NORTH WEST cambridge

Foul Water Drainage Strategy

Condition 30

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URS

North West Cambridge – Foul Water Drainage Strategy

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P04
For Information

Prepared for:
University of Cambridge

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URS
Scott House
Alençon Link
Basingstoke
Hampshire
RG21 7PP

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1. INTRODUCTION

This document presents the Foul Water Drainage Strategy which has been prepared in response to Condition 30 for the planning consent for the North West Cambridge development (reference 11/1114/OUT and S/1886/11). This document develops the information presented in the Utilities Chapter of the Environmental Statement which was prepared in support of the Outline Planning Application (OPA) for the development.

1.1 Planning Condition

The following Planning Conditions & Informatives have been considered in the preparation of this Foul Water Drainage Strategy.

Flood Risk and Sustainable Drainage Systems

Condition 30

Prior to the commencement of any development a detailed Foul Water Drainage Strategy, based on that within the FRA and Drainage Strategy, dated March 2012, shall be submitted and agreed in writing with the Local Authority. The strategy should include the phasing of such works. The strategy shall include details of any necessary improvement of the existing sewerage system to ensure that sufficient capacity exists to cater for the needs of the development. The works/scheme shall be constructed and completed in accordance with the approved plans/specification and such time(s) as may be specified in the approved scheme.

REASON To prevent environmental and amenity problems arising from flooding and ensure that sufficient capacity exists within the sewerage network to meet the needs of the development. North West Cambridge Area Action Plan Policies NW25, NW26 and NW27.

Informatives

There are no specific Informatives related to this Condition.

1.2 Planning Policy

Planning Policy requirements can be found in **Appendix A**.

2. CONSTRAINTS AND OPPORTUNITIES

2.1 Existing Foul Water Sewers

Anglian Water is the statutory sewerage authority and is therefore responsible for the treatment and disposal of foul water from Cambridge. The development is situated within the catchment of Cambridge Sewage Treatment Works.

Sewer record plans indicate that there are existing foul sewers below Huntingdon Road and Madingley Road, to the north and south of the site, respectively, as defined below (and shown on drawings in **Appendix B**):-

- Huntingdon Road Sewers - Two separate networks have been identified that fall in an easterly and westerly direction from the high point, which are situated adjacent to the Reston property on the west side of the Girton Road/Huntingdon Road junction. This existing sewer is formed using vitrified clay pipes with a diameter of between 9" and 300mm.

- Madingley Road Sewers – A 1200mm diameter trunk sewer is situated to the south east of the site, which accommodates the discharge from the 300mm diameter sewers situated below Madingley Road and Huntingdon Road.

Anglian Water has been consulted to determine the available capacity within the existing sewer network. Anglian Water has supplied a Predevelopment Enquiry Report which indicates that the Cambridge Sewage Treatment Works has sufficient capacity to serve the development. This is consistent with the Phase 1 Water Cycle Study for Major Growth Areas in and around Cambridge prepared by Halcrow, which states that there is capacity to accommodate the increased flow from this and other strategic growth sites

Anglian Water has also indicated that whilst there is no existing foul drainage network within, or directly adjacent to, the site with capacity to accept the proposed discharge from the development, there is a 1200mm diameter trunk foul sewer downstream of the junction of Madingley Road and Wilberforce Road, to the south east of the site, that will currently be capable of accommodating a discharge of up to 42.4 litres per second.

This connection location is consistent with the recommendations contained within the Phase 1 and Phase 2 Water Cycle Strategy for Major Growth Areas in and around Cambridge, which confirms that the 300mm diameter sewers that are situated in advance of the trunk sewer will not have sufficient capacity to accommodate the discharge from the development and indicates that it will not be feasible to connect to the existing sewer nearer to the proposed access with Madingley Road.

2.2 Existing topography

The site is generally at a higher level than the existing adjacent urban area situated to the south; it would therefore be feasible to provide a gravity sewer connection to the existing sewer network, however the provision of a full gravity system would necessitate deep excavations that would be expensive to construct, difficult to maintain and would not be capable of effectively attenuating the peak flow.

Foul water will therefore be drained by gravity to the lower levels within the development and pumped rising mains will be provided from these locations to convey foul water from the site to the existing publicly owned 1200mm diameter trunk sewer located downstream of the junction between Madingley Road and Wilberforce Road, to the southeast of the site.

A total of four foul pumping stations will be required to permit the on site foul sewerage network to be installed with minimum cover in order to minimise construction costs and ensure that the sewer can be safely maintained.

2.3 Phasing

The development will be brought forwards in phases. The v9 development schedule and v9 phasing plan have been issued to Anglian Water and they are aware of the proposed loads on their foul water network and sewage treatment works and when they are proposed to occur.

The first pumping station to be built will control the discharge from the site and will attenuate the flows from the other pumping stations to ensure that the capacity of the receiving sewer is not exceeded.

In general, as the development expands, each network and pumping station will be constructed before the units are occupied. However, temporary pumping stations may be required in the event that small parcels of land are developed within a larger catchment to remove the requirement for permanent pumping stations to manage low flows which would be impracticable. All foul flows will be directed via the first pumping station to be built to ensure that discharge rates are acceptable.

3. DESIGN CRITERIA

3.1 Design standards

The Flood and Water Management Act 2010 (FWMA) aims to improve both flood risk management and the way our water resources are managed.

Mandatory Build Standards (MBS) will be introduced, which will require Sewerage Companies to adopt and maintain new foul sewers connecting to the public system. The Mandatory Build Standards will ultimately introduce a requirement for all new sewers, lateral drains and pumping stations serving two or more properties that connect to the public sewer to be offered for adoption to Sewerage Companies.

An Access Point (point of demarcation) at the boundary between an adoptable sewer and private drain, will be incorporated into the design at or within 1 metre of the border of each individual curtilage or property to comply with the requirements of Sewers for Adoption 7th Edition or subsequent updates of this document (SfA 7th).

Any pipe and associated access upstream of the point of demarcation will be a private drain and will be designed in accordance with the Building Regulations and BS EN 752 'Drain and sewer systems outside buildings'. Drainage that extends downstream of the demarcation chamber will be designed to SfA 7th.

3.2 Flow rates by tenure

Table 3-1 presents a schedule of typical foul water discharges by tenure which have been submitted to Anglian Water for approval. These have been developed based on the following parameters:

- All domestic properties will be Code for Sustainable Homes Level 5.
- All non-domestic properties will be BREEAM Excellent or BREEAM Outstanding where viable
- Due to the high proportion of 1, 2 & 3 bed properties the SfA 7th flows of 4000l/day/unit are considered excessive and giving rise to concerns about achieving self cleansing velocity at regular enough intervals to minimise blockages.
- In smaller 1, 2 & 3 bed units a higher flow rate of 200l/head/day has been assumed
- In larger 4 & 5 bed units a lower flow rate of 150l/head per day, capped at 4000l/unit/day has been assumed.
- Academic and Commercial Research - Final usages are unknown at this time. A flow rate of 1.3l/s/Ha (SFA 7th - B5.1.2) has been assumed
- Student Housing - Flow rates as per studio flat have been assumed for each of the 2004 units to be provided.
- Other Uses:
    - University Accommodation Office and Police Office are considered to have low flows - only domestic component of 0.6l/s/Ha has been assumed (SFA 7th - B5.1.2a).
    - Senior Care Home, University Café, Pub, Hotel are considered to have high flows therefore 1.6l/s/Ha has been assumed (SFA 7th - B5.1.2b).
    - CHPs are considered to have a very low flow under normal conditions (typically a staff toilet, shower and kitchenette). Annual boiler inspections require each of the boilers to

be drained. Once the boiler selection is complete the volume of water from this activity can be assessed. Until this assessment can be made 1.6l/s/Ha has been assumed.

Table 3-1 Typical foul design flow rates by tenure

North West Cambridge - Proposed Foul Design Flow Rates

Usage	Building Type	Number of Units	Area (m^2)	Assumed Number of Occupants	Flow Rate l/head/day (based on BSEN 752 Tabel E4)	Peak Flow Rate (Occupants x Flow Rate x 6)	Domestic		Non Domestic Flows (l/s)
							Proposed Foul Peak Flow (l/day) (Max. 4000l/day)	Proposed Foul Peak Flow Rate (l/s/unit)	
Market Housing	Studio Flat	52		1	200	1200	1200	0.01	
	1 bed Flat	141		2	200	2400	2400	0.03	
	2 bed Flat	225		2	200	2400	2400	0.03	
	2 bed duplex	53		2	200	2400	2400	0.03	
	3 bed Flat	97		4	150	3600	3600	0.04	
	2 Bed terrace	184		2	200	2400	2400	0.03	
	3 Bed terrace	316		4	150	3600	3600	0.04	
	4 bed terrace	146		4	150	3600	3600	0.04	
	2 bed semi	27		3	200	3600	3600	0.04	
	3 bed semi	45		4	150	3600	3600	0.04	
	4 bed semi	18		4	150	3600	3600	0.04	
	3 bed dqach	53		4	150	3600	3600	0.04	
	4 bed dqach (1)	48		5	150	4500	4000	0.05	
	4 bed dqach (2)	45		5	150	4500	4000	0.05	
	5 bed dqach	97		5	150	4500	4000	0.05	
University Market Housing	1 bed Flat	22		2	200	2400	2400	0.03	
	2 bed Flat	11		2	200	2400	2400	0.03	
	3 Bed terrace	11		3	150	2700	2700	0.03	
	4 bed terrace	9		4	150	3600	3600	0.04	
Self Build	4 bed dqach (1)	13		5	150	4500	4000	0.05	
	4 bed dqach (2)	14		5	150	4500	4000	0.05	
Key Worker Housing	1 bed Flat	470		2	200	2400	2400	0.03	
	2 bed Flat	710		2	200	2400	2400	0.03	
	2 bed duplex flat	28		2	200	2400	2400	0.03	
	4 bed shared apes	36		5	150	4500	4000	0.05	
	3 bed terrace /duplex	215		4	150	3600	3600	0.04	
	4 bed terrace	45		5	150	4500	4000	0.05	
Academic Research	Floorspace		60123						1.3
Commercial Research	Floorspace		40264						1.3
Student Housing	Floorspace	2004	84864	2004	150	1803482	1803482	0.01	
Other Uses	Nursery		784						1.3
	Primary school		3611						1.3
	Community Hall		520						1.3
	Nursery		930						1.3
	Senior care home		6547						1.6
	University Café		725						1.6
	University accommodation office		411						0.6
	Retail		850						1.3
	Pub		250						1.6
	Storage		95						0
	Hotel 130 beds		6127						1.6
	Foodstore, 3800 sq.m. gross, 2000sq.m. net sales		3800						1.3
	Police Office		130						0.6
	CHP		1250						1.6
	Local Shops		217						0.6
	PCT		700						1.3
	Project office/exhibition/ community ans		480						1.3
	Nursery		991						1.3
	CHP (site area)		10019						1.6

3.3 Surface water recycling

The foul discharge from the development will be dependent on the water supply strategy. The Environment Agency defines the average consumption of freshwater as being 150 litres per person per day. However, the Code for Sustainable Homes requires the maximum indoor water consumption to be reduced to 80 litres per person per day for Level 5 and 6.

Potable water demand will be minimised using a three stage approach involving demand reduction, water use management and the use of alternative sources of water, such as surface water recycling to provide a non-potable water network at the development.

Recycling surface water to provide a non-potable water supply should reduce the potable water demand per dwelling but the level of reduction is unlikely to make the development independent of potable water supply on the grounds of water quality, volume demand, water pressure and long-term responsibility for maintenance. The on site sewerage network and receiving public sewer will therefore be required to accommodate the full foul discharge from the development and no allowance will be included for a reduction in flow due to the provision of surface water recycling to supply a non-potable water network.

3.4 Sewer Layout and Easements

Section B of SfA 7th provides the requirements for sewer layouts and access for maintenance.

3.5 Minimum pipe diameters and gradients

BS EN 752 ‘Drain and sewer systems outside buildings’ provides the requirements for minimum pipe diameters and gradients.

3.6 Pumping Station Geometry

Pumping stations should be designed in accordance with Section D of SfA 7th Edition. A standard layout is provided in Figure D.3 – minimum size of 8m x 12m.

Given the limited discharge from this development, on-site storage will be provided. The pumping station wet wells will be increased in size to accommodate the required storage. The pumping stations shown on the drawings in **Appendix E** have been assigned a size to accommodate an increased wet well. Final layouts and sizes of pumping station will be confirmed during detailed design in consultation with Anglian Water.

3.7 Adoption and maintenance

All foul sewers will be adopted by Anglian Water in accordance with SfA 7th Edition, with the exception of sewers that are within the curtilage of a building, which will be privately maintained.

4. DESIGN OPTIONS

There are two options for the foul sewer network at the site, a full gravity network and a gravity network incorporating pumping stations.

4.1 Full gravity network

The site is at a higher level than the adjacent area and it would be feasible to provide a gravity sewer connection to the existing sewer network.

As the provision of a full gravity system would necessitate deep excavations that would be expensive to construct, difficult to maintain and would not be capable of effectively attenuating the peak flow it is not the preferred option.

4.2 Gravity network incorporating pumping stations

Under this arrangement, foul water would be drained by gravity to the lower levels within the development. Pumped rising mains would be provided from the pumping stations on Networks 2, 3 and 4 into the site gravity network, which would discharge to the pumping station on Network 1. The Network 1 pumping station would then convey foul water from the site to the existing publicly owned 1200mm diameter trunk sewer located downstream of the junction between Madingley Road and Wilberforce Road, to the southeast of the site.

The proposed pumping stations would be used to balance flows in order to minimise the effect of the development on the receiving foul sewer. Additional storage would be provided to ensure that the 42.4l/s capacity of the existing trunk sewer is not exceeded and that the risk of sewer flooding is not increased. Sewers for Adoption requires storage to be provided at each pumping station to ensure that the anticipated discharge may be accommodated below ground for a period of twenty four hours in the event of a pump failure.

5. FOUL DRAINAGE CATCHMENTS AND PREDICTED FLOW RATES

The base principles for the foul drainage network shown on drawing D127313-500-120 (see **Appendix E**) were submitted as part of the OPA. The assumptions relating to overall strategic layout, number of pumping stations, peak flows etc, from the concept design have been reviewed against the updated phasing, topography, layout and other constraints.

5.1 Catchments

The site has been split into four foul drainage networks:-

- Network 1 – Predominantly the Phase 1 area.
- Network 2 – Eastern side of the site, east of the SSSI area.
- Network 3 – West of Network 1, except the three plots which form Network 4.
- Network 4 – Plots D1, D2 and D3.

5.2 Pumping Stations

Due to the topography of the site four pumping station are required. A review of the need for pumping stations has been undertaken to ensure that only the minimum number are provided. The review showed that removal of any of the pumping stations would result in a significant lengths of sewer pipe exceeding 4m deep with some areas in the 8-10m deep range and inverts at the pumping stations exceeding 6m deep. This was not considered practical or safe to construct or maintain. Therefore, the optimum number of pumping stations is four.

The pumping stations (PS) only pump the sewage the minimum distance required to overcome the topographical constraints, operating as follows:

- Network 4 PS discharges into the Network 3 gravity sewer adjacent to parcel D5
- Network 3 PS discharges into the Network 1 gravity sewer adjacent to parcel B3
- Network 2 PS discharges into the Network 1 gravity sewer adjacent to parcel A28
- Network 1 PS discharges into the trunk sewer in Madingley Road

5.3 Foul Distribution

The development schedule (see **Appendix C**) shows the mix of housing or other uses on each plot; from this a total discharge from each plot has been calculated using the flows given in Table 3-1.

A foul distribution table has been produced for each network and each plot, based on the V9 development schedule (see **Appendix C**). A percentage of the total flow from each plot has been assigned to relevant pipes in the network. A summation for each pipe gives the total flow entering that pipe (far right column of the distribution table). This figure has been entered into the WinDES model to determine the pipe sizes, levels and gradients.

Since this development has a number of pumping stations which discharge back into the gravity network within the site, it has been assumed that where a rising main discharges into an adjacent gravity network, it discharges at the same flow rate that would be used in a full gravity solution. These in-direct discharges are highlighted in yellow on the distribution table.

The drawings included in **Appendix F** graphically show the key trunk sewers through the entire development along with details of the distribution information built into the schedule

listed above. The drawings also show the catchment areas served by each foul network with the plots colour coded for each foul network.

5.4 Total Flows, Attenuation and Discharge

The peak foul flow from the development is 142l/s. This exceeds the permitted discharge to the Anglian Water trunk sewer of 42.4l/s and attenuation will therefore be required. Anglian Water are reviewing the permitted discharge figure as part of the ongoing discussions and application process with a view to increasing this value, thus reducing the volume of attenuation required.

Each pumping station will be designed in accordance with SfA 7th to provide attenuation in the event of failure in addition to the attenuation required due to limited discharge. The level of attenuation to be provided will be confirmed during detailed design in consultation with Anglian Water.

5.5 Modelling Approach

Network models have been built in Civil3D and WinDES to construct the plan layout and hydraulic properties of each of the four foul drainage networks.

A Civil3D surface model was built comprising the following:-

- Phase 1 surface levels (URS RIBA C)
- Surface levels across the parcels outside Phase 1, based on a designed centreline of the roads and tie-ins to existing levels at the boundaries.

This model has been used to assign cover levels to manholes and check pipes for appropriate cover depths.

The plan layout of the foul sewers has been developed using the following information:-

- Phase 1 Road layout
- V9 road, parcel, building layout for areas outside Phase 1 (provided by AECOM 10/10/12).

WinDES models have been built for each of the four foul networks to determine the pipe sizes and gradients. Flows from the distribution table have been inserted in to the model to generate the peak flows and 1/3rd design flow velocities.

The WinDES models have been optimised to, where possible, remove pipe runs deeper than 4.5m and minimise the depth to invert at the pumping station locations to ensure that the pumping station wet well depths are also minimised.

6. MODELLING RESULTS

The outputs from the WinDES simulations for the four foul drainage networks are included in **Appendix D**. Outlined below are the key results from the design of the four networks (which are also summarised on drawing D127313-500-120).

Network 1 covers all of the initial development and includes the main pumping station that discharges all of the foul sewage from the development to the trunk sewer in Madingley Road. The key parameters from the analysis are outlined below:-

- Maximum Pipe Size – 525mm
- Typical Sewer Depths – 1.5m – 4.2m
- Maximum Sewer Depths – 6.7m (see below)
- Emergency Storage Volume – will be confirmed during detailed design in consultation with Anglian Water
- Attenuation Storage Volume – will be confirmed during detailed design in consultation with Anglian Water

The design and analysis of Network 1 has highlighted that pipes 1.003 to 1.014 have depths exceeding 5m, up to a maximum of 6.7m. Further discussions will need to be undertaken with Anglian Water to ensure both the risks associated with construction and maintenance of pipelines at this depth are mitigated.

Network 2 covers the north-east corner of the site, with the rising main from this network discharging back into the Network 1 gravity sewer at pipe 9.000. The key parameters from the analysis are outlined below:-

- Maximum Pipe Size – 300mm
- Typical Sewer Depths – 1.35m – 2.2m
- Maximum Sewer Depths – 3.2m
- Emergency Storage Volume – will be confirmed during detailed design in consultation with Anglian Water
- Attenuation Storage Volume – will be confirmed during detailed design in consultation with Anglian Water

Network 3 cover the area west of Network 1, except the three plots which form Network 4, with the rising main from this network discharging back into the Network 1 gravity sewer at pipe 18.000. The key parameters from the analysis are outlined below:-

- Maximum Pipe Size – 300mm
- Typical Sewer Depths – 1.35m – 2.5m
- Maximum Sewer Depths – 4.2m
- Emergency Storage Volume – will be confirmed during detailed design in consultation with Anglian Water
- Attenuation Storage Volume – will be confirmed during detailed design in consultation with Anglian Water

Network 4 covers plots D1, D2 and D3 with the rising main from this network discharging back into the Network 3 gravity sewer at pipe 7.001. The key parameters from the analysis are outlined below:-

- Maximum Pipe Size – 150mm
- Typical Sewer Depths – 1.35m – 2.0m
- Maximum Sewer Depths – 3.2m
- Emergency Storage Volume – will be confirmed during detailed design in consultation with Anglian Water
- Attenuation Storage Volume – will be confirmed during detailed design in consultation with Anglian Water

Attenuation and emergency storage volumes were determined for the site during the OPA. These volumes are shown on the drawing in **Appendix E**. However, the distribution has altered and is now based on the matrix in **Appendix C**; the storage volumes will therefore need to change to reflect the revised distribution matrix. In addition to the distribution changes, Anglian Water have indicated that they will review the storage volumes and may use alternative storage durations to those within Sewers for Adoption.

SfA states that foul pipes should have a velocity of 0.75m/s at 1/3 design flow (B4 Item 9). Due to the topography of the site it is not possible to achieve this criteria on a number of the pipes in all four networks without the depths of the pipes and inlet invert depth at the pumping stations becoming excessive. In these situations the alternative criterion of the following have been applied:

- A 150mm nominal internal diameter gravity sewer is laid to a gradient not flatter than 1:150 where there are at least ten dwelling units connected; or
- A sewer or lateral drain with a nominal diameter of 100mm, or a lateral drain serving ten or fewer properties is laid to a gradient not flatter than 1:80, where there is at least one WC connected and 1:40 if there is no WC connected.

7. CONSULTATIONS

We have had an ongoing dialogue with Anglian Water throughout the concept design and OPA stages of the project. This dialogue has continued through the RIBA C infrastructure design. Copies of the key correspondence are included in **Appendix G.**

- 08/10/12 – Submission of proposed foul discharges by unit type to Anglian Water for Approval.
- 02/10/12 – Submission of Section 98 Application for Requisition of New Public Sewer
- 14/09/12 – Teleconference with Anglian Water to discuss Section 98 application
- 30/08/12 – Provided Anglian Water with a copy of the development schedule
- 09/08/12 – Met with Anglian Water to discuss Foul Drainage
- 15/02/13 – Met with Anglian Water and Turner and Townsend to discuss S98 Application
- 09/04/13 – Email confirmation from Anglian Water that the Foul Drainage Strategy is acceptable

8. CONCLUSIONS

This report demonstrates that four pumping stations are required to minimise the impacts of the topography on the depths of the pipes and pumping station wet wells. The locations of the pumping stations indicated on the drawing presented as part of the OPA (see **Appendix E**) have been tested and the positions updated to suit more accurate information on the proposed site topography.

The adopting authority (Anglian Water) has confirmed that the high level drainage strategy for connection flows to the public foul sewer is acceptable (see **Appendix G**). As agreed with Anglian Water some details such as the following will be subject to ongoing discussions:-

- Agreement of foul design flows by unit type
- Agreement of pumping station locations, sizes, access requirements etc
- Progression of Section 98 application.

APPENDIX A – PLANNING POLICY

North West Cambridge Area Action Plan

Policy NW26: Foul Drainage and Sewage Disposal

Development of any single phase will not result in harm in the form of untreated wastewater or increased flood risk from treated wastewater. Planning conditions (which may include 'Grampian' style conditions) will link the start and phased development of the site to the availability of wastewater treatment capacity and the capacity of receiving watercourses.

The foul water produced at the site will be directed to Cambridge Sewage Treatment Works at Milton to take advantage of consolidating existing facilities. Anglian Water are currently undertaking an appraisal of sewerage provision for the whole catchment and the outcome of that appraisal will inform the approach to be followed for foul water arising from North West Cambridge.

In accordance with the requirements of the WFD, the treatment of wastewater must not cause deterioration of the water environment. The options for the treatment of foul drainage and sewage disposal from the site will need to be agreed with the Environment Agency to ensure that development does not result in further pressure on the water environment and compromise WFD objectives.

Phase 1 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2008)

The Phase 1 Water Cycle Strategy assesses the potential impacts and constraints associated with the proposed major development areas by considering flood risk, water resources and supply, foul sewerage, wastewater treatment, water quality and water related ecology. This study establishes the most effective foul drainage and water supply strategy for all development in the Cambridge catchment and contains the following conclusions and recommendations in relation to the Proposed Development:

Foul Drainage, Sewage Treatment and Water Quality
The discharge consent at Cambridge WwTW will not require revision to accommodate the increased flow from the infill or strategic development sites within Cambridge. However, improvements will be needed to the treatment works in order to maintain the quality of the effluent discharged to the River Cam. AWS will seek investment to facilitate these improvements through its regulatory periodic review process for implementation in AMP5 (2010-15) and AMP6 (2015-20)

The large diameter sewer network can accommodate all of the flow from the strategic developments without upgrade. The majority of sites will need to provide strategic connection sewers to connect into the large diameter sewer network…..Northwest Cambridge will connect into the branches of the tunnel network on Madingley and Histon Road.

Phase 2 Water Cycle Strategy for Major Growth Areas in and around Cambridge (October 2010)

A Phase 2 report was completed by consultants for Cambridge Horizons and considered the recommendations made in the Phase 1 report which focused on identifying a strategy and providing the technical evidence base to show how new sustainable water services infrastructure for the Major Sites in and around Cambridge (including the North West Cambridge University site) could be delivered to maximise three opportunities:

- aspiring to water neutrality;
- improving biodiversity by protecting environmental water quality and hydromorphology, and;
- protecting and enhancing communities through sustainable surface water management.

The Phase 2 Water Cycle Study contains the following conclusions and recommendations in relation to the Proposed Development, which have been integrated into the proposals:

Foul Drainage, Sewage Treatment and Water Quality
At Cambridge WwTW, up to and including 2031, no consent change is required for ammonia to ensure no deterioration of the current WFD status downstream of the treatment works. However, the BOD consent will require marginal tightening from 15mg/l to 13mg/l, and a phosphate consent of 3 mg/l would be required (current phosphate discharge is 0.73 mg/l).

However, to meet WFD good status at Cambridge WwTW with 2031 growth flows, the BOD and ammonia consent would require tightening and that this is achievable with conventionally applied wastewater treatment technology. This analysis therefore shows that BOD and ammonia are not constraints to growth.

To meet good status for phosphate at Cambridge WwTW with the current population, even assuming the river quality upstream of the treatment works is good status, would require a mean annual average discharge consent of 0.23 mg/l. This is significantly beyond what can be achieved by current sewage treatment technology (1 mg/l). To meet good status for phosphate with the 2031 population tightens this consent from 0.23mg/l to 0.21mg/l.

Our interpretation of the current policy on assessing WFD consents in water cycle studies is that where WFD status cannot be met with the current population with conventionally applied sewage treatment technology, growth per se should not be considered a barrier to achieving good ecological status, subject to the assessment showing there will be no deterioration of current status.

Therefore, water quality environmental capacity and WFD compliance should not be a constraint to growth at Cambridge WwTW or Uttons Drove WwTW. The Environment Agency is responsible for determining through the RBMP if and when the consent will need to be tightened to achieve good ecological status for BOD and Ammonia, and securing water company funding for any infrastructure requirements that will be required as part of the National Environment Programme section of the appropriate Periodic Review.

Wastewater Networks
Additional housing growth will cause an increase in foul flows to the wastewater network. If no mitigation is put in place there is a risk that flooding due to under capacity and pollution due to overflows from the network could increase. The Phase 2 WCS defines the location of connections to the existing foul sewer and summarises AWS' preferred strategy to upgrade the wastewater networks to accommodate planned growth within Table 6-9, which is duplicated below.

Site name	Impact on sewer network	Proposed mitigation
Huntingdon / Madingley Rd (university site)	Site would connect to sewer in Madingley Road, which would cause increase in sewer flooding.	Connect development downstream of Madingley Road (1000m from site) on the 600mm diameter sewer

Table 6-9 Summary of impact of growth on wastewater network (adapted from Phase 1 WCS and Cambridge wastewater capacity study)

AWS are progressing their preferred wastewater strategy to accommodate development of the major growth sites in and around Cambridge. Upgrades will be required at both Cambridge and Uttons Drove WwTW, and the networks which drain flows to these works will also require localised upgrading. Upgrades to the WwTW and the wastewater networks will be funded through Periodic Review process and Requisition under Section 98 of Water Industry Act 98.

With respect to wastewater and water quality, the Phase 2 WCS has demonstrated that there are no environmental constraints to growth. In particular:

- *although new consents will be required at both Cambridge and Uttons Drove WwTWs to ensure no deterioration of current WFD status, these will be within the limits of conventional technology for sewage treatment;*
- *growth will not hinder the ability of the receiving water bodies achieving good physico-chemical status, as required by the WFD, and;*
- *the discharge volumes from the combined sewer overflows is not anticipated to increase due to the major growth sites, but there is a risk it could increase due to additional flows from infill development (see Phase 1 WCS).*

Flood risk downstream of the WwTW due to an increase in treated sewage effluent has also been assessed in the Phase 2 WCS. At Cambridge WwTW the risk of increased flood risk has been assessed to be low due to planned development up to 2031; therefore no mitigation will be required.

APPENDIX B – ANGLIAN WATER SEWER RECORDS

GEODESYS
LAND & PROPERTY INFORMATION

Zarina
Atkins
The Hub
500 Park Avenue
Almondsbury
Bristol
BS32 4RZ

07 July 2010

Dear Sirs,

RE: ASSET ENQUIRIES

Thank you for your recent search request(s). Please find below a summary of items included in this dispatch.

Yours faithfully

Queue Watcher
Asset Information Advisor

Item Ref	Product / Service	Reference	Address
A810193-1	General Enquiry Regular - Sewer Only	14384	SITE AT M11 HUNTINGDON ROAD

GEODESYS
LAND & PROPERTY INFORMATION

Atkins
The Hub
500 Park Avenue
Almondsbury
Bristol
BS32 4RZ

Our ref: A810193

Your ref: 14384

Dear Sirs,

SITE AT M11, HUNTINGDON ROAD, MADDINGLY ROAD, CAMBRIDGE, CB3 0JX

Thank you for your enquiry in connection with the above site.

Please find enclosed copy of records and/or drawings of assets belonging to Anglian Water Services Limited (Anglian Water) in the vicinity of the above site. Anglian Water has provided this information in good faith on the understanding that it is the best information available at this time. However, Anglian Water can accept no liability in respect of the information provided and your attention is drawn to the disclaimer on the information provided. Please note that sewer drawings generally show only public sewers and not private sewers.

Please be advised that our records show there are no public water mains in the vicinity of the works.

For Mains Water information relevant to this enquiry please contact:

Cambridge Water Company Plc, 90 Fulbourn Road, Cambridge, Cambs, CB1 9JN, Tel: 01223 403000, www.cambridge-water.co.uk

Water Service connections are not shown but may normally be traced from stop tap boxes. The possibility of damage or disturbance to connections must be avoided at all times.

Large species of trees should not be planted within five metres of Anglian Water apparatus/assets to reduce the possibility of damage from roots.

To avoid incurring costs arising from damage or disturbance to Anglian Water apparatus/assets we recommend the use of manual rather than mechanical excavation to ascertain their depth. Please contact us on 08457 145 145 if you are excavating to more than 450mm or if your activity may cause ground movement or vibration.

If you should wish to discuss connections, supplies, build overs or pre-development and capacity information please contact Developer Services on 0845 6066087.

Yours faithfully

Aaron Hayward
Customer Support Coordinator

Spencer House, Spitfire Close, Ermine Business Park
Huntingdon, Cambridgeshire, PE29 6XY
Tel: +44 (0) 1480 323891
Fax: +44 (0) 1480 323892
www.geodesys.com

Map Centre 542182, 261046 Scale: 1500 Date: 05/07/2010 16:09 Data updated: June 2010

GEODESYS
Asset Information Team
Geodesys
PO Box 496
Huntingdon
PE29 6YN

SEWER ASSET LEGEND

Surface Sewer	Gravity Sewer
Foul Sewer	Vent Column
Combined Sewer	Manhole (Combined)
Eckl/Private Sewer	Manhole (Foul Water)
Decommissioned Sewer	Manhole (Surface Water)
Rising Main	

Property Address: SITE AT M11, HUNTINGDON ROAD, MADDINGLEY ROAD, CAMBRIDGE, CB3 0JX

Customer: Atkins

Title: A810193(1) (Aaron Hayward)

Map Centre 543322, 260037 Scale: 1500 Date: 05/07/2010 16:09

Data updated: June 2010

This plan is provided by Anglian Water pursuant to its obligations under the Water Industry Act 1991 sections 199 and 201 and should be used for reference purposes only. No liability is accepted by Anglian Water for any inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or drain or disposal main or any item of apparatus. This information is valid for the date printed. The plan is derived from Ordnance Survey mapping. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Anglian Water Services Limited, trading as Geodesys from Ordnance Survey © Crown Copyright, 100018567. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other use of the map data or further copies are not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

GEODESYS
Asset Information Team
Geodesys
PO Box 486
Huntingdon
PE29 6YN

SEWER ASSET LEGEND

- Surface Sewer
- Foul Sewer
- Combined Sewer
- SW/Private Sewer
- Decommissioned Sewer
- Rising Main
- Gravity Sewer
- Yard Gulpers
- Manhole (Combined)
- Manhole (Foul Water)
- Manhole (Surface Water)

Property Address: SITE AT M11, HUNTINGDON ROAD, MADDINGLEY ROAD, CAMBRIDGE, CB3 0JX

Customer: Atkins

Title: A810193(2) (Aaron Hayward)

Map Centre 542836, 259158 Scale: 1500 Date: 05/07/2010 16:09 Data updated: June 2010

GEODESYS
Asset Information Team
Geodesys
PO Box 496
Huntingdon
PE29 6YN

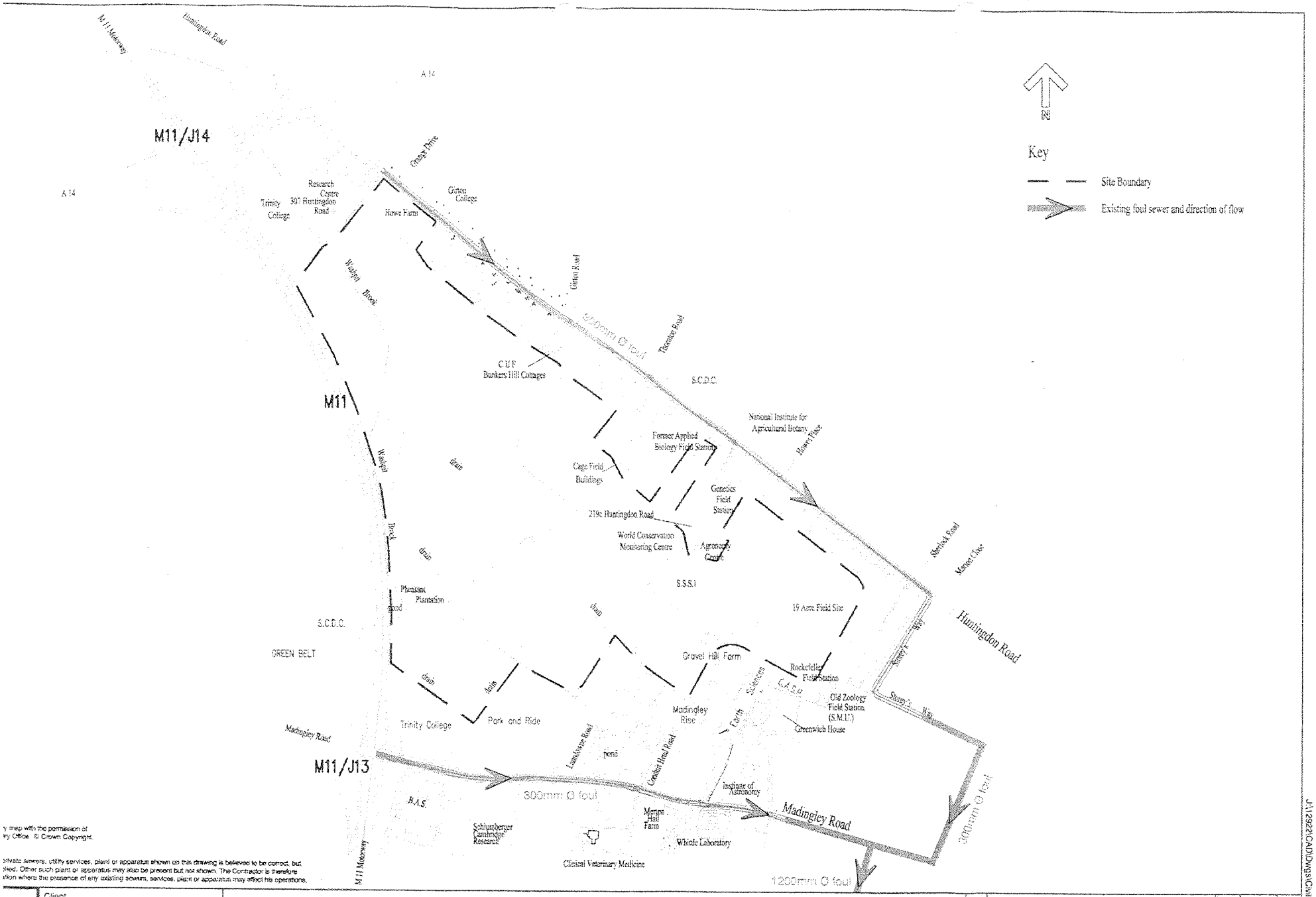
SEWER ASSET LEGEND

Surface Sewer	Gravity Sewer
Foul Sewer	Vent Column
Combined Sewer	
SW/Private Sewer	Manhole (Combined)
Decommissioned Sewer	Manhole (Foul Water)
Rising Main	Manhole (Surface Water)

Property Address: SITE AT M11, HUNTINGDON ROAD, MADDINGLEY ROAD, CAMBRIDGE, CB3 0JX

Customer: Atkins

Title: A810193(3) (Aaron Hayward)



Client
UNIVERSITY OF CAMBRIDGE

- LONDON W6 7LL - TEL 020 8741 4452 - FAX 020 8563 8303
don@pba.co.uk - internet: www.pba.co.uk

NORTH WEST CAMBRIDGE

EXISTING ADOPTED FOUL SEWER NETWORK

Rev	Description	Dwn	Date	Chkd

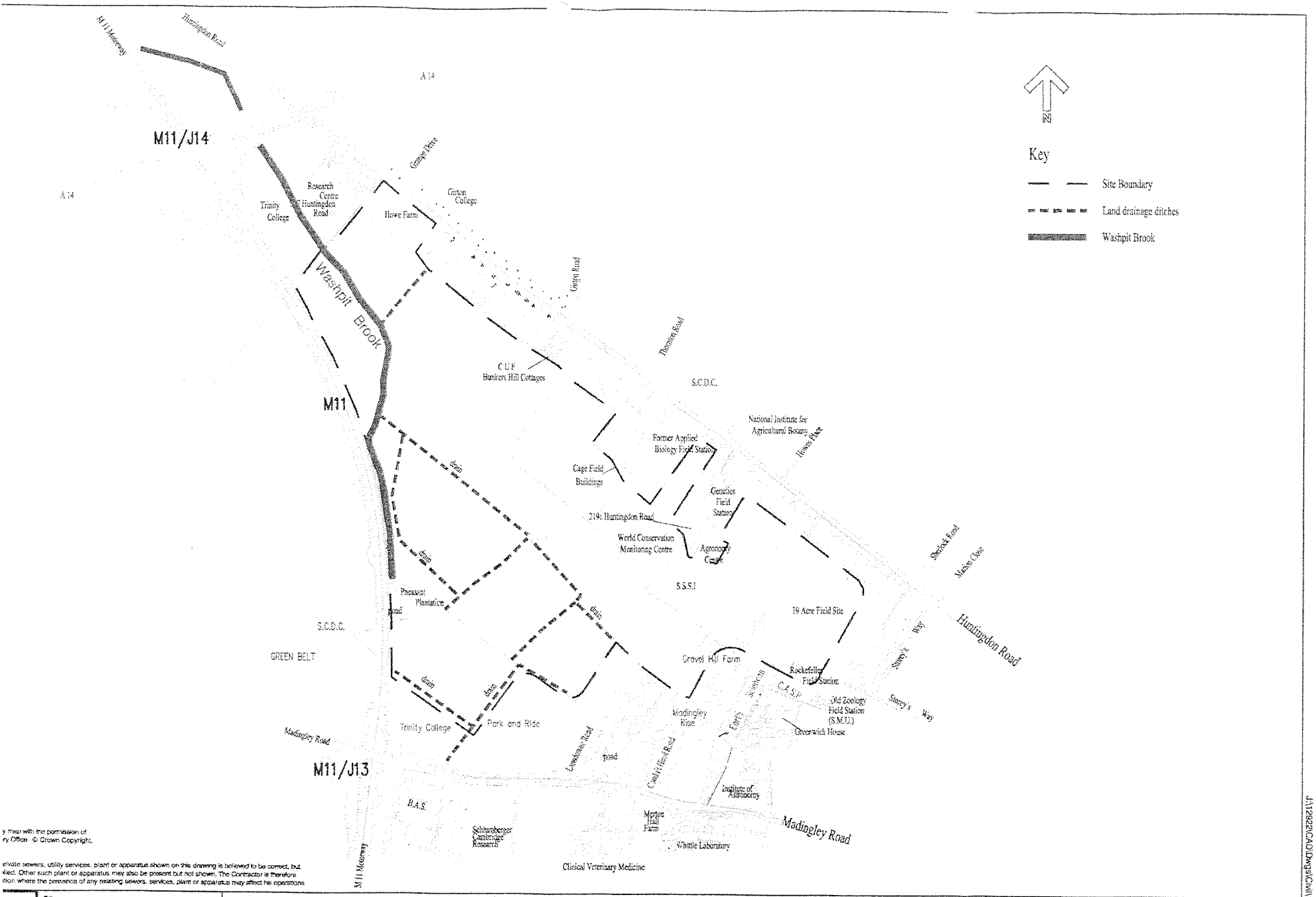
Drawing Status: INFORMATION

Date	06.11.02
A3 Scale	1:10000
Drawn	SH
Checked	ZF

Drawing Number: 12992/C/FIGURE 05

Revision

J:\12992\CAD\Dwgs\Civil\12992 fig 05 foul.dwg



Client
UNIVERSITY OF CAMBRIDGE

• LONDON W6 7LL • TEL 020 8741 4452 • FAX 020 8563 8303
don@pba.co.uk • internet: www.pba.co.uk

NORTH WEST CAMBRIDGE

EXISTING SURFACE WATER NETWORK

Rev	Description	Dwn	Date	Chkd

Drawing Status: INFORMATION

Date	06.11.02
A3 Scale	1:10000
Drawn	SH
Checked	ZF

Drawing Number: 12992/C/FIGURE 6

Revision

J:\12992\CAD\Dwgs\Civil\12992_figure01 water.dwg

Anglian Water

Mr Z. Fonseca
Peter Brett Associates
26-28 Hammersmith Grove
London
W6 7LL

PETER BRETT ASSOCIATES
PROJECT NO: 12992
PARTNER: ZF
PROJECT CO-ORDINATOR:
11 NOV 2002
DISTRIBUTION:
4094

Anglian Water Services Ltd
Colchester STW
Haven Road
Colchester
Essex
CO2 8HT

Tel 01206 289383
Fax 01206 289219

Our ref. SR/NWCambs

Your ref. 12992

07 November 2002

Dear Zito,

Re: Potential Development, NW Cambridge.

I refer to your facsimile dated 6 November 2002 regarding the proposed mixed-use development in Cambridge.

In order for Anglian Water to confirm whether we have capacity in our existing network to take flows from the proposed development it would be necessary to carry out a full drainage study of the area in question and also investigate what works are required, if any, at Cambridge Sewage Treatment Works to cope with the additional demand.

It is almost certain that Anglian Water will not consider specifically catering for the development unless it is allocated within the Cambridge City Local Plan.

My initial thoughts are that foul flows would certainly need to be directed to the 1200mm foul sewer, south-east of the site which is approximately 12m deep. It is unlikely that any existing public surface water sewers will have capacity to take flows from the site and therefore an alternative method of surface water drainage would need to be considered.

Should you require any further information, do not hesitate to contact me at the above address.

Yours sincerely,

Steve Raven
Development Engineering

Registered in England
No 2366656
Registered Office: Anglian House,
Ambury Road, Huntingdon,
Cambridgeshire. PE29 3NZ

APPENDIX C – FOUL PEAK FLOW TABLE AND FOUL SEWER DISTRIBUTION TABLE

Appendix C

North West Cambridge Development Schedule
Version 9A

Plot Number	Land Use	Market Housing: Studio Flat	1 bed Flat	2 bed Flat	2 bed duplex	3 bed Flat	2 Bed terrace	3 Bed terrace	4 bed terrace	2 bed semi	3 bed semi	4 bed semi	3 bed detach	4 bed detach (1)	4 bed detach (2)	5 bed detach	Total Market	No of hab rooms
Foul Peak Flow by Unit Type (See Table 3-1)		0.01	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05		
A1	Residential	2	6	8	0	1	0	0	0	0	0	0	0	0	0	0	17	42
A2	Residential	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0
A3	Residential	0	0	0		0	15	16	9	0	0	0	0	0	0	0	40	179
A4	Residential	3	12	17	0	2	0	0	0	0	0	0	0	0	0	0	34	85
A5	Residential	0	0	0		0	0	0	0	0	0	0	5	5	5	4	19	113
A6	Residential	3	12	17	6	2	0	0	0	0	0	0	0	0	0	0	40	86
A7	Residential	0	0	0		0	4	4	3	0	0	0	0	0	0	0	11	50
A8	Residential	0	0	0		0	19	19	12	0	0	0	0	0	0	0	50	224
A9	Residential	3	12	17	6	2	0	0	0	0	0	0	0	0	0	0	40	86
A10	Residential	0	0	0		0	4	4	3	0	0	0	0	0	0	0	11	50
A11	Residential	0	0	0		0	14	14	10	0	0	0	0	0	0	0	38	172
A12	Residential	3	12	17	6	2	0	0	0	0	0	0	0	0	0	0	40	86
A13	Residential	0	0	0		0	4	4	3	0	0	0	0	0	0	0	11	50
A14	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A15.1	Local Centre/Community Nursery	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A15.2	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A16	Residential	3	9	13	3	1	0	0	0	0	0	0	0	0	0	0	29	65
A17	Residential	0	0	0		0	3	3	1	0	0	0	0	0	0	0	7	30
A18	Residential	0	0	0		0	0	0	0	0	0	0	7	7	7	7	28	168
A19	Residential	0	0	0		0	20	20	12	0	0	0	0	0	0	0	52	232
A20	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A21	Residential	0	0	0		0	11	11	7	0	0	0	0	0	0	0	29	130
A22	Residential	0	0	0		0	15	16	11	0	0	0	0	0	0	0	42	191
A23	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A24	Residential	0	0	0		0	12	15	9	0	0	0	0	0	0	0	36	165
A25	Residential	0	0	0		0	0	0	0	0	0	0	5	3	3	2	13	75
A26a	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A26b	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A27	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A28a	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A28b	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A29	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
A30	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B1	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B2	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B3	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B4	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B5	Primary School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B6.1	Community Hall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B6.2	Nursery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B7	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B8	Senior Care	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B9	Student Housing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B10a	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B10b	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
B11a.1	University Café	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11a.2	University Accomodation Office	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11a.3	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11b	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11c	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11d	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B12.1	Retail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B12.1	Pub																	
B12.2	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B13	Hotel (130 Beds)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B14.1	Retail (Foodstore)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B14.2	Police Office	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B15.1	CHP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B15.2	Bring Site	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B16.1	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B16.2	Retail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B17.1	PCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B17.2	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B18	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B19	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B20.1	Project office/exhibition/community arts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B20.2	Residential	12	41	48	0	7	0	0	0	0	0	0	0	0	0	0	108	266
B21	Residential	14	12	47	0	9	0	0	0	0	0	0	0	0	0	0	82	215
C1	Residential	0	0	0	0	0	0	5	1	0	0	4	5	2	2	2	21	118
C2	Residential	0	0	0	0	0	5	5	4	3	3	3	0	3	3	2	31	156
C3	Residential	0	0	0	0	0	3	3	4	2	3	2	0	3	3	0	23	117
C4	Residential	0	0	0	0	0	1	2	0	0	0	0	1	3	2	1	10	55
C5	Residential	0	0	0	0	0	4	41	2	0	6	0	0	1	1	4	59	299
C6a	Residential	0	0	0	8	0	0	12	3	0	0	0	0	0	0	0	23	102
C6b	Residential	0	0	0	0	0	4	19	2	0	6	0	4	1	0	0	36	175
C7a	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C7b	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C8	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C9	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C10	Residential	0	0	0	8	0	15	25	6	0	0	0	0	0	0	0	54	206
C11	Residential	0	0	0	0	0	8	7	6	0	0	0	0	0	0	0	21	95
C12	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C13	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C14	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C15.1	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C15.2	Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C16	Residential	0	0	0	0	0	0	24	7	0	0	0	0	0	0	0	31	162
C17	Residential	3	14	19	0	2	0	0	0	0	0	0	0	0	0	0	38	96
C18	Residential	0	0	0	8	0	0	24	6	0	0	0	0	0	0	0	38	180
C19	Residential	2	7	9	0	1	0	0	0	0	0	0	0	0	0	0	19	47
C20	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
C21.1	Nursery	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
C21.2	Residential	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
C22	Academic Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
C23	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
C24	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D1	CHP	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D2	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D3	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D4a	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D4b	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D5	Residential	4	4	12	8	8	0	0	0	0	0	0	0	0	0	0	36	80
D6	Residential	0	0	0		0	12	12	10	10	12	4	7	5	5	5	82	400
D7	Residential	0	0	0		0	5	5	8	6	7	3	10	7	7	5	63	328
D8	Residential	0	0	0		0	2	2	2	2	2	0	3	3	3	2	21	109
D9	Residential	0	0	0		0	2	2	2	2	4	1	2	2	1	1	19	95
D10	Residential	0	0	0		0	2	2	3	2	2	1	4	3	3	2	24	126
D11a	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D11b	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D12	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D13	Student Housing	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
D14	Commercial Research	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		**52**	**141**	**225**	**53**	**37**	**184**	**316**	**146**	**27**	**45**	**18**	**53**	**48**	**45**	**37**	**1,426**	**5,707**

Plot Number	University Market Housing: 1 bed Flat	2 bed Flat	3 Bed terrace	4 bed terrace	Self Build: 4 bed detach (1)	4 bed detach (2)	Key Worker Housing: 1 bed Flat	2 bed Flat	2 bed duplex flat	4 bed shared apts	3 bed terrace /duplex	4 bed terrace	Academic Research: Floorspace sq.m.	Commercial Research: Floorspace sq.m.	Student Housing: rooms	Other Uses: Area	Area	Area	Foul Peak Flow by Plot Number
Foul Peak Flow by Unit Type	0.03	0.03	0.03	0.05	0.05	0.05	0.03	0.03	0.03	0.05	0.04	0.05	1.30	1.30	0.01	0.60	1.30	1.60	
A1	0	0	0	0			0	0		0	0	0	-	-		-			0.48
A2	0	0	0	0	13	14	0	0	0	0	0	0	-	-		-			1.35
A3	0	0	0	0			0	0		0	0	0	-	-		-			1.45
A4	0	0	0	0			0	0		0	0	0	-	-		-			0.97
A5	0	0	0	0			0	0		0	0	0	-	-		-			0.90
A6	0	0	0	0			0	0		0	0	0	-	-		-			1.16
A7	0	0	0	0			0	0		0	0	0	-	-		-			0.40
A8	0	0	0	0			0	0		0	0	0	-	-		-			1.81
A9	0	0	0	0			0	0		0	0	0	-	-		-			1.16
A10	0	0	0	0			0	0		0	0	0	-	-		-			0.40
A11	0	0	0	0			0	0		0	0	0	-	-		-			1.38
A12	0	0	0	0			0	0		0	0	0	-	-		-			1.16
A13	0	0	0	0			0	0		0	0	0	-	-		-			0.40
A14	0	0	0	0			8	4		0	12	6	-	-		-			1.14
A15.1	0	0	0	0			0	0		0	0	0	-	-			784		0.10
A15.2	0	0	0	0			6	12		0	0	0	-	-		-			0.54
A16	0	0	0	0			0	0		0	0	0	-	-		-			0.84
A17	0	0	0	0			0	0		0	0	0	-	-		-			0.25
A18	0	0	0	0			0	0		0	0	0	-	-		-			1.33
A19	0	0	0	0			0	0		0	0	0	-	-		-			1.88
A20	0	0	0	0			8	4		0	29	9	-	-		-			1.97
A21	0	0	0	0			0	0		0	0	0	-	-		-			1.05
A22	0	0	0	0			0	0		0	0	0	-	-		-			1.53
A23	0	0	0	0			8	4		0	28	9	-	-		-			1.93
A24	0	0	0	0			0	0		0	0	0	-	-		-			1.32
A25	0	0	0	0			0	0		0	0	0	-	-		-			0.60
A26a	0	0	0	0			12	30		0	0	0	-	-		-			1.26
A26b	0	0	0	0			24	27		0	35	5	-	-		-			3.18
A27	0	0	0	0			0	0		0	0	0	10,550	-		-			1.37
A28a	0	0	0	0			0	0		0	0	0	9,873	-		-			1.28
A28b	0	0	0	0			0	0		0	0	0	6,130	-		-			0.80
A29	0	0	0	0			0	0		0	0	0	9,420	-		-			1.22
A30	0	0	0	0			0	0		0	0	0	1,600	-		-			0.21
B1	0	0	0	0			0	0		0	0	0	7,760	-		-			1.01
B2	0	0	0	0			0	0		0	0	0	6,560	-		-			0.85
B3	0	0	0	0			44	38	8	0	0	0		-		-			2.70
B4	0	0	0	0			0	0	0	0	0	0		-	246	-			2.46
B5	0	0	0	0			0	0	0	0	0	0	-	-			3,611		0.47
B6.1	0	0	0	0			0	0	0	0	0	0	-	-			520		0.07
B6.2	0	0	0	0			0	0	0	0	0	0	-	-			830		0.11
B7	0	0	0	0			19	42	12	0	0	0	-	-		-			2.19
B8	0	0	0	0			0	0	0	0	0	0	-	-				6,547	1.05
B9	0	0	0	0			0	0	0	0	0	0	-	-	295	-			2.95
B10a	0	0	0	0			0	0		0	0	0	-	-	235	-			2.35
B10b	0	0	0	0			0	0		0	0	0	-	-	197	-			1.97
B11a.1	0	0	0	0			0	0	0	0	0	0	-	-				725	0.12
B11a.2	0	0	0	0			0	0	0	0	0	0	-	-		411			0.02
B11a.3	0	0	0	0			48	57	6	6	0	0	-	-		-			3.63
B11b	0	0	0	0			41	72	0	0	0	0	-	-		-			3.39
B11c	0	0	0	0			34	23	0	0	0	0	-	-		-			1.71
B11d	0	0	0	0			4	40	0	0	0	0	-	-		-			1.32
B12.1	0	0	0	0			0	0	0	0	0	0	-	-			850		0.11
B12.1																		250	0.04
B12.2	0	0	0	0			4	30	0	0	0	0	-	-		-			1.02
B13	0	0	0	0			0	0	0	0	0	0	-	-				6,127	0.98
B14.1	0	0	0	0			0	0	0	0	0	0	-	-				3,600	0.58
B14.2	0	0	0	0			0	0	0	0	0	0	-	-		190			0.01
B15.1	0	0	0	0			0	0	0	0	0	0	-	-				1,250	0.20
B15.2	0	0	0	0			0	0	0	0	0	0	-	-		-			0.00
B16.1	0	0	0	0			17	17	0	0	0	0	-	-		-			1.02
B16.2	0	0	0	0			0	0	0	0	0	0	-	-			208		0.03
B17.1	0	0	0	0			0	0	0	0	0	0	-	-			700		0.09
B17.2	0	0	0	0			19	37	0	0	0	0	-	-		-			1.68
B18	0	0	0	0			37	60	2	3	0	0	-	-		-			3.12
B19	22	11	0	0			0	0	0	0	0	0	-	-		-			1.32
B20.1	0	0	0	0			0	0	0	0	0	0	-	-			480		0.06
B20.2	0	0	0	0			0	0	0	0	0	0	-	-		-			3.07
B21	0	0	0	0			0	0	0	0	0	0	-	-		-			2.27
C1	0	0	0	0			0	0	0	0	0	0	-	-		-			0.90
C2	0	0	0	0			0	0	0	0	0	0	-	-		-			1.27
C3	0	0	0	0			0	0	0	0	0	0	-	-		-			0.95
C4	0	0	0	0			0	0	0	0	0	0	-	-		-			0.45
C5	0	0	0	0			0	0	0	0	0	0	-	-		-			2.38
C6a	0	0	0	0			0	0	0	0	0	0	-	-		-			0.84
C6b	0	0	0	0			0	0	0	0	0	0	-	-		-			1.41
C7a	0	0	0	0			17	16	0	3	0	0	-	-		-			1.14
C7b	0	0	0	0			25	38	0	0	0	0	-	-		-			1.89
C8	0	0	0	0			0	0	0	0	19	8	-	-		-			1.16
C9	0	0	0	0			14	34	0	6	0	0	-	-		-			1.74
C10	0	0	0	0			0	0	0	0	0	0	-	-		-			1.93
C11	0	0	0	0			0	0	0	0	0	0	-	-		-			0.76
C12	0	0	0	0			5	7	0	0	18	5	-	-		-			1.33
C13	0	0	0	0			16	32	0	6	0	0	-	-		-			1.74
C14	0	0	0	0			7	18	0	0	0	0	-	-		-			0.75
C15.1	0	0	11	3			0	0	0	0	0	0	-	-		-			0.48
C15.2	0	0	0	0			3	6	0	0	20	3	-	-		-			1.22
C16	0	0	0	0			0	0	0	0	0	0	-	-		-			1.24
C17	0	0	0	0			0	0	0	0	0	0	-	-		-			1.10
C18	0	0	0	0			0	0	0	0	0	0	-	-		-			1.44
C19	0	0	0	0			0	0	0	0	0	0	-	-		-			0.54
C20	0	0	0	0			36	44	0	7	24	0	-	-		-			3.71
C21.1	0	0	0	0			0	0		0	0	0	-	-			991		0.13
C21.2	0	0	0	0			14	18		5	30	0	-	-		-			2.41
C22	0	0	0	0			0	0		0	0	0	8,230	-		-			1.07
C23	0	0	0	0			0	0		0	0	0		6,625		-			0.86
C24	0	0	0	0			0	0		0	0	0		8,678		-			1.13
D1	0	0	0	0			0	0		0	0	0	-					10,019	1.60
D2	0	0	0	0			0	0		0	0	0		3,369		-			0.44
D3	0	0	0	0			0	0		0	0	0		4,310		-			0.56
D4a	0	0	0	0			0	0		0	0	0		6,422		-			0.83
D4b	0	0	0	0			0	0		0	0	0		4,448		-			0.58
D5	0	0	0	0			0	0		0	0	0	-	-		-			1.08
D6	0	0	0	0			0	0		0	0	0	-	-		-			3.31
D7	0	0	0	0			0	0		0	0	0	-	-		-			2.66
D8	0	0	0	0			0	0		0	0	0	-	-		-			0.90
D9	0	0	0	0			0	0		0	0	0	-	-		-			0.78
D10	0	0	0	0			0	0		0	0	0	-	-		-			1.02
D11a	0	0	0	0			0	0		0	0	0	-	-	328	-			3.28
D11b	0	0	0	0			0	0		0	0	0	-	-	266	-			2.66
D12	0	0	0	0			0	0		0	0	0	-	-	105	-			1.05
D13	0	0	0	0			0	0		0	0	0	-	-	332	-			3.32
D14	0	0	0	0			0	0		0	0	0	-	6,413		-			0.83
TOTALS	**22**	**11**	**11**	**3**	**13**	**14**	**470**	**710**	**28**	**36**	**215**	**45**	**60,123**	**40,264**	**2004**	**601**	**8,974**	**28,518**	**142**

Appendix C

Plot References & Foul Peak Flow Rates (l/s)

Network 1

Network 2

Network 3

Network 4

Direct foul load
Indirect foul load i.e. enters via a pumping station from another network

APPENDIX D – HYDRAULIC CALCULATIONS

FOUL SEWERAGE DESIGN

Design Criteria for net1.fws

Pipe Sizes net1 Manhole Sizes net1

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	0.00	Maximum Backdrop Height (m)	0.000
Persons per House	0.00	Min Design Depth for Optimisation (m)	0.000
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	96.996	0.647	150.0	0.000	0	0.9	1.500	o	150
F1.001	96.996	0.714	135.8	0.000	0	1.3	1.500	o	150
F2.000	36.788	0.245	150.0	0.000	0	0.5	1.500	o	150
F1.002	143.373	1.050	136.5	0.000	0	1.7	1.500	o	150
F1.003	60.933	0.451	135.0	0.000	0	1.9	1.500	o	150
F3.000	19.910	0.133	149.7	0.000	0	1.2	1.500	o	150
F1.004	51.003	0.379	134.6	0.000	0	0.0	1.500	o	150
F4.000	20.195	0.365	55.3	0.000	0	1.2	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	21.050	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9
F1.001	20.403	0.000	2.2	0	0.0	41	0.55	0.75	13.3	2.2
F2.000	21.825	0.000	0.5	0	0.0	21	0.34	0.71	12.6	0.5
F1.002	19.689	0.000	4.4	0	0.0	60	0.67	0.75	13.2	4.4
F1.003	18.639	0.000	6.3	0	0.0	73	0.74	0.75	13.3	6.3
F3.000	22.189	0.000	1.2	0	0.0	31	0.45	0.71	12.6	1.2
F1.004	18.188	0.000	7.5	0	0.0	80	0.78	0.75	13.3	7.5
F4.000	22.237	0.000	1.2	0	0.0	25	0.63	1.18	20.8	1.2

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.005	51.000	0.379	134.5	0.000	0	0.0	1.500	o	150
F5.000	20.213	0.354	57.1	0.000	0	1.1	1.500	o	150
F1.006	33.863	0.252	134.3	0.000	0	0.0	1.500	o	150
F1.007	14.493	0.108	134.3	0.000	0	0.0	1.500	o	150
F6.000	18.290	0.180	101.6	0.000	0	1.2	1.500	o	150
F1.008	30.492	0.227	134.3	0.000	0	0.0	1.500	o	150
F1.009	82.306	0.613	134.3	0.000	0	0.0	1.500	o	150
F1.010	22.280	0.166	134.3	0.000	0	0.0	1.500	o	150
F1.011	92.960	0.692	134.3	0.000	0	0.0	1.500	o	150
F1.012	67.689	0.504	134.3	0.000	0	0.6	1.500	o	150
F1.013	27.735	0.207	134.3	0.000	0	0.1	1.500	o	150
F7.000	12.187	0.235	51.9	0.000	0	0.6	1.500	o	150
F8.000	10.834	0.072	150.0	0.000	0	0.6	1.500	o	150
F7.001	54.610	0.409	133.6	0.000	0	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.005	17.809	0.000	8.7	0	0.0	88	0.80	0.75	13.3	8.7
F5.000	21.986	0.000	1.1	0	0.0	24	0.61	1.16	20.5	1.1
F1.006	17.430	0.000	9.8	0	0.0	95	0.83	0.76	13.3	9.8
F1.007	17.177	0.000	9.8	0	0.0	95	0.83	0.76	13.3	9.8
F6.000	22.390	0.000	1.2	0	0.0	29	0.51	0.87	15.4	1.2
F1.008	17.070	0.000	11.0	0	0.0	104	0.84	0.76	13.3	11.0
F1.009	16.842	0.000	11.0	0	0.0	104	0.84	0.76	13.3	11.0
F1.010	16.229	0.000	11.0	0	0.0	104	0.84	0.76	13.3	11.0
F1.011	16.063	0.000	11.0	0	0.0	104	0.84	0.76	13.3	11.0
F1.012	15.371	0.000	11.6	0	0.0	108	0.85	0.76	13.3	11.6
F1.013	14.867	0.000	11.7	0	0.0	109	0.85	0.76	13.3	11.7
F7.000	19.251	0.000	0.6	0	0.0	17	0.52	1.22	21.5	0.6
F8.000	18.924	0.000	0.6	0	0.0	22	0.36	0.71	12.6	0.6
F7.001	18.852	0.000	1.2	0	0.0	31	0.46	0.76	13.4	1.2

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.014	112.410	0.483	232.6	0.000	0	3.1	1.500	o	225
F1.015	24.137	0.104	232.6	0.000	0	0.0	1.500	o	225
F9.000	84.427	1.200	70.4	0.000	0	31.0	1.500	o	225
F9.001	84.427	1.297	65.1	0.000	0	5.9	1.500	o	225
F9.002	10.851	0.950	11.4	0.000	0	0.0	1.500	o	225
F9.003	11.714	0.950	12.3	0.000	0	0.0	1.500	o	225
F9.004	15.384	1.504	10.2	0.000	0	0.0	1.500	o	225
F1.016	21.053	0.063	334.2	0.000	0	0.0	1.500	o	300
F1.017	58.665	0.175	335.2	0.000	0	0.0	1.500	o	300
F1.018	31.821	0.097	328.1	0.000	0	0.0	1.500	o	300
F1.019	24.762	0.074	334.6	0.000	0	0.0	1.500	o	300
F1.020	49.514	0.158	314.1	0.000	0	1.8	1.500	o	300
F10.000	81.346	1.959	41.5	0.000	0	2.6	1.500	o	150
F10.001	52.612	0.390	135.0	0.000	0	1.8	1.500	o	150
F1.021	48.177	0.106	453.1	0.000	0	1.3	1.500	o	375
F1.022	44.301	0.098	453.1	0.000	0	0.0	1.500	o	375

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.014	14.585	0.000	16.0	0	0.0	117	0.76	0.75	29.9	16.0
F1.015	14.102	0.000	16.0	0	0.0	117	0.76	0.75	29.9	16.0
F9.000	20.700	0.000	31.0	0	0.0	122	1.41	1.37	54.5	31.0
F9.001	19.500	0.000	36.9	0	0.0	132	1.52	1.42	56.6	36.9
F9.002	18.203	0.000	36.9	0	0.0	80	2.90	3.41	135.5	36.9
F9.003	17.253	0.000	36.9	0	0.0	82	2.82	3.28	130.4	36.9
F9.004	16.303	0.000	36.9	0	0.0	78	3.02	3.60	143.2	36.9
F1.016	13.923	0.000	52.9	0	0.0	244	0.86	0.76	53.5	52.9
F1.017	13.860	0.000	52.9	0	0.0	244	0.86	0.76	53.4	52.9
F1.018	13.685	0.000	52.9	0	0.0	241	0.87	0.76	54.0	52.9
F1.019	13.588	0.000	52.9	0	0.0	244	0.86	0.76	53.4	52.9
F1.020	13.514	0.000	54.7	0	0.0	244	0.89	0.78	55.2	54.7
F10.000	17.841	0.000	2.6	0	0.0	33	0.88	1.36	24.1	2.6
F10.001	15.882	0.000	4.4	0	0.0	59	0.68	0.75	13.3	4.4
F1.021	13.282	0.000	60.4	0	0.0	238	0.82	0.75	82.9	60.4
F1.022	13.176	0.000	60.4	0	0.0	238	0.82	0.75	82.9	60.4

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F11.000	27.704	0.798	34.7	0.000	0	3.0	1.500	o	150
F1.023	40.135	0.089	453.1	0.000	0	0.0	1.500	o	375
F1.024	42.932	0.095	453.1	0.000	0	0.0	1.500	o	375
F12.000	83.125	1.071	77.6	0.000	0	0.4	1.500	o	150
F12.001	22.367	0.167	134.2	0.000	0	0.0	1.500	o	150
F12.002	26.322	0.196	134.2	0.000	0	1.7	1.500	o	150
F12.003	16.728	0.125	134.2	0.000	0	0.0	1.500	o	150
F12.004	10.308	0.077	134.2	0.000	0	0.2	1.500	o	150
F12.005	24.049	0.179	134.2	0.000	0	0.2	1.500	o	150
F12.006	82.914	0.618	134.2	0.000	0	4.0	1.500	o	150
F13.000	43.964	0.567	77.5	0.000	0	0.6	1.500	o	150
F13.001	31.325	0.234	133.8	0.000	0	0.2	1.500	o	150
F14.000	7.406	0.095	78.0	0.000	0	1.2	1.500	o	150
F15.000	8.826	0.114	77.4	0.000	0	0.3	1.500	o	150
F13.002	15.820	0.117	135.6	0.000	0	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F11.000	16.116	0.000	3.0	0	0.0	34	0.98	1.49	26.3	3.0
F1.023	13.078	0.000	63.4	0	0.0	246	0.83	0.75	82.9	63.4
F1.024	12.989	0.000	63.4	0	0.0	246	0.83	0.75	82.9	63.4
F12.000	21.735	0.000	0.4	0	0.0	16	0.40	0.99	17.6	0.4
F12.001	20.664	0.000	0.4	0	0.0	18	0.33	0.76	13.3	0.4
F12.002	20.497	0.000	2.1	0	0.0	40	0.55	0.76	13.3	2.1
F12.003	20.301	0.000	2.1	0	0.0	40	0.55	0.76	13.3	2.1
F12.004	20.177	0.000	2.3	0	0.0	42	0.56	0.76	13.3	2.3
F12.005	20.100	0.000	2.5	0	0.0	44	0.58	0.76	13.3	2.5
F12.006	19.921	0.000	6.5	0	0.0	74	0.75	0.76	13.3	6.5
F13.000	21.864	0.000	0.6	0	0.0	19	0.45	1.00	17.6	0.6
F13.001	21.297	0.000	0.8	0	0.0	25	0.41	0.76	13.4	0.8
F14.000	21.932	0.000	1.2	0	0.0	27	0.56	0.99	17.5	1.2
F15.000	21.914	0.000	0.3	0	0.0	14	0.36	1.00	17.6	0.3
F13.002	21.063	0.000	2.3	0	0.0	42	0.56	0.75	13.3	2.3

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F16.000	7.377	0.095	77.7	0.000	0	0.5	1.500	o	150
F17.000	8.748	0.113	77.4	0.000	0	1.1	1.500	o	150
F13.003	23.881	0.177	135.2	0.000	0	0.0	1.500	o	150
F13.004	45.427	0.336	135.2	0.000	0	0.0	1.500	o	150
F13.005	38.359	1.050	36.5	0.000	0	0.0	1.500	o	150
F13.006	20.241	0.550	36.8	0.000	0	0.0	1.500	o	150
F12.007	98.896	2.222	44.5	0.000	0	0.0	1.500	o	150
F18.000	64.297	0.969	66.4	0.000	0	44.2	1.500	o	225
F12.008	53.099	0.572	92.8	0.000	0	1.2	1.500	o	300
F12.009	42.161	0.824	51.2	0.000	0	0.0	1.500	o	300
F12.010	24.415	0.322	75.8	0.000	0	4.2	1.500	o	300
F12.011	15.036	0.154	97.9	0.000	0	0.0	1.500	o	300
F19.000	48.912	0.820	59.6	0.000	0	0.7	1.500	o	150
F19.001	11.326	0.083	136.0	0.000	0	1.1	1.500	o	150
F20.000	57.534	0.741	77.6	0.000	0	1.2	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F16.000	21.509	0.000	0.5	0	0.0	18	0.43	0.99	17.6	0.5
F17.000	21.478	0.000	1.1	0	0.0	26	0.55	1.00	17.6	1.1
F13.003	20.946	0.000	3.9	0	0.0	56	0.65	0.75	13.3	3.9
F13.004	20.770	0.000	3.9	0	0.0	56	0.65	0.75	13.3	3.9
F13.005	20.434	0.000	3.9	0	0.0	40	1.04	1.45	25.7	3.9
F13.006	19.384	0.000	3.9	0	0.0	40	1.04	1.45	25.6	3.9
F12.007	18.834	0.000	10.4	0	0.0	70	1.28	1.32	23.2	10.4
F18.000	17.975	0.000	44.2	0	0.0	151	1.56	1.41	56.1	44.2
F12.008	16.462	0.000	55.8	0	0.0	159	1.47	1.44	101.8	55.8
F12.009	15.890	0.000	55.8	0	0.0	133	1.84	1.94	137.2	55.8
F12.010	15.066	0.000	60.0	0	0.0	156	1.62	1.59	112.6	60.0
F12.011	14.744	0.000	60.0	0	0.0	168	1.47	1.40	99.1	60.0
F19.000	20.880	0.000	0.7	0	0.0	19	0.52	1.14	20.1	0.7
F19.001	20.060	0.000	1.8	0	0.0	37	0.52	0.75	13.3	1.8
F20.000	20.712	0.000	1.2	0	0.0	27	0.56	0.99	17.6	1.2

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F19.002	65.796	0.487	135.2	0.000	0	1.2	1.500	o	150
F19.003	46.202	1.050	44.0	0.000	0	0.6	1.500	o	150
F19.004	131.272	3.934	33.4	0.000	0	3.6	1.500	o	150
F12.012	44.617	0.366	121.8	0.000	0	0.0	1.500	o	300
F12.013	18.931	0.148	127.8	0.000	0	0.0	1.500	o	300
F21.000	154.686	4.500	34.4	0.000	0	3.6	1.500	o	150
F12.014	19.813	0.140	141.5	0.000	0	0.0	1.500	o	300
F12.015	24.135	0.101	239.0	0.000	0	0.0	1.500	o	375
F12.016	14.954	0.078	191.7	0.000	0	0.0	1.500	o	375
F1.025	61.034	0.109	559.9	0.000	0	2.3	1.500	o	525
F22.000	61.295	0.454	135.0	0.000	0	2.4	1.500	o	150
F22.001	12.061	0.089	135.0	0.000	0	0.0	1.500	o	150
F22.002	70.011	0.519	135.0	0.000	0	2.0	1.500	o	150
F1.026	46.413	0.109	425.8	0.000	0	0.0	1.500	o	525
F1.027	26.089	0.060	434.8	0.000	0	0.0	1.500	o	525

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F19.002	19.971	0.000	4.2	0	0.0	58	0.67	0.75	13.3	4.2
F19.003	19.484	0.000	4.8	0	0.0	46	1.04	1.32	23.4	4.8
F19.004	18.434	0.000	8.4	0	0.0	58	1.34	1.52	26.9	8.4
F12.012	14.350	0.000	68.4	0	0.0	198	1.38	1.26	88.8	68.4
F12.013	13.984	0.000	68.4	0	0.0	201	1.36	1.23	86.7	68.4
F21.000	18.622	0.000	3.6	0	0.0	38	1.04	1.50	26.5	3.6
F12.014	13.836	0.000	72.0	0	0.0	218	1.31	1.16	82.3	72.0
F12.015	13.621	0.000	72.0	0	0.0	216	1.09	1.04	114.4	72.0
F12.016	13.520	0.000	72.0	0	0.0	202	1.19	1.16	127.8	72.0
F1.025	12.744	0.000	137.7	0	0.0	343	0.92	0.84	181.6	137.7
F22.000	13.211	0.000	2.4	0	0.0	43	0.57	0.75	13.3	2.4
F22.001	12.757	0.000	2.4	0	0.0	43	0.57	0.75	13.3	2.4
F22.002	12.668	0.000	4.4	0	0.0	59	0.68	0.75	13.3	4.4
F1.026	11.774	0.000	142.1	0	0.0	318	1.03	0.96	208.4	142.1
F1.027	11.665	0.000	142.1	0	0.0	321	1.02	0.95	206.3	142.1

Network Design Table for net1.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.028	1.424	0.010	142.4	0.000	0	0.0	1.500	o	525

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.028	11.605	0.000	142.1	0	0.0	229	1.57	1.67	361.3	142.1

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	F1	22.700	21.050	1.500	Open Manhole	1050
F1.001	o	150	F2	23.550	20.403	2.997	Open Manhole	1200
F2.000	o	150	F3	23.475	21.825	1.500	Open Manhole	1200
F1.002	o	150	F4	23.475	19.689	3.636	Open Manhole	1200
F1.003	o	150	F5	23.500	18.639	4.711	Open Manhole	1200
F3.000	o	150	F6	23.839	22.189	1.500	Open Manhole	1050
F1.004	o	150	F7	23.563	18.188	5.225	Open Manhole	1200
F4.000	o	150	F8	23.887	22.237	1.500	Open Manhole	1200
F1.005	o	150	F9	23.522	17.809	5.563	Open Manhole	1200
F5.000	o	150	F10	23.636	21.986	1.500	Open Manhole	1050
F1.006	o	150	F11	23.282	17.430	5.702	Open Manhole	1200
F1.007	o	150	F12	23.734	17.177	6.407	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	96.996	150.0	F2	23.550	20.403	2.997	Open Manhole	1200
F1.001	96.996	135.8	F4	23.475	19.689	3.636	Open Manhole	1200
F2.000	36.788	150.0	F4	23.475	21.580	1.745	Open Manhole	1200
F1.002	143.373	136.5	F5	23.500	18.639	4.711	Open Manhole	1200
F1.003	60.933	135.0	F7	23.563	18.188	5.225	Open Manhole	1200
F3.000	19.910	149.7	F7	23.563	22.056	1.357	Open Manhole	1200
F1.004	51.003	134.6	F9	23.522	17.809	5.563	Open Manhole	1200
F4.000	20.195	55.3	F9	23.522	21.872	1.500	Open Manhole	1200
F1.005	51.000	134.5	F11	23.282	17.430	5.702	Open Manhole	1200
F5.000	20.213	57.1	F11	23.282	21.632	1.500	Open Manhole	1200
F1.006	33.863	134.3	F12	23.734	17.177	6.407	Open Manhole	1200
F1.007	14.493	134.3	F14	23.860	17.070	6.641	Open Manhole	1200

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F6.000	o	150	F13	24.040	22.390	1.500	Open Manhole	1050
F1.008	o	150	F14	23.860	17.070	6.641	Open Manhole	1200
F1.009	o	150	F15	23.420	16.842	6.427	Open Manhole	1200
F1.010	o	150	F16	22.790	16.229	6.410	Open Manhole	1200
F1.011	o	150	F17	22.911	16.063	6.697	Open Manhole	1200
F1.012	o	150	F18	21.939	15.371	6.418	Open Manhole	1200
F1.013	o	150	F19	20.955	14.867	5.938	Open Manhole	1200
F7.000	o	150	F20	20.901	19.251	1.500	Open Manhole	1050
F8.000	o	150	F21	20.574	18.924	1.500	Open Manhole	1200
F7.001	o	150	F22	20.666	18.852	1.664	Open Manhole	1200
F1.014	o	225	F23	20.710	14.585	5.900	Open Manhole	1200
F1.015	o	225	F24	18.555	14.102	4.228	Open Manhole	1200
F9.000	o	225	F25	23.600	20.700	2.675	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F6.000	18.290	101.6	F14	23.860	22.210	1.500	Open Manhole	1200
F1.008	30.492	134.3	F15	23.420	16.842	6.427	Open Manhole	1200
F1.009	82.306	134.3	F16	22.790	16.229	6.410	Open Manhole	1200
F1.010	22.280	134.3	F17	22.911	16.063	6.697	Open Manhole	1200
F1.011	92.960	134.3	F18	21.939	15.371	6.418	Open Manhole	1200
F1.012	67.689	134.3	F19	20.955	14.867	5.938	Open Manhole	1200
F1.013	27.735	134.3	F23	20.710	14.660	5.900	Open Manhole	1200
F7.000	12.187	51.9	F22	20.666	19.016	1.500	Open Manhole	1200
F8.000	10.834	150.0	F22	20.666	18.852	1.664	Open Manhole	1200
F7.001	54.610	133.6	F23	20.710	18.443	2.117	Open Manhole	1200
F1.014	112.410	232.6	F24	18.555	14.102	4.228	Open Manhole	1200
F1.015	24.137	232.6	F30	18.236	13.998	4.013	Open Manhole	1200
F9.000	84.427	70.4	F26	22.344	19.500	2.619	Open Manhole	1200

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F9.001	o	225	F26	22.344	19.500	2.619	Open Manhole	1200
F9.002	o	225	F27	19.778	18.203	1.350	Open Manhole	1050
F9.003	o	225	F28	19.294	17.253	1.816	Open Manhole	1200
F9.004	o	225	F29	18.792	16.303	2.264	Open Manhole	1200
F1.016	o	300	F30	18.236	13.923	4.013	Open Manhole	1200
F1.017	o	300	F31	17.922	13.860	3.762	Open Manhole	1200
F1.018	o	300	F32	17.234	13.685	3.249	Open Manhole	1200
F1.019	o	300	F33	16.713	13.588	2.825	Open Manhole	1200
F1.020	o	300	F34	16.993	13.514	3.179	Open Manhole	1200
F10.000	o	150	F35	19.491	17.841	1.500	Open Manhole	1050
F10.001	o	150	F36	17.532	15.882	1.500	Open Manhole	1050
F1.021	o	375	F37	17.539	13.282	3.882	Open Manhole	1350
F1.022	o	375	F38	17.536	13.176	3.985	Open Manhole	1350
F11.000	o	150	F39	17.766	16.116	1.500	Open Manhole	1050
F1.023	o	375	F40	16.968	13.078	3.515	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F9.001	84.427	65.1	F27	19.778	18.203	1.350	Open Manhole	1050
F9.002	10.851	11.4	F28	19.294	17.253	1.816	Open Manhole	1200
F9.003	11.714	12.3	F29	18.792	16.303	2.264	Open Manhole	1200
F9.004	15.384	10.2	F30	18.236	14.799	3.212	Open Manhole	1200
F1.016	21.053	334.2	F31	17.922	13.860	3.762	Open Manhole	1200
F1.017	58.665	335.2	F32	17.234	13.685	3.249	Open Manhole	1200
F1.018	31.821	328.1	F33	16.713	13.588	2.825	Open Manhole	1200
F1.019	24.762	334.6	F34	16.993	13.514	3.179	Open Manhole	1200
F1.020	49.514	314.1	F37	17.539	13.357	3.882	Open Manhole	1350
F10.000	81.346	41.5	F36	17.532	15.882	1.500	Open Manhole	1050
F10.001	52.612	135.0	F37	17.539	15.492	1.897	Open Manhole	1350
F1.021	48.177	453.1	F38	17.536	13.176	3.985	Open Manhole	1350
F1.022	44.301	453.1	F40	16.968	13.078	3.515	Open Manhole	1350
F11.000	27.704	34.7	F40	16.968	15.318	1.500	Open Manhole	1350
F1.023	40.135	453.1	F41	16.454	12.989	3.089	Open Manhole	1350

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.024	o	375	F41	16.454	12.989	3.089	Open Manhole	1350
F12.000	o	150	F42	23.385	21.735	1.500	Open Manhole	1200
F12.001	o	150	F43	22.498	20.664	1.684	Open Manhole	1200
F12.002	o	150	F44	22.635	20.497	1.988	Open Manhole	1200
F12.003	o	150	F45	22.811	20.301	2.360	Open Manhole	1200
F12.004	o	150	F46	22.525	20.177	2.198	Open Manhole	1200
F12.005	o	150	F47	22.516	20.100	2.266	Open Manhole	1200
F12.006	o	150	F48	22.014	19.921	1.943	Open Manhole	1200
F13.000	o	150	F49	23.514	21.864	1.500	Open Manhole	1050
F13.001	o	150	F50	23.616	21.297	2.169	Open Manhole	1200
F14.000	o	150	F51	23.582	21.932	1.500	Open Manhole	1200
F15.000	o	150	F52	23.564	21.914	1.500	Open Manhole	1050
F13.002	o	150	F53	23.489	21.063	2.276	Open Manhole	1200
F16.000	o	150	F54	23.159	21.509	1.500	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.024	42.932	453.1	F78	16.025	12.894	2.756	Open Manhole	1500
F12.000	83.125	77.6	F43	22.498	20.664	1.684	Open Manhole	1200
F12.001	22.367	134.2	F44	22.635	20.497	1.988	Open Manhole	1200
F12.002	26.322	134.2	F45	22.811	20.301	2.360	Open Manhole	1200
F12.003	16.728	134.2	F46	22.525	20.177	2.198	Open Manhole	1200
F12.004	10.308	134.2	F47	22.516	20.100	2.266	Open Manhole	1200
F12.005	24.049	134.2	F48	22.014	19.921	1.943	Open Manhole	1200
F12.006	82.914	134.2	F60	21.134	19.303	1.681	Open Manhole	1200
F13.000	43.964	77.5	F50	23.616	21.297	2.169	Open Manhole	1200
F13.001	31.325	133.8	F53	23.489	21.063	2.276	Open Manhole	1200
F14.000	7.406	78.0	F53	23.489	21.837	1.502	Open Manhole	1200
F15.000	8.826	77.4	F53	23.489	21.800	1.539	Open Manhole	1200
F13.002	15.820	135.6	F56	23.088	20.946	1.992	Open Manhole	1200
F16.000	7.377	77.7	F56	23.088	21.414	1.524	Open Manhole	1200

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F17.000	o	150	F55	23.128	21.478	1.500	Open Manhole	1050
F13.003	o	150	F56	23.088	20.946	1.992	Open Manhole	1200
F13.004	o	150	F57	22.498	20.770	1.579	Open Manhole	1200
F13.005	o	150	F58	22.122	20.434	1.538	Open Manhole	1200
F13.006	o	150	F59	21.490	19.384	1.956	Open Manhole	1200
F12.007	o	150	F60	21.134	18.834	2.150	Open Manhole	1200
F18.000	o	225	F61	19.700	17.975	1.500	Open Manhole	1050
F12.008	o	300	F62	18.731	16.462	1.969	Open Manhole	1200
F12.009	o	300	F63	18.158	15.890	1.968	Open Manhole	1200
F12.010	o	300	F64	17.334	15.066	1.968	Open Manhole	1200
F12.011	o	300	F65	17.012	14.744	1.968	Open Manhole	1200
F19.000	o	150	F66	22.530	20.880	1.500	Open Manhole	1200
F19.001	o	150	F67	21.710	20.060	1.500	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F17.000	8.748	77.4	F56	23.088	21.365	1.573	Open Manhole	1200
F13.003	23.881	135.2	F57	22.498	20.770	1.579	Open Manhole	1200
F13.004	45.427	135.2	F58	22.122	20.434	1.538	Open Manhole	1200
F13.005	38.359	36.5	F59	21.490	19.384	1.956	Open Manhole	1200
F13.006	20.241	36.8	F60	21.134	18.834	2.150	Open Manhole	1200
F12.007	98.896	44.5	F62	18.731	16.612	1.969	Open Manhole	1200
F18.000	64.297	66.4	F62	18.731	17.006	1.500	Open Manhole	1200
F12.008	53.099	92.8	F63	18.158	15.890	1.968	Open Manhole	1200
F12.009	42.161	51.2	F64	17.334	15.066	1.968	Open Manhole	1200
F12.010	24.415	75.8	F65	17.012	14.744	1.968	Open Manhole	1200
F12.011	15.036	97.9	F72	16.858	14.590	1.968	Open Manhole	1200
F19.000	48.912	59.6	F67	21.710	20.060	1.500	Open Manhole	1200
F19.001	11.326	136.0	F69	21.747	19.977	1.620	Open Manhole	1200

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F20.000	o	150	F68	22.362	20.712	1.500	Open Manhole	1050
F19.002	o	150	F69	21.747	19.971	1.626	Open Manhole	1200
F19.003	o	150	F70	21.348	19.484	1.714	Open Manhole	1200
F19.004	o	150	F71	21.116	18.434	2.532	Open Manhole	1200
F12.012	o	300	F72	16.858	14.350	2.208	Open Manhole	1200
F12.013	o	300	F73	16.492	13.984	2.208	Open Manhole	1200
F21.000	o	150	F74	20.272	18.622	1.500	Open Manhole	1050
F12.014	o	300	F75	16.344	13.836	2.208	Open Manhole	1200
F12.015	o	375	F76	16.204	13.621	2.208	Open Manhole	1350
F12.016	o	375	F77	16.103	13.520	2.208	Open Manhole	1350
F1.025	o	525	F78	16.025	12.744	2.756	Open Manhole	1500
F22.000	o	150	F79	14.861	13.211	1.500	Open Manhole	1200
F22.001	o	150	F80	15.222	12.757	2.315	Open Manhole	1200
F22.002	o	150	F81	15.230	12.668	2.412	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F20.000	57.534	77.6	F69	21.747	19.971	1.626	Open Manhole	1200
F19.002	65.796	135.2	F70	21.348	19.484	1.714	Open Manhole	1200
F19.003	46.202	44.0	F71	21.116	18.434	2.532	Open Manhole	1200
F19.004	131.272	33.4	F72	16.858	14.500	2.208	Open Manhole	1200
F12.012	44.617	121.8	F73	16.492	13.984	2.208	Open Manhole	1200
F12.013	18.931	127.8	F75	16.344	13.836	2.208	Open Manhole	1200
F21.000	154.686	34.4	F75	16.344	14.122	2.072	Open Manhole	1200
F12.014	19.813	141.5	F76	16.204	13.696	2.208	Open Manhole	1350
F12.015	24.135	239.0	F77	16.103	13.520	2.208	Open Manhole	1350
F12.016	14.954	191.7	F78	16.025	13.442	2.208	Open Manhole	1500
F1.025	61.034	559.9	F82	15.271	12.635	2.111	Open Manhole	1500
F22.000	61.295	135.0	F80	15.222	12.757	2.315	Open Manhole	1200
F22.001	12.061	135.0	F81	15.230	12.668	2.412	Open Manhole	1200
F22.002	70.011	135.0	F82	15.271	12.149	2.972	Open Manhole	1500

PIPELINE SCHEDULES for net1.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.026	o	525	F82	15.271	11.774	2.972	Open Manhole	1500
F1.027	o	525	F83	15.500	11.665	3.310	Open Manhole	1500
F1.028	o	525	F84	15.500	11.605	3.370	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.026	46.413	425.8	F83	15.500	11.665	3.310	Open Manhole	1500
F1.027	26.089	434.8	F84	15.500	11.605	3.370	Open Manhole	1500
F1.028	1.424	142.4	F85	15.500	11.595	3.380	Open Manhole	0

FOUL SEWERAGE DESIGN

Design Criteria for FW_NET_2_OP3.fws

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	0.00	Maximum Backdrop Height (m)	0.000
Persons per House	0.00	Min Design Depth for Optimisation (m)	1.350
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	0.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for FW_NET_2_OP3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	150.000	1.432	104.7	0.000	0	0.9	1.500	o	150
F1.001	61.590	0.938	65.7	0.000	0	0.2	1.500	o	150
F2.000	86.279	1.508	57.2	0.000	0	1.0	1.500	o	150
F2.001	15.876	0.106	150.0	0.000	0	0.0	1.500	o	150
F2.002	15.151	0.101	150.0	0.000	0	0.5	1.500	o	150
F2.003	101.179	0.675	150.0	0.000	0	1.0	1.500	o	150
F2.004	27.204	0.181	150.0	0.000	0	1.5	1.500	o	150
F3.000	68.608	0.457	150.0	0.000	0	0.8	1.500	o	150
F2.005	101.481	0.677	150.0	0.000	0	0.4	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	23.142	0.000	0.9	0	0.0	25	0.46	0.86	15.1	0.9
F1.001	21.710	0.000	1.1	0	0.0	25	0.58	1.08	19.1	1.1
F2.000	23.165	0.000	1.0	0	0.0	23	0.59	1.16	20.5	1.0
F2.001	21.657	0.000	1.0	0	0.0	29	0.42	0.71	12.6	1.0
F2.002	21.551	0.000	1.5	0	0.0	35	0.48	0.71	12.6	1.5
F2.003	21.450	0.000	2.5	0	0.0	45	0.55	0.71	12.6	2.5
F2.004	20.776	0.000	4.0	0	0.0	58	0.63	0.71	12.6	4.0
F3.000	22.434	0.000	0.8	0	0.0	26	0.39	0.71	12.6	0.8
F2.005	20.594	0.000	5.2	0	0.0	67	0.68	0.71	12.6	5.2

Network Design Table for FW_NET_2_OP3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.002	50.883	0.339	150.0	0.000	0	0.2	1.500	o	150
F4.000	149.826	2.074	72.2	0.000	0	1.9	1.500	o	150
F5.000	38.165	0.254	150.0	0.000	0	0.3	1.500	o	150
F6.000	42.377	0.283	150.0	0.000	0	0.6	1.500	o	150
F7.000	54.199	0.361	150.0	0.000	0	2.0	1.500	o	150
F5.001	79.743	0.532	150.0	0.000	0	0.4	1.500	o	150
F5.002	79.755	0.532	150.0	0.000	0	0.8	1.500	o	150
F8.000	52.792	0.579	91.2	0.000	0	2.3	1.500	o	150
F5.003	120.045	1.181	101.6	0.000	0	1.3	1.500	o	150
F4.001	57.873	0.678	85.3	0.000	0	0.2	1.500	o	150
F1.003	14.080	0.094	150.0	0.000	0	0.0	1.500	o	225
F9.000	71.962	0.562	128.0	0.000	0	0.4	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.002	19.918	0.000	6.5	0	0.0	76	0.72	0.71	12.6	6.5
F4.000	23.269	0.000	1.9	0	0.0	33	0.66	1.03	18.2	1.9
F5.000	24.200	0.000	0.3	0	0.0	16	0.29	0.71	12.6	0.3
F6.000	23.722	0.000	0.6	0	0.0	22	0.36	0.71	12.6	0.6
F7.000	24.189	0.000	2.0	0	0.0	41	0.52	0.71	12.6	2.0
F5.001	23.439	0.000	3.3	0	0.0	52	0.60	0.71	12.6	3.3
F5.002	22.908	0.000	4.1	0	0.0	59	0.64	0.71	12.6	4.1
F8.000	23.081	0.000	2.3	0	0.0	38	0.65	0.92	16.2	2.3
F5.003	22.376	0.000	7.7	0	0.0	75	0.87	0.87	15.4	7.7
F4.001	21.195	0.000	9.8	0	0.0	82	0.99	0.95	16.8	9.8
F1.003	19.504	0.000	16.3	0	0.0	104	0.90	0.94	37.2	16.3
F9.000	21.669	0.000	0.4	0	0.0	18	0.33	0.77	13.7	0.4

Network Design Table for FW_NET_2_OP3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F9.001	135.082	1.184	114.1	0.000	0	1.6	1.500	o	150
F9.002	73.548	0.490	150.0	0.000	0	1.4	1.500	o	150
F10.000	105.969	1.394	76.0	0.000	0	2.0	1.500	o	150
F10.001	105.969	1.051	100.8	0.000	0	2.0	1.500	o	150
F9.003	73.358	0.419	175.1	0.000	0	0.4	1.500	o	150
F11.000	29.287	0.542	54.0	0.000	0	4.0	1.500	o	150
F11.001	109.170	1.872	58.3	0.000	0	0.5	1.500	o	150
F11.002	132.017	1.146	115.2	0.000	0	1.6	1.500	o	150
F9.004	75.731	0.255	296.9	0.000	0	1.7	1.500	o	225
F1.004	13.286	0.052	257.7	0.000	0	0.0	1.500	o	300

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F9.001	21.107	0.000	2.0	0	0.0	38	0.57	0.82	14.5	2.0
F9.002	19.923	0.000	3.4	0	0.0	53	0.61	0.71	12.6	3.4
F10.000	22.094	0.000	2.0	0	0.0	34	0.66	1.01	17.8	2.0
F10.001	20.700	0.000	4.0	0	0.0	52	0.73	0.87	15.4	4.0
F9.003	19.433	0.000	7.8	0	0.0	90	0.71	0.66	11.7	7.8
F11.000	23.576	0.000	4.0	0	0.0	44	0.92	1.19	21.1	4.0
F11.001	23.034	0.000	4.5	0	0.0	48	0.92	1.15	20.3	4.5
F11.002	21.162	0.000	6.1	0	0.0	68	0.78	0.82	14.4	6.1
F9.004	18.939	0.000	15.6	0	0.0	124	0.69	0.66	26.4	15.6
F1.004	18.609	0.000	31.9	0	0.0	154	0.87	0.86	60.9	31.9

PIPELINE SCHEDULES for FW_NET_2_OP3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	F1	24.642	23.142	1.350	Open Manhole	1050
F1.001	o	150	F2	23.210	21.710	1.350	Open Manhole	1050
F2.000	o	150	F3	24.665	23.165	1.350	Open Manhole	1050
F2.001	o	150	F4	23.157	21.657	1.350	Open Manhole	1050
F2.002	o	150	F5	23.087	21.551	1.386	Open Manhole	1050
F2.003	o	150	F6	22.989	21.450	1.389	Open Manhole	1050
F2.004	o	150	F7	23.722	20.776	2.796	Open Manhole	1200
F3.000	o	150	F8	23.934	22.434	1.350	Open Manhole	1050
F2.005	o	150	F9	23.597	20.594	2.852	Open Manhole	1200
F1.002	o	150	F10	22.272	19.918	2.204	Open Manhole	1200
F4.000	o	150	F11	24.769	23.269	1.350	Open Manhole	1050
F5.000	o	150	F12	25.700	24.200	1.350	Open Manhole	1050
F6.000	o	150	F13	25.222	23.722	1.350	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	150.000	104.7	F2	23.210	21.710	1.350	Open Manhole	1050
F1.001	61.590	65.7	F10	22.272	20.772	1.350	Open Manhole	1200
F2.000	86.279	57.2	F4	23.157	21.657	1.350	Open Manhole	1050
F2.001	15.876	150.0	F5	23.087	21.551	1.386	Open Manhole	1050
F2.002	15.151	150.0	F6	22.989	21.450	1.389	Open Manhole	1050
F2.003	101.179	150.0	F7	23.722	20.776	2.796	Open Manhole	1200
F2.004	27.204	150.0	F9	23.597	20.594	2.852	Open Manhole	1200
F3.000	68.608	150.0	F9	23.597	21.977	1.470	Open Manhole	1200
F2.005	101.481	150.0	F10	22.272	19.918	2.204	Open Manhole	1200
F1.002	50.883	150.0	F20	22.017	19.579	2.288	Open Manhole	1200
F4.000	149.826	72.2	F19	22.695	21.195	1.350	Open Manhole	1050
F5.000	38.165	150.0	F15	25.456	23.946	1.360	Open Manhole	1200
F6.000	42.377	150.0	F15	25.456	23.439	1.866	Open Manhole	1200

PIPELINE SCHEDULES for FW_NET_2_OP3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	o	150	F14	25.689	24.189	1.350	Open Manhole	1050
F5.001	o	150	F15	25.456	23.439	1.866	Open Manhole	1200
F5.002	o	150	F16	24.707	22.908	1.649	Open Manhole	1200
F8.000	o	150	F17	24.581	23.081	1.350	Open Manhole	1050
F5.003	o	150	F18	24.002	22.376	1.476	Open Manhole	1050
F4.001	o	150	F19	22.695	21.195	1.350	Open Manhole	1050
F1.003	o	225	F20	22.017	19.504	2.288	Open Manhole	1200
F9.000	o	150	F21	23.169	21.669	1.350	Open Manhole	1050
F9.001	o	150	F22	22.607	21.107	1.350	Open Manhole	1050
F9.002	o	150	F23	21.423	19.923	1.350	Open Manhole	1050
F10.000	o	150	F24	23.594	22.094	1.350	Open Manhole	1050
F10.001	o	150	F25	22.200	20.700	1.350	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	54.199	150.0	F15	25.456	23.828	1.478	Open Manhole	1200
F5.001	79.743	150.0	F16	24.707	22.908	1.649	Open Manhole	1200
F5.002	79.755	150.0	F18	24.002	22.376	1.476	Open Manhole	1050
F8.000	52.792	91.2	F18	24.002	22.502	1.350	Open Manhole	1050
F5.003	120.045	101.6	F19	22.695	21.195	1.350	Open Manhole	1050
F4.001	57.873	85.3	F20	22.017	20.517	1.350	Open Manhole	1200
F1.003	14.080	150.0	F31	21.915	19.410	2.280	Open Manhole	1200
F9.000	71.962	128.0	F22	22.607	21.107	1.350	Open Manhole	1050
F9.001	135.082	114.1	F23	21.423	19.923	1.350	Open Manhole	1050
F9.002	73.548	150.0	F26	21.149	19.433	1.566	Open Manhole	1200
F10.000	105.969	76.0	F25	22.200	20.700	1.350	Open Manhole	1050
F10.001	105.969	100.8	F26	21.149	19.649	1.350	Open Manhole	1200

PIPELINE SCHEDULES for FW_NET_2_OP3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F9.003	o	150	F26	21.149	19.433	1.566	Open Manhole	1200
F11.000	o	150	F27	25.026	23.576	1.300	Open Manhole	1050
F11.001	o	150	F28	24.483	23.034	1.299	Open Manhole	1050
F11.002	o	150	F29	22.662	21.162	1.350	Open Manhole	1050
F9.004	o	225	F30	21.517	18.939	2.353	Open Manhole	1200
F1.004	o	300	F31	21.915	18.609	3.006	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F9.003	73.358	175.1	F30	21.517	19.014	2.353	Open Manhole	1200
F11.000	29.287	54.0	F28	24.483	23.034	1.299	Open Manhole	1050
F11.001	109.170	58.3	F29	22.662	21.162	1.350	Open Manhole	1050
F11.002	132.017	115.2	F30	21.517	20.017	1.350	Open Manhole	1200
F9.004	75.731	296.9	F31	21.915	18.684	3.006	Open Manhole	1200
F1.004	13.286	257.7	F32	22.035	18.557	3.178	Open Manhole	1200

FOUL SEWERAGE DESIGN

Design Criteria for FW_NET_3.fws

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	0.00	Maximum Backdrop Height (m)	0.000
Persons per House	0.00	Min Design Depth for Optimisation (m)	1.500
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	0.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for FW_NET_3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	56.463	0.376	150.2	0.000	0	0.8	1.500	o	150
F1.001	63.724	0.425	149.9	0.000	0	0.6	1.500	o	150
F1.002	65.618	0.437	150.2	0.000	0	0.0	1.500	o	150
F1.003	18.728	0.125	150.0	0.000	0	0.5	1.500	o	150
F1.004	38.885	0.259	150.1	0.000	0	0.0	1.500	o	150
F1.005	66.093	0.441	149.9	0.000	0	0.4	1.500	o	150
F1.006	16.128	0.108	149.3	0.000	0	0.0	1.500	o	150
F2.000	25.722	0.623	41.3	0.000	0	0.2	1.500	o	150
F2.001	30.238	0.559	54.1	0.000	0	0.0	1.500	o	150
F1.007	28.987	0.193	150.2	0.000	0	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	12.045	0.000	0.8	0	0.0	26	0.39	0.71	12.6	0.8
F1.001	11.669	0.000	1.4	0	0.0	34	0.47	0.71	12.6	1.4
F1.002	11.244	0.000	1.4	0	0.0	34	0.47	0.71	12.6	1.4
F1.003	10.807	0.000	1.9	0	0.0	39	0.51	0.71	12.6	1.9
F1.004	10.682	0.000	1.9	0	0.0	39	0.51	0.71	12.6	1.9
F1.005	10.423	0.000	2.3	0	0.0	44	0.54	0.71	12.6	2.3
F1.006	9.982	0.000	2.3	0	0.0	43	0.54	0.72	12.6	2.3
F2.000	12.419	0.000	0.2	0	0.0	10	0.39	1.37	24.1	0.2
F2.001	11.796	0.000	0.2	0	0.0	11	0.36	1.19	21.1	0.2
F1.007	9.874	0.000	2.5	0	0.0	45	0.55	0.71	12.6	2.5

Network Design Table for FW_NET_3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F3.000	53.827	0.359	149.9	0.000	0	1.2	1.500	o	150
F3.001	55.842	0.372	150.1	0.000	0	1.2	1.500	o	150
F3.002	106.364	0.709	150.0	0.000	0	0.0	1.500	o	150
F3.003	87.547	0.584	149.9	0.000	0	0.9	1.500	o	150
F3.004	49.560	0.330	150.2	0.000	0	0.9	1.500	o	150
F4.000	54.726	1.471	37.2	0.000	0	0.0	1.500	o	150
F3.005	108.253	0.722	149.9	0.000	0	0.0	1.500	o	150
F5.000	22.656	0.297	76.3	0.000	0	1.1	1.500	o	150
F3.006	111.554	0.744	149.9	0.000	0	0.0	1.500	o	150
F3.007	38.229	0.255	149.9	0.000	0	1.7	1.500	o	150
F6.000	32.665	0.218	150.0	0.000	0	1.7	1.500	o	150
F3.008	37.254	0.248	150.2	0.000	0	0.0	1.500	o	150
F3.009	9.904	0.066	150.1	0.000	0	0.0	1.500	o	150
F7.000	69.699	0.465	150.0	0.000	0	0.6	1.500	o	150
F7.001	16.250	0.108	150.0	0.000	0	0.3	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F3.000	14.711	0.000	1.2	0	0.0	32	0.45	0.71	12.6	1.2
F3.001	14.352	0.000	2.4	0	0.0	44	0.55	0.71	12.6	2.4
F3.002	13.980	0.000	2.4	0	0.0	44	0.55	0.71	12.6	2.4
F3.003	13.271	0.000	3.3	0	0.0	52	0.60	0.71	12.6	3.3
F3.004	12.687	0.000	4.2	0	0.0	60	0.64	0.71	12.6	4.2
F4.000	14.924	0.000	0.0	0	0.0	0	0.00	1.44	25.4	0.0
F3.005	12.357	0.000	4.2	0	0.0	60	0.64	0.71	12.6	4.2
F5.000	12.022	0.000	1.1	0	0.0	26	0.55	1.00	17.7	1.1
F3.006	11.635	0.000	5.3	0	0.0	68	0.68	0.71	12.6	5.3
F3.007	10.891	0.000	7.0	0	0.0	80	0.73	0.71	12.6	7.0
F6.000	11.459	0.000	1.7	0	0.0	37	0.49	0.71	12.6	1.7
F3.008	10.636	0.000	8.7	0	0.0	91	0.77	0.71	12.6	8.7
F3.009	10.388	0.000	8.7	0	0.0	91	0.77	0.71	12.6	8.7
F7.000	18.115	0.000	0.6	0	0.0	22	0.36	0.71	12.6	0.6
F7.001	17.650	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9

Network Design Table for FW_NET_3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F7.002	19.047	0.127	150.0	0.000	0	0.0	1.500	o	150
F7.003	15.542	0.104	150.0	0.000	0	0.0	1.500	o	150
F7.004	12.337	0.082	150.0	0.000	0	0.0	1.500	o	150
F7.005	90.794	0.605	150.0	0.000	0	0.0	1.500	o	150
F7.006	128.146	0.854	150.0	0.000	0	3.3	1.500	o	150
F7.007	43.877	1.000	43.9	0.000	0	0.8	1.500	o	150
F8.000	100.437	0.674	149.0	0.000	0	0.6	1.500	o	150
F8.001	100.437	1.014	99.1	0.000	0	2.9	1.500	o	150
F9.000	47.766	0.318	150.0	0.000	0	0.4	1.500	o	150
F8.002	68.436	2.446	28.0	0.000	0	0.1	1.500	o	150
F8.003	29.746	1.350	22.0	0.000	0	0.3	1.500	o	150
F7.008	111.381	1.696	65.7	0.000	0	0.8	1.500	o	150
F10.000	95.350	1.917	49.7	0.000	0	0.8	1.500	o	150
F11.000	70.594	0.471	150.0	0.000	0	0.2	1.500	o	150
F11.001	68.958	1.910	36.1	0.000	0	0.6	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F7.002	17.542	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9
F7.003	17.415	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9
F7.004	17.311	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9
F7.005	17.229	0.000	0.9	0	0.0	27	0.41	0.71	12.6	0.9
F7.006	16.624	0.000	4.2	0	0.0	60	0.64	0.71	12.6	4.2
F7.007	15.770	0.000	5.0	0	0.0	47	1.05	1.32	23.4	5.0
F8.000	20.925	0.000	0.6	0	0.0	22	0.36	0.72	12.7	0.6
F8.001	20.251	0.000	3.5	0	0.0	49	0.71	0.88	15.6	3.5
F9.000	18.884	0.000	0.4	0	0.0	19	0.32	0.71	12.6	0.4
F8.002	18.566	0.000	4.0	0	0.0	38	1.16	1.66	29.3	4.0
F8.003	16.120	0.000	4.3	0	0.0	37	1.29	1.87	33.1	4.3
F7.008	14.769	0.000	10.1	0	0.0	78	1.10	1.08	19.1	10.1
F10.000	20.792	0.000	0.8	0	0.0	20	0.58	1.24	22.0	0.8
F11.000	21.256	0.000	0.2	0	0.0	14	0.25	0.71	12.6	0.2
F11.001	20.785	0.000	0.8	0	0.0	18	0.65	1.46	25.8	0.8

Network Design Table for FW_NET_3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F10.001	90.044	1.264	71.2	0.000	0	0.0	1.500	o	150
F10.002	30.975	1.210	25.6	0.000	0	0.5	1.500	o	150
F10.003	81.743	3.327	24.6	0.000	0	0.0	1.500	o	150
F7.009	14.845	0.363	40.9	0.000	0	0.0	1.500	o	150
F12.000	150.000	1.655	90.6	0.000	0	0.7	1.500	o	150
F12.001	60.360	1.152	52.4	0.000	0	0.5	1.500	o	150
F12.002	22.288	0.592	37.7	0.000	0	0.0	1.500	o	150
F12.003	89.785	3.195	28.1	0.000	0	0.0	1.500	o	150
F13.000	70.580	0.306	230.7	0.000	0	0.5	1.500	o	150
F13.001	17.465	0.263	66.4	0.000	0	0.0	1.500	o	150
F13.002	39.835	1.363	29.2	0.000	0	3.7	1.500	o	150
F13.003	90.903	3.636	25.0	0.000	0	1.7	1.500	o	150
F13.004	61.737	1.436	43.0	0.000	0	1.1	1.500	o	150
F12.004	116.919	2.061	56.7	0.000	0	0.0	1.500	o	150
F14.000	93.402	3.587	26.0	0.000	0	2.5	1.500	o	150
F14.001	38.575	0.806	47.9	0.000	0	3.7	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F10.001	18.875	0.000	1.6	0	0.0	30	0.63	1.04	18.4	1.6
F10.002	17.611	0.000	2.1	0	0.0	27	0.98	1.74	30.7	2.1
F10.003	16.401	0.000	2.1	0	0.0	26	1.00	1.77	31.3	2.1
F7.009	13.073	0.000	12.2	0	0.0	75	1.37	1.37	24.2	12.2
F12.000	22.083	0.000	0.7	0	0.0	21	0.45	0.92	16.3	0.7
F12.001	20.428	0.000	1.2	0	0.0	24	0.65	1.21	21.4	1.2
F12.002	19.276	0.000	1.2	0	0.0	22	0.72	1.43	25.3	1.2
F12.003	18.684	0.000	1.2	0	0.0	21	0.80	1.66	29.3	1.2
F13.000	22.492	0.000	0.5	0	0.0	23	0.29	0.57	10.2	0.5
F13.001	22.186	0.000	0.5	0	0.0	17	0.45	1.08	19.0	0.5
F13.002	21.923	0.000	4.2	0	0.0	39	1.15	1.62	28.7	4.2
F13.003	20.560	0.000	5.9	0	0.0	44	1.35	1.76	31.0	5.9
F13.004	16.924	0.000	7.0	0	0.0	56	1.16	1.34	23.7	7.0
F12.004	15.489	0.000	8.2	0	0.0	66	1.10	1.16	20.6	8.2
F14.000	17.820	0.000	2.5	0	0.0	29	1.03	1.72	30.4	2.5
F14.001	14.233	0.000	6.2	0	0.0	54	1.08	1.27	22.4	6.2

Network Design Table for FW_NET_3.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F12.005	110.646	0.970	114.1	0.000	0	0.0	1.500	o	150
F12.006	56.997	0.380	150.0	0.000	0	6.0	1.500	o	225
F12.007	36.619	0.244	150.0	0.000	0	0.9	1.500	o	225
F7.010	80.589	0.589	136.8	0.000	0	0.0	1.500	o	225
F1.008	5.516	0.025	220.6	0.000	0	0.0	1.500	o	300

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F12.005	13.427	0.000	14.4	0	0.0	122	0.94	0.82	14.5	14.4
F12.006	12.382	0.000	20.4	0	0.0	119	0.96	0.94	37.2	20.4
F12.007	12.002	0.000	21.3	0	0.0	122	0.97	0.94	37.2	21.3
F7.010	11.758	0.000	33.5	0	0.0	161	1.10	0.98	39.0	33.5
F1.008	9.531	0.000	44.7	0	0.0	181	1.00	0.93	65.9	44.7

PIPELINE SCHEDULES for FW_NET_3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	F1	13.545	12.045	1.350	Open Manhole	1050
F1.001	o	150	F2	13.702	11.669	1.883	Open Manhole	1200
F1.002	o	150	F3	13.839	11.244	2.445	Open Manhole	1200
F1.003	o	150	F4	13.267	10.807	2.310	Open Manhole	1200
F1.004	o	150	F5	12.878	10.682	2.046	Open Manhole	1200
F1.005	o	150	F6	12.720	10.423	2.147	Open Manhole	1200
F1.006	o	150	F7	12.734	9.982	2.602	Open Manhole	1200
F2.000	o	150	F8	13.919	12.419	1.350	Open Manhole	1050
F2.001	o	150	F9	13.295	11.796	1.349	Open Manhole	1050
F1.007	o	150	F10	12.698	9.874	2.674	Open Manhole	1200
F3.000	o	150	F11	16.211	14.711	1.350	Open Manhole	1050
F3.001	o	150	F12	16.148	14.352	1.646	Open Manhole	1200
F3.002	o	150	F13	16.572	13.980	2.442	Open Manhole	1200
F3.003	o	150	F14	17.637	13.271	4.216	Open Manhole	1200
F3.004	o	150	F15	16.645	12.687	3.808	Open Manhole	1200
F4.000	o	150	F16	16.424	14.924	1.350	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	56.463	150.2	F2	13.702	11.669	1.883	Open Manhole	1200
F1.001	63.724	149.9	F3	13.839	11.244	2.445	Open Manhole	1200
F1.002	65.618	150.2	F4	13.267	10.807	2.310	Open Manhole	1200
F1.003	18.728	150.0	F5	12.878	10.682	2.046	Open Manhole	1200
F1.004	38.885	150.1	F6	12.720	10.423	2.147	Open Manhole	1200
F1.005	66.093	149.9	F7	12.734	9.982	2.602	Open Manhole	1200
F1.006	16.128	149.3	F10	12.698	9.874	2.674	Open Manhole	1200
F2.000	25.722	41.3	F9	13.295	11.796	1.349	Open Manhole	1050
F2.001	30.238	54.1	F10	12.698	11.237	1.311	Open Manhole	1200
F1.007	28.987	150.2	F61	12.670	9.681	2.839	Open Manhole	1200
F3.000	53.827	149.9	F12	16.148	14.352	1.646	Open Manhole	1200
F3.001	55.842	150.1	F13	16.572	13.980	2.442	Open Manhole	1200
F3.002	106.364	150.0	F14	17.637	13.271	4.216	Open Manhole	1200
F3.003	87.547	149.9	F15	16.645	12.687	3.808	Open Manhole	1200
F3.004	49.560	150.2	F17	15.263	12.357	2.756	Open Manhole	1200
F4.000	54.726	37.2	F17	15.263	13.453	1.660	Open Manhole	1200

PIPELINE SCHEDULES for FW_NET_3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F3.005	o	150	F17	15.263	12.357	2.756	Open Manhole	1200
F5.000	o	150	F18	13.522	12.022	1.350	Open Manhole	1050
F3.006	o	150	F19	13.277	11.635	1.492	Open Manhole	1050
F3.007	o	150	F20	13.829	10.891	2.788	Open Manhole	1200
F6.000	o	150	F21	12.959	11.459	1.350	Open Manhole	1050
F3.008	o	150	F22	12.651	10.636	1.865	Open Manhole	1200
F3.009	o	150	F23	12.574	10.388	2.036	Open Manhole	1200
F7.000	o	150	F24	19.615	18.115	1.350	Open Manhole	1050
F7.001	o	150	F25	19.495	17.650	1.694	Open Manhole	1200
F7.002	o	150	F26	19.547	17.542	1.855	Open Manhole	1200
F7.003	o	150	F27	19.654	17.415	2.089	Open Manhole	1200
F7.004	o	150	F28	19.753	17.311	2.291	Open Manhole	1200
F7.005	o	150	F29	19.819	17.229	2.439	Open Manhole	1200
F7.006	o	150	F30	19.156	16.624	2.382	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F3.005	108.253	149.9	F19	13.277	11.635	1.492	Open Manhole	1050
F5.000	22.656	76.3	F19	13.277	11.725	1.402	Open Manhole	1050
F3.006	111.554	149.9	F20	13.829	10.891	2.788	Open Manhole	1200
F3.007	38.229	149.9	F22	12.651	10.636	1.865	Open Manhole	1200
F6.000	32.665	150.0	F22	12.651	11.241	1.260	Open Manhole	1200
F3.008	37.254	150.2	F23	12.574	10.388	2.036	Open Manhole	1200
F3.009	9.904	150.1	F61	12.670	10.322	2.198	Open Manhole	1200
F7.000	69.699	150.0	F25	19.495	17.650	1.694	Open Manhole	1200
F7.001	16.250	150.0	F26	19.547	17.542	1.855	Open Manhole	1200
F7.002	19.047	150.0	F27	19.654	17.415	2.089	Open Manhole	1200
F7.003	15.542	150.0	F28	19.753	17.311	2.291	Open Manhole	1200
F7.004	12.337	150.0	F29	19.819	17.229	2.439	Open Manhole	1200
F7.005	90.794	150.0	F30	19.156	16.624	2.382	Open Manhole	1200
F7.006	128.146	150.0	F31	17.386	15.770	1.467	Open Manhole	1050

PIPELINE SCHEDULES for FW_NET_3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.007	o	150	F31	17.386	15.770	1.467	Open Manhole	1050
F8.000	o	150	F32	22.425	20.925	1.350	Open Manhole	1050
F8.001	o	150	F33	21.751	20.251	1.350	Open Manhole	1050
F9.000	o	150	F34	20.384	18.884	1.350	Open Manhole	1050
F8.002	o	150	F35	20.737	18.566	2.022	Open Manhole	1200
F8.003	o	150	F36	17.620	16.120	1.351	Open Manhole	1050
F7.008	o	150	F37	16.270	14.769	1.351	Open Manhole	1050
F10.000	o	150	F38	22.292	20.792	1.350	Open Manhole	1050
F11.000	o	150	F39	22.756	21.256	1.350	Open Manhole	1050
F11.001	o	150	F40	22.704	20.785	1.768	Open Manhole	1200
F10.001	o	150	F41	20.375	18.875	1.350	Open Manhole	1050
F10.002	o	150	F42	19.111	17.611	1.350	Open Manhole	1050
F10.003	o	150	F43	17.901	16.401	1.350	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.007	43.877	43.9	F37	16.270	14.770	1.350	Open Manhole	1050
F8.000	100.437	149.0	F33	21.751	20.251	1.350	Open Manhole	1050
F8.001	100.437	99.1	F35	20.737	19.237	1.350	Open Manhole	1200
F9.000	47.766	150.0	F35	20.737	18.566	2.022	Open Manhole	1200
F8.002	68.436	28.0	F36	17.620	16.120	1.351	Open Manhole	1050
F8.003	29.746	22.0	F37	16.270	14.769	1.351	Open Manhole	1050
F7.008	111.381	65.7	F44	14.574	13.073	1.351	Open Manhole	1050
F10.000	95.350	49.7	F41	20.375	18.875	1.350	Open Manhole	1050
F11.000	70.594	150.0	F40	22.704	20.785	1.768	Open Manhole	1200
F11.001	68.958	36.1	F41	20.375	18.875	1.349	Open Manhole	1050
F10.001	90.044	71.2	F42	19.111	17.611	1.350	Open Manhole	1050
F10.002	30.975	25.6	F43	17.901	16.401	1.350	Open Manhole	1050
F10.003	81.743	24.6	F44	14.574	13.074	1.350	Open Manhole	1050

PIPELINE SCHEDULES for FW_NET_3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.009	o	150	F44	14.574	13.073	1.351	Open Manhole	1050
F12.000	o	150	F45	23.583	22.083	1.350	Open Manhole	1050
F12.001	o	150	F46	21.928	20.428	1.350	Open Manhole	1050
F12.002	o	150	F47	20.776	19.276	1.350	Open Manhole	1050
F12.003	o	150	F48	20.184	18.684	1.350	Open Manhole	1050
F13.000	o	150	F49	23.992	22.492	1.350	Open Manhole	1050
F13.001	o	150	F50	23.686	22.186	1.350	Open Manhole	1050
F13.002	o	150	F51	23.423	21.923	1.350	Open Manhole	1050
F13.003	o	150	F52	22.060	20.560	1.350	Open Manhole	1050
F13.004	o	150	F53	18.425	16.924	1.350	Open Manhole	1050
F12.004	o	150	F54	16.989	15.489	1.350	Open Manhole	1050
F14.000	o	150	F55	19.320	17.820	1.350	Open Manhole	1050
F14.001	o	150	F56	15.733	14.233	1.350	Open Manhole	1050
F12.005	o	150	F57	14.927	13.427	1.350	Open Manhole	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.009	14.845	40.9	F60	14.211	12.710	1.351	Open Manhole	1200
F12.000	150.000	90.6	F46	21.928	20.428	1.350	Open Manhole	1050
F12.001	60.360	52.4	F47	20.776	19.276	1.350	Open Manhole	1050
F12.002	22.288	37.7	F48	20.184	18.684	1.350	Open Manhole	1050
F12.003	89.785	28.1	F54	16.989	15.489	1.350	Open Manhole	1050
F13.000	70.580	230.7	F50	23.686	22.186	1.350	Open Manhole	1050
F13.001	17.465	66.4	F51	23.423	21.923	1.350	Open Manhole	1050
F13.002	39.835	29.2	F52	22.060	20.560	1.350	Open Manhole	1050
F13.003	90.903	25.0	F53	18.425	16.924	1.350	Open Manhole	1050
F13.004	61.737	43.0	F54	16.989	15.489	1.350	Open Manhole	1050
F12.004	116.919	56.7	F57	14.927	13.427	1.350	Open Manhole	1050
F14.000	93.402	26.0	F56	15.733	14.233	1.350	Open Manhole	1050
F14.001	38.575	47.9	F57	14.927	13.427	1.350	Open Manhole	1050
F12.005	110.646	114.1	F58	14.900	12.457	2.293	Open Manhole	1200

PIPELINE SCHEDULES for FW_NET_3.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F12.006	o	225	F58	14.900	12.382	2.293	Open Manhole	1200
F12.007	o	225	F59	14.647	12.002	2.420	Open Manhole	1200
F7.010	o	225	F60	14.211	11.758	2.228	Open Manhole	1200
F1.008	o	300	F61	12.670	9.531	2.839	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F12.006	56.997	150.0	F59	14.647	12.002	2.420	Open Manhole	1200
F12.007	36.619	150.0	F60	14.211	11.758	2.228	Open Manhole	1200
F7.010	80.589	136.8	F61	12.670	11.169	1.276	Open Manhole	1200
F1.008	5.516	220.6	F62	12.760	9.506	2.954	Open Manhole	1200

FOUL SEWERAGE DESIGN

Design Criteria for FW_NET_4.fws

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	0.00	Maximum Backdrop Height (m)	0.000
Persons per House	0.00	Min Design Depth for Optimisation (m)	1.500
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	0.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for FW_NET_4.fws

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	105.210	1.795	58.6	0.000	0	0.5	1.500	o	150
F1.001	105.173	1.622	64.8	0.000	0	0.0	1.500	o	150
F2.000	38.776	0.287	135.0	0.000	0	1.6	1.500	o	150
F1.002	60.327	1.618	37.3	0.000	0	0.0	1.500	o	150
F3.000	96.513	0.715	135.0	0.000	0	0.6	1.500	o	150
F3.001	96.942	0.718	135.0	0.000	0	0.0	1.500	o	150
F3.002	5.905	0.044	135.0	0.000	0	0.0	1.500	o	150
F1.003	13.218	0.098	135.0	0.000	0	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	16.289	0.000	0.5	0	0.0	17	0.47	1.15	20.2	0.5
F1.001	14.494	0.000	0.5	0	0.0	17	0.46	1.09	19.2	0.5
F2.000	13.143	0.000	1.6	0	0.0	35	0.50	0.75	13.3	1.6
F1.002	12.856	0.000	2.1	0	0.0	29	0.86	1.44	25.4	2.1
F3.000	11.133	0.000	0.6	0	0.0	22	0.37	0.75	13.3	0.6
F3.001	10.418	0.000	0.6	0	0.0	22	0.37	0.75	13.3	0.6
F3.002	9.700	0.000	0.6	0	0.0	22	0.37	0.75	13.3	0.6
F1.003	9.656	0.000	2.7	0	0.0	46	0.59	0.75	13.3	2.7

PIPELINE SCHEDULES for FW_NET_4.fws

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	F1	17.789	16.289	1.350	Open Manhole	1050
F1.001	o	150	F2	15.994	14.494	1.350	Open Manhole	1050
F2.000	o	150	F3	14.643	13.143	1.350	Open Manhole	1050
F1.002	o	150	F4	14.372	12.856	1.366	Open Manhole	1050
F3.000	o	150	F5	12.633	11.133	1.350	Open Manhole	1050
F3.001	o	150	F6	12.603	10.418	2.035	Open Manhole	1200
F3.002	o	150	F7	12.584	9.700	2.734	Open Manhole	1200
F1.003	o	150	F8	12.738	9.656	2.932	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	105.210	58.6	F2	15.994	14.494	1.350	Open Manhole	1050
F1.001	105.173	64.8	F4	14.372	12.872	1.350	Open Manhole	1050
F2.000	38.776	135.0	F4	14.372	12.856	1.366	Open Manhole	1050
F1.002	60.327	37.3	F8	12.738	11.238	1.350	Open Manhole	1200
F3.000	96.513	135.0	F6	12.603	10.418	2.035	Open Manhole	1200
F3.001	96.942	135.0	F7	12.584	9.700	2.734	Open Manhole	1200
F3.002	5.905	135.0	F8	12.738	9.656	2.932	Open Manhole	1200
F1.003	13.218	135.0	F9	12.832	9.558	3.124	Open Manhole	1200

APPENDIX E – OPA FOUL DRAINAGE STRATEGY

PUMP STATION	1
NO. OF PROPERTIES	745
COMMERCIAL AREA	4 Ha
STUDENT AREA	6 Ha
PEAK FLOW RATE	48.7 l/s
24HR STORAGE REQUIRED	170m³
ATTENUATION STORAGE REQUIRED	132m³
TOTAL STORAGE REQUIRED	302m³

VALUES FOR PUMPING STATION 1 ARE DIRECT LOADS AND DO NOT INCLUDE INFLOWS FROM THE PUMPING STATION 3 VIA THE GRAVITY SEWER. THE TOTAL LOAD ON PUMPING STATION 1 IS A SUMMATION OF THE LOADS ON PUMPING STATIONS 1 & 3

PUMP STATION	2
NO. OF PROPERTIES	1459
COMMERCIAL AREA	7 Ha
STUDENT AREA	3 Ha
PEAK FLOW RATE	83.6 l/s
24HR STORAGE REQUIRED	291m³
ATTENUATION STORAGE REQUIRED	227m³
TOTAL STORAGE REQUIRED	518m³

VALUES FOR PUMPING STATION 2 ARE DIRECT LOADS AND DO NOT INCLUDE INFLOWS FROM THE OTHER PUMP STATIONS VIA THE GRAVITY SEWERS. FOR THE TOTAL PUMPING STATION 2 LOAD REFER TO TOTAL LOAD TABLE

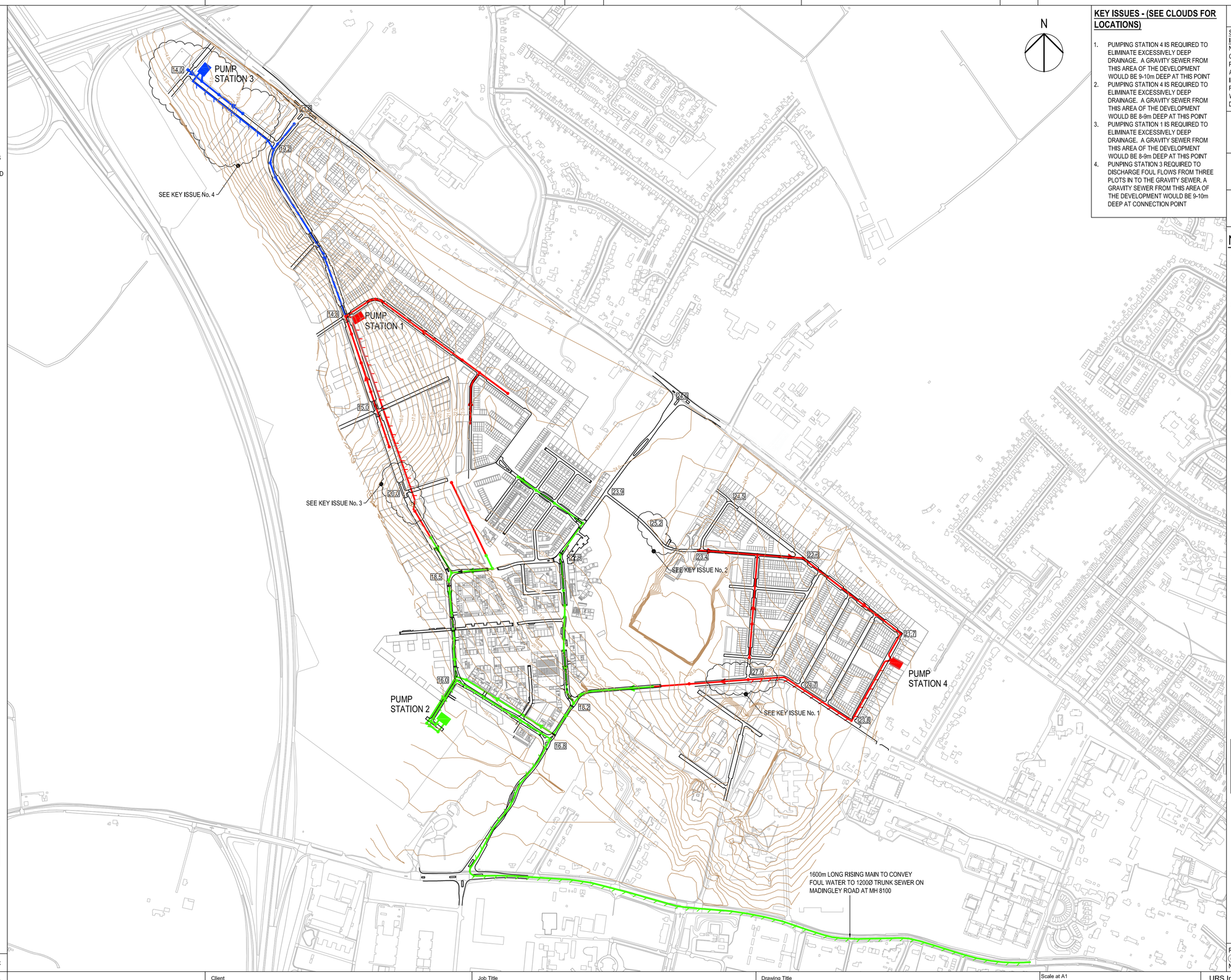
PUMP STATION	3
NO. OF PROPERTIES	44
COMMERCIAL AREA	2 Ha
STUDENT AREA	0 Ha
PEAK FLOW RATE	4.4 l/s
24HR STORAGE REQUIRED	16m³
ATTENUATION STORAGE REQUIRED	12m³
TOTAL STORAGE REQUIRED	28m³

PUMP STATION	4
NO. OF PROPERTIES	753
COMMERCIAL AREA	0 Ha
STUDENT AREA	0 Ha
PEAK FLOW RATE	34.9 l/s
24HR STORAGE REQUIRED	121m³
ATTENUATION STORAGE REQUIRED	95m³
TOTAL STORAGE REQUIRED	215m³

PUMP STATION	TOTAL
NO. OF PROPERTIES	3000
COMMERCIAL AREA	13.1 Ha
STUDENT AREA	9.6 Ha
PEAK FLOW RATE	171.7 l/s
24HR STORAGE REQUIRED	597m³
ATTENUATION STORAGE REQUIRED	465m³
TOTAL STORAGE REQUIRED	1063m³

NOTE : COMMERCIAL INCLUDES RESEARCH, HOTEL, SCHOOL, RETAIL AND LOCAL CENTRE.

THE DISTRIBUTION OF PROPERTIES, COMMERCIAL AREA & STUDENT AREA SERVED BY EACH PUMPING STATION IS INDICATIVE. VALUES FOR EACH PUMPING STATION WILL BE CONFIRMED PRIOR TO COMMENCEMENT OF DETAILED DESIGN



KEY ISSUES - (SEE CLOUDS FOR LOCATIONS)

1. PUMPING STATION 4 IS REQUIRED TO ELIMINATE EXCESSIVELY DEEP DRAINAGE. A GRAVITY SEWER FROM THIS AREA OF THE DEVELOPMENT WOULD BE 9-10m DEEP AT THIS POINT
2. PUMPING STATION 4 IS REQUIRED TO ELIMINATE EXCESSIVELY DEEP DRAINAGE. A GRAVITY SEWER FROM THIS AREA OF THE DEVELOPMENT WOULD BE 8-9m DEEP AT THIS POINT
3. PUMPING STATION 1 IS REQUIRED TO ELIMINATE EXCESSIVELY DEEP DRAINAGE. A GRAVITY SEWER FROM THIS AREA OF THE DEVELOPMENT WOULD BE 8-9m DEEP AT THIS POINT
4. PUNPING STATION 3 REQUIRED TO DISCHARGE FOUL FLOWS FROM THREE PLOTS IN TO THE GRAVITY SEWER. A GRAVITY SEWER FROM THIS AREA OF THE DEVELOPMENT WOULD BE 9-10m DEEP AT CONNECTION POINT

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

NOTES: THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RISK REGISTER PRODUCED FOR INCLUSION IN THE HEALTH AND SAFETY PLAN. THE HAZARDS NOTED ARE IN ADDITION TO THE NORMAL HAZARDS AND RISKS FACED BY A COMPETENT CONTRACTOR WHEN DEALING WITH THE TYPE OF WORKS DETAILED ON THIS DRAWING.

CONSTRUCTION RISKS

DEEP DRAINAGE (8-10m) IN VARIOUS LOCATIONS IF PUMPING STATION OPTIONS REPLACED WITH GRAVITY ONLY. REFER TO KEY ISSUES.

MAINTENANCE/ CLEANING RISK

SEE CONSTRUCTION RISKS

DEMOLITION RISKS

SEE CONSTRUCTION RISKS

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS AND SPECIFICATION.
2. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN THESE DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ARCHITECT AND / OR THE ENGINEER FOR CLARIFICATION.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. DO NOT SCALE THIS DRAWING.
5. DESIGN BASED ON MASTER PLAN v8.7.

KEY :

- PHASE 1 (YEAR 1 - 2) FOUL GRAVITY DRAIN
- PHASE 2 (YEAR 3 - 7) FOUL GRAVITY DRAIN
- PHASE 3 (YEAR 8-9) FOUL GRAVITY DRAIN
- PHASE 1 (YEAR 1 - 2) PUMPING STATION AND FOUL RISING MAIN
- PHASE 2 (YEAR 3 - 7) PUMPING STATION AND FOUL RISING MAIN
- PHASE 3 (YEAR 8 - 9) PUMPING STATION AND FOUL RISING MAIN
- 27.0 INDICATIVE FINISHED LEVEL, TO BE CONFIRMED AT DETAILED DESIGN
- 24.0 INDICATIVE FINISHED CONTOURS

TOTAL PEAK FLOW RATE	171.7 l/s
PERMITTED DISCHARGE TO ANGLIAN WATER TRUNK SEWER	42.4 l/s
FLOW TO BE ATTENUATED ON SITE	129.3 l/s

Revision Details	By / Check	Date	Suffix
PUMPING STATION 2 RELOCATED	IP / SES	01.10.12	C
LAYOUT UPDATED AND STRATEGY REVISED	IP / SES	19.06.12	B
REVISED STORAGE CALCULATIONS	PH / RW	04.11.10	A

Drawing Status: PRELIMINARY

This drawing is for preliminary purposes only and is subject to amendment during design development. UNDER NO CIRCUMSTANCES MUST THIS DRAWING BE USED FOR CONSTRUCTION PURPOSES

Client: UNIVERSITY OF CAMBRIDGE

Job Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE

Scale at A1: NTS

Drawn	Approved		
PH	SES		
Stage 1 check	Stage 2 check	Originated	Date
RW	JR	SW BAS	OCT 10

URS Infrastructure & Environment UK Limited
Scott House
Alençon Link, Basingstoke
Hampshire, RG21 7PP
+44(0)1256 310200
+44(0)1256 310201
www.ursglobal.com

Drawing Number: D127313-500-120 Rev: C

Plot Date : 01-Oct-12 03:23 PM BY : ip2761jc
File Name : [7:7] K:\D127313 - NW Cambridge\06a CAD\Working\Sheets\500 SERIES\500-100 SERIES\D127313-500-120.dwg [3.Xrefs] X-OS BASE.DWG X-LANDSCAPE.DWG X-GROND FLOOR PLAN.DWG

DB1H

APPENDIX F - DESIGN DRAWINGS SHOWING PROPOSED FOUL SEWERS AND PUMP STATIONS

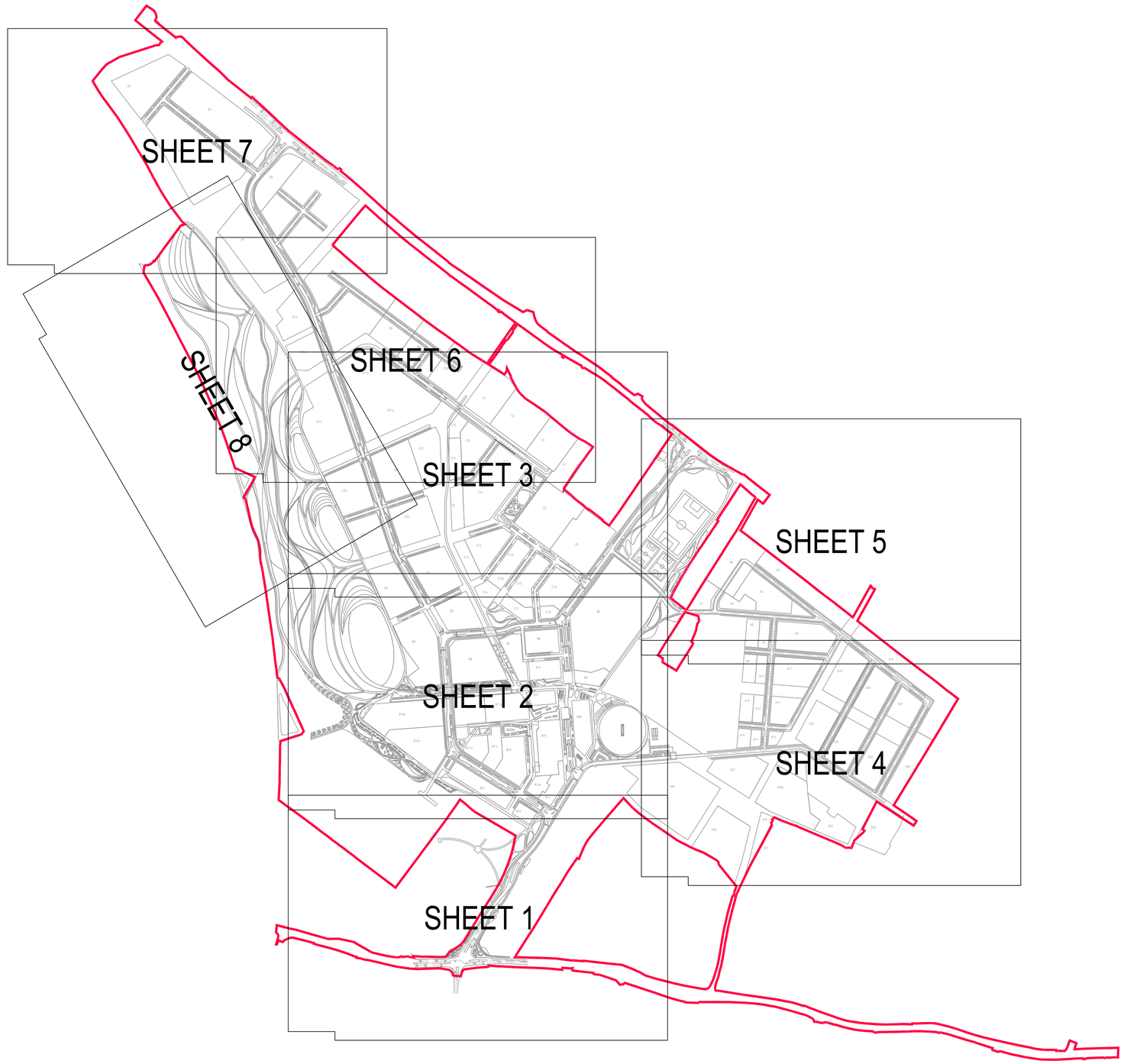
N

NOTES

1. THIS DRAWINGS IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS AND SPECIFICATION.
2. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN THESE DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ARCHITECT AND / OR THE ENGINEER FOR CLARIFICATION.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. DO NOT SCALE THIS DRAWING.

KEY

APPLICATION SITE BOUNDARY



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Revision Details	By / Check	Date	Suffix

CONSTRUCTION RISKS	MAINTENANCE / CLEANING RISK	DEMOLITION RISKS

In addition to the hazard/risks normally associated with the types of work detailed on this drawing take note of above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: SURFACE AND FOUL WATER STRATEGY SHEET ARRANGEMENT

Designed	Drawn	Checked	Approved	Date
RT	JC	SES	DAJS	26.11.12

URS Internal Project No.: Project No

Suitability:

Scale @ A1: 1:5000

URS Infrastructure & Environment UK Limited
Scott House
Alencon Link, Basingstoke
Hampshire, RG21 7PP
+44 (0)1256 310 200
+44 (0)1256 310 201
www.ursglobal.com

Drawing Number: NWC-URS-UT-05-DR-CE-00103

Rev: 0.1

Plot Date: 26/11/2012 13:58:08PM
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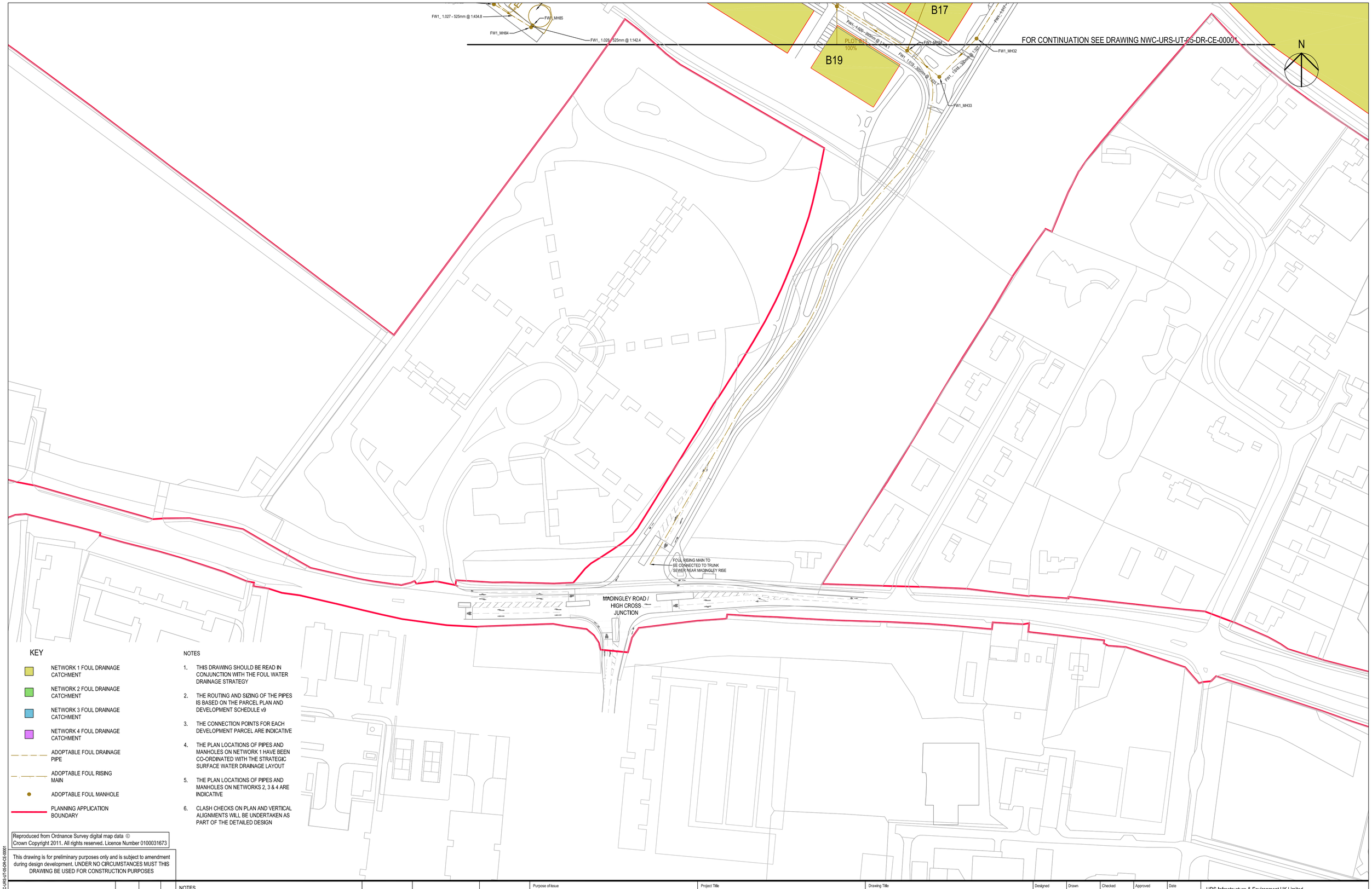

KEY

- NETWORK 1 FOUL DRAINAGE CATCHMENT
- NETWORK 2 FOUL DRAINAGE CATCHMENT
- NETWORK 3 FOUL DRAINAGE CATCHMENT
- NETWORK 4 FOUL DRAINAGE CATCHMENT
- ADOPTABLE FOUL DRAINAGE PIPE
- ADOPTABLE FOUL RISING MAIN
- ADOPTABLE FOUL MANHOLE
- PLANNING APPLICATION BOUNDARY

NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE FOUL WATER DRAINAGE STRATEGY
2. THE ROUTING AND SIZING OF THE PIPES IS BASED ON THE PARCEL PLAN AND DEVELOPMENT SCHEDULE v9
3. THE CONNECTION POINTS FOR EACH DEVELOPMENT PARCEL ARE INDICATIVE
4. THE PLAN LOCATIONS OF PIPES AND MANHOLES ON NETWORK 1 HAVE BEEN CO-ORDINATED WITH THE STRATEGIC SURFACE WATER DRAINAGE LAYOUT
5. THE PLAN LOCATIONS OF PIPES AND MANHOLES ON NETWORKS 2, 3 & 4 ARE INDICATIVE
6. CLASH CHECKS ON PLAN AND VERTICAL ALIGNMENTS WILL BE UNDERTAKEN AS PART OF THE DETAILED DESIGN

This drawing is for preliminary purposes only and is subject to amendment during design development. UNDER NO CIRCUMSTANCES MUST THIS DRAWING BE USED FOR CONSTRUCTION PURPOSES

Revision Details	By / Check	Date	Suffix
FIRST ISSUE	IP / SES	19.11.12	1.0

NOTES

CONSTRUCTION RISKS	MAINTENANCE / CLEANING RISK	DEMOLITION RISKS

In addition to the hazard/risks normally associated with the types of work detailed on this drawing take note of above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of Issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 1 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: 47064388

Suitability: S2 - FOR INFORMATION

Scale @ A1: 1:1000

URS Infrastructure & Environment UK Limited
Scott House
Alencon Link, Basingstoke
Hampshire, RG21 7PP
+44 (0)1256 310 200
+44 (0)1256 310 201
www.ursglobal.com

Drawing Number: NWC-URS-UT-05-DR-CE-00001

Rev: 1.0

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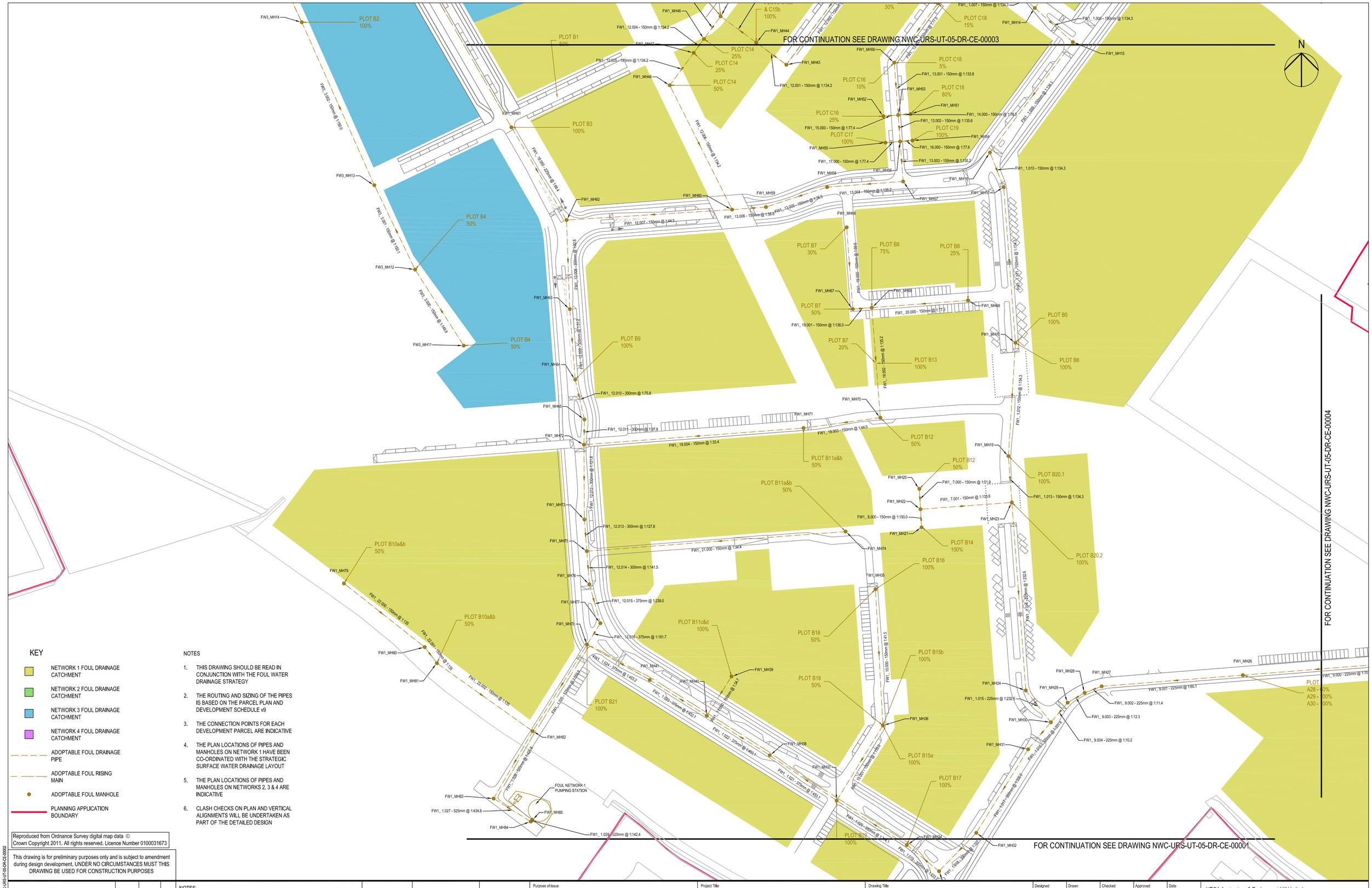

KEY

- NETWORK 1 FOUL DRAINAGE CATCHMENT
- NETWORK 2 FOUL DRAINAGE CATCHMENT
- NETWORK 3 FOUL DRAINAGE CATCHMENT
- NETWORK 4 FOUL DRAINAGE CATCHMENT
- ADOPTABLE FOUL DRAINAGE PIPE
- ADOPTABLE FOUL RISING MAIN
- ADOPTABLE FOUL MANHOLE
- PLANNING APPLICATION BOUNDARY

NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE FOUL WATER DRAINAGE STRATEGY
2. THE ROUTING AND SIZING OF THE PIPES IS BASED ON THE PARCEL PLAN AND DEVELOPMENT SCHEDULE v9
3. THE CONNECTION POINTS FOR EACH DEVELOPMENT PARCEL ARE INDICATIVE
4. THE PLAN LOCATIONS OF PIPES AND MANHOLES ON NETWORK 1 HAVE BEEN CO-ORDINATED WITH THE STRATEGIC SURFACE WATER DRAINAGE LAYOUT
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6. CLASH CHECKS ON PLAN AND VERTICAL ALIGNMENTS WILL BE UNDERTAKEN AS PART OF THE DETAILED DESIGN

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Revision Details	By / Check	Date	Suffix
FIRST ISSUE	IP / SES	19.11.12	1.0

NOTES

CONSTRUCTION RISKS	MAINTENANCE / CLEANING RISK	DEMOLITION RISKS
In addition to the hazard/risks normally associated with the types of work detailed on this drawing take note of above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.		

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 2 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: 47064388
Suitability: S2 - FOR INFORMATION
Scale @ A1: 1:1000

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Scott House
Alencon Link, Basingstoke
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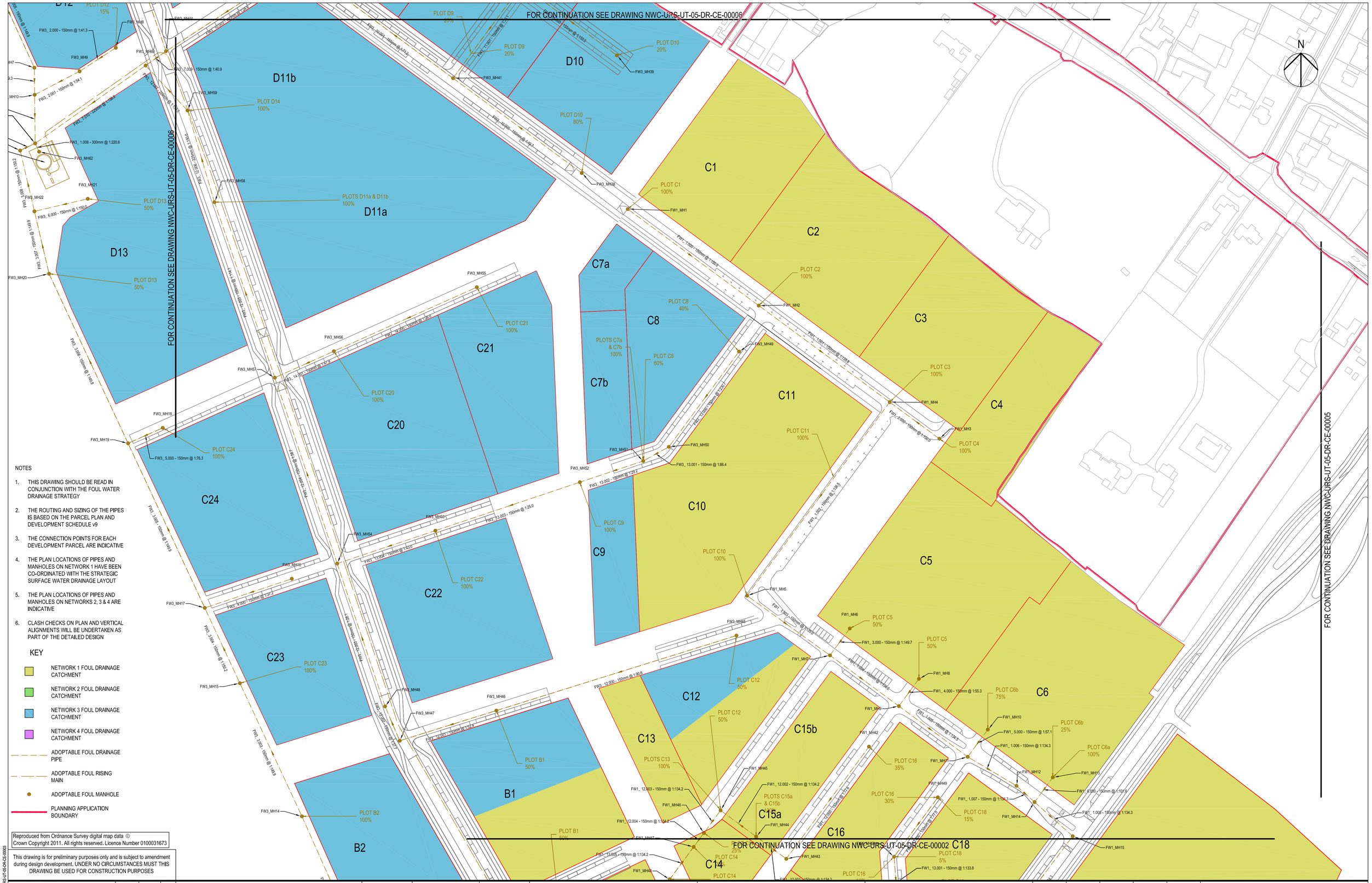
Drawing Number: NWC-URS-UT-05-DR-CE-00002
Rev: 1.0

Plot Date: 27/11/2012 13:58:05
File Name: K:\WC4_CAD\UTILS\DWG\NWC-URS-UT-05-DR-CE-00002



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- NETWORK 4 FOUL DRAINAGE CATCHMENT
- ADOPTABLE FOUL DRAINAGE PIPE
- ADOPTABLE FOUL RISING MAIN
- ADOPTABLE FOUL MANHOLE
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Revision Details	By / Check	Date	Suffix
FIRST ISSUE	IP / SES	19.11.12	1.0

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of Issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 3 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: Project No

Suitability:

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Drawing Number: NWC-URS-UT-05-DR-CE-00003

Rev: 1.0

Plot Date: 27/11/2012 18:56:56
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FIRST ISSUE	IP / SES	19.11.12	1.0

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 4 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: Project No

Suitability:

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Drawing Number: NWC-URS-UT-05-DR-CE-00004

Rev: 1.0

Plot Date: 27/11/2012 1:55:44 PM
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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of Issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 5 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: 47064388

Suitability: S2 - FOR INFORMATION

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Drawing Number: NWC-URS-UT-05-DR-CE-00005

Rev: 1.0

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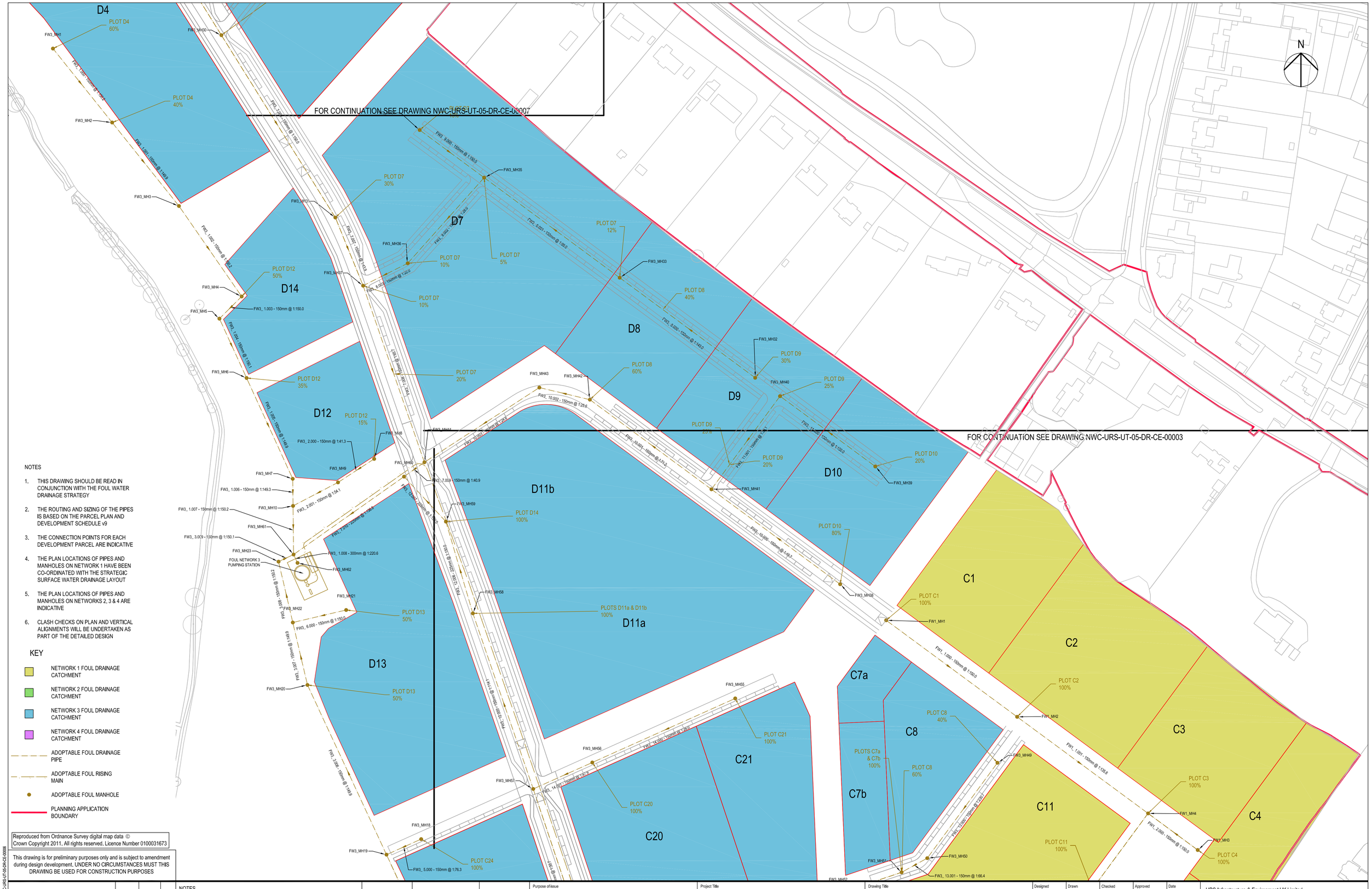

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 6 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.: 47064388

Suitability: S2 - FOR INFORMATION

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Drawing Number: NWC-URS-UT-05-DR-CE-00006

Rev: 1.0

Plot Date: 27/11/2012 15:58:05
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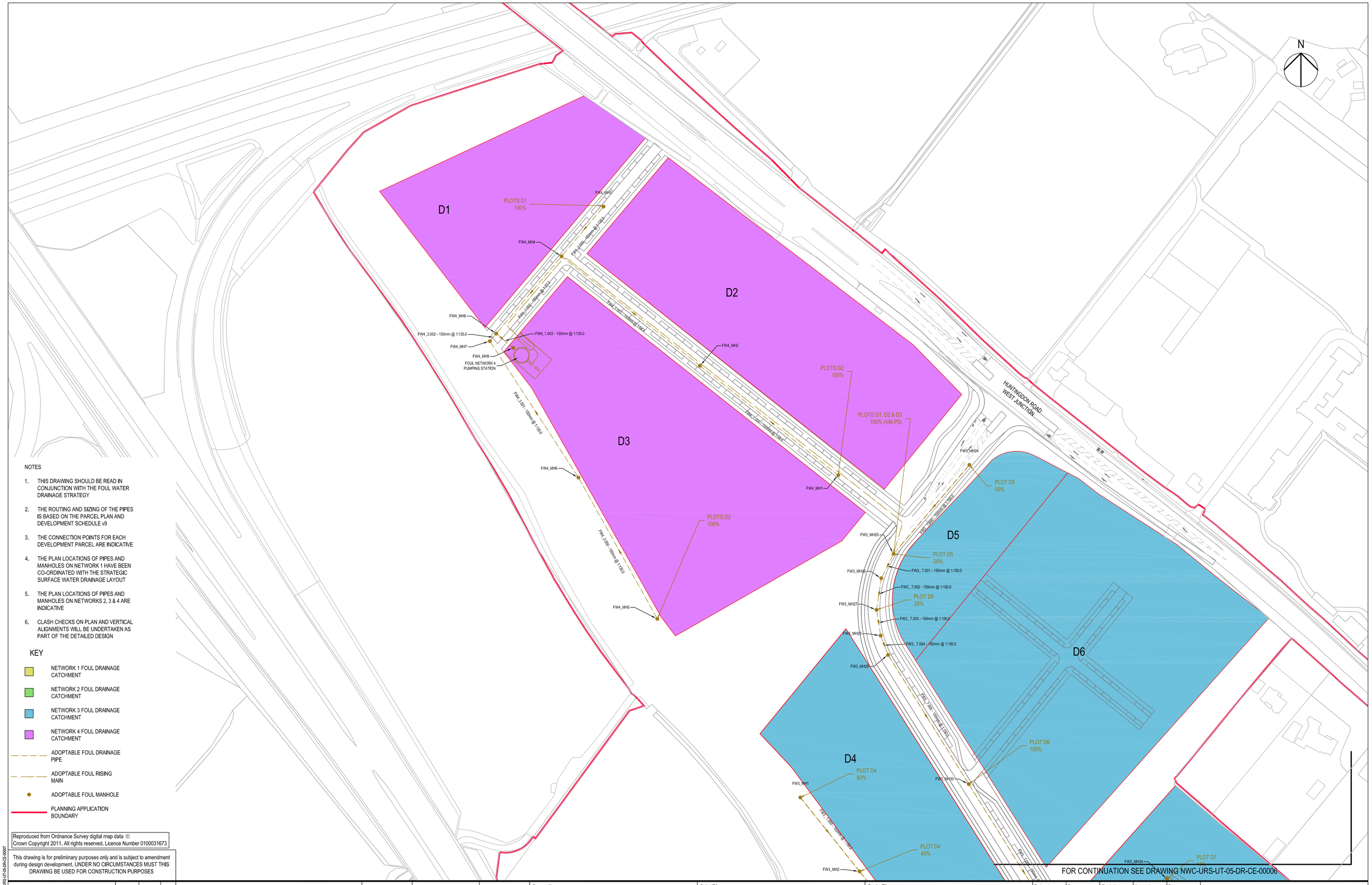

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FOR CONTINUATION SEE DRAWING NWC-URS-UT-05-DR-CE-00006

Revision Details	By / Check	Date	Suffix
FIRST ISSUE	IP / SES	19.11.12	1.0

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of Issue: INFORMATION

Client: UNIVERSITY OF CAMBRIDGE

Project Title: NORTH WEST CAMBRIDGE

Drawing Title: FOUL DRAINAGE STRATEGY GENERAL ARRANGEMENT SHEET 7 OF 7

Designed	Drawn	Checked	Approved	Date
IP	IP	SES	DAJS	13.11.12

URS Internal Project No.	Suitability
47064388	S2 - FOR INFORMATION
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Drawing Number	Rev
NWC-URS-UT-05-DR-CE-00007	1.0

Plot Date: 27/11/2012 - 13:54:27 PM
File Name: K:\NWC\4_CAD\UTILS\SW\NWC-URS-UT-05-DR-CE-00007

APPENDIX G – CORRESPONDENCE

Ian Philpott

From: Ian Philpott
Sent: 30 August 2012 14:19
To: Dunn Michael
Subject: RE: North West Cambridge
Attachments: RE: North West Cambridge - Off-site junctions impacts; 120626 _NWC_Plot_Schedule_v9A_revised.xls; NWC_REV9A_PHASING_YR1-19_LR.pdf

Mike

Apologies for not getting back to you sooner but I have been somewhat snowed under with this project.

With regards you email below, this is exactly the issue I raised at our meeting. Our Client (University of Cambridge) has a number of consultants appointed on this project and I suspect it is the discussions with AECOM they are referring to. At our meeting I outlined that the they were considering a number of "greener" water solutions such as black water harvesting for non-potable uses etc. However, I am aware that if they wish to proceed with some of these options there are a number of regulatory hurdles to overcome with OFWAT before they can be progressed. Such regulatory issues are not compatible with an on-site commencement on Q1 2013. Therefore, our client has instruct us to progress with Phase 1 using "traditional" drainage techniques.

Further to our meeting please find attached the current development timeline and schedule (this may change in the future). What I refer to as Phase 1 is covered by Year 1 (2014) and Year 2 (2015). Could you please get back to me as soon as possible on what we need to do to move forward.

On a slightly different note I have not had any response to the C3 requests from 12th July (See attached email). Could you chase them down with your planning Engineers.

Thanks

Ian

Ian Philpott BEng (Hons)
Engineer
URS Infrastructure & Environment UK Limited

Scott House, Alencon Link, Basingstoke, Hampshire, RG21 7PP, United Kingdom

Direct: +44 (0)1256 310 617
Mobile: +44 (0)7767 230 143
ian.philpott@urs.com

From: Dunn Michael [mailto:mDunn2@anglianwater.co.uk]
Sent: 24 August 2012 10:33
To: Ian Philpott
Subject: North West Cambridge

Hi Ian

With regards to the above development, I had a meeting with our planning team yesterday on how we are taking this forward.

They have asked me to make the recommendations for the site clear, as there seems to be some confusion with how we will serve the site. I mentioned that we had already discussed the pumping station solution and that we may proceed with a detailed assessment to work through what the best 'traditional 'options will be for the site. However planning have also been involved with another consultant regarding a greener strategy for the site including possible black water re harvesting and so on.

Are you able to shed any light from your perspective on where I need to focus the planning team, they obviously have heavy workloads and don't wish to spend time working on options that may never see the light of day!

If you could advise that would be appreciated.

Regards

Mike

Mike Dunn
Developer Account Manager
Developer Services
Mob 07740 072186
E-Mail: mDunn2@anglianwater.co.uk
Website: www.anglianwater.co.uk/developers

Ian Philpott

From: Ian Philpott
Sent: 02 October 2012 10:00
To: Dunn Michael
Subject: RE: North West Cambridge
Attachments: D127313-500-120 Rev C.pdf; Figure 1.pdf; IandT Issue Sheet 120110.pdf; 120924 AW Sec 98_signed & dated.pdf; 120924 AW Sec 98.pdf; 120626 _NWC_Plot_Schedule_v9A_revised.xls; V9.pdf

Mike

Please find attached the following

- A Revised copy of the foul strategy drawing 500-120. Please note that we have had to relocate pumping station 2 compared to the previous drawing I circulated to yourself and Rob.
- Location plan (figure 1)
- Copy of the Sec98 form. One being a clean scan. The other being where our client has signed section 1d
- V9 development schedule
- V9 phasing plan

Could you please push this forward as soon as possible as I'm being pressured to get things under way. Any problems please give me a call.

I am currently drafting a schedule based on the V9 development plan outlining the proposed peak flow rates for each type of unit, as discussed at our meeting. Once I have finalised this I will forward this to you so we can agree these flow rates before we begin designing the networks in more detail.

Regards

Ian

Ian Philpott BEng (Hons)
Engineer
URS Infrastructure & Environment UK Limited

Scott House, Alencon Link, Basingstoke, Hampshire, RG21 7PP, United Kingdom

Direct: +44 (0)1256 310 617
Mobile: +44 (0)7767 230 143
ian.philpott@urs.com

From: Dunn Michael [mailto:mDunn2@anglianwater.co.uk]
Sent: 17 September 2012 15:18
To: Ian Philpott
Subject: North West Cambridge

Hi Ian

Following Fridays call, below is the link to the formal application you will need to make for the foul solutions to the site. Once we have received the application we will then be in touch to discuss next steps.

http://www.anglianwater.co.uk/developers/sewer-connection/new-sewer.aspx

In terms of the C3 requests, this was submitted to our planning team on 12 July, along with the plans for the site. I have chased planning up on this and they are due to send me a response shortly. I am out of the office from now until tomorrow afternoon but I have my blackberry switched on so will forward any response that I receive as soon as it hits my email.

Regards

Mike

Mike Dunn
Developer Account Manager
Developer Services
Mob 07740 072186
E-Mail: mDunn2@anglianwater.co.uk
Website: www.anglianwater.co.uk/developers

Ian Philpott

From: Ian Philpott
Sent: 24 October 2012 14:52
To: Suzanne Scobie
Subject: FW: North west Cambridge - Design Flows for Foul Network for Agreement
Attachments: 121008 Foul Design Flows.pdf

Ian Philpott BEng (Hons)
Engineer
URS Infrastructure & Environment UK Limited

Scott House, Alencon Link, Basingstoke, Hampshire, RG21 7PP, United Kingdom

Direct: +44 (0)1256 310 617
Mobile: +44 (0)7767 230 143
ian.philpott@urs.com

From: Ian Philpott
Sent: 08 October 2012 15:35
To: Mike Dunn (mdunn2@anglianwater.co.uk)
Subject: North west Cambridge - Design Flows for Foul Network for Agreement

Mike

At our initial meeting I indicated that I would like to establish a schedule of the proposed building types for the development and agree foul flow rate which we would use for each of them. My concern being that as this development has a high proportion of 1 & 2 bed units the standard sewers for adoption 4000l/unit per day would result in pipe sizes and gradients such that self cleansing velocity is not achieved on a regular basis and thus blockages occur. In addition to this there is a proportion of non-domestic flows that also need to be considered. My aim is to ensure that everything is agreed with yourselves, as the adopting authority, prior to the design being submitted for approval so there are no surprises for either party.

Attached is a schedule I have developed based in the V9 masterplan schedule that I have previously provided you. Highlighted in orange are the flows I propose to use for each domestic house type and each non-domestic usage. Summarised below are a few key points for the development of the attached schedule

- All domestic properties will be CfSH Level 5.
- All non-domestic properties will be BREAM Excellent or BREAM Outstanding where viable
- Due to the high proportion of 1, 2 & 3 bed properties the SFA flows of 4000l/day/unit are considered excessive and giving rise to concerns about achieving self cleansing velocity at regular enough intervals to minimise blockages.
- In smaller 1,2 & 3 bed units a higher flow rate of 200l/head/day has been assumed
- In larger 4 & 5 bed units a lower flow rate of 150l/head per day, capped at 4000l/unit/day has been assumed.
- Academic and Commercial Research - Final usages are unknown at this time. Therefore, a flow rate of 1.3l/s/Ha (SFA 7 - B5.1.2) has been assumed
- Student Housing - Flow rates as per studio flat have been assumed for each of the 2004 units to be provided.
- Other Uses
    - Storage area in Plot B12.1 - No foul connection
    - University Accommodation Office (Plot B11a.2) and Police Office (Plot B14.2) considered to have low flows therefore only domestic component of 0.6l/s/Ha (SFA 7 - B5.1.2a) assumed.
    - Senior Care Home (Plot B8), University Café (Plot B11a.1), Pub (Plot B12.1), Hotel (Plot B13) considered to have high flows therefore 1.6l/s/Ha (SFA 7 - B5.1.2b) assumed

- CHP (Plots B15.1 & D1) have very low flows under normal conditions, typically a staff toilet, shower and kitchenette). However, annual boiler inspections requires each of the boilers to be drained. Once the boiler selection is complete the volume of water from this activity can be assessed. Until this assessment can be made we have assumed 1.6l/s/Ha but we will confirm the actual figures as soon as these are available.

I would be grateful if you could confirm if these will be acceptable to Anglian Water. If there are any questions or you wish to discuss any of these points further then please give me a call.

Regards

Ian

Ian Philpott BEng (Hons)
Engineer
URS Infrastructure & Environment UK Limited

Scott House, Alencon Link, Basingstoke, Hampshire, RG21 7PP, United Kingdom

Direct: +44 (0)1256 310 617
Fax: +44 (0)1256 310 201
Mobile: +44 (0)7767 230 143
ian.philpott@urs.com
www.ursglobal.com

URS

Meeting Record

Contract:	North West Cambridge	**Contract No:**	47064388
Subject:	Foul Drainage Strategy	**Date:**	15/02/13
Place:	Anglian Water – Huntingdon		

Present:	**Name**	**Company**
IP	Ian Philpott	URS
MD	Mike Dunn	Anglian Water
GB	Gareth Barker	Anglian Water
DN	Derek Newman	Turner and Townsend
JN	Jon Neve	Turner and Townsend
Distribution:	**As above plus**	
SES	Suzanne Scobie	URS
RM	Rob Morris	Anglian Water
VT	Vyas Toteram	Turner and Townsend
HT	Heather Topel	AECOM D&P

ITEM	**DESCRIPTION**	**ACTION**
1.0	IP outlined the key changes within the foul drainage strategy which, AW should have received via CCC, compared to drawing 500-120 Rev c as issued with the Sec 98 Application • Pumping Station 4 has been relocated to minimise pipe inverts at the pumping, previous location didn't have required clearance to buildings and would have resulted in incoming invert around 6m deep. Revised location invert 3-3.5m deep • Pumping Station 1 has been relocated away from buildings and at a lower elevation, again to minimise incoming invert depths • Pumping Station 3 has been relocated at a lower elevation, again to minimise incoming invert depths. It should be noted that this pumping station isn't required until very late in the development programme. A decision on whether this is an adopted or private pumping station can be delayed until details of the development of plots D1 – D3 is decided.	
2.0	IP re-iterated the reasoning why 4 pumping stations are required these are highlighted in the "Key Issues" box on drawing 500-120 Rev C. MD / GB agreed with the reasoning that 8-10m deep sewers would not be desirable.	
3.0	MD requested a copy of the FW strategy to ensure AW are working from the latest information. App F drawings will need to replace 500-120 in S98	IP

URS

Meeting Record

ITEM	DESCRIPTION	ACTION
4.0	DN outlined the key facts in the development timeline • Outline Planning Consent – Granted August 2011 • UoC Phase 1 Sign Off – January 2013 • S106 Agreement Sign Off – Expect 22/02/13 • Madingley Road and Huntingdon Road junction already have detailed consent and are progressing through technical approval.	
5.0	MD outlined the S98 process • Timescale and costing expected by MD 15/02/13 • For this scale of development AW would be able to make a non-statutory offer as well as the 2 statutory offers. MD will forward once received	
6.0	DN/JN indicated that some minor changes have been made to number of units being developed. DN/JN to forward build schedule to AW	DN/JN
7.0	DN indicated that they would like to meeting AW again once the offers are on the table, bringing along Brian Nearney (UoC Commercial Manager) to discuss options	
8.0	IP advised that CCC would not release the condition within the planning application. Key points from CCC were information on wet well storage volumes which we were awaiting advice from AW on following there review of capacity in Madingley Road and pumping strategy. Any minor changes due to development numbers and wet well sizing etc could then be incorporated. MD / GB to progress release with CCC.	MD / GB
9.0	MD suggested a monthly conference call to make sure everything stay on track now development is moving forward. MD to schedule	MD
10.0	GB indicated that all works could be completed under the S98 whether it was done by UoC contractor or AW contractor. AW would need on-site costs, off-site cost to develop the cost model. DN / JN to get cost planning team to extract costs for on-site works.	DN/JN

Minutes prepared by: Ian Philpott

Issued By: Ian Philpott

Scott House
Alencon Link
Basingstoke
Hampshire
RG21 7PP

Ian Philpott

From: Derek.Newman@turntown.co.uk
Sent: 09 April 2013 16:19
To: Topel, Heather
Cc: David A Smith; Ian Philpott; Gavin Coull
Subject: Fw: NW Cambridge Development Foul Water Strategy

Heather

Apologies unread mail - see below from Anglian Water.

Derek

Derek Newman
Director
Turner & Townsend Project Management
t: +44 (0)20 7544 4000| d: +44 (0)20 77598483 | d: +44 (0)7939674530
e: derek.newman@turntown.co.uk | http://www.turnerandtownsend.com

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----- Forwarded by Derek Newman/PM/Lon/TTGroup on 09/04/2013 16:16 -----

From: Dunn Michael <mDunn2@anglianwater.co.uk>
To: "'Derek.Newman@turntown.co.uk'" <Derek.Newman@turntown.co.uk>, "'Jon.Neve@turntown.co.uk'" <Jon.Neve@turntown.co.uk>
Date: 05/04/2013 15:28
Subject: RE: NW Cambridge Development Foul Water Strategy

Hi Derek, Jon

I will cover off the Section 98 offer and the communication with Cambridge CC in greater detail at our meeting next week.

All correspondence with the local authority is conducted through our growth planning team. The growth team have confirmed that we were sent details of the foul strategy for the site in October 2012.

We know that Outline planning approved by the Joint Development Control Committee on 8 August 2012, subject to the signing of a Section 106 Agreement. This was signed on 22 February 2013.

The proposal includes:

- up to 3,000 dwellings
- up to 2,000 student bedspaces
- 100,000 sq m employment floorspace, of which: up to 40,000 sq m commercial floorspace (class B1(b) and sui generis research uses) and at least 60,000 sq m academic floorspace (class D1)
- up to 5,300 sq m gross retail floorspace (use classes A1 to A5) (of which the supermarket is 2,000 sq m net floorspace)
- senior living, up to 6,500 sq m (class C2: residential institution, eg care home)
- community centre, police, primary healthcare, primary school, nurseries (Class D1)
- indoor sports provision and open space

The growth planning team responded to the council on 21 January 2013.
We have confirmed to the council that the high level drainage strategy of connecting the foul flows into the public foul sewer is acceptable. We also confirmed that the onsite strategy is currently ongoing.
We then added that following receipt of the surface water drainage strategy dated November 2012 that we would make the following comments

‘ The surface water outfall will not be to a public surface water sewer and therefore it is outside of our jurisdiction to comment on available capacity. Should the on site surface water sewers be proposed for adoption, they should be designed in accordance with the current version of sewers for adoption.
We have invited the Council to contact us should they have any queries or additional points to raise and to date we have not been contacted since our correspondence on 21 January 2013.
Given the above, I am going to arrange a meeting with our growth team and the authority; even if it is to re-confirm our approach I think this would be beneficial.
Regards
Mike

Mike Dunn
Developer Account Manager
Developer Services
Mob 07740 072186
E-Mail: mDunn2@anglianwater.co.uk
Website: www.anglianwater.co.uk/developers

From: Derek.Newman@turntown.co.uk [mailto:Derek.Newman@turntown.co.uk]
Sent: 05 April 2013 13:22
To: Dunn Michael
Subject: RE: NW Cambridge Development Foul Water Strategy

EXTERNAL MAIL
Mike

I have been told that this matter is unresolved and may have serious implications for follow on reserved matters applications.

Would you kindly chase for us?

Regards

Derek

Derek Newman
Director
Turner & Townsend Project Management
t: +44 (0)20 7544 4000| d: +44 (0)20 77598483 | d: +44 (0)7939674530
e: derek.newman@turntown.co.uk | http://www.turnerandtownsend.com

From: Dunn Michael <mDunn2@anglianwater.co.uk>
To: "'Derek.Newman@turntown.co.uk'" <Derek.Newman@turntown.co.uk>
Cc: "ian.philpott@urs.com" <ian.philpott@urs.com>, "'Jon.Neve@turntown.co.uk'" <Jon.Neve@turntown.co.uk>
Date: 27/02/2013 10:27
Subject: RE: NW Cambridge Development

Hi Derek

I have chased our growth planning team for a response. As soon as I have that I will be in touch.

Regards

Mike

Mike Dunn
Developer Account Manager
Developer Services
Mob 07740 072186
E-Mail: mDunn2@anglianwater.co.uk
Website: www.anglianwater.co.uk/developers

From: Derek.Newman@turntown.co.uk [mailto:Derek.Newman@turntown.co.uk]
Sent: 25 February 2013 17:14
To: Dunn Michael
Cc: ian.philpott@urs.com; 'Jon.Neve@turntown.co.uk'
Subject: Re: NW Cambridge Development

EXTERNAL MAIL
Mike

Can you confirm that Anglian Water are satisfied with URS foul water site wide proposals?

Regards

Derek

Derek Newman
Director
Turner & Townsend Project Management
t: +44 (0)20 7544 4000| d: +44 (0)20 77598483 | d: +44 (0)7939674530
e: derek.newman@turntown.co.uk | http://www.turnerandtownsend.com

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From: Dunn Michael <mDunn2@anglianwater.co.uk>
To: "ian.philpott@urs.com" <ian.philpott@urs.com>, "Derek.Newman@turntown.co.uk" <Derek.Newman@turntown.co.uk>, "'Jon.Neve@turntown.co.uk'" <Jon.Neve@turntown.co.uk>
Date: 22/02/2013 14:20
Subject: NW Cambridge Development

Hi all

Firstly apologies for the slight delay in responding with the capital scheme cost numbers following last weeks meeting.

Please be aware that the outline figures are given subject to further investigation. No warranty is given with regard to the reliability or accuracy of the amounts or the assumptions and conditions used in its preparation. These outline figures have been prepared in good faith using the assumptions and conditions we have been given, but actual costs may vary considerably from those set out. On request, as matters become more certain, we will aim to provide more accurate cost estimates for you, but these too may vary considerably from the amounts to be used as the basis for any contract.

Costs

A total scheme cost including the pumping station and the rising main of £3323k. This also includes risk consideration for highways and other utilities. The cost of the design is estimated at £194,000. The design costs will be included into the total scheme cost.

Timeframes

As mentioned last week we will need to take the scheme costs and timeframes through our internal gateway process.

Our gateway process works as follows

Gateway 1 – Submission of the Section 98 and high level processing by Anglian Water to generate a capital scheme cost and timeframe

Gateway 2 – We will begin detailed modelling and scoping of works including refining the scheme cost and optioneering other potential solutions to the development which could benefit cost and time.

Gateway 3 – We will take the scheme to our Capital Investment Group to release the Anglian Water financial contribution which allows us to commit to works.

At the moment we are estimating a time span of 46 weeks to get to gateway 3.

Next Steps

In the next week I will begin to work with the capital scheme costs that have been given and will take the cost through three costing options that will reveal your contribution to the capital scheme cost.

1. Relevant Deficit calculation – This option takes the cost of providing the infrastructure as the basis of a notional loan. Over 12 years we calculate the actual revenue we receive in respect of the infrastructure and this is offset against the cost of actual repayments. The deficit is paid annually by the Developer.
2. DADS – The calculation is the same principle as the Relevant Deficit except the deficit is paid as a single payment and the revenue is estimated from the build rate rather than the actual revenue
3. FCS – Fixed commuted sum. – This is our own non statutory offer that is unique to Anglian Water. Given the size and scale of the development, this is the preferred costing option. Over the next couple of weeks I will begin the process of putting the FCS together. It is likely I will be in touch to request various pieces of information.

I will also be sending out meeting requests next week to ensure that we have regular updates on the scheme and modelling process. I am happy to do this either by dial in or face to face meeting and I would suggest a minimum of one meeting per month at present. I will set the first meeting for a couple of week's time so that I can update you all on FCS, costs and progress through Gateway.

Regards

Mike

Mike Dunn
Developer Account Manager
Developer Services
Mob 07740 072186
E-Mail: mDunn2@anglianwater.co.uk
Website: www.anglianwater.co.uk/developers

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