Site Entrance right and Ahead	52%	3	71%	8
	3 / 1+ 3 / 2	Huntingdon Road Southbound - Right and Ahead	86%	19	74%	11
Junction 2 - NIAB Access	1 / 1+ 1 / 2	NIAB entrance left and right	47%	3	14%	1
	2 / 1+ 2 / 2	Huntingdon Road Northbound – Straight and Right	61%	15	89%	34
	3 / 1 + 3 / 2	Huntingdon Road Southbound - Left and Ahead	86%	22	73%	15
		Cycle Time	114		118	

Note – Degree of Saturation – the ratio of the predicted flow to pass through each arm of this junction, to the theoretical capacity

20.7.7 With respect to the results of the Huntingdon Road East / NIAB Site Access traffic signal controlled junction arrangement assessment reported in Table 20.9:

i) the junction would be operating within capacity;

ii) queues between the NWC junction and the NIAB junction do not block back, with the maximum queue reaching 22 vehicles. There is suffient space for 26 vehicles in each direction between the two junctions.

20.7.8 Both the access junction to the Proposed Development and other junctions on Huntingdon Road are therefore considered to operate within capacity in the 2014 With Development Scenario.

Madingley Road Corridor junctions - North West Cambridge Site Access / Park and Ride traffic signal controlled junction / M11 J13

20.7.9 Reflecting the methodology of assessment in the Transport Assessment for the 2026 With Development scenario, the interaction between the following junctions along the Madingley Road corridor was modelled in TRANSYT:

i) M11 Junction 13 Northbound Off Slip;

ii) M11 Junction 13 Southbound On Slip;

iii) Park and Ride Site;

iv) North West Cambridge / West Cambridge Site Access.

20.7.10 The proposed arrangement for this corridor used in the assessment assumed:

i) the existing alignment between the M11 Junction 13 Off and On Slips;

ii) the section of Madingley Road between the M11 On Slip and the Park and Site access is subject to the improvements associated with the West Cambridge Development, and includes for 2 lane operation. Sketches of this are included on the Site Access plans in Appendix 12 of the Transport Assessment;

iii) the North West Cambridge / West Cambridge Site Access is shown on D127313-700-104 - Madingley Road enclosed in Appendix 12 of the Transport Assessment;

iv) although pedestrian phases will be called on a demand-only basis, for the purposes of this assessment a pedestrian phase will be called on every formal crossing point during the cycle.

20.7.11 The computer output is contained in Appendix 14, and summarised in Table 20.10:

Table 20.10 – Summary of TRANSYT Assessment – Madingley Road Corridor traffic signal controlled junction - 2014 With Development flows – including a pedestrian phase every cycle

	Arm/Lane	Link Description	AM		PM	
			Degree of Saturation	Mean Maximum Queue	Degree of Saturation	Mean Maximum Queue
Junction 1 - M11 J13 Northbound Off slip / A1303	Arm J / Stream 1	A1303 Eastbound - ahead	67%	9	9%	1
	Arm K / Stream 1	A1303 Westbound - ahead	39%	4	57%	7
	Arm If / Stream 1	M11 Off Slip – left	26%	2	27%	2
	Arm If / Stream 2	M11 Off Slip – right	77%	7	56%	6
Junction 2 - M11 J13 Southbound On slip / A1303	Arm F / Stream 1	A1303 - right turn to M11 On Slip	9%	0	8%	0
	Arm H / Stream 1	A1303 - left turn to M11 On Slip	20%	0	53%	0
Junction 3 - A1303 / Park and Ride Junction	Arm Cf / Stream 1	A1303 Eastbound – left	12%	2	2%	0
	Arm Cf / Stream 2	A1303 Eastbound – ahead	86%	29	47%	9
	Arm E west f / Stream 1	A1303 Westbound - ahead	46%	2	82%	5
	Arm E west f / Stream 2	A1303 Westbound - right	0%	0	0%	0
	Arm Bf / Stream 1	Park and Ride exit – left	2%	0	4%	0
	Arm Bf / Stream 2	Park and Ride exit – righ	7%	0	71%	9
Junction 4 - A1303 / NWC site access	Arm E east f / Stream 1	A1303 Eastbound - ahead and left	87%	9	58%	10
	Arm E east f / Stream 2	A1303 Eastbound – right	82%	6	9%	0
	Arm Af / Stream 1	A1303 Westbound - ahead and left	57%	13	90%	35
	Arm Af / Stream 2	A1303 Westbound – right	3%	0	7%	0
	Arm Df / Stream 1	NWC Access - left	49%	2	55%	3
	Arm Df / Stream 2	NWC Access - right	45%	2	62%	3
	Arm Gf / Stream 1	WC Access - left	0%	0	3%	0
	Arm Gf / Stream 2	WC Access - ahead and right	6%	0	21%	1
		Cycle Time	112		120	

20.7.12 With respect to the results reported in Table 20.10:

i) all queues can be accommodated within the available stacking space;

ii) this signal arrangement provides a pedestrian phase on each arm every cycle;

iii) the above results do not include the benefit provided by the proposed MOVA and SCOOT traffic signal optimisation apparatus which would have been implemented by the end of 2014..

20.7.13 Both the access junction to the Proposed Development and other junctions on Madingley Road are therefore considered to operate within capacity in the 2014 With Phase 1 Development Scenario.

20.8 2014 – Cumulative flows from the Proposed Development, NIAB and West Cambridge

20.8.1 Operational flows from the NIAB and West Cambridge Developments as completed in 2026 are included within the 2026 CSRM NWC option test. Such flows are therefore integral to the 2014 Baseline Flows described above. It is therefore inherent in the above conclusions that the network can operate satisfactorily with all flows from the Proposed Development, that the network will operate satisfactorily with projected operational flows from the Proposed Development in combination with NIAB and West Cambridge.

20.9 2014 Construction movements

20.9.1 As well as the daily operational flows from Phase 1 of the Proposed Development in isolation and in combination with NIAB and West Cambridge Developments, construction movements in 2014 associated with the construction of the Proposed Development, the construction of NIAB and the construction of the West Cambridge Development have been considered, as have construction and operational movements in combination. These matters have been considered for both 2014 “Pre Opening” and 2014 “Post Opening” scenarios.

Practicality of construction traffic movements

20.9.2 In practice, regardless of any super-imposed controls, only a very limited number of car and HGV construction movements typically occur during the peak hours. The working hours of most operatives would not coincide with the network peak, construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods and delivery drivers would wish to avoid being on the network at congested times of the day when drivable hours used are disproportionate to the quantities of goods deliverable..This could be reinforced by the Development Construction Environmental Management Plan controlling construction movements during the peak hours

2014 Pre Opening.

20.9.3 The peak daily construction movements associated with the Proposed Development has been assessed as being generated before 2014, in advance of the Proposed Development operational flows being generated. The assumed daily Construction flows from the Proposed Development are assumed to peak at 135 HGV and 137 light vehicle two-way movements per day, albeit that the general level of generation would be lower. These trips would assign via the Madingley Road Site Access to the M11, and would be prohibited from passing through Cambridge.

2014 Post Opening

20.9.4 The peak daily construction movements generated after 2014 have not been quantified in detail, but the daily Construction flows from the Proposed Development would in practice be much lower than the pre-opening peak after completion of various construction activities. These trips would continue to be prohibited from passing through Cambridge, and hence would be concentrated on the link between the Madingley Road Site Access and the M11.

NIAB

20.9.5 For the daily NIAB construction movements, 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". This reports that:

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;

20.9.6 As 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. As such, there would be no cumulative further construction effects from NIAB Development.

20.9.7 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

20.9.8 Construction of the West Cambridge Development infrastructure and buildings commenced in 1999, currently, around half of the final Development is completed and occupied.

20.9.9 Before 2014, 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.

20.9.10 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 have been assumed – this is assumed to generate 13 car movements. A total of 10 HGV movements per day have also been assumed.

20.9.11 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.

20.9.12 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.

20.9.13 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.

Cumulative construction and operational effects – 2014 Pre Opening

20.9.14 With respect to the cumulative construction movements generated before the completion of Phase 1 of the Proposed Development, these daily construction trips from West Cambridge and the Proposed Development would peak on Madingley Road at 145 HGV and 150 light vehicle two-way trips per day. Similarly, the cumulative daily construction movements on Huntingdon Road would peak at 61 HGV and 150 light vehicle two-way movements per day, the majority associated with NIAB. The daily operational vehicle trip generation of Phase 1 of the Proposed Development has been reported previously. Construction movements would be considerably lower than daily operational flows. Accordingly, the peak hour construction movements in the 2014 Pre Opening scwenario (ie, in advance of Phase 1 of the Development opening) would also be lower than daily operational flows. Hence, both daily and peak hour construction flows in the 2014 Pre Opening scenario would have no more than insignificant effects on the operation of the highway network.

Cumulative construction and operational effects 2014 post-opening

20.9.15 Similarly, the cumulative construction movements generated after the completion of Phase 1 of the Proposed Development have also been considered. For the Proposed Development, these daily post-opening construction trips would peak on Madingley Road at 160 HGV and 170 light vehicle two-way trips per day. The cumulative daily construction movements on Huntingdon Road would be zero, as the opening of the new alternative NIAB Site Construction Access on Histon Road would stop construction movements accessing via Huntingdon Road. Construction vehicle flows on Madingley Road would continue to be insignificant. Construction movements post-opening would therefore be lower than in the 2014 Pre Opening scenario peak hour effects of the construction movements in this post-opening phase would also be insignificant.

20.9.16 For the reasons expressed in paragraph 20.9.8, above the analysis undertaken concludes that construction and operational traffic for the Proposed Development, NIAB and West Cambridge would satisfactorily be accommodated within the capacity of the network (including links and junctions on Huntingdon Road and Madingley Road) within both 2014 Pre and 2014 Post Opening scenarios.

20.10 Conclusions

20.10.1 This section considers the likely effects of Phase 1 of the Proposed Development. It has been assumed that Phase 1 will be completed by 2014.

20.10.2 This work has been prepared using a manual assessment – ie, without reference to the County Council's Cambridge Sub Regional SATURN Model (CSRM).

20.10.3 When compared to the 2009 traffic survey observations, the predicted 2014 Base flows are consistently higher, by more than 5%. The 2014 Base flows assumed for the purposes of this assessment are therefore, consistently with other assumptions made in the TA, robustly conservative assessments.

20.10.4 The manual methodology does not consider capacity constraint and reassignment effects. As a consequence, the 2014 Base flows - but more noticeably the 2014 With Phase 1 Development flows – do not reflect assignment away from links such as Huntingdon Road and Madingley Road.

20.10.5 Nevertheless, even without reassignment, capacity assessment of links and junctions including the two site access junctions using the 2014 With Development flows has concluded that all of these links and junctions would operate within capacity.

20.10.6 It is therefore concluded that, based on the 2014 Base and 2014 With Phase 1 Development flow assessment, the road network in the vicinity of the Proposed Development can as at 2014 operate satisfactory after taking into account the likely traffic generation of the Proposed Development.

20.10.7 The analysis undertaken concludes that construction and operational traffic for the Proposed Development, NIAB and West Cambridge would satisfactorily be accommodated within the capacity of the network (including links and junctions on Huntingdon Road and Madingley Road) within both 2014 Pre and 2014 Post Opening scenarios.

PART 6 CONCLUSIONS

This Part contains the Conclusions:

21 Conclusions

21.1 This report sets out the results of the Transport Assessment undertaken to accompany the application for planning permission by the University of Cambridge to develop land at North West Cambridge, between Huntingdon Road and Madingley Road. The Proposed Development includes up to 3,000 houses and flats – both Market and for Key Workers, 2,000 units of student accommodation, 100,000m^2 of academic and commercial research, a food store, a hotel and supporting local centre / community uses.

21.2 The Proposed Development has excellent sustainable location and accessibility characteristics, based on:

i) reducing the need to travel away from the Proposed Development to work, to reach leisure facilities, to find community facilities or to shop for essential provisions by providing a good mix of land-uses;

ii) increasing the opportunity for non-car travel, particularly by delivering an excellent public transport system;

iii) delivering strong connectivity with the rest of Cambridge to result in a genuinely integrated urban extension.

iv) reducing the distance travelled by University and College employees by providing significant volumes of Key Worker housing for them, and the number of car movements by delivering this Key Worker accommodation where non-car modes of travel can be adopted.

21.3 These factors are complemented by and build upon the existing and highly effective University-wide Travel Plan designed to encourage non car travel by all University members.

21.4 A comprehensive and sustainable transport strategy has been formulated for the Proposed Development. The elements within this strategy include the following::

i) **Land Use** - the land uses proposed within the Proposed Development incorporate a complementary mix of uses, selected both to respond to the needs of the University, and to manage and reduce the need to travel for all occupants;

ii) **Walking and Cycling** - the Proposed Development is well-located for walking and cycling with respect to existing pedestrian and cycle facilities, and to connect to other developments in the area. The pedestrian and cycle infrastructure strategy for the Proposed Development has been formulated:

- to provide full permeability throughout the Proposed Development, on routes designed to the Department for Transport's *Manual for Streets* guidance;

- to provide connectivity between the Proposed Development and the surrounding area with the Ridgeway, a quality combined cycleway / footway; and

- to enhance existing connectivity between surrounding areas by providing infrastructure enhancements along key links to complement infrastructure enhancement proposals by others. This includes key links to the West Cambridge site, and connections via the Coton footpath network to the main University and College central sites whilst the Storeys Way and Huntingdon Road links will provide enhanced access to the City Centre;

iii) **Parking** - providing car and cycle parking in accordance with the Area Action Plan;

iv) **Public Transport** – whilst the site is well-located adjacent well-frequented existing bus routes connecting to a range of destinations across the City, the strategy has been developed to enhance connectivity by bus by diverting existing bus services through the site, and to providing additional links to strengthen services to surrounding destinations;

v) **Travel Demand Management (and Development Framework Travel Plan)** – a comprehensive travel demand strategy has been developed for the Proposed Development to 'manage down' the number of vehicular trips generated. This will be achieved by the promotion of alternative means of travel, the locational and accessibility advantages of the Site, as well as features integral to the Proposed Development itself;

vi) **Vehicle Access** - .the vehicular access points to the Proposed Development would be located such as to reduce the number of vehicles using the strategic highway travelling through residential areas of Cambridge. The layout of the Proposed Development has been designed strongly to favour sustainable modes of transport, to make it attractive for pedestrians and cyclists, and to deter rat-running. The design philosophies of the Department for Transport's 'Manual for Streets' for all roads have been adopted.

21.5 The influence of the Proposed Development on the local highway network has been assessed using the highway authority's Cambridge Sub Regional Model (CSRM). This considers the operation of the Proposed Development as at 2026 using development-specific North West Cambridge Development option tests. The CSRM includes all other major committed developments within the Cambridge area. Model runs considered the locational attributes of the Proposed Development, combined with:

i) the car trip-reducing benefits of the Proposed Development public transport strategy;

ii) Framework Travel Plan measures, including funding for the Transport Coordinator, setting up the Stakeholders Group, and the series of measures to support and encourage walking, cycling, public transport, car passenger trips, and Home Working.

Throughout the assessment process, robust assessments have been adopted to the number of car-trips associated with the Proposed Development and the likely effects of travel demand measures.

21.6 The results of the assessment indicate that in the "With Development" scenarios vehicle link flows on the highway network during the peak hours would, at worst, be only marginally more than in the "Without Development" scenario. The vehicle trips on the network would be only around 700 higher during the AM peak period and 900 during the PM peak period - with circa 200 on the A14 to the north west of Cambridge. Any congestion attributable to the Development would therefore, at worst be minimal.

21.7 Even so, following discussions with the Highways Agency and Cambridgeshire County Council on receipt of the CSRM model results, the University agreed to consider further measures to reduce any effects of the additional trips on the highway network mentioned above.

21.8 The further measures considered following discussions with the Highways Agency and Cambridgeshire County Council have 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 difference in flows as between the with and without development scenarios is less than 1%;

iii) potential enhancements to the University-wide Travel Plan to effect further general reductions in car trips .

21.9 The University has therefore identified that the measures from the following might be included as future additional travel demand management measures:

i) measures directed at **trip reduction** across the strategic and local highway network:

- a reduction in the car parking provision across the Proposed Development of around 21% from the Area Action Plan maximum levels;

- funding 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;

ii) measures directed at **preserving / enhancing** capacity on the network:

- ***strategic network***: a capacity enhancement scheme to the M11 Junction 13 Southbound Slip road, possibly including ramp metering;

- ***local network:*** minor measures if necessary at the Queen Street / Madingley Road / Northampton Street junction;

iii) measures directed at **demand management** across the network;

- SCOOT and MOVA traffic signal optimisation to achieve linked traffic signals along the Madingley Road and Huntingdon Road Corridors – to reduce any additional queuing and delays as a consequence of vehicles entering or leaving the Proposed Development;

- A monitoring scheme, potentially with further traffic calming measures along the Oxford Road / Windsor Road link;

iv) measures to improve conditions for **pedestrian and cyclists**:

- targeted enhancements to the movement of :
  - cyclists along Huntingdon Road into the City;
  - pedestrians and cyclists through the Huntingdon Road / Victoria Road / Castle Street junction;
- provision of a crossing of Huntingdon Road for the Whitehouse Lane commuter cycle route.

v) the University is the single largest employer in the Cambridge area, and has the ability to encourage changes in trip patterns of its sizable existing community when travelling to, from and between its facilities across the City. The beneficial effects of the University's existing Travel Plan in reducing car use among the University community are already manifest. The University has considered the extent to which further measures aimed at encouraging still lower levels of car use might be employed. It has formulated a series of measures which might additionally be introduced to enhance its existing University-wide Travel Plan.

21.10 Further measures from the additional suite of initiatives listed above could be aimed at mode shift, demand management and improvement of conditions on the network. If Implemented, that all of the additional trips on the network created by the Proposed Development - of around 700 trips in the AM peak and 900 trips in the PM peak - could be offset. The proposed further measures, in total, are estimated, even on conservative estimates, to offer a potential reduction of between 850 to 1,160 trips.

21.11 Overall, therefore, this Transport Assessment has identified a co-ordinated, integrated and sustainable transport strategy for the Proposed Development within which development can proceed, within the context of the wider transport and development strategy for the whole of Cambridge.

21.12 The 2014 With Phase 1 Development assessment concluded that the road network in the vicinity of the Proposed Development would operate satisfactory after taking into account the likely traffic generation of the Proposed Development.

21.13 It is concluded that the Proposed Development can proceed fully in accordance with current land-use and transport policy, and the North West Cambridge Area Action Plan both as at 2014 and as at completion in 2026.The analysis undertaken also concludes that construction and operational traffic for the Proposed Development, NIAB and West Cambridge would satisfactorily be accommodated within the capacity of the network (including links and junctions on Huntingdon Road and Madingley Road) within both 2014 Pre and 2014 Post Opening scenarios.

21.14 In summary:

i) the Proposed Development is inherently sustainable as to its development components, development location, development layout and comprehensive transportation strategy;

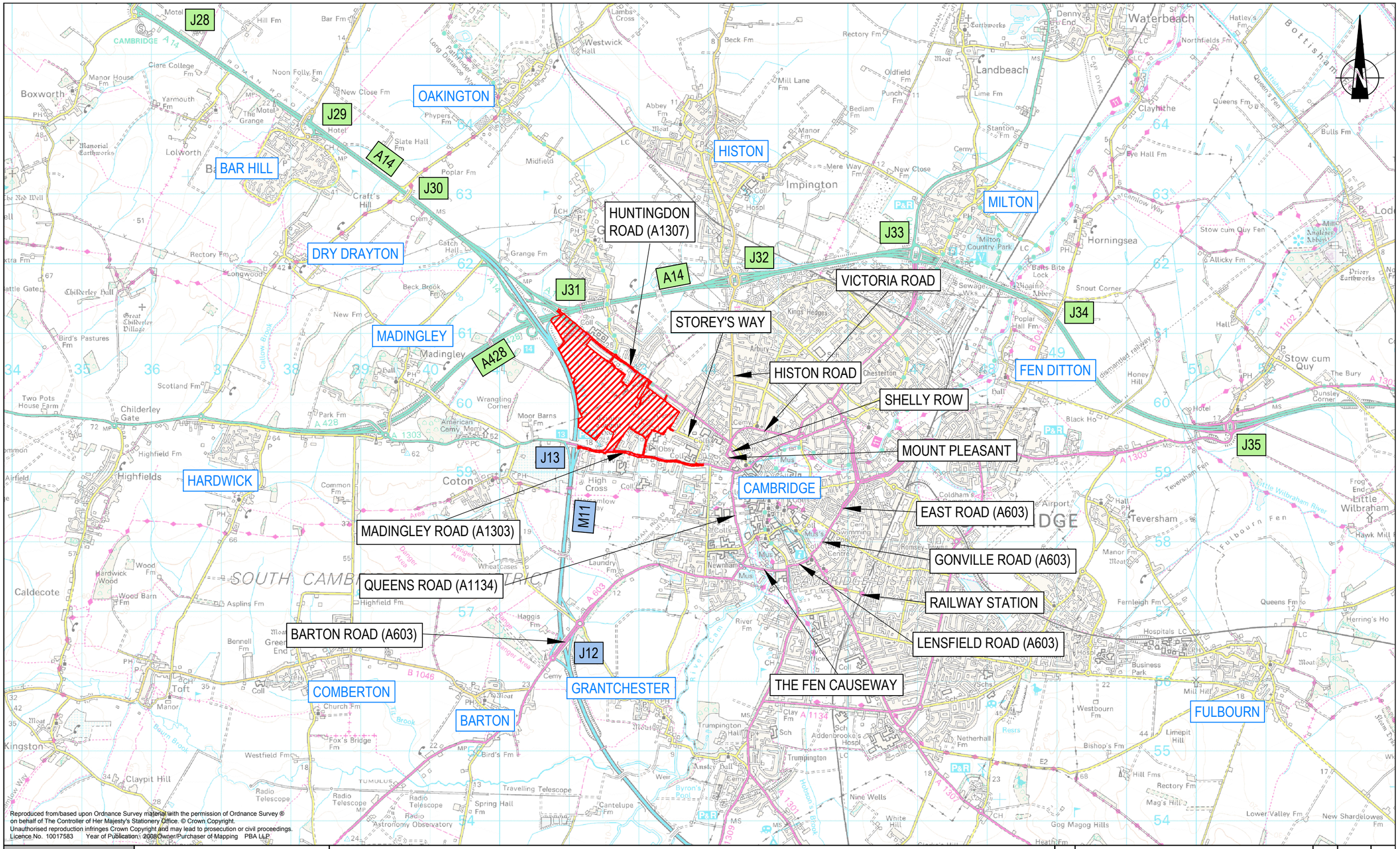
ii) the Proposed Development would create the opportunity for Key Workers to live close not only to uses forming part of the Proposed Development itself but also to uses present on the University's neighbouring West Cambridge Development;

iii) the University is uniquely placed to influence (and through the existing University Wide Travel Plan already does influence) travel patterns not only among occupiers of the Proposed Development, but also within the existing University Community across the City;

iv) only a small number of additional vehicle movements are predicted to be on the local highway network when the “With Development” highway model scenarios for 2026 are compared with the “Without Development” scenarios;

v) a full suite of travel demand management measures have been proposed and their effects considered. Employing conservative assumptions as to their likely effects, the reduction in vehicles on the network could more than offset the small increase referred to above;

vi) the analysis undertaken also concludes that construction and operational traffic for the Proposed Development, NIAB and West Cambridge would satisfactorily be accommodated within the capacity of the network (including links and junctions on Huntingdon Road and Madingley Road) within both the 2014 Pre and 2014 Post Opening scenarios.



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Client
UNIVERSITY OF CAMBRIDGE

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NORTH WEST CAMBRIDGE DEVELOPMENT

SITE LOCATION PLAN

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	1:50,000
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 1
23035 / TA / 001 - Figure 1

Revision: A

KEY

NORTH WEST CAMBRIDGE DEVELOPMENT

NIAB DEVELOPMENT

WEST CAMBRIDGE DEVELOPMENT

DUCK END
GIRTON
HOWE FARM
A14
GRANGE DRIVE
M11 JUNCTION 14
A428
GIRTON ROAD
THORNTON ROAD
B1049 HISTON ROAD
ARBURY
WHITEHOUSE LANE
M11
TRINITY FARM
HUNTINGDON ROAD (A1307)
ALL SOULS LANE
UNIVERSITY FARM
STOREY'S WAY
MADINGLEY RISE
CONDUIT HEAD ROAD
CAMBRIDGE ROAD
AMERICAN CEMETERY
MADINGLEY ROAD (A1303)
M11 JUNCTION 13
CHURCHILL ROAD
MOUNT PLEASANT
CLERK MAXWELL ROAD
HIGH CROSS
JJ THOMSON AVENUE
MADINGLEY ROAD (A1303)
LANSDOWNE ROAD

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Client

UNIVERSITY OF CAMBRIDGE

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NORTH WEST CAMBRIDGE DEVELOPMENT

LOCAL CONTEXT PLAN

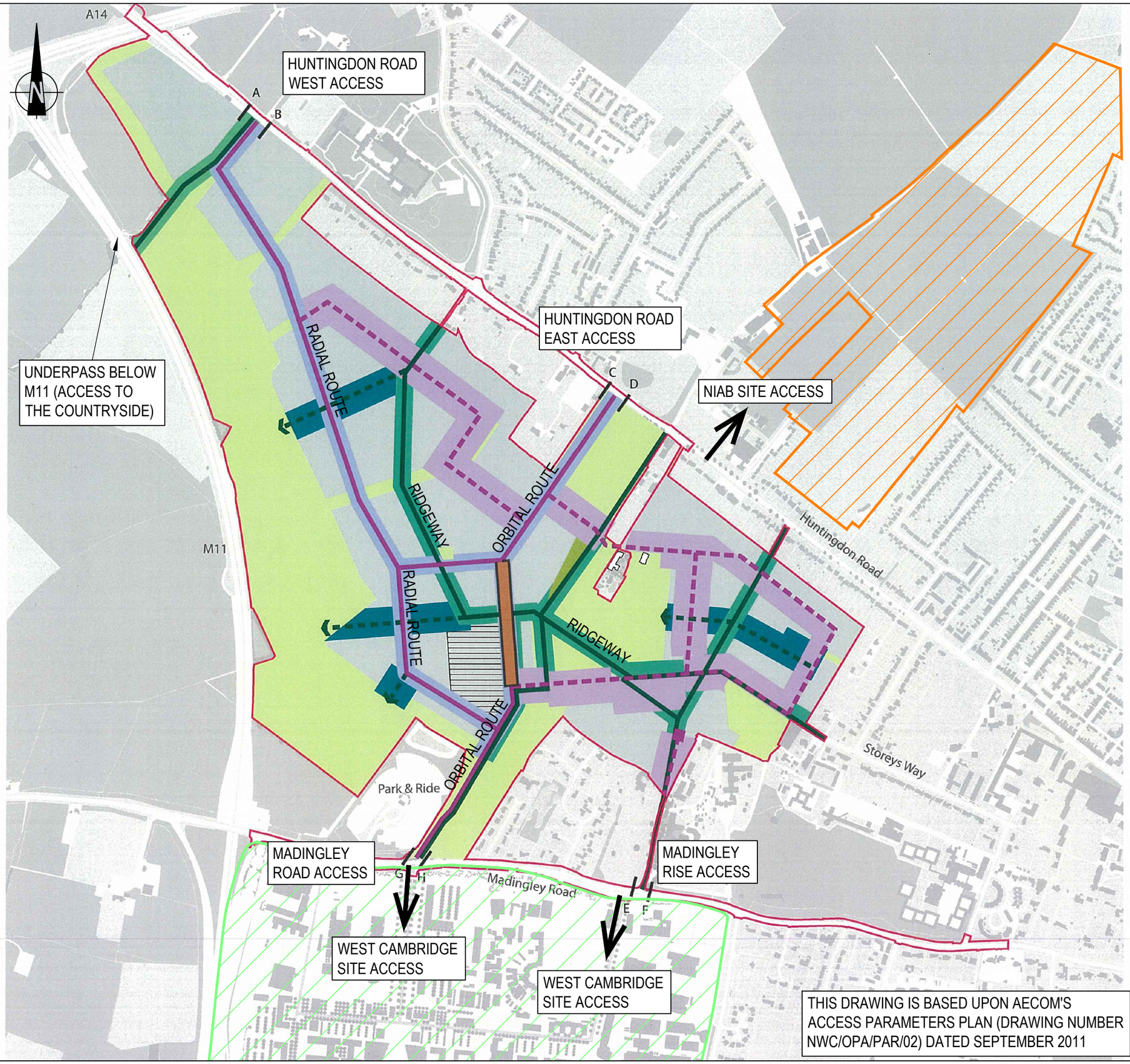
Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 2
23035 / TA / 002 - Figure 2

Revision: A



KEY

Contextual Information:

- Existing and retained buildings
- Open land (reference NWC/OPA/PAR/03)
- Open land within school site (reference NWC/OPA/PAR/03)
- Primary street
- Secondary street
- Primary pedestrian/cycle route
- Secondary pedestrian/cycle route

For Approval:

- Application site boundary
- Primary street zone*
- Secondary street zone *
- Primary pedestrian/cycle route zone *
- Secondary pedestrian/cycle route zone *
- Restricted Access Zone
- Market Square pedestrianised Zone

* Zones may overlap

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

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Drawing Issue Status

TRANSPORT ACCESSMENT

NORTH WEST CAMBRIDGE DEVELOPMENT

ACCESS PARAMETERS PLAN

Client

UNIVERSITY OF CAMBRIDGE

Date of 1st Issue	Drawn by
14/10/10	TA
A3 Scale	Checked by
NTS	JPH

Drawing Number: FIGURE 3

23035 / TA / 003 - Figure 3

Revision: A

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KEY

- SITE BOUNDARY
- FOOTWAY
- COMBINED FOOTWAY / CYCLEWAY
- FORMAL CROSSING POINTS
- NATIONAL CYCLE ROUTES ON-ROAD (NCR 51 / NCR11)
- ON-ROAD CYCLE ROUTE
- CYCLE LANES

PUBLIC RIGHTS OF WAY

- FOOTPATH (AND REFERENCE NUMBER) [48]
- BRIDLEWAY (AND REFERENCE NUMBER) [30]

NCR51

NCR11

WHITEHORSE LANE COMMUTER ROUTE INTO NIAB SITE

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NORTH WEST CAMBRIDGE DEVELOPMENT

EXISTING PEDESTRIAN CYCLIST AND EQUESTRIAN FACILITIES

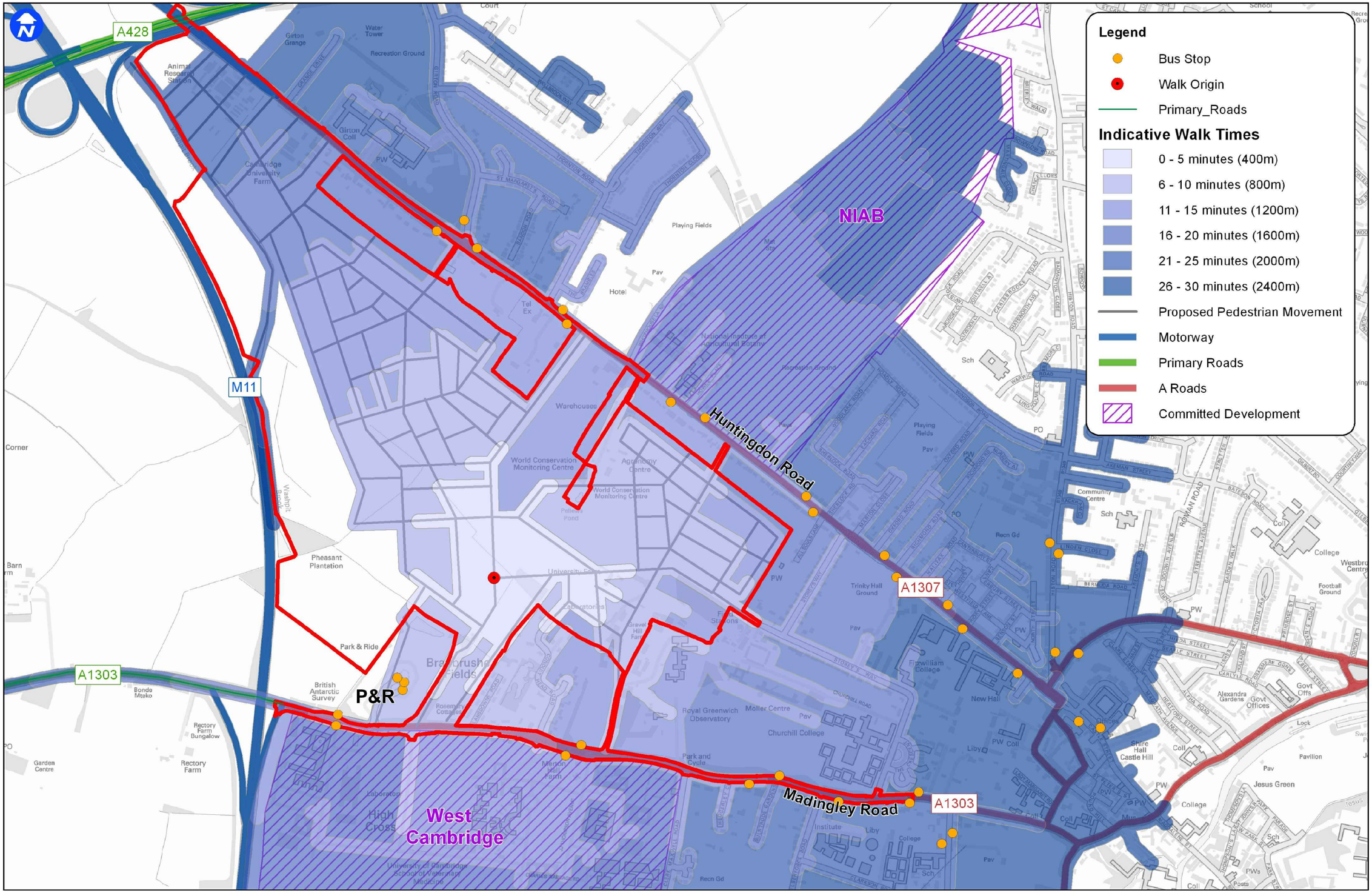
Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 4
23035 / TA / 004 - Figure 4

Revision: A



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NORTH WEST CAMBRIDGE DEVELOPMENT

POTENTIAL PEDESTRIAN ACCESSIBILITY FROM THE PROPOSED LOCAL CENTRE

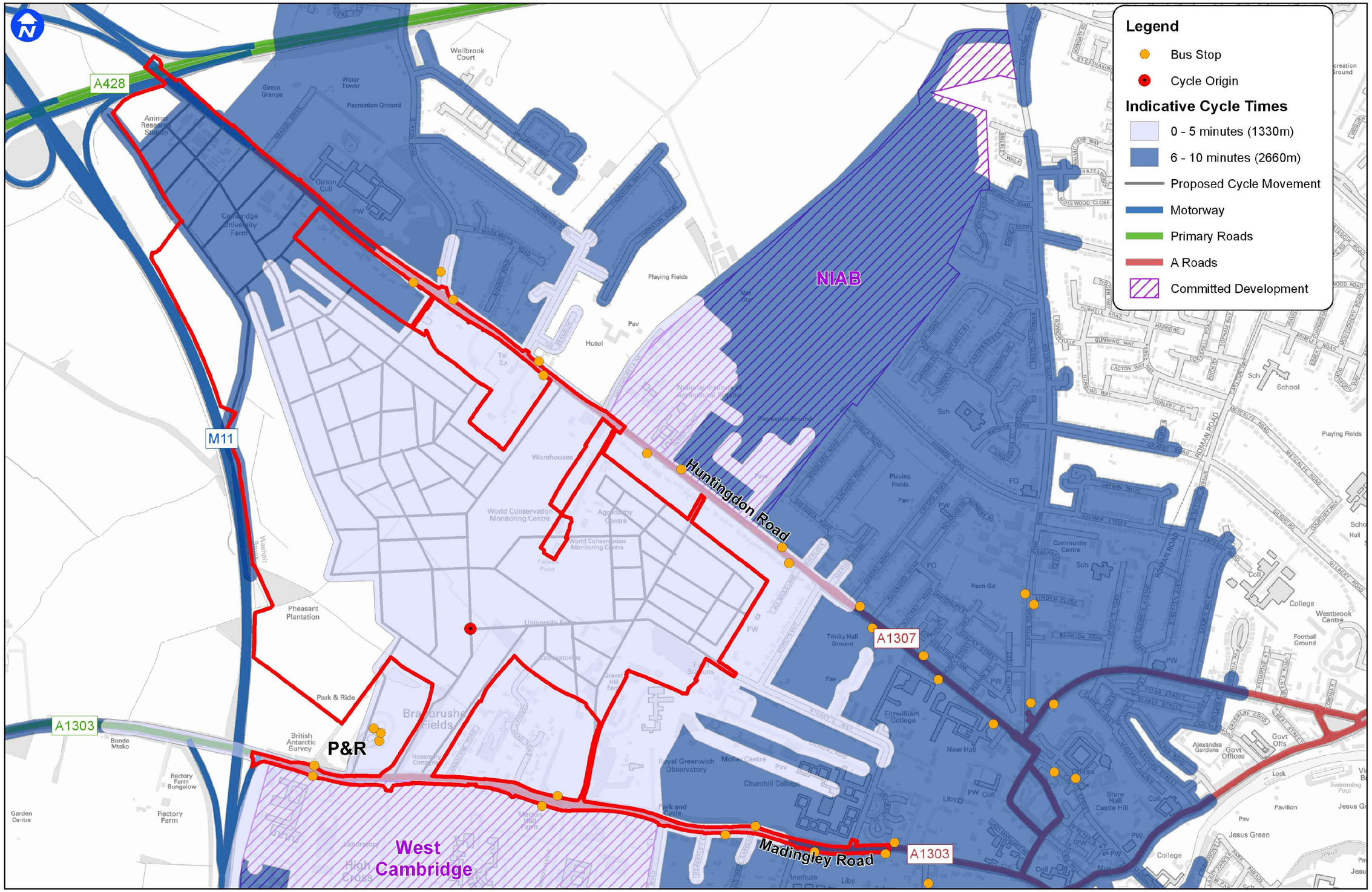
Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 5
23035 / TA / 005 - Figure 5

Revision: A



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NORTH WEST CAMBRIDGE DEVELOPMENT

POTENTIAL CYCLIST ACCESSIBILITY FROM THE PROPOSED LOCAL CENTRE

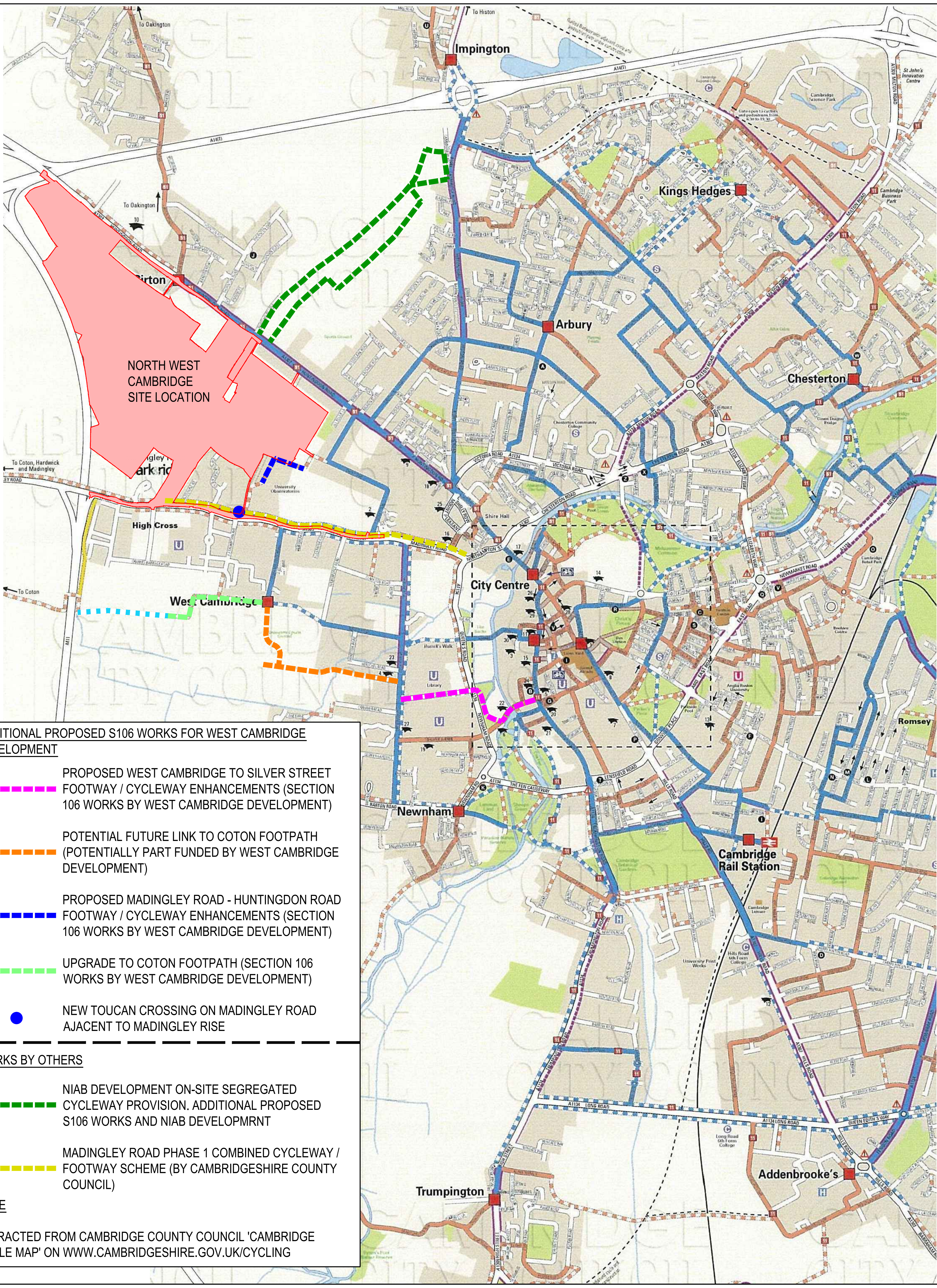
Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 6
23035 / TA / 006 - Figure 6

Revision: A



ADDITIONAL PROPOSED S106 WORKS FOR WEST CAMBRIDGE DEVELOPMENT

- PROPOSED WEST CAMBRIDGE TO SILVER STREET FOOTWAY / CYCLEWAY ENHANCEMENTS (SECTION 106 WORKS BY WEST CAMBRIDGE DEVELOPMENT)
- POTENTIAL FUTURE LINK TO COTON FOOTPATH (POTENTIALLY PART FUNDED BY WEST CAMBRIDGE DEVELOPMENT)
- PROPOSED MADINGLEY ROAD - HUNTINGDON ROAD FOOTWAY / CYCLEWAY ENHANCEMENTS (SECTION 106 WORKS BY WEST CAMBRIDGE DEVELOPMENT)
- UPGRADE TO COTON FOOTPATH (SECTION 106 WORKS BY WEST CAMBRIDGE DEVELOPMENT)
- NEW TOUCAN CROSSING ON MADINGLEY ROAD AJACENT TO MADINGLEY RISE

WORKS BY OTHERS

- NIAB DEVELOPMENT ON-SITE SEGREGATED CYCLEWAY PROVISION. ADDITIONAL PROPOSED S106 WORKS AND NIAB DEVELOPMRNT
- MADINGLEY ROAD PHASE 1 COMBINED CYCLEWAY / FOOTWAY SCHEME (BY CAMBRIDGESHIRE COUNTY COUNCIL)

NOTE

EXTRACTED FROM CAMBRIDGE COUNTY COUNCIL 'CAMBRIDGE CYCLE MAP' ON WWW.CAMBRIDGESHIRE.GOV.UK/CYCLING

Signed primary network on road
Signed primary network off road
Local links and links to villages on road
Local links and links to villages off road
On-road cycle lane
Cycle and bus lane
Cycling prohibited at all times
Cycling prohibited Mon-Sat 10am-4pm
Bridleway (useable when dry)
National Cycle Network
Cycle Park
Busy roundabout or junctions. Take care
Cambridge University locations
University College locations
Other university locations
Hospital
Pinch points. Restricted width for trailers
Blue sign destinations
Colleges and secondary schools
One-way street
Bike shops *(see other side for details)*

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NORTH WEST CAMBRIDGE

EXISTING STRATEGIC CYCLE ROUTES

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	07/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 7
23035 / TA / 007 - Figure 7

Revision: A

HIGHER FREQUENCY BUS SERVICE DETAILS					
KEY	SERVICE	DESTINATIONS	MON - SAT	EVENINGS	SUNDAY
	1A WHIPPET	HUNTINGDON - HOUGHTON - ST IVES - FENSTANTON BAR HILL - CAMBRIDGE	30 MINS	NO SERVICE	60 MINS
	55	HUNTINGDON - HOUGHTON - ST IVES - CAMBRIDGE	20 MINS	60 MINS	NO SERVICE
	CITI 5	BAR HILL - WEST CAMBRIDGE - CAMBRIDGE	20 MINS	NO SERVICE	60 MINS
	CITI 6	OAKINGTON - GIRTON - CAMBRIDGE	20 MINS	NO SERVICE	60 MINS
	77	PARK AND RIDE: MADINGLEY ROAD P&R - CAMBRIDGE - NEWMARKET ROAD P&R	10 MINS	NO SERVICE	15 MINS
	CITI 4	ORCHARD PARK - CHESTERTON - CAMBRIDGE - COTON - HARWICK - CAMBOURNE - ST NEOTS	20 MINS	60 MINS	60 MINS
	UNI 4	ADDENBROOKE'S HOSPITAL - NEWHAM - WEST CAMBRIDGE - MADINGLEY ROAD P&R	20 MINS MON - FRI	NO SERVICE	NO SERVICE
	X5	OXFORD - MILTON KEYNES - BEDFORD - ST NEOTS - MADINGLEY ROAD P&R - CAMBRIDGE	30 MINS	60 MINS	30 MINS
	CITI 1, 3 AND 7	CAMBRIDGE - CAMBRIDGE RAILWAY STATION - VARIOUS DESTINATIONS	5 MINS	5 MINS	15 MINS

M11 J14

A1307 HUNTINGDON ROAD

A1305 MADINGLEY ROAD

MADINGLEY PARK AND RIDE SERVICES 77, X5 AND UNI 4

FREQUENCY OF SERVICES FROM RAILWAY STATION TO CITY CENTRE (ST ANDREWS STREET)
MON - SAT = 5 MINS
EVENINGS AND SUNDAYS = 15 MINS

CAMBRIDGE RAILWAY STATION

CAMBRIDGE

SERVICE 1A WHIPPET

SERVICE 55

SERVICE CITI 6

SERVICE CITI 5

SERVICE 77

SERVICE UNI 4

SERVICE CITI 1,3 AND 5

SERVICE X5

KEY

SITE LOCATION

BUS STOP

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NORTH WEST CAMBRIDGE

EXISTING BUS SERVICES

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 8
23035 / TA / 008 - Figure 8

Revision: A

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NORTH WEST CAMBRIDGE ROUTE OF CAMBRIDGESHIRE GUIDED BUSWAY

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: INFORMATION

Date of 1st Issue	10/06/11
A4 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 9
23035/TA/009 - FIGURE 9

Revision: A

KEY

SITE BOUNDARY

PROPOSED DEVELOPMENT

EXISTING AND FUTURE OFF-SITE FACILITIES

NATIONAL CYCLE ROUTE (51) ON-ROAD

LOCAL CYCLE ROUTE ON-ROAD

LOCAL CYCLE ROUTE OFF-ROAD

CYCLE LANES

FORMAL CROSSING POINTS

EXISTING RIGHTS OF WAY

ON-SITE SEGREGATED FOOTPATH AND CYCLEWAY PROVISION IN NIAB AND WEST CAMBRIDGE DEVELOPMENTS

PROPOSED ON-SITE INFRASTRUCTURE PROVIDED BY NWC

PRIMARY PEDESTRIAN / CYCLE ROUTES

SECONDARY PEDESTRIAN / CYCLE ROUTES

PROPOSED OFF-SITE INFRASTRUCTURE PROVIDED BY NWC

TRAFFIC SIGNAL CONTROLLED CROSSING POINT

POTENTIAL CYCLEWAY / FOOTWAY CONNECTIONS (WITH AGREEMENTS FROM OTHERS)

SEGREGATED COMBINED CYCLEWAY / FOOTWAY

POTENTIAL INFRASTRUCTURE POSSIBLY PROVIDED BY NWC AND OTHERS

POTENTIAL BRIDLEWAY CONNECTION BY NWC

POTENTIAL BRIDLEWAY CONNECTION REQUIRED TO BE DELIVERED BY OTHERS

N

DEMAND-RESPONSIVE PEDESTRIAN AND CYCLIST CROSSING IN TRAFFIC SIGNAL CONTROLLED JUNCTION

UNDERPASS BELOW M11 (ACCESS TO THE COUNTRYSIDE)

TOUCAN CROSSING

DEMAND-RESPONSIVE PEDESTRIAN AND CYCLIST CROSSING IN TRAFFIC SIGNAL CONTROLLED JUNCTION

POTENTIAL TO PROVIDE BRIDLEWAY CONNECTIONS - SUBJECT TO OTHERS RESOLVING THE CROSSING OF HUNTINGDON ROAD AND THIRD PARTY LAND ISSUES BETWEEN NWC AND HUNTINGDON ROAD

EXISTING CROSSING POINT TO BE REPLACED WITH THE NIAB ACCESS JUNCTION

FOR BRIDLEWAY LINK TO BE COMPLETED BY NWC CROSSING OF MADINGLEY ROAD AND THIRD PARTY LAND TO BE RESOLVED BY OTHERS

30

TOUCAN CROSSING

IMPROVED MEASURES TO CROSSING FACILITIES

DEMAND-RESPONSIVE PEDESTRIAN AND CYCLIST CROSSING IN TRAFFIC SIGNAL CONTROLLED JUNCTION

TOUCAN CROSSING (POTENTIALLY PROVIDED BY WEST CAMBRIDGE DEVELOPMENT)

ENHANCED OFF ROAD, COMBINED CYCLEWAY / FOOTWAY (MADINGLEY ROAD PHASE 1 WORKS 2010 - 2011) - CCC

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NORTH WEST CAMBRIDGE DEVELOPMENT

FUTURE PROPOSED PEDESTRIAN, CYCLE AND EQUESTRIAN INFRASTRUCTURE

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

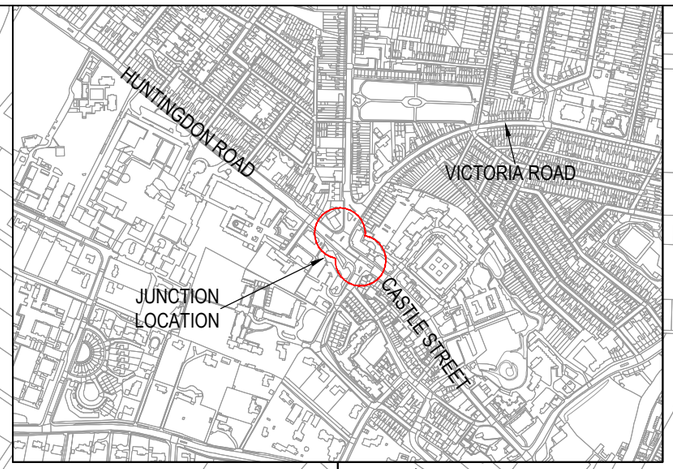
Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 10

23035 / TA / 0010 - Figure 10

Revision: A



EXISTING SITUATION

PROPOSED SITUATION

HUNTINGDON ROAD

HISTON ROAD

VICTORIA ROAD

EXTEND CENTRAL ISLAND

CENTRAL ISLAND WIDENED TO 3m

EXTEND CENTRAL ISLAND

MOUNT PLEASANT

CASTLE STREET

NOTE:-

1. THE ROAD MARKINGS SHOWN ON THIS PLAN HAVE BEEN DETERMINED FROM AERIAL PHOTOGRAPHS

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NORTH WEST CAMBRIDGE
POTENTIAL ENHANCEMENTS OF THE HUNTINGDON ROAD / VICTORIA ROAD / HISTON ROAD / CASTLE STREET JUNCTION

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

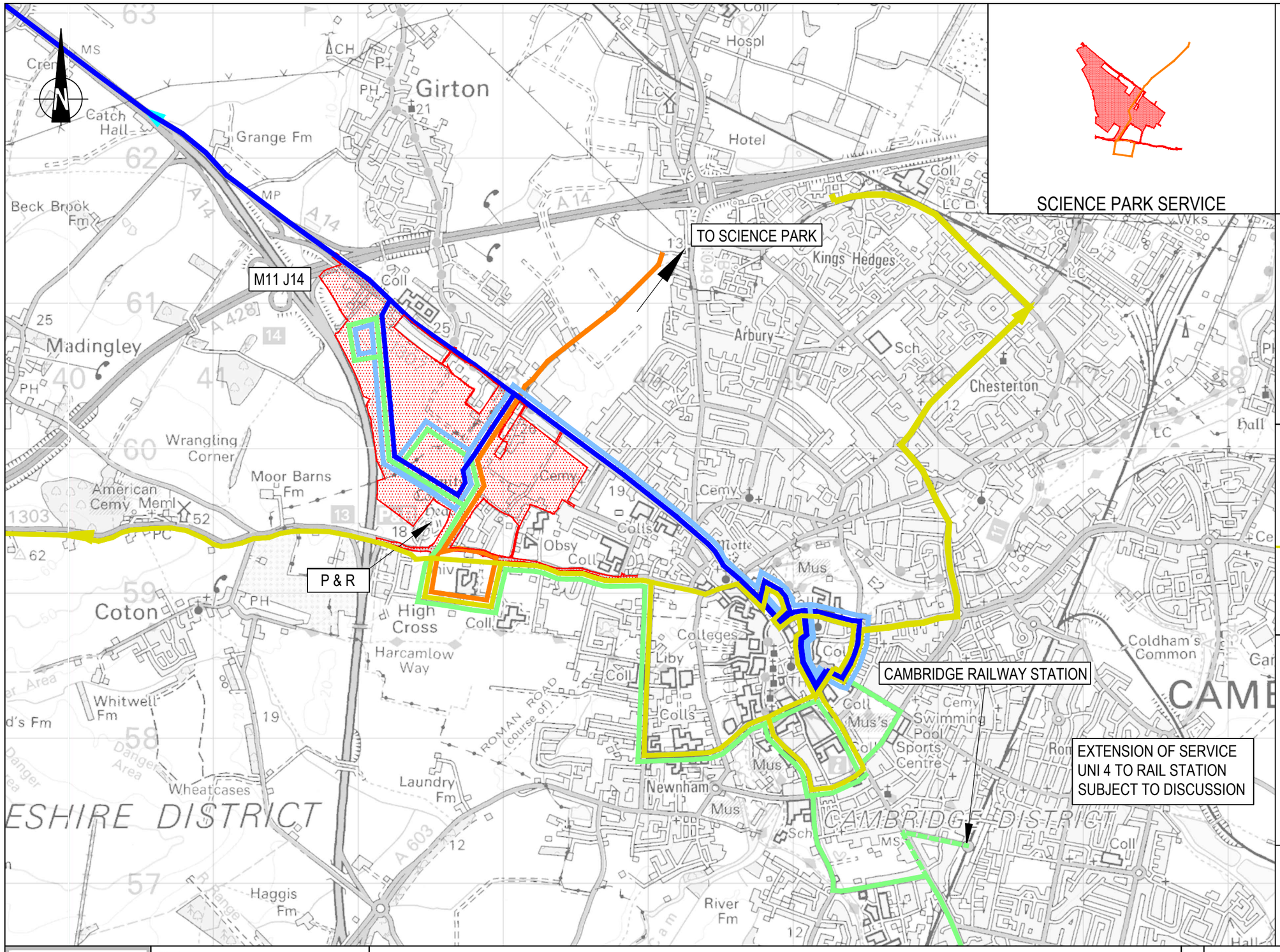
Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	10/03/11
A3 Scale	1:1000
Drawn by	TA
Checked by	JPH

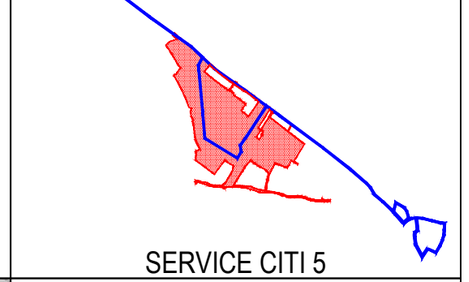
Drawing Number: FIGURE 11

23035/TA/011 - FIGURE 11

Revision: A

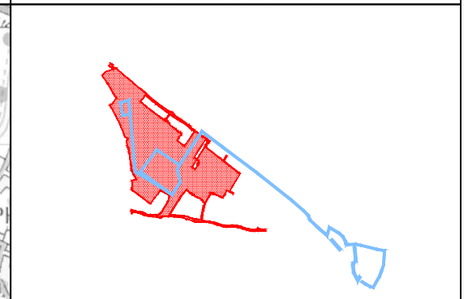


SCIENCE PARK SERVICE

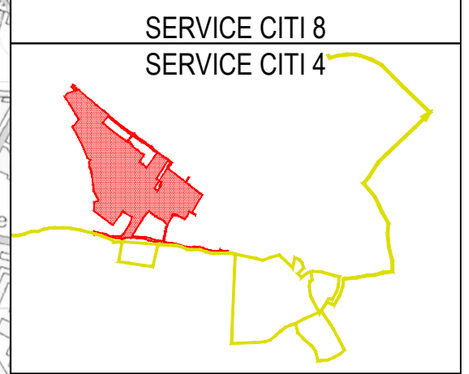


SERVICE CITI 5

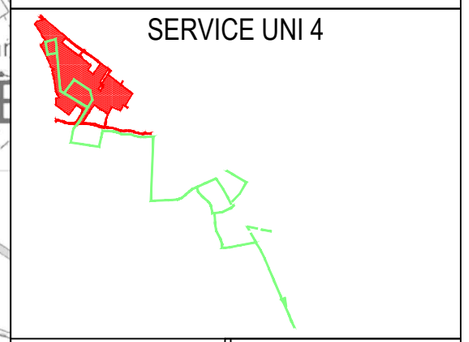
SERVICE CITI 8



SERVICE CITI 4



SERVICE UNI 4



10mins Citi 5
10mins Citi 8
10mins Uni 4 to City, 30 mins to Addenbrookes
30mins Science Park

KEY	SERVICE
	Citi 5
	Uni 4
	Citi 4
	Citi 8
	Science Park Service

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NORTH WEST CAMBRIDGE

PROPOSED BUS SERVICE ROUTE

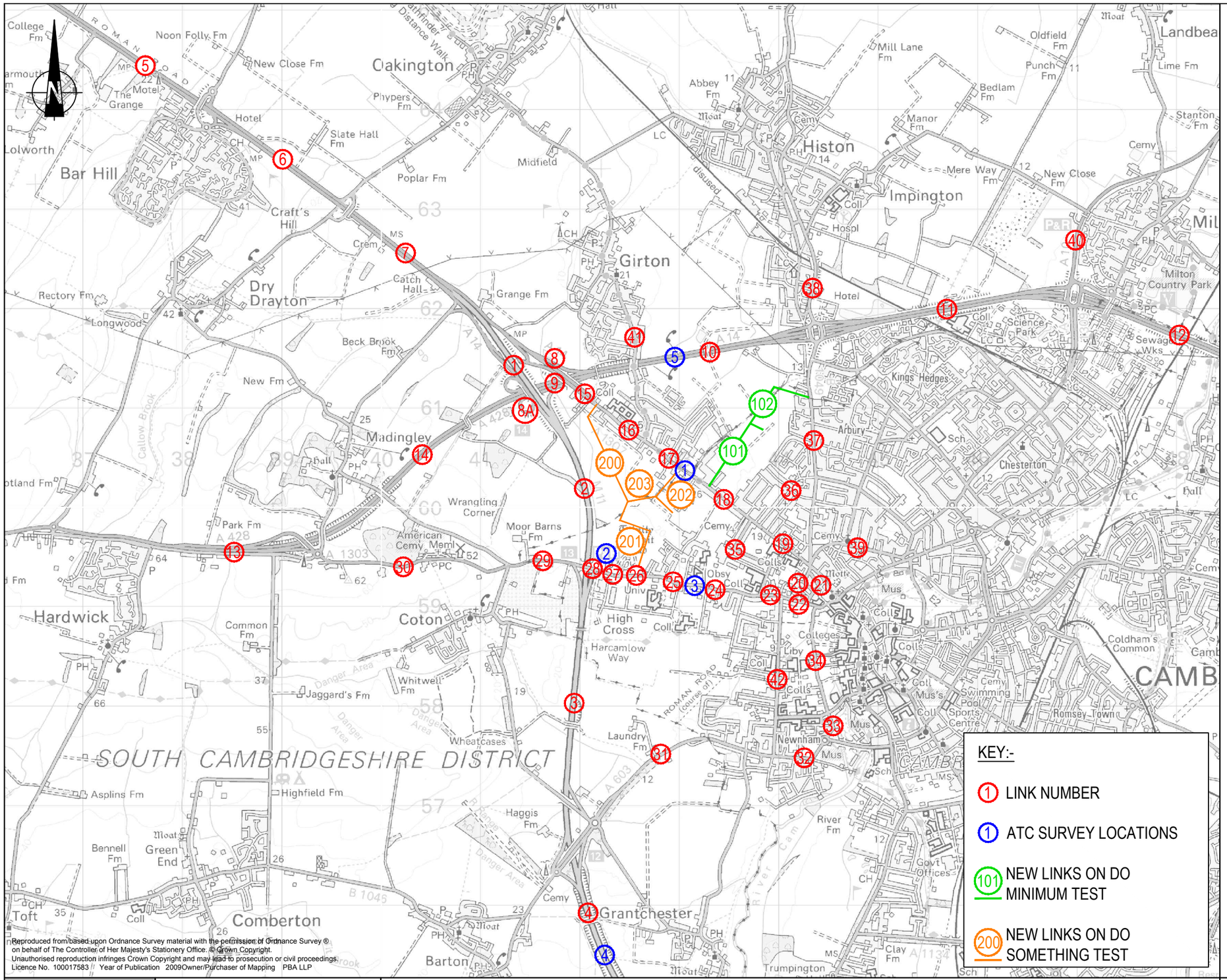
Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 12
23035 / TA / 012 - Figure 12

Revision: A



KEY:-

(1) LINK NUMBER

(1) ATC SURVEY LOCATIONS

(101) NEW LINKS ON DO MINIMUM TEST

(200) NEW LINKS ON DO SOMETHING TEST

LINK NUMBER	LINK DESCRIPTION
1	M11 – Junction 14 to M1 / A604 Merger
2	M11 – from Junction 13 to Junction 14
3	M11 – from Junction 12 to Junction 13
4	M11 – from Junction 11 to Junction 12
5	A14 – NW of B1050 Junction
6	A14 – from B1050 Junction to Dry Drayton Road Junction
7	A14 – from Dry Drayton Road to M11 Merge
8	A14 and A14 Service Road – from M11 Merge to A14 Eastbound Slip
8A	A14 and A14 Service Road – from M11 Merge Westbound Slip
9	Southbound Slip Road from A428 to M11
10	A14 – from A428 Merger to B1049 (Cambridge Road) Junction
11	A14 – from B1049 Junction to A10 Junction
12	A14 – from Junction to Horningsea Road
13	A428 – West of Madingley Road Junction
14	A428 – from Madingley Road Junction to M11 Junction
15	Huntingdon Road – from A14 slip road to North-western NWC Site Access
16	Huntingdon Road – from North-western NWC Site Access to Girton Road
17	Huntingdon Road – from Girton Road to North-eastern NWC Site Access
18	Huntingdon Road – from North-eastern NWC Site Access to Storey's Way
19	Huntingdon Road – from Storey's Way to Victoria Road / Castle Street Junction
20	Lady Margaret Road and Mount Pleasant
21	Shelly Row and Albion Row
22	Madingley Road – from Queens Road to Grange Road
23	Madingley Road – from Grange Road to Storey's Way
24	Madingley Road – from Storey's Way to JJ Thomson Avenue
25	Madingley Road – from J.J. Thomson Avenue to South NWC Site Access
26	Madingley Road – from South NWC Site Access to Park and Ride Entrance
27	Madingley Road – from Park and Ride Entrance to Unnamed Road
28	Madingley Road – from Unnamed Road to M11 Junction 13
29	Madingley Road – from M11 Junction to Cambridge Road
30	Madingley Road – from Cambridge Road to A428 Junction
31	Barton Road – from M11 Junction 12 to Grange Road
32	Barton Road – from Grange Road to Newham Road / The Fen Causeway Junction
33	Newham Road – from Barton Road / The Fen Causeway Junction to Queens Road / Silver Street Junction
34	Queens Road – from Newham Road / Silver Street Junction to Madingley Road
35	Storey's Way
36	Oxford Road and Windsor Road
37	Histon Road
38	Bridge Road (Histon)
39	Victoria Road
40	A10
41	Girton Road
42	Grange Road

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NORTH WEST CAMBRIDGE DEVELOPMENT

LINK NUMBER REFERENCE PLAN

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

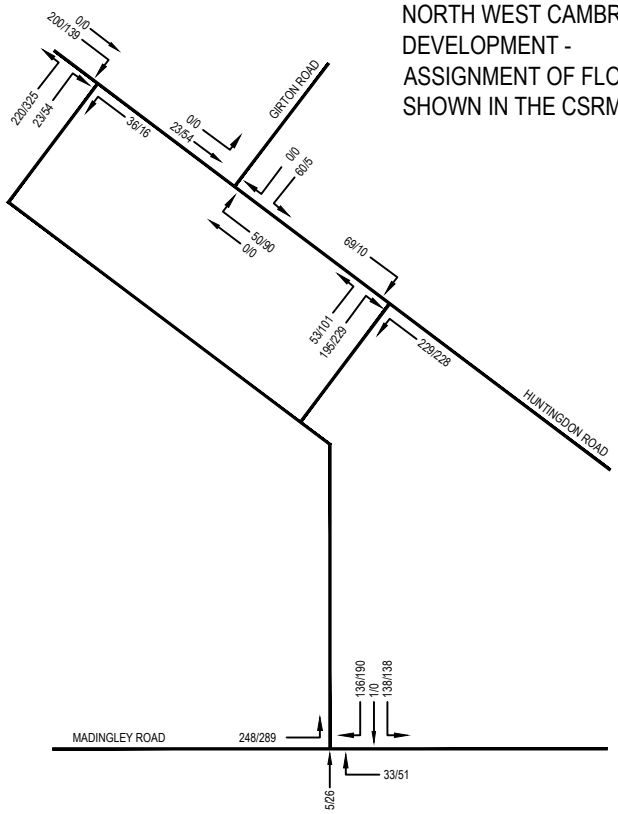
Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	12/10/10
A3 Scale	NTS
Drawn by	TA
Checked by	JH

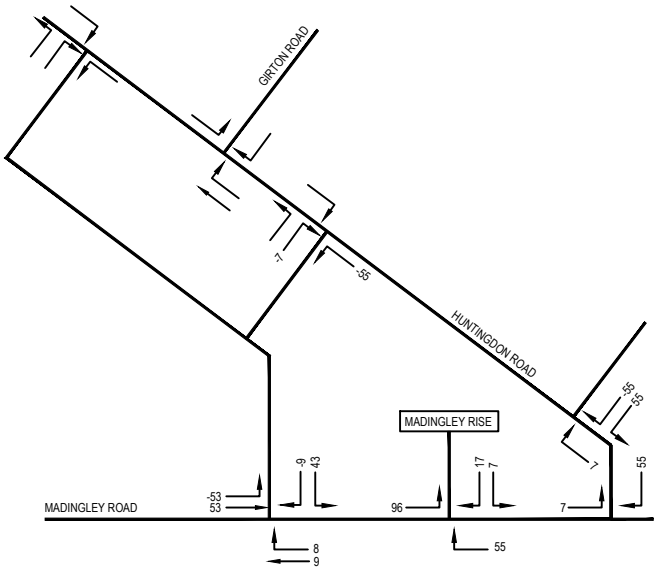
Drawing Number: FIGURE 13
23035 / TA / 013 - FIGURE 13

Revision: A

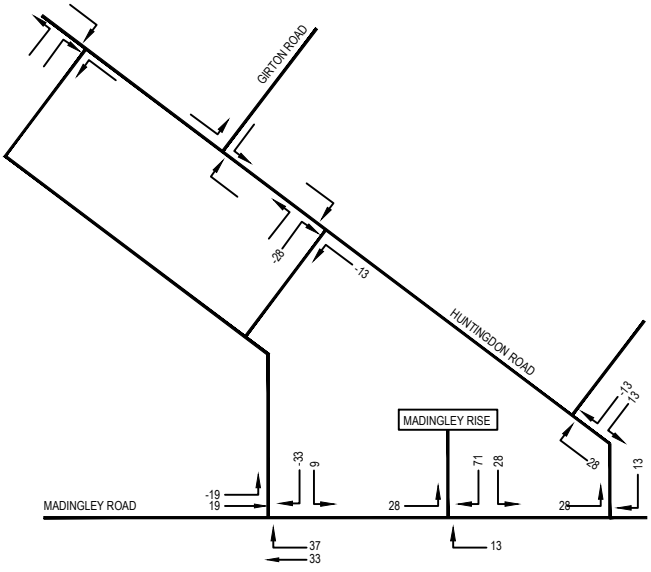
NORTH WEST CAMBRIDGE DEVELOPMENT - ASSIGNMENT OF FLOWS SHOWN IN THE CSRM



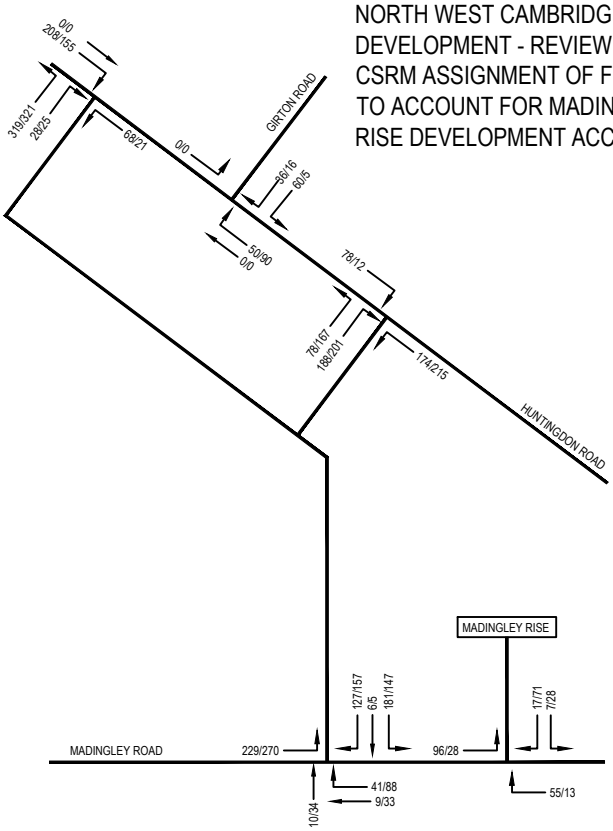
ASSUMED ASSIGNMENT OF FLOWS TO THE MADINGLEY RISE DEVELOPMENT - AM PEAK



ASSUMED ASSIGNMENT OF FLOWS TO THE MADINGLEY RISE DEVELOPMENT - PM PEAK



NORTH WEST CAMBRIDGE DEVELOPMENT - REVIEWED / CSRM ASSIGNMENT OF FLOWS TO ACCOUNT FOR MADINGLEY RISE DEVELOPMENT ACCESS



Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

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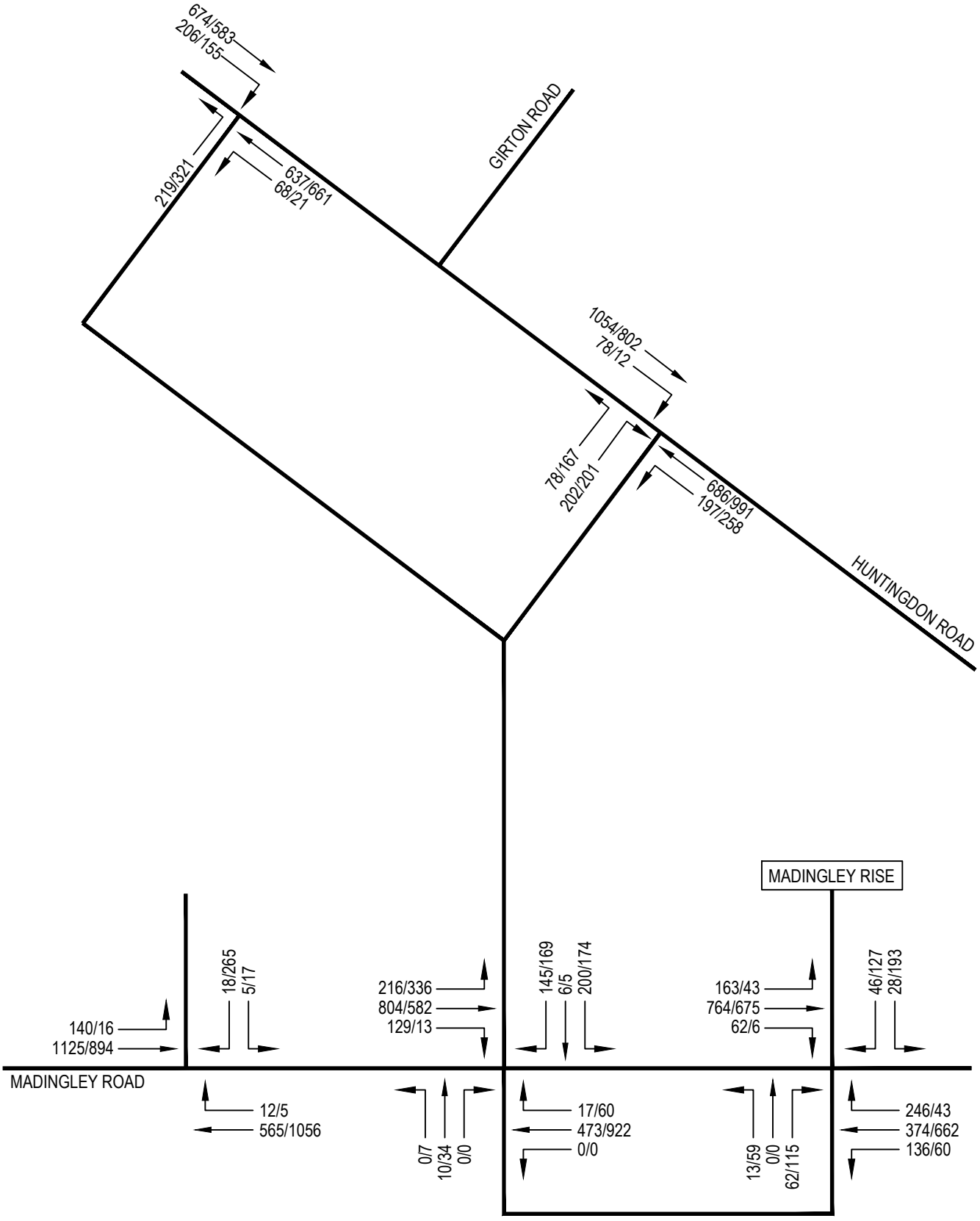
NORTH WEST CAMBRIDGE DEVELOPMENT REASSIGNMENT OF THE MADINGLEY RISE DEVELOPMENT TRIPS

Date of 1st Issue	13/10/10
A4 Scale	NTS
Drawn by	SC
Checked by	JPH

Drawing Number: FIGURE 14

23035 / TA / 014A - FIGURE 14

Revision: A



Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status

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NORTH WEST CAMBRIDGE DEVELOPMENT

2026 REVISED DO SOMETHING FLOWS

Date of 1st Issue	13/10/10
A4 Scale	NTS
Drawn by	SC
Checked by	JPH

Drawing Number

FIGURE 15

23035 / TA / 015A - FIGURE 15

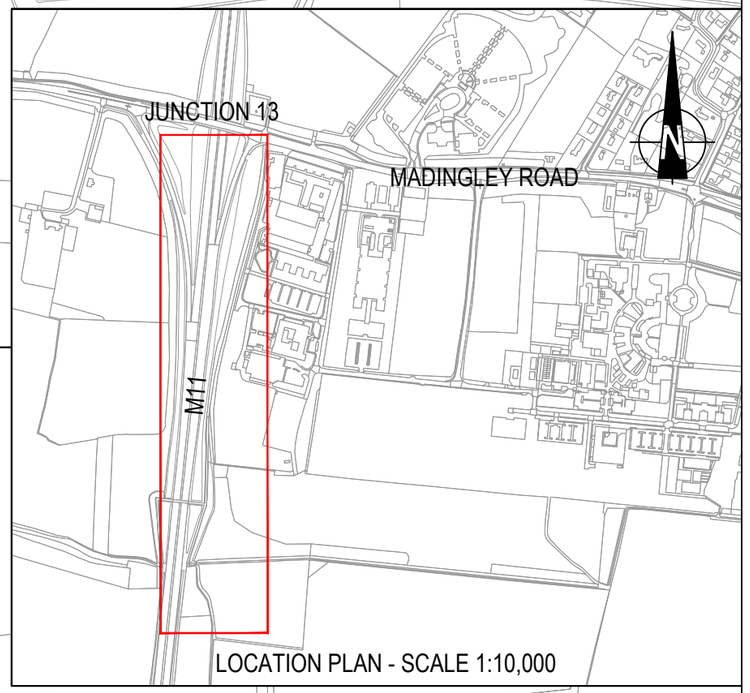
Revision

A

CARRIAGEWAY WIDENING REQUIRED

POTENTIAL FUTURE SITUATION - PARALLEL TAPER

CARRIAGEWAY CONSTRUCTION REQUIRED



LOCATION PLAN - SCALE 1:10,000

EXISTING SITUATION - DIRECT TAPER

NOTES:-

1. THE WHITE LINES SHOWN HAVE BEEN DERIVED WITH REFERENCE TO AERIAL PHOTOGRAPHY AND NOT A TOPOGRAPHICAL SURVEY

2. THE POTENTIAL ENHANCEMENT SHOWN IS A PARALLEL TAPER MERGE

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NORTH WEST CAMBRIDGE
POTENTIAL ENHANCEMENTS TO THE M11 J13 SOUTHBOUND ON-SLIP

Mark	Revision	Drawn	Date	Chkd
A	PLANNING APPLICATION	TA	09/09/11	JPH

Drawing Status: TRANSPORT ASSESSMENT

Date of 1st Issue	10/03/11
A3 Scale	1:2500
Drawn by	TA
Checked by	JPH

Drawing Number: FIGURE 16
23035 / TA / 016 - Figure 16

Revision: A