Wellesley

ALDERSHOT

# UTILITY STRATEGY

DECEMBER 2012

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# Quality Management

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# Contents

# 1 Introduction

This Utility Strategy accompanies a ‘Hybrid’ planning application submitted by Grainger plc (hereafter known as the ‘ Applicant’) to Rushmoor Borough Council (RBC) for the development of land within Aldershot known as the Aldershot Urban Extension (AUE), hereafter referred to as ‘Wellesley’. The Applicant seeks outline planning permission for residential development of up to 3,850 dwellings with associated infrastructure including access, and Maida Zone - Phase 1 detail for 235 dwellings at Wellesley (the Hybrid Application). This Utility Strategy should be read in conjunction with the corresponding application forms and drawings, along with the suite of documents that support this Hybrid Application. For further details on the Hybrid Application please refer to the Planning Statement.

As part of the submission package some plans are for approval, whilst others are for information/illustrative purposes only. Plans that are not for approval are clearly labelled ‘illustrative’ or ‘for information’. All other plans should be determined by the LPA as application drawings. The illustrative Masterplan is one way of interpreting the site against the opportunities and constraints identified and tested in the parameter plans. The parameter plans are for approval. Detailed proposals, following consent granted pursuant to the Hybrid Application, will be submitted to RBC in accordance with the Development Zones identified by the Applicant, as one or more Reserved Matter Application per Development Zone, which will include Listed Building Applications and Conservation Area Applications as appropriate.

Capita Symonds have been commissioned by Grainger to review the existing utility/drainage infrastructure and to develop the utility/drainage strategy for the entire Wellesley development. This is a particularly complex element due to the extent of the existing infrastructure and the need for retention of portions for the continuing need of the Aldershot Garrison.

The strategy covers two main areas at present that of the initial Maida Zone - Phase 1 development area together with the Western School site, and the wider area strategy for the remainder of the site.

Due to the approximate development period, currently indicated as around 15 years, the development of the utility supply may change during that period, but the underlying strategy is not likely to alter. However, should changes in legislation for energy or environmental occur then these would be incorporated with the relevant development phase detail design.

# 2 Utilities General

Utilities are essentially classified as all services required to operate a residential or commercial/industrial development and will include in part or all of the following:

- Potable water supply
- Electricity supply
- Gas supply
- Foul sewage disposal system
- Surface water control and disposal system
- Telecommunications

Although the site has been operated by the MoD for a long time, and was originally self sufficient in utility provision, operational needs have dictated changes particularly with the supply of potable water and electricity to the site.

This Utility Strategy should be read in conjunction with the Flood Risk Assessment also being submitted as part of the Hybrid Planning Application.

# 3 Existing Utilities on Development Area

The whole of the area now considered for development was serviced by the MoD. Drawings included within the appendices show the extent of all the utilities that were installed and which may be adapted for future use for Maida Zone - Phase 1 and the wider development.

Within the MoD the Defence Infrastructure Organisation (DIO) was created to separate the military operations from the utility supply to the garrison and accommodation. This was a country wide consideration but operates slightly differently in different areas.

The provision and management of the utilities for the Aldershot garrison is covered by two contracts Project Allenby Connaught, (PAC) and Project Aquatrine.

## 3.1 Project Aquatrine

The MoD's 1998 Strategic Defence Review highlighted a need to undertake major upgrading of its water and waste water assets. This need was generated in response to more stringent UK and EU legislation and an historical lack of investment, as well as uneven and unfocussed capital investment.

The review concluded that, to allow the MoD to focus on its core activities, the operation and maintenance of water and waste water assets and infrastructure should be transferred to the private sector. This process is known as Project Aquatrine.

Costain and Severn Trent Water formed C2C Services Limited with the combined company experience of operations and construction to run Project Aquatrine Package C Contract. This involves the design and delivery of potable water and waste water improvement solutions to 1,500 MoD sites across England for 25 years.

Under Project Aquatrine Package C, C2C undertake the supply of bulk potable water and the treatment of foul sewage within the Aldershot garrison. Neither of the two elements includes the operation of the distribution/collection infrastructure.

## 3.2 Project Allenby Connaught, PAC

As part of the same Strategic Defence Review, PAC was developed to undertake the upgrading and development of modern working and living accommodation for the military personnel. The Aldershot garrison is a section of this contract. The contract deals with two areas; accommodation & operational buildings and utility delivery. The utility delivery is undertaken by the Multi Utility Joint venture, (MUJV). MUJV Limited is a company owned by UK Power Networks Services and Veolia Water which designs and lays all potable water distribution mains, foul and surface water sewers, gas and electricity pipes and cables to the new buildings that Aspire is building for Project Allenby/Connaught. This is in addition to the operation and maintenance of the existing utility systems to the garrison including Annington Homes.

## 3.3 Current Position

All the utilities within the old MoD area have been contracted out for the service delivery and system maintenance and are operated as follows:

### 3.3.1 C2C

Costain and Severn Trent Water formed C2C Services Limited. Costain are a large international construction company and Severn Trent Water are one of the major water service providers for potable water and sewage treatment in UK. C2C are responsible for the bulk supply of potable water to the Aldershot garrison together with the treatment and disposal of all associated foul sewage.
This includes:

The operation and maintenance (O&M), of the bulk transfer water main between the South East Water reservoir at Upper Hale to Bourley Reservoir, owned by MoD, and from there to a connection point on the distribution system on the Farnborough Road.

The O&M of the Camp Farm Sewage Treatment Works (CFSTW), located off Camp Farm Road beside the A331, Blackwater Valley by-pass

### 3.3.2 MUJV

UK Power Networks Services and Veolia Water form the MUJV. UK Power Networks Services distribute electricity to a large part of the south east and east of England including London. Veolia Water are a part of the international Veolia Environment Group working in all areas of Water, Waste management, Transport and Energy and employ in excess of 300,000 people worldwide.

MUJV are responsible for the following for the entire Aldershot garrison area:

- O&M of the potable water distribution system
- O&M of the foul sewage collection system to a connection point at CFSTW.
- O&M of the entire surface water disposal system ultimately discharging to the Basingstoke canal, including outfall structures and silt traps
- Supply and distribution of all electrical requirements
- Provision of gas supply and management of operator Scotia Gas Networks, (SGN)

# 4 Sewage Treatment and Disposal Options

There have always been a number of options for the sewage treatment and disposal including the option to retain the current operator.

Capita Symonds Ltd considered at a very early stage that the most appropriate solution would be to consider the adoption of the entire sewerage network together with the CFSTW. This would have two major benefits:

- Property sales are generally less difficult if utilities are provided by a regulated business, proposals are being sought for adoption by Thames Water of all the drainage facilities.
- Adoption of the system would ensure alignment with the industry standard to all service delivery and as such be part of the regulatory framework.

## 4.1 Options

There are four options for foul treatment:

- Discharge all new foul sewage to CFSTW, capacity permitting
- Discharge all new foul sewage to Aldershot or Ash Vale STW capacity permitting
- Construct new dedicated sewage treatment facilities within the Wellesley development
- Combinations of any of the above either local or in larger volumes

# 5 Foul Sewage Options Assessment

The following is a brief overview of the investigations undertaken on potential sewage disposal options.

## 5.1 Camp Farm Sewage Treatment Works

The obvious first option to be considered was the existing treatment facility that of CFSTW. The CFSTW is currently serving the whole of the Aldershot Garrison including the Annington Homes with a total estimated peak population of between 10,000-15,000.

We have been able to confirm the design capacity of CFSTW and establish discharge consent volumes to the Blackwater River. Information received form the operators of CFSTW, C2C, have confirmed certain volumetric information which has enabled us to make an engineering assessment as to the suitability of the installation.

### 5.1.1 CFSTW Capacity

Overall capacity:

- Full treatment capacity of CFSTW 6603 m3 per day
- Peak recorded flow to CFSTW between 2009 - 2011 2800 m3 per day
- Current discharge consent to Blackwater River 7500 m3 per day
- Average potable water demand during last 2 years 1800 m3 per day

We are advised that the garrison population does not exceed the 15,000. We have taken the 2800 m3/d as equating to a typical peak when the garrison is full occupied.

It will be seen that the record information indicates that CFSTW is operating at peak flow of around 43% capacity.

Wellesley Development

The current estimated proposed development will consist 3850 residential units with an average occupancy rate as agreed in the core strategy of 2.4 giving a potential population of 9240. Using the South East Water figure of 170 l/h/d for potable consumption, we would require a potable demand of 1570 m3 per day. However, depending on the level used for the code for sustainable homes this demand could be less. Typically sewage discharge from a potable demand is around 85% which would equate to 1335 m3 per day.

Even if we assume the total potable demand for the new development returns through the sewage system, the current recorded peak flow together with the Wellesley domestic demand would equate to 4450 m3/d or less than 75% of current treatment capacity.

Current Infrastructure

There is in place a fully operating foul sewerage network covering the whole development area. Whilst a significant majority of this network may become obsoleted, the very existence of the system confirms the entire site can be serviced by CFSTW as it now is.

## 5.2 On Site Sewage Treatment

The construction of a new installation for the treatment of sewage for the Wellesley would take up developable land thus reducing again the overall value of the development. Additional discharge points would be required to watercourses with the associated environmental issues.

Frequently used for small treatment installations is the RBC, Rotating Biological Contactor. These are package treatment installations which would have the capacity for generally up to 1000 population, but are normally used in much smaller installations. With the possible development of around 10,000 population this could require as many as 10 units which would not include for any emergency arrangement.

Each installation would require approximately 300 m2 of land take, possibly more depending on the requirement of the adopting authority for access. Hence 10 units would require an area of 3000 m2 excluding access.

Each installation would require some form of discharge consent either to the canal or the Blackwater River, both of which are logistically difficult to reach and particularly to the canal could be environmentally challenging.

Our estimate for the sewage treatment using this method would at current prices be £2.35M excluding any additional infrastructure required to deliver the final effluent to the discharge point.

## 5.3 Discharge to Existing Off Site Sewage Treatment Installations

There are two Sewage treatment Works (STW) off site which could be within the reach of the Wellesley development, Aldershot and Ash Vale. We do not have definitive spare capacity at these installations and previous reports by Entec refer to the statement that the MOD would not allow non military effluent to go to the CFSTW, a constraint which does not exist now, particularly if the adoption of the CFSTW takes place in the future.

Discharge to either of the off site installations would require extensive infrastructure development off site and potential additional crossings of the railway and or canal, both of which would be complex. The associate pumping required would be a major consideration in the development of this option.

Aldershot Sewage works in Holder Road is approximately 2km south east to the nearest point of the new development. There is a sewer run under the railway bridge in North Lane but this is the head of a run and small diameter. It would not accommodate significant flow from the development but we have assumed that a proportion may be discharged at this point from Reme and ABRO subject to capacity availability.

Ash Vale sewage works is a similar distance from the development but to the north east and would involve crossing both the canal and the Blackwater Valley bypass to connect to the works.

## 5.4 Combination Options

The option of combinations would be most appropriately considered in the event of needing additional capacity at CFSTW. This may be achievable by the redirection of foul flow from say the Annington Homes areas immediately to the north of Aldershot town and south of the Cambridge Military Hospital. Information and records provided imply that even following full development of the Wellesley, CFSTW would still have spare capacity.

If the CFSTW and the foul sewerage network were to be adopted then all discharges would be to the same service provider. This is a longer term investigation and could create additional capacity at CFSTW. At this stage we have not taken this option further but options including this may be considered as the development progresses.

## 5.5 Future Service Provision

From the foregoing sections it is clear that CFSTW is best suited for utilisation as the discharge point for all foul sewage from Wellesley summarised as follows:

- There is more that the required spare capacity to accommodate all future flows.
- The discharge consent to the Blackwater River system is greater than the CFSTW design capacity hence no additional or extended consents will be required.
- The Long development period would facilitate refurbishments or refinements to treatment if necessary, currently none are required or envisaged other than normal asset replacement.
- It is recommended that CFSTW be transferred to a regulated business.

# 6 Foul Water Drainage

There is in existence throughout the site a foul sewerage network which historically collected all foul drainage from the MoD installations within the development area and conveyed it to the Camp Farm Sewage Treatment Works, CFSTW, for disposal. Since the decommissioning of large areas of the site much of this system has fallen into reduced usage or complete disuse. However, the system has not itself been decommissioned and is currently being investigated for possible reuse within the development. Re-use of any of the system will result in economies in development and also be environmentally friendly and more sustainable.

The foul drainage strategy considers how the proposed waste water from the developments will drain. The overriding objective is to offer the entire foul drainage system up for adoption to a regulated service provider. Adoption of the system will increase the level of confidence for potential purchasers thus stabilising the land values by eliminating uncertainties.

Not all of the existing foul network is strategically positioned for potential integration into the disposal system. Before any of the existing system can be considered for re-use and ultimately adoption, all potentially usable sections must be hydraulically modelled to ascertain its potential capacity and, internally investigated by CCTV to determine condition and verify record information. See later section for details of CCTV.

## 6.1 Existing Drainage Network

The site is currently served by and existing foul network owned by the MOD and maintained by MUJV. The foul flows are collected by the foul drainage network and discharge for treatment into Camp Farm Sewage Treatment Works

The strategic foul sewage system covers all areas of the Wellesley development as it was servicing all these points previously. There are two major routes for the system one either side of the high level ridge running through the site. The first covering the Wellesley development area discharging to the north of the ridge and the second covering the area south of the ridge primarily servicing Annington Homes.

Reme currently has no drainage and the ground levels indicate that a foul drainage system should mostly be able to be connected to the south network however part may require pumping into the system or, possibly discharge to the existing adopted sewers in North Lane. This will not be determined before more detailed design plans for the area have been formulated.

The most appropriate starting point for the foul sewage disposal system is to review as fully as possible the existing system and see how suitable it is for continued use.

### 6.1.1 Condition of Existing Sewer - CCTV Survey

In order to assess the condition of the existing foul sewer network, and verify the parameters obtained from record information, a CCTV survey was commenced in June 2012 and is expected to be complete by September 2012.

The survey will provide pipe diameters, invert levels, gradients, depth to invert and pipe condition information in video format which can be reviewed in detail. This information will allow a more thorough assessment to be made of the exact condition and characteristics of the foul network and its suitability for reuse and adoption.

The following are the sections currently being surveyed and modelled:

- The main strategic sewer line from CFSTW running parallel to the canal within the retained land to Queens Avenue
- From Queens Avenue through Browning, School End, Stanhope Lines West, Corunna and through the Maida Zone - Phase 1 development area in Maida.
- The four strategic sewers crossing the retained land and Alison's road and currently terminating in Clayton, Gods Acre, Buller and Stanhope Lines East.

The surveys have all been prioritised to enable the assessment of the sewers servicing Maida Zone - Phase 1 to be undertaken first and the other to follow closely to facilitate the development of the greater strategic development for the system. As the whole development progresses additional strategic mains and those potentially suitable for integration will be surveyed and modelled.

### 6.1.2 Hydraulic Modelling

A schematic network model of the existing foul sewer has been developed using the Windes (Micro Drainage) software. Windes is an industry standard software used for surface and foul water network modelling.

With the information available at the time it has been decided to create a high level / schematic model. The schematic Windes hydraulic model will give an initial overview of the foul network which will be refined as further data becomes available.

The model will help with the following aspects for the hydraulic design:

- Provide a high level assessment of the capacity for the existing network and determine any bottlenecks or pipe runs where there is insufficient capacity
- Understand whether there are any areas of the network which are likely to have available capacity for new connections
- Assist in determining where new connections to the foul network can be made
- Review the pipe diameter and gradients for new foul network branches

### 6.1.3 Windes Modelling Approach

With the model commencing as a high level/schematic, as a consequence the results can only be indicative but will inform the further stages of the modelling. It has been considered that at present with the level of information available a schematic model would be adequate to provide an initial assessment of the network. As more information becomes available from the CCTV survey this will be incorporated into the model.

### 6.1.4 Assumptions

The first review of the model is to make base assumptions in the absence of specific flows and to assume a condition status. For the purpose of the model it has been assumed

- that the existing pipe and sewer network is in good state of repair and unblocked.

- only strategic/main runs have been included
- the network has been simplified in layout but still incorporates all strategic parameters.
- The model assumes peak foul flows which have been modelled as base flows in the model
- There is currently no information on what the foul flows are for the retained areas and these have been estimated based on approximate occupancies for the military operations. We are awaiting more detained information to refine the estimates from Aspire.

6.1.5 Data Sources

Until the CCTV survey is complete, the data sources for the foul sewer investigation have been obtained as follows:

1. Topographic Survey data undertaken as part of the Grainger contract.
2. Veolia Water GIS records (extract from July 2011) detailing lengths of existing sewers, together with a proportion of pipe diameters and invert levels.
3. Entec report and model data "Aldershot Urban Extension Foul Drainage Strategy (Final Report - October 2005)"

As CCTV survey information becomes available this will be integrated into the hydraulic model to verify assumed parameters and refine the output.

6.1.6 Data Limitations

At present the available data on sewer pipe diameters, invert levels and cover levels is limited. The strategic network has been considered in the first instance through to the CFSTW together with the potentially adoptable sections that align with the proposed development boundaries.

6.1.7 Estimated Foul flows

Foul sewage flows have been based on the current indicative housing density plans together with the 2.4 average factor for occupancy to determine the population and using the standard potable water demand from South East Water of 170 l/h/d. These flows have been incorporated at node points into the strategic network until such time that detailed layout plans have been completed refining the model accordingly.

6.1.8 Suitability of existing network.

In order to determine the suitability of the existing network to convey the flows for the new proposed development a Windes foul model of the existing network has been created.

## 6.2 Retained Foul Drainage

The main outfall for the foul sewage is through the retained land between Alison’s Road and the Basingstoke Canal, crossing the canal at a location within St Omer Barracks. The MoD have confirmed that there would be no objections to the adoption of this section of the sewers to be operated by a regulated company.

The CCTV survey currently in progress, expected completion September 2012, is being carried through this section as well as areas outside the retained land. These sections will be checked for condition and capacity with regard to adoptable status. A drawing indicating the strategic fouls sewers being surveyed is included in the Appendices.

## 6.3 Future Provision of Foul Drainage

It is the recommendation that the entire development be supplied with foul drainage services via a regulated business i.e. a fully adopted sewerage system. Currently the network is operated and maintained under PAC and any additions to the network will have contractual considerations to be resolved. This is under discussion with DIO to determine the contractual implications.

### 6.3.1 Existing Foul Sewers

Where existing sewers are deemed to be constructed to an appropriate standard for adoption together with being appropriately sized for the future use, i.e. in line with Sewers for Adoption, they will be offered up for adoption.

### 6.3.2 New Foul Sewers

All new sewers will be constructed in accordance with Sewers for Adoption, and will be offered up for adoption. The phasing of adoption may be logistically difficult due to the number of properties to be connected prior to adoption.

There are a number of options available and the final situation is still to be resolved within the structure of the MoD services contracts. However in the intervening period the following are acceptable possibilities:

- Connect to existing system operated by MUJV with an appropriate contract until such time that the sewers are adopted by a regulated business.
- The new phases could be adopted by a regulated business and pay to discharge into the system operated by MUJV, until such time that the sewers are adopted by a regulated business.
- The new phases could be operated by a private company and pay to discharge into the system operated by MUJV, until such time that the sewers are adopted by a regulated business.

# 7 Surface Water Management

Surface water management is a critical element in development design to prevent:

- Changes in the surface water run-off created by the proposed development
- Potential problems caused by any additional surface water run-off created by the increase of impermeable areas on the development over the original site
- To minimise the impact on the existing environment by mitigating potential pollution caused by or as a result of the development.

A Flood Risk Assessment (FRA) has been previously undertaken for the Application Site by Capita Symonds which will be submitted as part of the planning application. A draft version of the FRA was sent to the Environment Agency who provided comment. Subsequently, the comments have been incorporated and included in the final FRA. This determined that surface water run-off for each land parcel would be restricted to the rates generated by the existing surface water run-off scenario, with flooding generated by the 1 in 100 year storm event (plus 30% for Climate Change) contained within the site. In order to establish the existing run-off rates and volumes discharging from the site, a detailed drainage model for each phase will need to be constructed in order to establish the flow rates and volumes of surface water discharge.

## 7.1 Aldershot General

The proposals for areas for the development can be seen on the “Development Zone Plan” HPA 2 by Adam Urbanism contained in Appendices. This plan highlights the areas which will be developed as part of Wellesley.

Typically new developments are created on greenfield sites which significantly changes the historic nature of the site with regard to surface water run-off between pre and post development constituting a substantial need for control/attenuation.

A large proportion of the area referred to as the Wellesley development, has been an operational military installation for in excess of 100 years. Included in this are existing roads, parade grounds, barracks and other operational, administrative and amenity/recreational buildings amounting to a significant impermeable area. Drawing No. CS/050416/UTI/PA/001 indicates the extent of these existing impermeable areas.

As a consequence, whilst significant green open spaces will remain, a large proportion of the site is classified as brownfield, and off site discharge has been assessed in the Flood Risk Assessment (FRA) to reflect this.

Due to the length of the development programme, whilst the outline strategy is unlikely to change, the actual detail will be reviewed on a zone by zone basis. An overview of all the existing surfaces indicates that there is a limited overall change in surface characteristics both increasing impermeable areas in some places and reducing them in others. Until all development proposals are finalised, the change in overall impermeable areas cannot be fully calculated. Drawing No. CS050416/UTI/PA/003 shows the current master plan laid over the existing site to give an overview of the variation.

In addition to the nature of the development site, the Basingstoke Canal, being the major receptor for the site, relies heavily on the discharge of surface water to maintain the water levels. This canal is a Site of Special Scientific Interest (SSSI) and we understand through discussions with the Basingstoke Canal Authority that any variation of the water level of the canal greater than 50mm can have consequences for both navigation and ecology. As a consequence, retention of water within the site boundaries longer than the typical attenuation periods will have a detrimental effect on the canal ecology.

The site is classified as Brownfield, because it is currently developed and as such has had non-natural impermeability characteristic for many years, i.e. significant hard surfaces from structures and paved areas. This is the baseline to which it will be necessary to measure the surface water flows from the proposed development.

There is an extensive surface water drainage system covering the majority of the existing development area which comprises of 13 distinct catchment areas. The strategic elements of the network are generally along roads and other boundaries which will be retained in the long term and are thus well suited to be integrated in the proposed development. It is proposed that strategic elements will be retained wherever suitable, as the basis for the surface water drainage system which will be integrated with extensions to the existing network and proposed SuDS features. A plan of the existing Veolia surface water sewer networks is contained within the Appendices.

The existing surface water sewer networks serving the site are private networks and have never been adopted. Therefore, their current condition and make-up is largely unknown and will need to be established should they be put forward for adoption by Thames Water.

A drawing showing the existing impermeable areas is contained within the Appendices.

## 7.2 CCTV Surveys

The strategic sections of the foul and surface water networks are currently undergoing a CCTV survey inspection in order to determine their condition and verify size and gradient parameters, where this has not been clear from record information already received. Analysis of the final survey data will enable the determination of which sewers are suitable for adoption purposes by conforming to the general parameters of Sewers for Adoption.

he surveys are in the final stages at present but current results have indicated that the existing sewers within Maida Zone - Phase 1 are in a poor condition and will not be suitable for inclusion in the development. This is not considered a major problem as the zone is at the high point in the development and are not considered as strategic for any other phase.

## 7.3 Particular Site Constraints

The main receptor for the positive drainage systems across the site is the Basingstoke Canal, with a proportion of natural infiltration in unpaved areas. The site has a significant fall from south to north, approximately 106.5m AOD at Hospital Road and 78m AOD at Browning Barracks beside the Basingstoke Canal. Hence the existing surface water sewerage system collects all water and discharges to the canal through a number of consented discharge points.

Figure 4 from the Rushmoor Borough Council SFRA (Sep 2008) indicates that breaches in the Basingstoke Canal will flood generally in a southerly direction into the site. However, closer inspection of the bank heights along the length of the adjacent canal indicate that the northern bank is generally lower in places than the southern bank and the land to the north is much lower. In addition, there are two weirs which cater for high level over flows from the canal which discharge to the north therefore making breach to the south not possible.

There are essentially no direct overland flow paths within the site with any major flooding being channelled along existing carriageways.

## 7.4 Environment Agency Requirements for Managing Surface Water

The existing site has large impermeable areas including roads, buildings parade grounds and parking areas. As a consequence the existing surface water run-off is significant. This in turn dictates the quantity of attenuation required. Essentially the Environment Agency requirements are summarised as follows:

•Surface water discharge from the development should mimic that of the existing situation which in this case is classified as a Brownfield site. The drainage system must be designed to manage a 1 in 100 year storm event with an allowance of 30% for climate change in residential developments.

## 7.5 Surface Water Drainage Design

The CCTV surveys being carried out will be used to model the existing drainage networks. A model for each existing network will be created in order to determine the following:

- the discharge rate and volume of water discharged from each network;
- any flooding occurring from the 1 in 30 year storm event or greater.

This will allow the existing behaviour of the networks to be determined and inform on how the surface water drainage should be designed moving forward in order to comply with the requirements of the FRA and also Sewers for Adoption.

As it is anticipated that the proposed surface water sewer networks will be adopted, all drainage will be designed to comply with the current edition of Sewers for Adoption. This allows for surcharging for the 1 in 30 year storm event but no flooding. Containment of the 1 in 100 year plus 30% climate change will be managed on site using the SuDS management train. This will include the hydraulic modelling of all systems to determine the worst case scenario as the parameters for the SuDS design.

Where possible and their compliance with Sewers for Adoption allow, existing strategic surface water sewer networks will be utilised. It may be necessary to provide control manholes at strategic locations in the networks in order to ensure that the flow rates for the proposed surface water sewers match that of the existing networks.

Where proposed land parcels discharge across more than one existing network, control manholes will be used for at system at the land parcel boundary in order to restrict flows to that of the existing scenario once they have been modelled.

## 7.6 The Sustainable Drainage Systems (SuDS) Management Train

Under the Drainage section of the March 2009 SPD for the Aldershot AUE Development, Principle SD4 states the following:
*The AUE will have to ensure integration of SuDS that follow best practice hierarchy from control at source and infiltration, to a range of management features.*

CIRIA document C697, the SuDS Manual, defines SuDS management should be designed to mimic natural catchment processes as closely as possible. This is the basis for all surface water management design for development. As inferred above in the case of Wellesley, this will be to mimic the run-off from a site with varying impermeability characteristics.

It must also be kept in mind that whilst attenuation of surface water is required, SuDS are not designed primarily to enhance the environment but essentially to maintain the status quo of the existing runoff to major receptors without causing additional problems to adjacent areas/properties. In many cases SuDS features can reduce current adverse conditions whilst preventing additional problems.

To mimic natural catchment processes as closely as possible a 'management train' is required. This concept is fundamental to designing a successful SuDS scheme as it uses drainage techniques in series to incrementally reduce pollution, flow rates and volumes.

The hierarchy of techniques that should be considered in developing the management train are as follows:

1. **Prevention** – the use of good site design and site housekeeping measures to prevent runoff and pollution (e.g. sweeping to remove surface dust and detritus from car parks), and rainwater reuse/harvesting. Prevention policies should generally be included within the site management plan.

2. **Source control** – control of runoff at or very near its source (e.g. soakaways, other infiltration methods, green roofs, pervious pavements).

3. **Site control** – management of water in a local area or site (e.g. routing water from building roofs and car parks to a large soakaway, infiltration or detention basin).

4. **Regional control** – management of runoff from a site or several sites, typically in a balancing pond or wetland.

In appropriate locations with significant rainfall events it is possible to design SuDS features to enhance amenity. However, with the demand from the Basingstoke canal this may have limited potential within Wellesley.

Assuming a SuDS feature becomes full due to a storm event, it is expected to be emptied, i.e. discharged to the receptors within a period of 24 hours thus enabling it to be ready to receive the next event.

## 7.7 Main SuDS Options

As the later stages of the development progress into detail stage design, SuDS features will form a greater part of the surface water strategy. Were there no existing surface water drainage system the design parameters would be more defined but the need to integrate the existing drainage with new requirements is a detail design process.

### 7.7.1 Permeable Paving

Permeable paving creates a conduit direct to the underlying ground and excess water being taken away to further/alternative disposal. This system can be extensively used under footways, roads, parking areas and private driveways.

**Typical Permeable Surfaces**

7.7.2 Swales and Infiltration Channels

Shallow vegetation lined ditches which restrict linear flow of water prior to discharge into larger watercourses or other drainage systems. These can be installed longitudinally beside roads or through open green spaces

**Typical usage of swales**

7.7.3 Green/Brown Roofs

In general green/brown roofs are less suited to residential development due to the significant variation in building profile and potentially significant increased cost of construction. However, when considering commercial developments, schools and similar larger structures, the economies of scale can be render the options viable under appropriate conditions.

T


**Typical green and brown roof construction**

7.7.4 Underground Storage Systems

These systems are well suited to storage of large volumes of water in small areas. They can either be of the ‘crate’ type or cylindrical vessels. These systems have the ability to be constructed under trafficked areas such as car parks and minor roads as they are load bearing.

**Underground storage**

7.7.5 Other Options

Depending on the quantity of storage/attenuation required during major storm events, then the use of open storage ponds/basins are appropriate for storage. These can be either temporary or permanent. For example lowered green areas and car parks and infiltration basins and ponds. However it must be remembered that the SuDS element of these is temporary storage.

## 7.8 SuDS Approving Body (SAB)

From October 2011 a new organisation, the SuDS Approving Body (SAB) was due to be created but this has been delayed and now looks likely not to happen before sometime in 2013. They will have responsibility, along with the Building Control Authority, for approving the design and construction of SuDS features, and subsequently for owning and maintaining them. The SAB will exist within Lead Local Flood Authority, in this case Hampshire County Council.

Should the SAB not have been established by the time detailed proposals are put forward. Paragraph 21 of Schedule 3 to the Flood and Water Management Act allows the SAB to voluntarily adopt SuDS where the duty to adopt does not apply. This means the SAB would be able to adopt and maintain existing SuDS if it chooses to do so, funding would need to be agreed separately.

## 7.9 Maida Zone - Phase 1

The proposed layout for Maida Zone - Phase 1 has been evaluated in detail and the pre development permeable/impermeable percentages for the developable area were found to be approximately 25% and 75% respectively. Analysis of the proposed construction layout indicates that those will change to approximately 44% and 56% respectively. This is before the application of permeable paving techniques.

This site is at a high point and investigation of the existing surface water sewers indicate that they are most probably unsuitable for reuse within the development. The new sewer layout will be sized in accordance with Sewers for Adoption but the opportunity is available to oversize sewers in some areas as part of the attenuation system.

The second and important contribution to the SuDS will be the use of permeable paving on private driveways and roads within the residential areas. If the results of the soils investigation confirm that infiltration is feasible the relevant proportion will be accommodated and traditional soakaways could be used for surface water disposal. Should the SI indicate that infiltration rates are poor then the connection of under-drainage from permeable areas would be connected to the main collection system. The latter system thus incorporates a significant delay in discharge rates from the site to receptors as well as pollution control.

The area where permeable surfaces could be used could be as much as 53% of the indicated impermeable area, i.e. approximately 30% of the entire development area for Maida Zone - Phase 1 and would include roads. footways, private drives and apartment parking areas.

Storage of water in underground crate type storage would be a potential at the apartment blocks in Maida Zone - Phase 1 collecting flow from the very highest point of the development and regulating the flow to the system. The existing ground levels would favour this position. Crate storage would also be possible in un-adopted highways.

## 7.10 Maida Zone – Phase 1 Design Approach

The Environment Agency have stated that discharge from the existing site will be allowed to match the existing flows from the existing impermeable areas plus 2l/s for the remaining Greenfield areas.

In order to assess the discharge from the existing site, the relevant pipe runs from the site were isolated in the model and the contributing areas assessed. The resulting contributing impermeable areas were as follows:

| | |
|---|---|
| Existing Pipe 1.004 | = 0.979Ha |
| Existing Pipe 2.006 | = 0.335Ha |
| Total | = <u>1.314Ha</u> |

Resultant flows for the 1in100+CC are 254l/s and 166l/s respectively. The brownfield area attributing to the Maida Zone - Phase 1 developable area is roughly calculated to be 5.7Ha, therefore 5.7-1.314 = 4.386Ha. Therefore for the Greenfield area the allowable discharge will be 4.386Ha x 2l/s = 8.77l/s.

Therefore total allowable flows from the site will be: 254+166+8.8 = <u>429l/s</u>.

Due to the nature of the site and the fact that other catchments discharge through the site, the allowable flow rates should be referenced against the proposed development areas within the site boundary and the resultant flows should be less

The following table outlines suggested discharge rates that should be aimed at during the detailed design stage. These are for the developed area and do not relate to the through flows generated by adjacent catchments:

| Pipe Number | 1 in 2 flow l/s | 1 in 30 | 1 in 100 | 1 in 100 + CC |
|---|---|---|---|---|
| 2.001 | 5.6 | 5.6 | 5.6 | 5.6 |
| 3.001 | 9.7 | 10.4 | 11.8 | 12.0 |
| 4.003 | 16.8 | 20.3 | 21 | 21.7 |
| 6.001 | 21.3 | 21.8 | 22.6 | 23.9 |
| 8.003 | 57.7 | 72.3 | 73.6 | 90.1 |
| Totals | 111.1l/s | 130.4l/s | 134.6l/s | **153.3l/s** |

A comparison between the existing flow rates and volumes and proposed flow rates and volumes for the Phase 1 network, including the through flow from adjacent catchments for the 1in2, 1in30, 1in100 & 1in100+CC storm events has been carried out and indicative results for these are tabled below:

| Existing Discharge Rate (l/s) | | | | Existing Discharge Volume ($m^3$) | | | |
|---|---|---|---|---|---|---|---|
| 1 in 2 Year Event | 1 in 30 Year Event | 1 in 100 Year Event | 1 in 100 Year Event + 30% CC | 1 in 2 Year Event | 1 in 30 Year Event | 1 in 100 Year Event | 1 in 100 Year Event + 30% CC |
| 1,177 | 1,298 | 1,397 | 1,456 | 3,194 | 6,347 | 8,645 | 11,240 |

**Existing Scenario**

| Proposed Discharge Rate (l/s) | | | | Proposed Discharge Volume ($m^3$) | | | |
|---|---|---|---|---|---|---|---|
| 1 in 2 Year Event | 1 in 30 Year Event | 1 in 100 Year Event | 1 in 100 Year Event + 30% CC | 1 in 2 Year Event | 1 in 30 Year Event | 1 in 100 Year Event | 1 in 100 Year Event + 30% CC |
| 368 | 433 | 435 | 456 | 5,406 | 5,991 | 6,383 | 6,806 |

**Proposed scenario**

Drainage from properties will have restricted flow using Garastor flow restrictors and surface water attenuation with a maximum flow rate of 1.4l/s for the 1 in 100 year storm event. These will be used in conjunction with surface water attenuation in the form of cellular storage underneath the permeable paved driveways and are indicated on the drainage strategy drawing in the appendices.

The flooding identified at manhole 1.000 is as a result of the contributing area to the south. This has been incorporated into the model in order to determine the relevant pipe sizing required by Sewers for Adoption. This flooding will be catered for when the land parcel to the south is developed in the future and cannot be accounted for in the proposed Phase 1 development. However, flood routing has been assessed in order to determine its impact on the proposed Phase 1 development and the routing has been indicated on the Phase 1 plan drainage strategy drawing in the appendices.

The flooding identified at 1.006 and 1.007 is at the convergence of the proposed development sewers and the existing smaller sewers that are being connected in to and is a result of the higher flows coming from the development to the south and running through the proposed Phase 1 development. As previously mentioned, this flooding will be catered for within when the adjacent land parcels are developed but it should also be noted that the volume of flooding is also greatly reduced from the existing scenario.

## 7.11 Western School Site

The western school site has the opportunity to consider a number of SuDS options. Rainwater harvesting may be suitable if this accords with the HCC model for school design. Discussions with HCC representative have indicated that they would be prepared to consider al sustainable options and consider themselves as forerunner with regard to innovation in school design.

Car park areas will be suitable for the installation of underground storage systems and the green areas within the site would be considered appropriate for overland flooding and attenuation in major events.

## 7.12 Wider Site

As previously implied the overall difference between current and proposed impermeable areas are not excessive and the general initial approach to dealing with surface water will be to mimic the current discharges from the site.

There will be a combination of all systems employed on the wider development which will be sized provisionally from estimations of development and determined critically during the design stages for future phases. However, it is expected at this stage feature will consist of oversized pipes, permeable paving, underground storage, overland flooding using swales, infiltration ditches and possibly ponds.

The majority of features will be phase specific and permeable paving is intended to be extensively used as part of the wider collection/disposal system.

Whilst the size of the site would imply significant options for SuDS features, the current developed area and discharge from the site is likely to minimise the need when full calculations have been completed.

However, there are a number of SuDS which are most probably going to be used significantly in the development.

## 7.13 Suds Constraints

With a greenfield development it is possible to design in a variety of SuDS features to enhance and manage the storm/surface water. However, when the development/redevelopment revolves around a brownfield site there are constraints which prevent the straightforward incorporation of a SuDS system.

Typical constraints include, but are not limited to:

- Retention of existing roads and footways
- Site levels & gradients
- Integration/extension of existing structures
- Relative location of disposal points
- Extended development programme and or incomplete master plan

# 8 Electrical Infrastructure

A review of the proposed development with regard to electrical supply has been undertaken and Scottish and Southern Energy (SSE) have confirmed at this time that there is electrical supply available for the entire site on the condition that electricity will not be the primary source for heating.

## 8.1 Existing

SSE is responsible for providing electricity supplies to the public within the local area and also provides strategic supplies to the MOD network for which MUJV are responsible.

To enable the development to proceed considerable effort has been made to separate the public and MOD assets across the entire site.

Since the decommissioning of the Aldershot Military Power Station, (AMPS) and to replace the loss in electrical capacity, a new strategic 33kV connection was laid to SSE's primary substation at Laburnum Road (approx 500m south of the site). This 33kV was laid east along Fleet Road (A323) and south along Farnborough Road. To provide continuity of supply to MOD activities outside of the site two new 11kV cables were laid from Laburnum Road to AMPS (which now serves as a transformer) via Farnborough Road and Alison's Road.

At the present time there are five MOD substations within the wider development site. These have been retained temporarily to continue providing power to street lighting and some MOD buildings outside of the development area. In due course these will be replaced with two substations outside of the site. The principal 11kV cable that feeds the substations runs along Knolly's Road to the south of the site, the length of Queen's Avenue within the site and beyond the site to the north. It also links into the AMPS substation.

There is a further MOD 11kV cable within the site which runs between AMPS and Pits Road along the southern side of Alison's Road. This cable is to be retained.

### 8.1.1 New Development

As part of the rationalisation exercise three new 11kV cables were laid from Laburnum Road, along Farnborough Road in readiness for the wider development. One cable terminates with a 'pot end' at the junction of Farnborough Road with Pennefather's Road and is intended to serve development to the western part of the site.

The second cable continues through to Alison's Road where a 'pot end' is located at the junction with Queen's Avenue. This cable is intended to serve the north-western portion of the site and the western school site.

The third cable continues along Alison's Road with a final 'pot end' near to the junction with Thornhill Road, and will serve development located to the east of the site.

SSE has a significant network of 11kV cables and associated substations to the south of the site.

A composite drawing showing the electrical network of strategic importance is contained in Appendix A (drawing CS-050416-UTI-EL-01). SSE and MOD (UK Power Networks) asset plans are also include within this Appendices.

## 8.2 Proposed

### 8.2.1 Energy Strategy

Reference should be made to the separate Energy Strategy document which outlines the use of energy centres within a development. We are advised that at this time the use of energy centres has not been finalised, primarily due to the rate of construction in the first stages of the development. However, this will be continuously re evaluated during the coming years and will be influenced by technological development and any changes in legislation.

### 8.2.2 Maida Zone - Phase 1

Whilst the new cabling has been installed in readiness for the development of the site, further investigations and discussions with SSE have determined that Maida Zone - Phase 1 will not be connected to the new system. Due to its proximity to the existing supply networks at Hospital Hill it will be possible to connect it into this system as indicated in the drawings contained in the Appendices.

In order that SSE can provide electrical power to Maida Zone - Phase 1 the existing 11kV network will be extended and a new cable will be laid from the existing substation located close to the junction of Queen’s Avenue and Hospital Road (Hospital Hill). A new substation will need to be installed along the western edge of this development phase. The drawing within the appendices also indicates the approximate location of the substation which is within what will be the car parking area of Maida Gym.

### 8.2.3 Western School Site

As indicated previously there is an 11kV cable ‘pot ‘end’ at the junction of Queens Avenue and Alison’s Road. This is approximately where a sub-station will need to be constructed to serve the western area of the site including the school site.

At this time the definitive position on the sub-station has not been determined and will be subject to the following design parameters:

- Demand from the school site
- Demand from the adjacent development phases and which will be connected to the sub station.
- Landscaping, highway alignment, other utility positioning and the Masterplan for the area. It will be necessary to review this early in the near future to facilitate the planning of the school site.

### 8.2.4 Wider site

As part of the separation of SSE public and MOD private electrical networks, a significant level of work was undertaken in advance of the development. In summary these works included:

- Decommissioning of AMPS
- Installation of 33kV network to Laburnum Road substation (SSE)
- Installation of three 11kV cables from Laburnum Road to the former AMPS
- Installation of three 11kV cables to provide supplies to future Wellesley development.

Detailed consideration will be given to the installation of electrical supplies to individual phases as details become available. However this is not believed to be a constraint owing to the level of infrastructure currently installed in readiness for the development.

8.2.5 Retained Structures and Heritage Sites

There are a number of retained structures and monuments which have an energy supply to them. Some of these will be incorporated into the development for alternative use and others are only monuments and points of local and/or historical heritage.

Structures that are intended for alternative usage will be provided with an appropriate metered electrical supply from the new networks. Monuments and similar structures we understand will be come the responsibility of the RBC and requiring perhaps only a lighting supply may be connected to the street lighting supply or connected to an individual metered supply.

# 9 Gas infrastructure

## 9.1 Existing

Within the Application Site gas distribution and supply services are provided by Scotia Gas Networks (SGN). The responsibility for this network therefore falls outside of the DIO utility agreements with MUJV.

The SGN network within the application site serves a significant number of existing buildings within the Application Site. Drawing CS-050416-UTI-GS-01 contained in the Appendices identifies the location of key intermediate, medium and low pressure pipework within the site. Supply routes to individual buildings are not considered constraints to development; for clarity these routes are not shown beyond the upstream connection point.

### 9.1.1 Existing Intermediate Pressure (IP)

Gas distributed across the site is fed from SGN's strategic 16 inch IP network. This interface is located approximately 225m east of the site, south of Government Road and west of the Basingstoke Canal.

Spatially the IP network is not considered a constraint to locating the development however certain working activities may be restricted within 'zones of influence'. Based on specification for Safe Working in the vicinity of National Grid practices (see appendices).

### 9.1.2 Medium Pressure (MP)

There are two key 8 inch MP mains that serve the site and connect to the IP main discussed above via a gas governor.

A MP main extends west from the gas governor along Government Road and Ordnance Road. At the intersection with Louise Margaret Road this gas main splits with a 125 mm MP main feeding Cambridge Military Hospital only. The strategic continuation of this MP main is a 250 mm which continues along Ordnance Road (albeit in proximity to Cassino Close) and eventually terminates at a gas governor located on the High Street between the NAAFI and Ordnance roundabouts. This gas governor provides connections to the LP network.

The second strategic MP main extends from the IP governor and heads to the northwest beneath the track through St. Omer Barracks broadly parallel to Camp Farm Road. This 250 mm main provides some MP supplies to buildings within St. Omer Barracks but also interfaces with the LP network in this area. Beyond the MP/LP governor the MP continues north, crosses beneath the Basingstoke Canal and beyond the area of interest.

### 9.1.3 Low pressure (LP)

Gas supplies to the majority of buildings at the site are LP. The gas mains are located within the majority of roads across the site. These mains interconnect with both the strategic MP mains discussed above.

This LP network also serves properties external to the development site.

## 9.2 Proposed

### 9.2.1 Maida Zone - Phase 1

The proposed development layout takes account of the LP network routed through the site between Hospital Road and Hope Grant’s Road. Diversions to this LP apparatus are not anticipated.

Given that this part of the site is well served by the existing gas network, we have been advised that there will no need for mains reinforcements at this time.

At the detailed design stage an Independent Gas Distribution Network operator will be appointed to provide gas infrastructure from SGN’s network.

### 9.2.2 Western School Site

There are two existing gas mains located within close proximity to the Western School site boundaries. These are 150m north of the Queens Avenue / Alison’s Road site corner and 170m south of the Queens Avenue/Steele’s Road corner of the site. This is indicated in the drawings in the Appendices.

Until such time that the estimated demand from the school is confirmed we are unable to confirm with the service provider whether these will be sufficient to supply or whether reinforcement will be required. However, we are able to advise that the provider has confirmed there is strategic availability for the entire Wellesley development without off site reinforcement works. With this in mind it will only be necessary to undertake network extension works within the vicinity to ensure the supply.

### 9.2.3 Wider site

The principal road routes within the wider site are for the most part retained. As a consequence significant alterations to key gas distribution pipework will not be required. Localised lowering/protection gas apparatus may be required to suit highway alignments and this will be considered at the appropriate time in association with the detailed design.

To deliver sufficient volumes of gas to the wider site, SGN has undertaken a capacity assessment for the entire development to determine whether the strategic IP network has sufficient capacity. The results of this land enquiry indicate that at present the IP network can cater for increases in demand posed by the development. However, strategic mains installation may be required within the development site to ensure appropriate apportioning of supplies to all points. This will only be determined when a clearer development plan is defined.

At the detailed design stage an Independent Gas Distribution Network operator will be appointed to provide gas infrastructure from SGN’s network.

As each future development phase progresses consideration will be given by SGN to potential alterations to the LP and MP network.

# 10 Potable Water Supply

Historically as with all other utilities, the Aldershot Garrison was self sufficient with potable water which was derived from springs at Bourley and treated on site. This was then stored in Bourley reservoir and subsequently forwarded on to the MoD site.

## 10.1 Existing Supply

The Bourley treatment installation was found to be unreliable and it was decided to change the source of water to the local service provider South East Water (SEW). The system now operates in the following manner:

SEW supply water through a main from Upper Hale reservoir to Bourley reservoir via an MoD asset. Water is then transferred to the MoD site via another main. Operation maintenance of this main is vested in C2C through the Aquatrine Contract.

Water is transferred into the distribution system operated and maintained by MUJV under PAC.

## 10.2 Proposed Potable Water Supply

As with the drainage of the development site, it is proposed that the supply of potable water should be through a regulated business. The local provider would be South East Water. This will ensure that the supply meets all regulatory standards for quality and service.

### 10.2.1 South East Water

Meetings with the provider have confirmed that there is the availability of supply to be brought in based on the estimated demand for 3850 units, approximately 1600 m3/d. However, until such time that the details of the development are completed or at least more developed, it is not possible to fully define the strategic supply information. This is as a consequence of the extended delivery period, 15 years plus, and the water service providers work on the strategic Asset Management Plans (AMP’s), which run in five year cycles. The development will cover at least three of these cycles.

### 10.2.2 Maida Zone - Phase 1

As with the other utilities discussions with SEW have confirmed that Maida Zone - Phase 1 could be supplied from existing infrastructure close to the boundary of the site at Hospital Hill. This will facilitate more flexibility the later strategic development of infrastructure within the site and enable SEW to take over the mains when installed. The installation can be undertaken either direct by SEW’s contractor or laid under the ‘self lay’ option which is defined by OFWAT, the water regulator. Full specifications are included with this to ensure it is to an adoptable standard and would be inspected during construction.

### 10.2.3 Western School Site

There are no potable water mains in the immediate vicinity of the school site. The closest main is on the Farnborough Road approximately 350 metres to the west of the proposed school buildings. A supply main can be brought in along the road to the south of the school site to feed the site direct. This may be a temporary connection until such time that Stanhope Lines West and the remainder of School End are developed or could be sized for greater demand at an early stage minimising the need for temporary works.

### 10.2.4 The Wider Site

We have been advised that SEW are able to provide adequate supplies of potable water to the development. We are still awaiting definitive information from SEW as to whether major reinforcement works will be required to supply potable water to the whole of the development but this is dependent upon being able to supply SEW with a more definitive phasing plan and time frame for the site.. Communications with SEW have implied that a proportion if not all potable water could come from the Farnborough main indicated above, but this has not been confirmed. The other option may be the possibility of new strategic mains from Hale reservoir to the development area but this is still under discussion.

It is proposed that the whole Wellesley development site will be supplied with potable water through a regulated business that would own and operate the entire distribution system.

# 11 Telecommunications

None of the existing site has any telecommunications installed. The site being military has its own infrastructure throughout which will be decommissioned in line with the handover of the plots.

## 11.1 Future Telecommunications

BT Openreach have been contacted with regard to the whole Wellesley development and in particular the Maida Zone - Phase 1 and the western school site.

BT Openreach have stated that under their Universal Services Obligation they have to provide the proposed development with a minimum of a basic telephone line and a narrowband connection capable of functional internet access (existing guidelines on FIA define include a benchmark speed of 28.8 kbps). There would be no direct cost charged to the developer for providing a BT Openreach network for the new development. The only expected cost only would be the connection charge for each new property.

On this basis the nature and speed of the installation would be discussed with the developer when detailed design is complete. As stated above the existing guidelines on FIA define include a benchmark speed of 28.8 kbps. However, this would be assessed at the appropriate time and the maximum available supply would be installed.

The period for the development will enable detailed discussions to be held with the provider to ascertain the most appropriate installation.

### 11.1.1 Western School Site

As with the Maida Zone - Phase 1 when the demand for telecommunications is quantified by HCC the appropriate negotiations will be held with BT Openreach to determine the necessary connections.

# Appendices

## Appendix A – Drawings

- **CS/050416/UTI/GEN/001 - Site Location Plan**
- **5510/HPA/03 - Indicative Masterplan**
- **HPA 2 - Development Zone Plan**
- **CS/050416/UTI/DR/001 - Existing Surface Water Drainage Catchments**
- **CS/050416/UTI/DR/002 - Maida Zone – Phase 1 Proposed Surface Water Drainage**
- **CS/050416/UTI/DR/005 - Flood Attenuation and SuDS Proposals (Indicative Only)**
- **CS/050416/UTI/EL/001 - Existing Electric Network Layout MoD & SSE**
- **CS/040516/UTI/FW/001 - Existing Strategic Foul Sewer Network**
- **CS/050416/UTI/GS/001 - Existing Gas Infrastructure SGN**
- **CS/050416/UTI/PA/001 - Existing Permeable and Impermeable Areas**
- **CS/050416/UTI/PA/004 - Maida Zone - Phase 1 Master Layout**
- **CS/050416/UTI/PA/005 - Preliminary Utility Layout for Maida Zone – Phase 1**
- **CS/050416/UTI/PA/006 - Preliminary Utility Layout for Western School Site**
- **CS/050416/UTI/WA/01 - Existing SEW Water Network**
- **Veolia - Surface Water Sewer Records**
- **Veolia - Foul Sewer Records**

REV. -

DRAWING NUMBER
CS/050416/GEN/001

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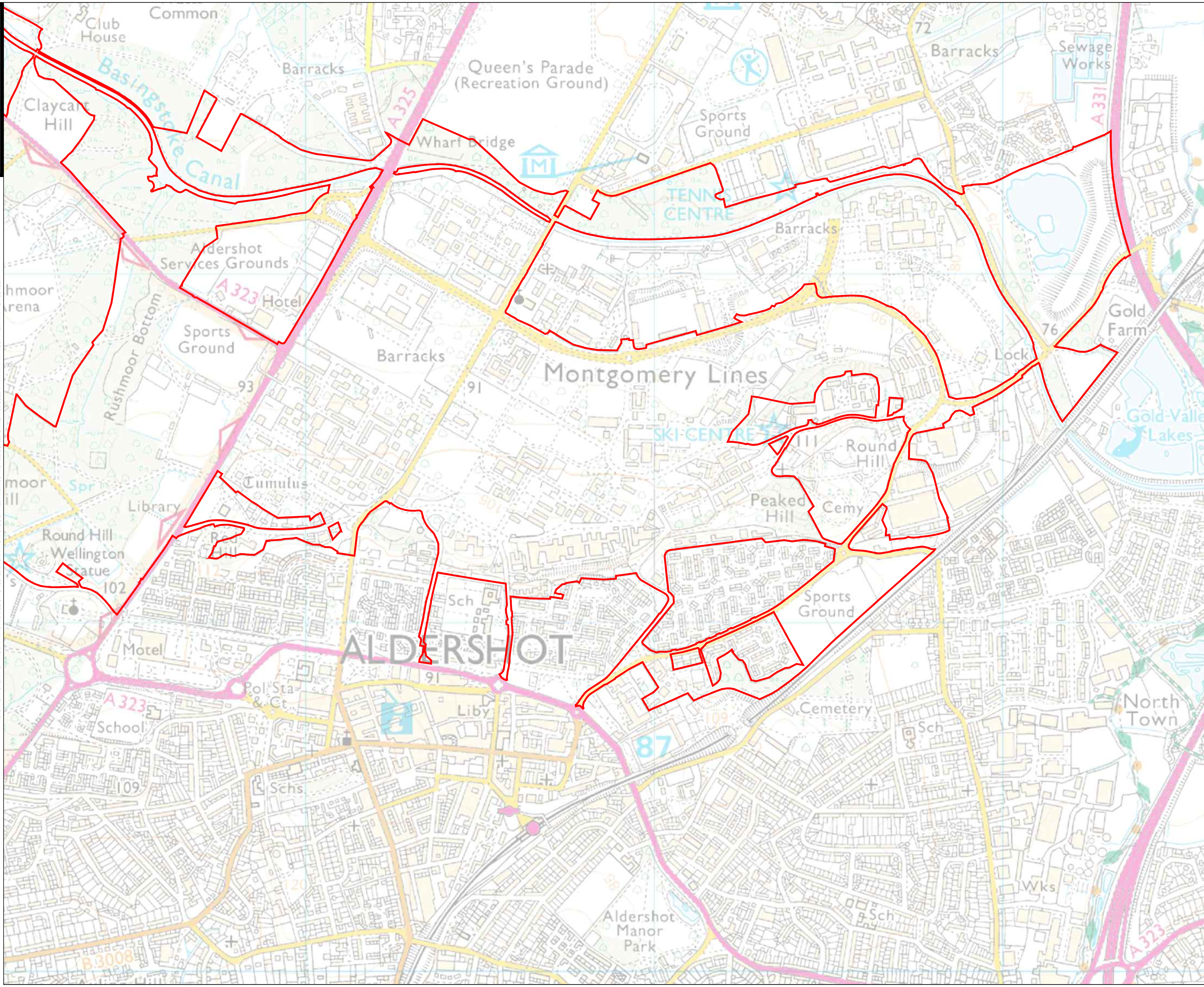


NOTES

KEY

WELLESLEY OUTLINE PLANNING APPLICATION BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
|---|---|---|---|---|---|---|

| DESIGNED BY | DRAWN BY | CHECKED BY | PASSED BY |
|---|---|---|---|
| FN | FN | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A1 SIZE | ISSUE STATUS |
|---|---|
| 1:5,000 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

SITE LOCATION PLAN

GRAINGER PLC

**CAPITA SYMONDS**


Capita Symonds House, Wood Street,
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DRAWING NUMBER: CS/050416/GEN/001
REV. -


Wellesley
ALDERSHOT
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ADAM URBANISM




KEY

WELLESLEY OUTLINE PLANNING APPLICATION BOUNDARY

| | |
|---|---|
| A | MAIDA |
| B | CORUNA |
| C | CMH |
| D | MCGRIGOR |
| E | GUNHILL |
| F | KNOLLYS |
| G | PENNEFATHERS |
| H | STANHOPE LINES WEST |
| I | SCHOOL END |
| J | BROWNING |
| K | STANHOPE LINES EAST |
| L | NEIGHBOURHOOD CENTRE |
| M | BULLER |
| N | GOD'S ACRE |
| O | MANDORA |
| P | PEAKED HILL |
| Q | CLAYTON |
| R | ABRO |
| S | REME |
| T | PARSONS |

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| Title | Development Zone Plan |
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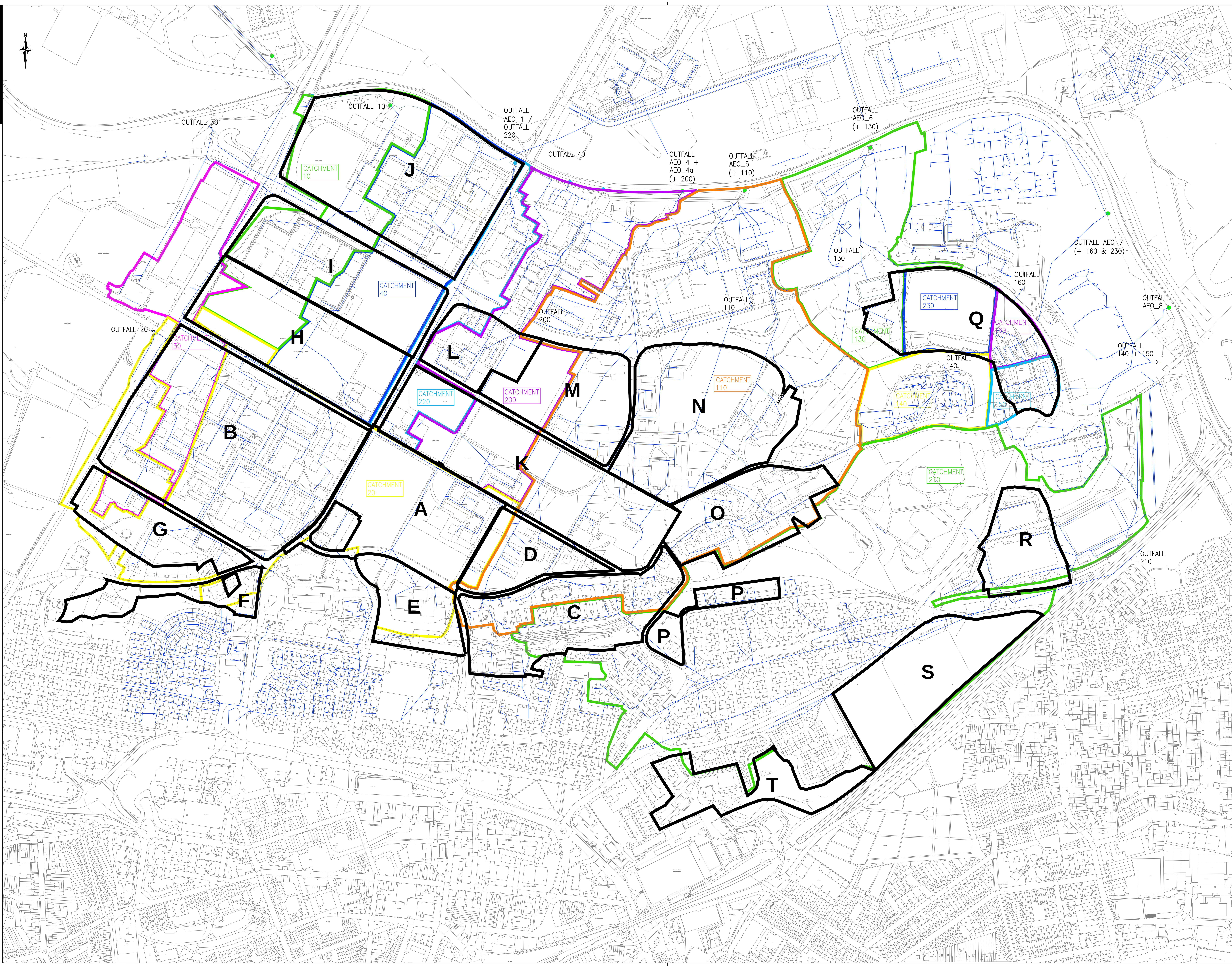
| Scale | 1:5000 @ A1 |
| Date | 04 December 2012 |
| Drawn by | AB |

ADAM URBANISM




NOTES

1. RED LINE PLANNING BOUNDARY OMITTED FOR CLARITY

KEY

SURFACE WATER DRAINAGE PIPES

PROPOSED DEVELOPMENT ZONE

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| SCALES @ A0 SIZE | ISSUE STATUS |
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WELLESLEY
ALDERSHOT

EXISTING
SURFACE WATER
DRAINAGE CATCHMENTS
AND DEVELOPMENT ZONES

GRAINGER PLC

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|---|---|
| CS/050416/UTI/DR/001 | - |


NOTES

1. LAYOUT TAKEN FROM ADAM URBANISM DRAWING 5510/HPAxx.
2. SURFACE WATER NETWORK AND ATTENUATION LOCATIONS ARE INDICATIVE. FINAL SIZING AND LOCATIONS ARE SUBJECT TO DETAILED DESIGN.
3. USEAGE OF EXISTING SURFACE WATER NETWORK WILL DEPEND ON RESULTS FROM FINAL CCTV SURVEY.
4. SURFACE WATER NETWORK TO BE DESIGNED IN ACCORDANCE WITH SEWERS FOR ADOPTION AND TO ATTENUATE FOR THE 1 IN 100 YEAR STORM PLUS 30% CLIMATE CHANGE.
5. EXISTING CATCHMENTS TO THE SOUTH AND EAST HAVE BEEN USED IN ASSESSING THE EXISTING SURFACE WATER SEWERS IN LINE WITH "SEWERS FOR ADOPTION". ANY FLOODING FROM THESE CATCHMENTS HAS NOT BEEN ACCOUNTED FOR WITHIN THE PHASE 1 ATTENUATION AS THESE WILL BE CATERED FOR SEPARATELY.
6. FLOOD FLOWS FROM CATCHMENTS TO THE SOUTH AND EAST WILL FOLLOW THE EXISTING FLOOD PATHS AND BE MAINTAINED WITHIN KERBED HIGHWAY.

KEY

- ROOFED AREAS
- PROPOSED HIGHWAYS/ CYCLEWAY/FOOTWAY
- PROPOSED PERMEABLE AREAS
- EXISTING HIGHWAYS
- PROPOSED CELLULAR ATTENUATION
- PROPOSED PERMEABLE PAVING
- GARASTOR MANHOLE (DISCHARGE RATE 1.4L/S)
- SURFACE WATER MANHOLE
- SURFACE WATER CONTROL MANHOLE
- SURFACE WATER PIPE
- REDUNDANT SURFACE WATER PIPE
- EXISTING SURFACE WATER PIPE
- OVERLAND FLOOD FLOWS FROM EXISTING DEVELOPED AREAS
- MAIDA ZONE PHASE 1 BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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| GD | GD | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A1 SIZE | ISSUE STATUS |
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| 1:500 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

MAIDA PHASE 1
SURFACE WATER
DRAINAGE STRATEGY

GRAINGER PLC

CAPITA SYMONDS
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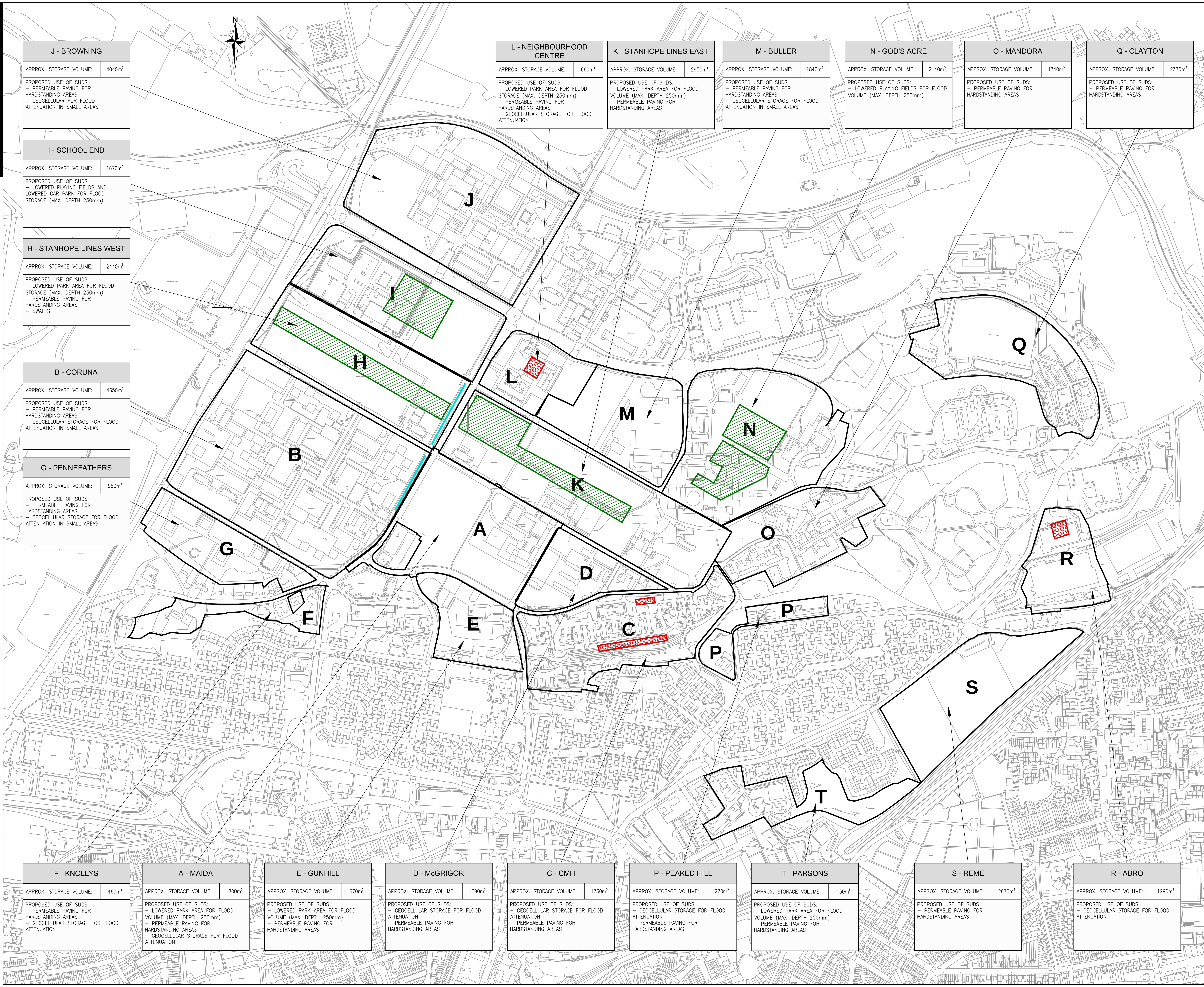
DRAWING NUMBER: CS/050416/UTI/DR/002 REV. -

REV. -
DRAWING NUMBER CS/050416/DR/002




## J - BROWNING

APPROX. STORAGE VOLUME: 4040m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR FOR FLOOD ATTENUATION IN SMALL AREAS

## I - SCHOOL END

APPROX. STORAGE VOLUME: 1670m³

PROPOSED USE OF SUDS:
- LOWERED PLAYING FIELDS AND LOWERED CAR PARK FOR FLOOD STORAGE (MAX. DEPTH 250mm)

## H - STANHOPE LINES WEST

APPROX. STORAGE VOLUME: 2440m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD STORAGE (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- SWALES

## B - CORUNA

APPROX. STORAGE VOLUME: 4650m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION IN SMALL AREAS

## G - PENNEFATHERS

APPROX. STORAGE VOLUME: 950m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION IN SMALL AREAS

## L - NEIGHBOURHOOD CENTRE

APPROX. STORAGE VOLUME: 660m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD STORAGE (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION

## K - STANHOPE LINES EAST

APPROX. STORAGE VOLUME: 2950m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD VOLUME (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## M - BULLER

APPROX. STORAGE VOLUME: 1840m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION IN SMALL AREAS

## N - GOD'S ACRE

APPROX. STORAGE VOLUME: 2140m³

PROPOSED USE OF SUDS:
- LOWERED PLAYING FIELDS FOR FLOOD VOLUME (MAX. DEPTH 250mm)

## O - MANDORA

APPROX. STORAGE VOLUME: 1740m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## Q - CLAYTON

APPROX. STORAGE VOLUME: 2370m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## F - KNOLLYS

APPROX. STORAGE VOLUME: 460m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION

## A - MAIDA

APPROX. STORAGE VOLUME: 1800m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD VOLUME (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION

## E - GUNHILL

APPROX. STORAGE VOLUME: 670m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD VOLUME (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## D - McGRIGOR

APPROX. STORAGE VOLUME: 1390m³

PROPOSED USE OF SUDS:
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## C - CMH

APPROX. STORAGE VOLUME: 1730m³

PROPOSED USE OF SUDS:
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## P - PEAKED HILL

APPROX. STORAGE VOLUME: 270m³

PROPOSED USE OF SUDS:
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## T - PARSONS

APPROX. STORAGE VOLUME: 450m³

PROPOSED USE OF SUDS:
- LOWERED PARK AREA FOR FLOOD VOLUME (MAX. DEPTH 250mm)
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## S - REME

APPROX. STORAGE VOLUME: 2670m³

PROPOSED USE OF SUDS:
- PERMEABLE PAVING FOR HARDSTANDING AREAS

## R - ABRO

APPROX. STORAGE VOLUME: 1290m³

PROPOSED USE OF SUDS:
- GEOCELLULAR STORAGE FOR FLOOD ATTENUATION

NOTES

KEY

SWALES

LOWERED GREEN AREAS FOR FLOOD STORAGE

GEOCELLULAR CRATES

NOTES

1. FOR MAIDA PHASE 1 DETAILS SEE DRAWING CS/050416/UTI/DR/002
2. ALL POSITIONS ARE INDICATIVE ONLY AND NOT TO SCALE.
3. EXACT LOCATIONS, SIZE AND TYPE OF SUDS FEATURE WILL BE DETERMINED AT DETAILED DESIGN FOR EACH PHASE.
4. RESULTS FROM SITE INVESTIGATION WILL DETERMINE INFILTRATION CAPABILITY IN EACH PHASE.
5. GEOCELLULAR STORAGE WILL BE CONSIDERED FOR ALL SITES WHEREVER APPROPRIATE

| REV | | DE | DR | CH | PA | DATE |
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| FN | FN | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A1 SIZE | ISSUE STATUS |
|---|---|
| NTS | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

FLOOD ATTENUATION AND SUDS PROPOSALS (INDICATIVE ONLY)

GRAINGER PLC


CAPITA SYMONDS

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DRAWING NUMBER CS/050416/UTI/DR/005 REV. -


REV. -
DRAWING NUMBER CS/050416/UTI/DR/005




CAD FILE NAME : \\CSLGRVMU03\DATA\ZENV\!PROJECTS\CS050416 AUE_ALDERSHOT\B.WORK_TASKS\6. ZINK - UTILITIES\DESIGN\CAD\CS-050416-UTI-DR-005.DWG
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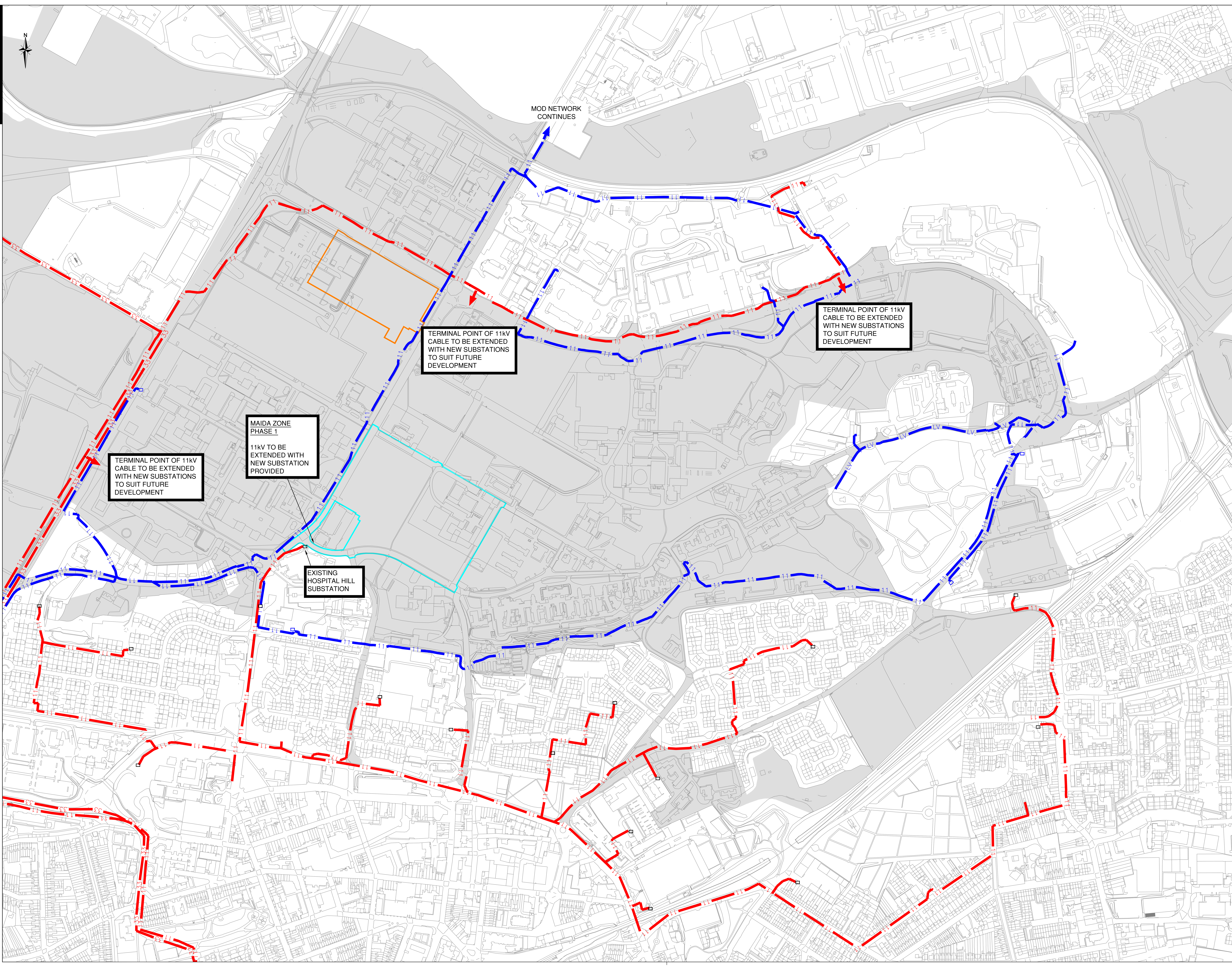


NOTES

1. CABLE ROUTES HAVE BEEN TRANSCRIBED FROM PLANS RECEIVED FROM UKPN AND SSE.
2. THIS DRAWING IS INTENDED TO IDENTIFY KEY INFRASTRUCTURE WITHIN AND SURROUNDING THE WELLESLEY SITE.

ELECTRICITY INFRASTRUCTURE

SSE ASSETS

- 33 — EXTRA HIGH VOLTAGE (33kV) CABLES
- 11 — HIGH VOLTAGE (11kV) CABLES
- ELECTRICAL SUBSTATION

RETAINED MOD ASSETS

- 11 — HIGH VOLTAGE (11kV) CABLES
- LV — LOW VOLTAGE CABLES (LV)
- ELECTRICAL SUBSTATION

- DEVELOPMENT BOUNDARY
- MAIDA ZONE PHASE 1 BOUNDARY
- WESTERN SCHOOL SITE BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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|---|---|---|---|
| ML | ML/FN | BDF | RJW |
| DATE 07.12 | DATE 07.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A0 SIZE | ISSUE STATUS |
|---|---|
| 1:2,500 | PLANNING ISSUE |

WELLESLEY ALDERSHOT

EXISTING ELECTRICAL NETWORK LAYOUT (MOD AND SSE)

GRAINGER PLC


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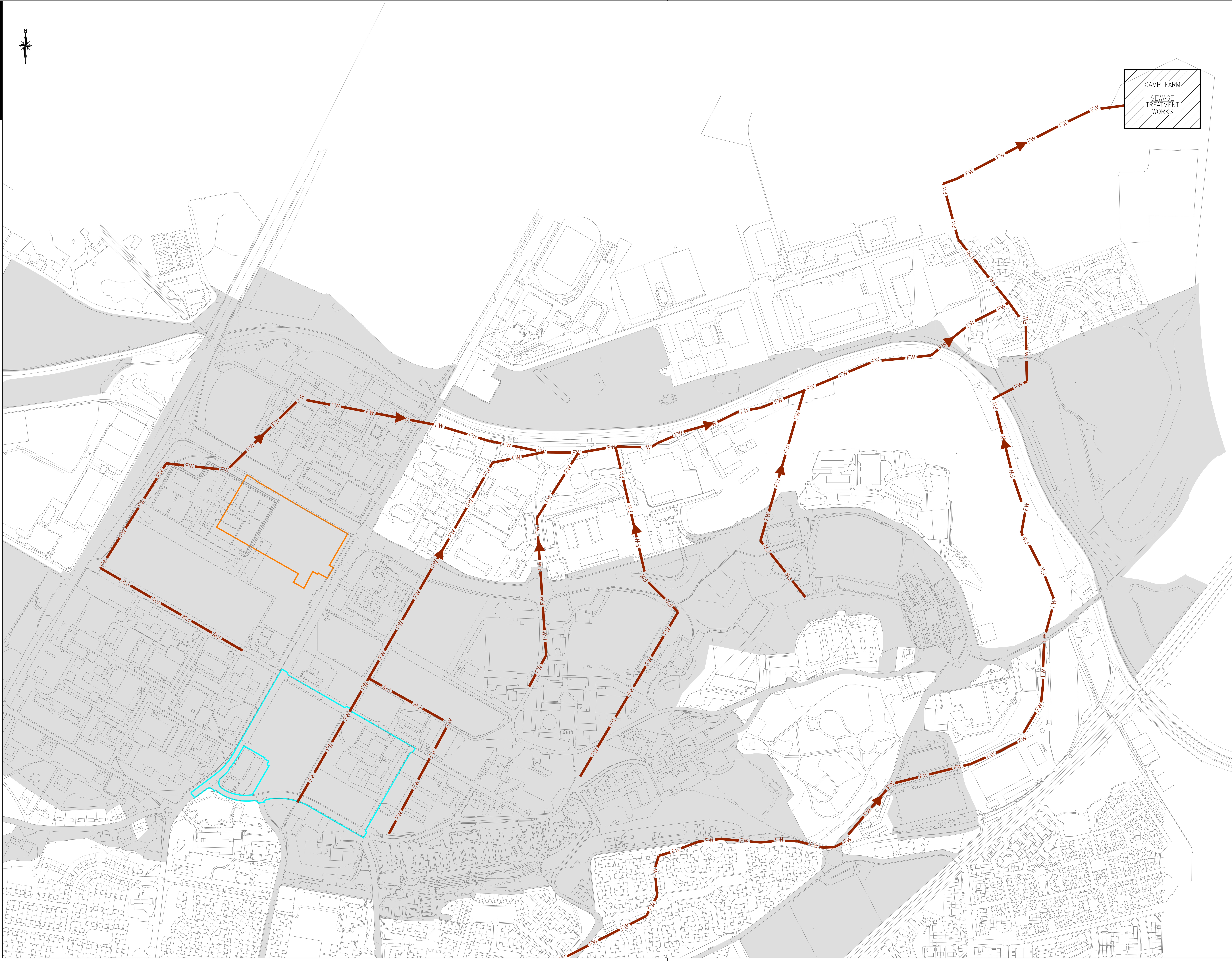
DRAWING NUMBER CS/0580416/UTI/EL/001 REV. -




NOTES

1. FOUL SEWERS SHOWN ON THIS DRAWING HAVE BEEN TRANSCRIBED FROM VEOLIA WATER GIS RECORDS
2. THIS DRAWING IS INTENDED TO IDENTIFY KEY INFRASTRUCTURE THEREFORE SHOWS ONLY THE MAIN STRATEGIC SEWERS RUNNING THROUGH THE DEVELOPMENT SITE
3. CAPACITY AND CONDITION OF FOUL NETWORK SUBJECT TO CCTV SURVEY

KEY

- FW — EXISTING TRUNK FOUL NETWORK
- DEVELOPMENT BOUNDARY
- MAIDA ZONE PHASE 1 BOUNDARY
- WESTERN SCHOOL SITE BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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| FN | FN | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A0 SIZE | ISSUE STATUS |
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| 1:2,500 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

EXISTING
STRATEGIC FOUL
SEWER NETWORK

GRAINGER PLC

CAPITA SYMONDS
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| DRAWING NUMBER | REV. |
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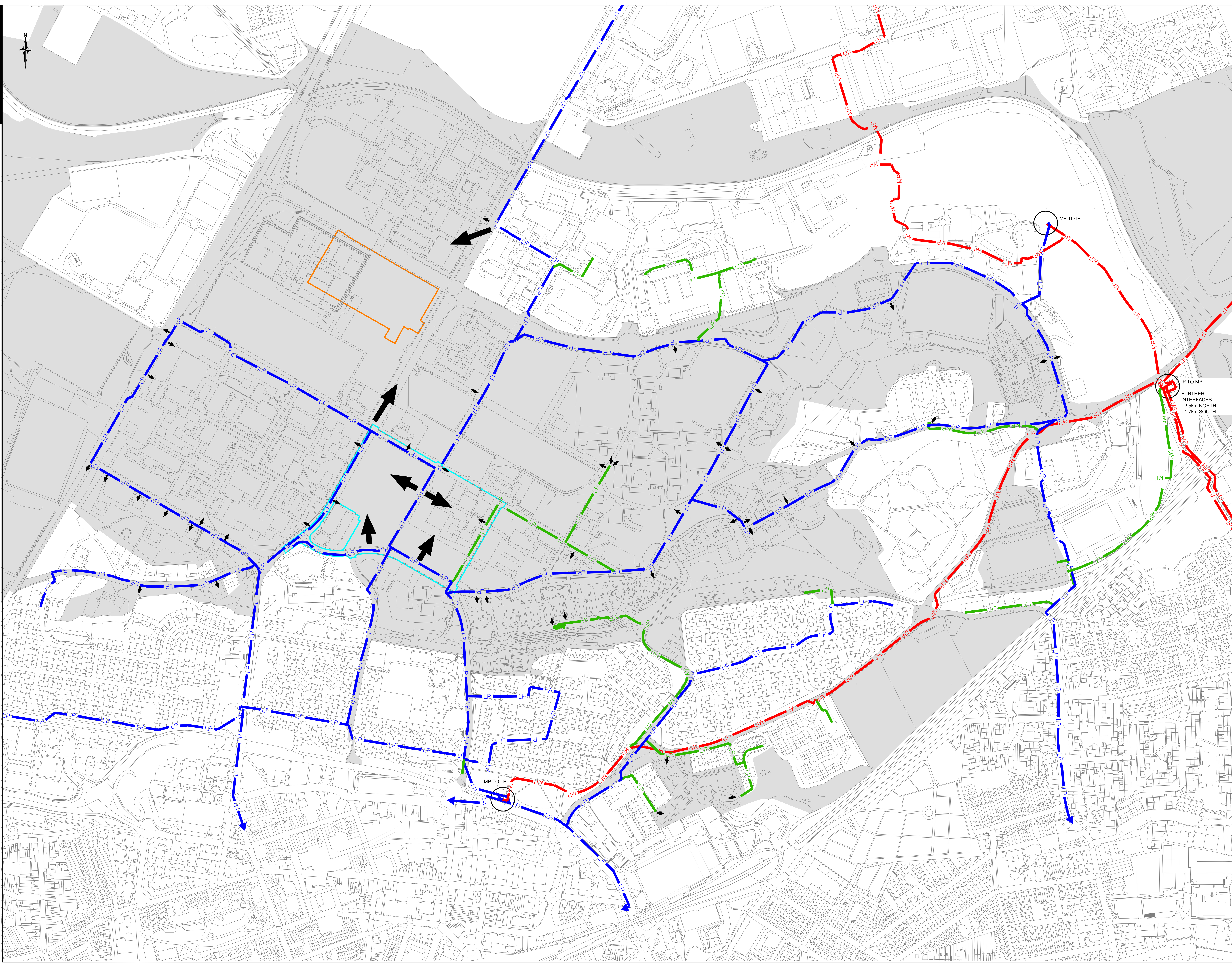
| CS/050416/UTI/FW/001 | - |



DRAWING NUMBER CS/050416/UTI/FW/001 REV. -




NOTES

1. GAS ROUTES SHOWN ON THIS DRAWING HAVE BEEN TRANSCRIBED FROM SOUTHERN GAS NETWORKS RECORDS.
2. THIS DRAWING IS INTENDED TO IDENTIFY KEY INFRASTRUCTURE WITHIN AND SURROUNDING THE WELLESLEY SITE.

KEY

EXISTING GAS INFRASTRUCTURE

- IP — INTERMEDIATE PRESSURE (IP)
- MP — MEDIUM PRESSURE (MP)
- LP — LOW PRESSURE (LP)
- CONNECTIONS POINTS WITHIN AUE SITE
- KEY INTERFACE POINTS (IP/MP OR MP/LP)

**PRIMARY GAS INFRASTRUCTURE**
- STRATEGIC SIGNIFICANCE
- NUMEROUS SECONDARY, SOME TERTIARY CONNECTIONS
- TYPICALLY IP AND MP
- DISTRUPTIONS WIDE SPREAD

**SECONDARY GAS INFRASTRUCTURE**
- LOCAL SIGNIFICANCE
- INTERCONNECTIONS WITH OTHER SECONDARIES
- NUMEROUS TERTIARY CONNECTIONS
- TYPICALLY MP AND LP
- DISRUPTIONS LOCALISED (DYNAMIC)

**TERTIARY GAS INFRASTRUCTURE**
- MINOR LOCAL SIGNIFICANCE
- SUPPLIES INDIVIDUAL PLOTS/PREMISES
- TYPICALLY LP WITH SOME MP

PROPOSED GAS INFRASTRUCTURE

- INDICATIVE CONNECTION FROM LP NETWORK TO PHASE1

- DEVELOPMENT BOUNDARY
- MAIDA ZONE PHASE 1 BOUNDARY
- WESTERN SCHOOL SITE BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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| ML | ML/FN | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A0 SIZE | ISSUE STATUS |
|---|---|
| 1:2,500 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

EXISTING GAS
INFRASTRUCTURE
SGN

GRAINGER PLC

CAPITA SYMONDS

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| DRAWING NUMBER | REV. |
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DRAWING NUMBER CS/050416/UTI/GS/001 REV. -

DRAWING NUMBER CS/050416/UTI/PA/001 REV. -

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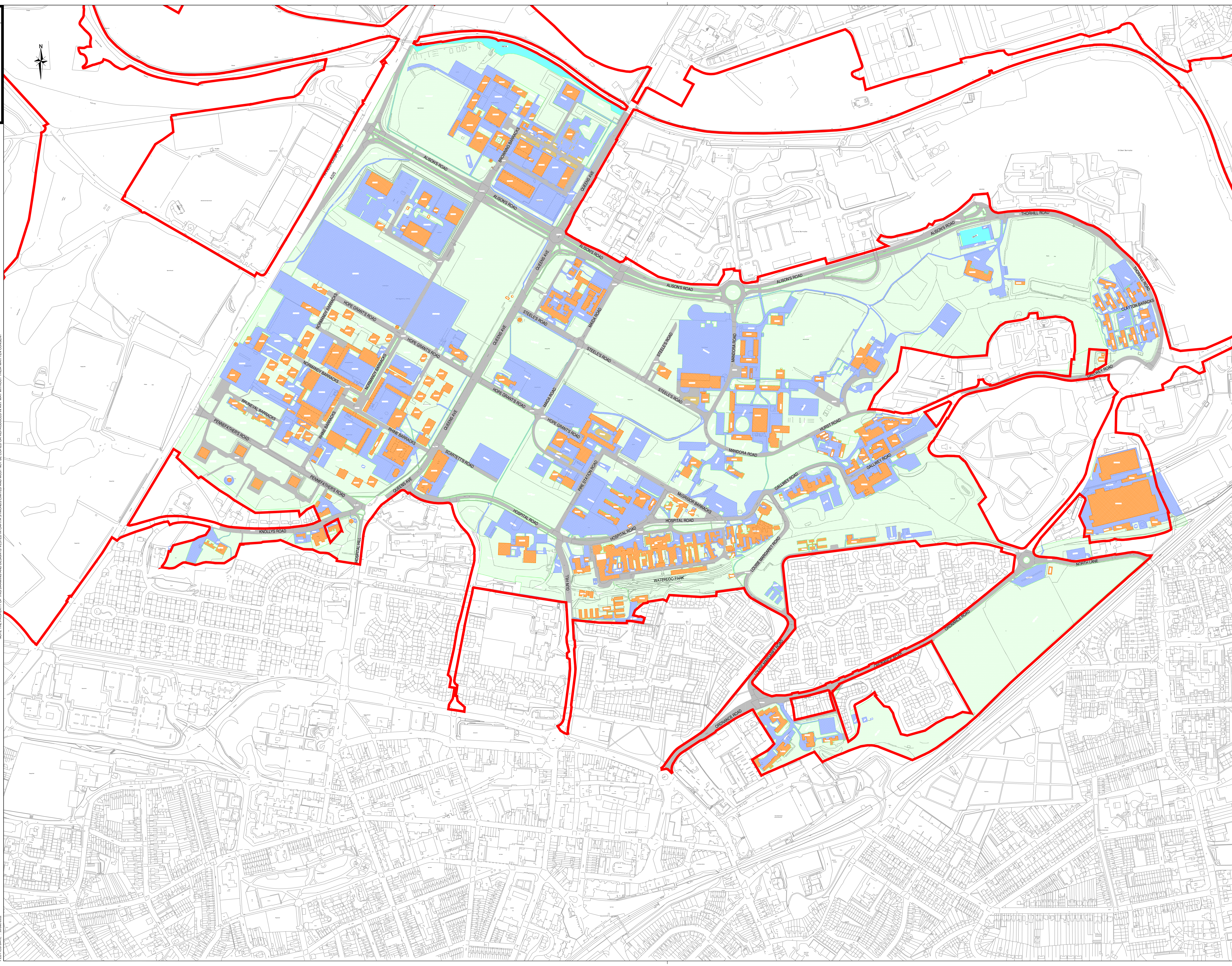


NOTES

KEY

WELLESLEY OUTLINE PLANNING APPLICATION BOUNDARY

PERMEABLE AREAS

GRASS OR VEGETATION

GRAVEL, ETC.

CANAL OR WATER STORAGE

IMPERMEABLE AREAS

BUILDINGS

HARDSTANDING AND FOOTPATHS

CARRIAGEWAYS AND FOOTWAYS

| REV | | DE | DR | CH | PA | DATE |
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| SW | SW | BDF | RJW |
| DATE 06.11 | DATE 06.11 | DATE 12.12 | DATE 12.12 |

SCALES @ A0 SIZE: 1:2,500

ISSUE STATUS: PLANNING ISSUE

WELLESLEY
ALDERSHOT

EXISTING
PERMEABLE AND
IMPERMEABLE
AREAS

GRAINGER PLC

CAPITA SYMONDS

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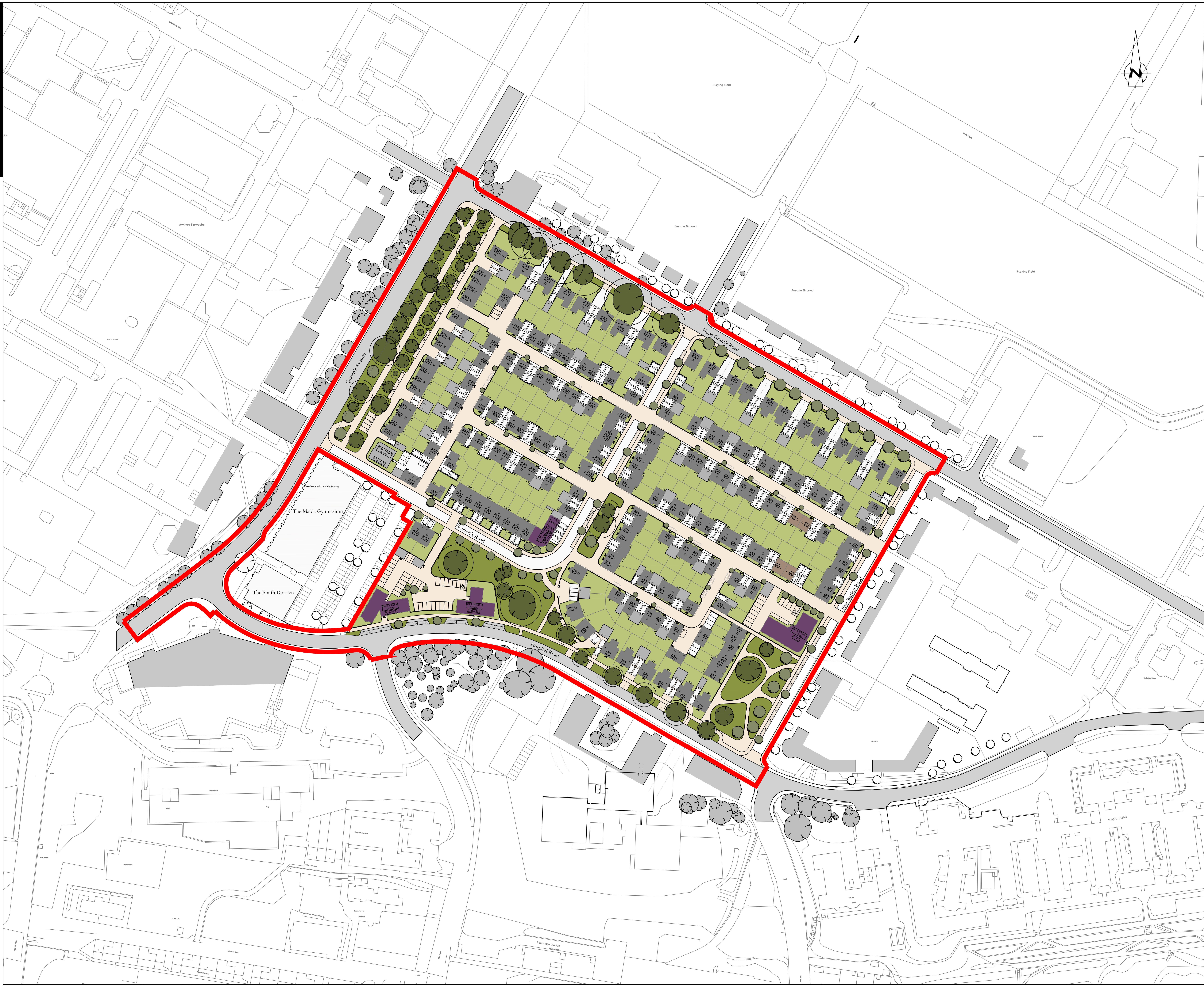
East Grinstead, West Sussex RH19 1UU
Tel: +44 (0)1342 327161 Fax: +44 (0)1342 315927

DRAWING NUMBER: CS/050416/UTI/PA/001 REV. -




NOTES

1. LAYOUT TAKEN FROM ADAM URBANISM DRAWING 5510/HPA05 REV A.

KEY

MAIDA ZONE PHASE 1 BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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| | TH | BDF | RJW |
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| SCALES @ A1 SIZE | ISSUE STATUS |
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| 1:1000 | PRELIMINARY |

WELLESLEY
ALDERSHOT

MAIDA ZONE
PHASE 1

GRAINGER PLC

CAPITA SYMONDS

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East Grinstead, West Sussex RH19 1UU
Tel: +44 (0)1342 327161 Fax: +44 (0)1342 315927

| DRAWING NUMBER | REV. |
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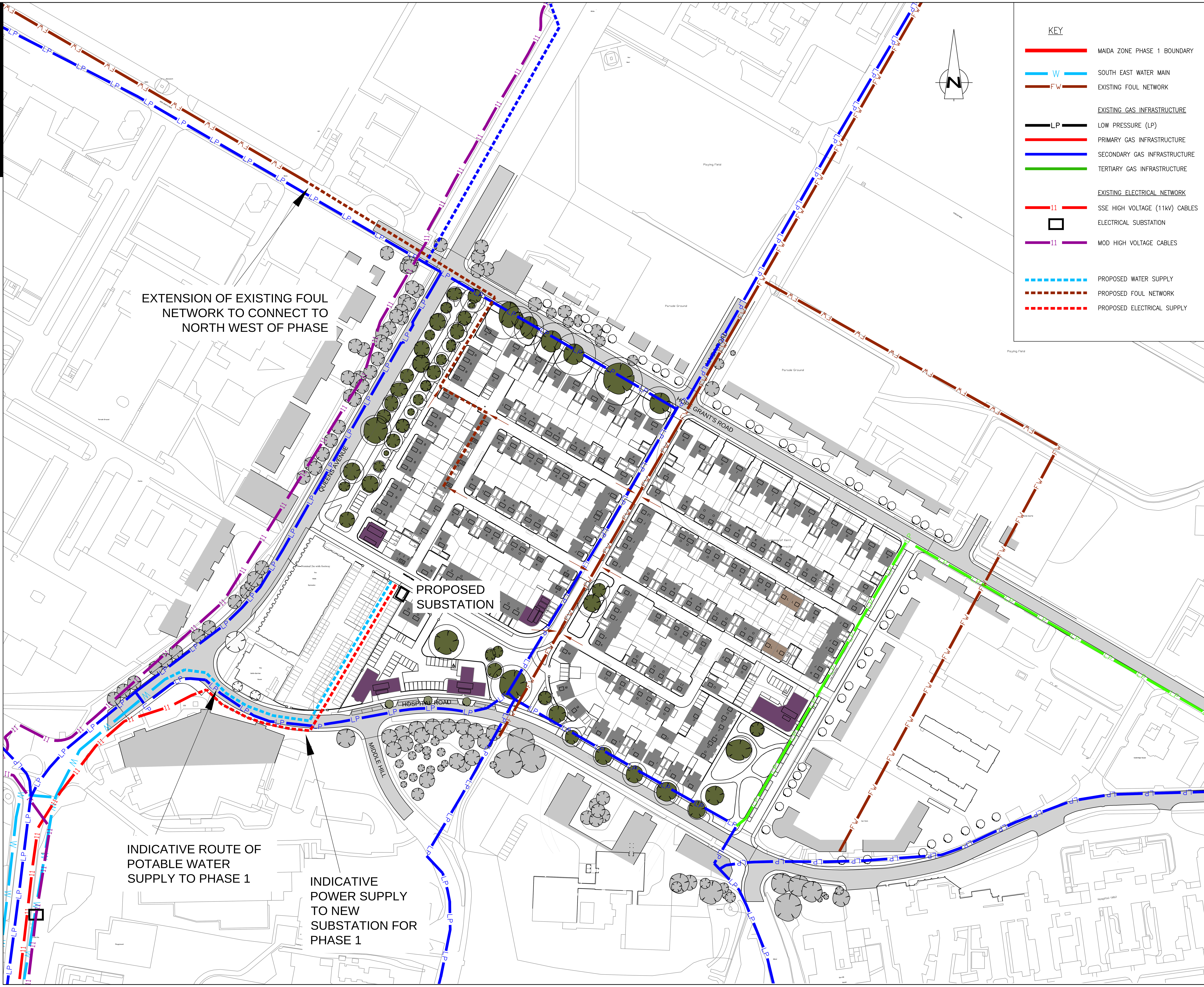
PLOTTED DATE : 11-Dec-2012

DRAWING NUMBER
CS/050416/UTI/PA/004
REV.
-




NOTES

1. LAYOUT TAKEN FROM ADAM URBANISM DRAWING 5510/HPA xx.
2. POSITION OF ALL EXISTING SERVICES IS APPROXIMATE AND BASED ON RECORDS. EXACT LOCATION TO BE DETERMINED ON SITE.
3. GAS SUPPLY OBTAINED FROM APPROPRIATE POINT OF SYSTEM FOR ANY PART OF PHASE.
4. ELECTRICAL SUPPLY FROM SUBSTATION IN MAIDA GYM CARPARK
5. POTABLE WATER APPROXIMATE POSITION FOR PHASE CONNECTION INDICATED
6. NEW FOUL NETWORK STILL TO BE CONFIRMED SUBJECT TO DESIGN LEVELS.
7. SUITABILITY OF FOUL SEWER TO BE CONFIRMED FROM CCTV.
8. WHERE NEW SERVICES UTILITIES AND DRAINAGE TO BE INSTALLED NJUG LAYOUT TO BE USED.

| REV | | DE | DR | CH | PA | DATE |
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| FN | FN | BDF | RJW |
| DATE 12.12 | DATE 12.12 | DATE 12.12 | DATE 12.12 |

| SCALES @ A1 SIZE | ISSUE STATUS |
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| 1:1000 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

PLANNING ISSUE
UTILITY LAYOUT
MAIDA ZONE
PHASE 1

GRAINGER PLC

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DRAWING NUMBER: CS/050416/UTI/PA/005 REV. -

DRAWING NUMBER CS/050416/UTI/PA/005 REV. -

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CAD FILE NAME : \\CSLGRVMU03\DATA\ZENV\PROJECTS\CS050416 AUE_ALDERSHOT\B.WORK_TASKS\6. ZINK - UTILITIES\DESIGN\CAD\CS-050416-UTI-PA-005-006.DWG
CTB FILE NAME : ZDTI.ctb
PLOTTED DATE : 11-Dec-2012

DRAWING NUMBER CS/050416/UTI/PA/006 REV. -

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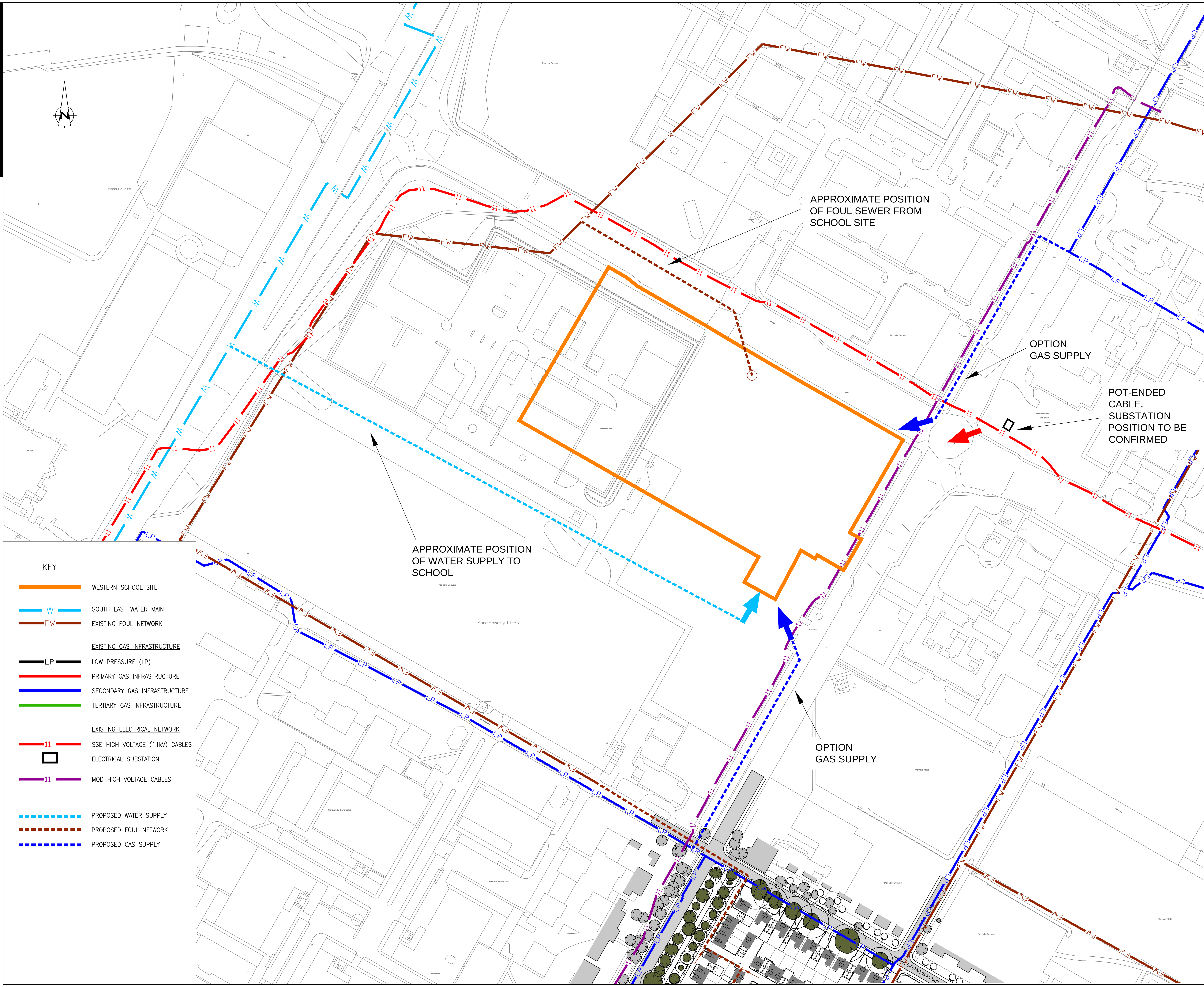


NOTES

1. LAYOUT TAKEN FROM ADAM URBANISM DRAWING 5510/HPAxx.
2. POSITION OF ALL EXISTING SERVICES IS APPROXIMATE AND BASED ON RECORDS. EXACT LOCATION TO BE DETERMINED ON SITE.
3. GAS SUPPLY OBTAINED FROM APPROPRIATE POINT OF SYSTEM FOR ANY PART OF PHASE.
4. SUBSTATION LOCATION TO BE DETERMINED
5. POTABLE WATER APPROXIMATE POSITION FOR PHASE CONNECTION INDICATED
6. APPROXIMATE CONNECTION POINTS TO EXISTING SEWERAGE NETWORK.
7. SUITABILITY OF FOUL SEWER TO BE CONFIRMED FROM CCTV.
8. WHERE NEW SERVICES UTILITIES AND DRAINAGE TO BE INSTALLED NJUG LAYOUT TO BE USED.

| REV | | DE | DR | CH | PA | DATE |
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WELLESLEY ALDERSHOT

PRELIMINARY UTILITY LAYOUT WESTERN SCHOOL SITE

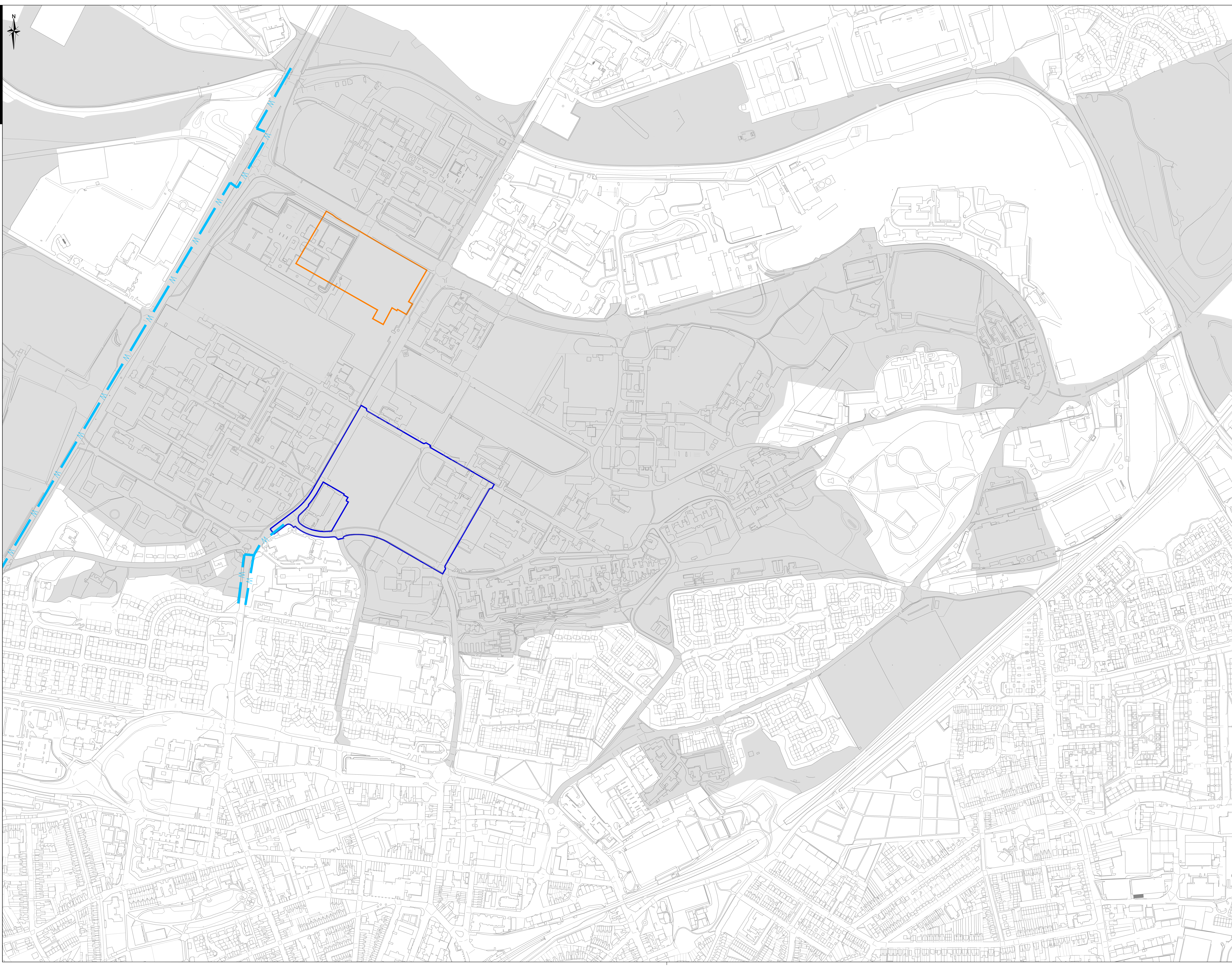
GRAINGER PLC

CAPITA SYMONDS


Capita Symonds House, Wood Street, East Grinstead, West Sussex RH19 1UU
Tel: +44 (0)1342 327161 Fax: +44 (0)1342 315927


DRAWING NUMBER CS/050416/UTI/PA/006 REV. -

PLOTTED DATE : 11-Dec-2012

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NOTES

1. WATER MAIN ROUTES SHOWN ON THIS DRAWING HAVE BEEN TRANSCRIBED FROM SOUTH EAST WATER RECORDS (Q2 2012)
2. THIS DRAWING IS INTENDED TO IDENTIFY KEY INFRASTRUCTURE WITHIN AND SURROUNDING THE WELLESLEY SITE.

KEY

- W — EXISTING SOUTH EAST WATER MAIN
- DEVELOPMENT BOUNDARY
- MAIDA ZONE PHASE 1 BOUNDARY
- WESTERN SCHOOL SITE BOUNDARY

| REV | | DE | DR | CH | PA | DATE |
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| SCALES @ A0 SIZE | ISSUE STATUS |
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| 1:2,500 | PLANNING ISSUE |

WELLESLEY
ALDERSHOT

EXISTING SEW
WATER SUPPLY
NETWORK

GRAINGER PLC

CAPITA SYMONDS

Capita Symonds House, Wood Street,
East Grinstead, West Sussex RH19 1UU
Tel: +44 (0)1342 327161 Fax: +44 (0)1342 315927

| DRAWING NUMBER | REV. |
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| CS/050416/UTI/WA/001 | - |


VEOLIA WATER

Request for Network Records from Veolia Water Outsourcing Limited

The Record Plans supplied should be read in conjunction with the notes and Map Symbol Key.

THE POSITION OF THE APPARATUS SHOWN ON THE PLANS IS GIVEN WITHOUT OBLIGATION AND WARRANTY AND THE ACCURACY CANNOT BE GUARANTEED. SERVICE PIPES ARE NOT NECESSARILY SHOWN BUT THEIR PRESENCE SHOULD BE ANTICIPATED. NO LIABILITY OF ANY KIND IS ACCEPTED BY VEOLIA WATER FOR ANY ERROR OR OMISSION. THE ACTUAL POSITION OF MAINS AND SERVICES MUST BE VERIFIED AND ESTABLISHED ON SITE BEFORE ANY WORKS ARE UNDERTAKEN. THE SUPPLY OF THESE NETWORK RECORDS SHOULD NOT BE TAKEN AS APPROVAL OF THE PROPOSED WORKS BY VEOLIA WATER. CONNECTION TO ANY WATER OR WASTE WATER ASSET SHALL NOT BE CARRIED OUT WITHOUT PRIOR APPROVAL FROM VEOLIA WATER.

Please note that the plans attached do not show proposed water and wastewater assets nor do they show recently constructed services undertaken either directly by ADCW or MUJV (Veolia Water). These are available via the ADCW External Works process.


Request for Network Records from Veolia Water Outsourcing Limited

The Record Plans supplied should be read in conjunction with the notes and Map Symbol Key.

THE POSITION OF THE APPARATUS SHOWN ON THE PLANS IS GIVEN WITHOUT OBLIGATION AND WARRANTY AND THE ACCURACY CANNOT BE GUARANTEED. SERVICE PIPES ARE NOT NECESSARILY SHOWN BUT THEIR PRESENCE SHOULD BE ANTICIPATED. NO LIABILITY OF ANY KIND IS ACCEPTED BY VEOLIA WATER FOR ANY ERROR OR OMISSION. THE ACTUAL POSITION OF MAINS AND SERVICES MUST BE VERIFIED AND ESTABLISHED ON SITE BEFORE ANY WORKS ARE UNDERTAKEN. THE SUPPLY OF THESE NETWORK RECORDS SHOULD NOT BE TAKEN AS APPROVAL OF THE PROPOSED WORKS BY VEOLIA WATER. CONNECTION TO ANY WATER OR WASTE WATER ASSET SHALL NOT BE CARRIED OUT WITHOUT PRIOR APPROVAL FROM VEOLIA WATER.

Please note that the plans attached do not show proposed water and wastewater assets nor do they show recently constructed services undertaken either directly by ADCW or MUJV (Veolia Water). These are available via the ADCW External Works process.

# Appendix B – Correspondence

## Fyfe, Bruce (Capita Symonds)

| | |
|---|---|
| **From:** | Griffiths, Jim [jim.griffiths@veoliawater.co.uk] |
| **Sent:** | 13 January 2012 11:49 |
| **To:** | Wills, Robin (Capita Symonds) |
| **Cc:** | Fyfe, Bruce (Capita Symonds); Lennon, Mark (Capita Symonds); Campbell, Robbie; Nicholl, David |
| **Subject:** | RE: Aldershot |

Good morning Robin,

Happy to entertain questions as they arise.

Regarding your current queries I can say we have no SW pumping stations. All SW systems either gravitate to the canal via various key interceptors or silt traps or discharge to ditches / water courses, some of which may well find there way to the canal eventually.

Other than some occasional localised flooding probably related to blocked road gullies or the like we have no experience of meaningful land flooding. That said, but not seen by us since Contract commencement in 2004, there were rumours that the Queens Ave playing fields did flood and the MoD were apparently preparing to spend a large sum of money to alleviate this matter.

We too understand that the canal itself can't flood as it has an overflow into the adjacent river

Kind Regards


Jim D Griffiths

Services and Contracts Manager

Tidworth PFI and Project Allenby Connaught.

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**Veolia Water Outsourcing Ltd.**

Tidworth Treatment Works, Humber Lane, Tidworth,

Wilts, SP9 7AW

Mob: +44 07747 641765

DD: +44 01980 840302

Fax: +44 01980 844158

Jim.Griffiths@veoliawater.co.uk


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**From:** Wills, Robin (Capita Symonds) [mailto:Robin.Wills@capita.co.uk]
**Sent:** 12 January 2012 12:29
**To:** Griffiths, Jim
**Cc:** Fyfe, Bruce (Capita Symonds); Lennon, Mark (Capita Symonds); Campbell, Robbie
**Subject:** Aldershot

Hi Jim Happy New Year

We will be contacting you regarding some various elements at the Aldershot site as we are putting together an Environmental Impact Assessment at present. It may be me or one of my colleagues.

One question that springs to mind is do you have any information or knowledge of flooding on the site since MUJV have been operating which caused problems with operating the system particularly in 2007. Also if there were any canal flooding issues, probably not as we believe there is an overflow to the Blackwater River.

Are there any surface water pumping stations on the site which you are responsible for?

Any help would be much appreciated.

Regards

**Robin Wills** **CEng MCIWEM, MIWater**
**Associate (Development Infrastructure)**
**CAPITA SYMONDS**

Capita Symonds House, Wood Street

East Grinstead, RH19 1UU

Tel: 01342 327161

Mobile: 07795 612578

Fax: 01342 315927

Email: robin.wills@capita.co.uk
Web: www.capitasymonds.co.uk

## Fyfe, Bruce (Capita Symonds)

**From:** Campbell, Robbie [Robbie.Campbell@veoliawater.co.uk]
**Sent:** 14 January 2012 10:26
**To:** Wills, Robin (Capita Symonds); Griffiths, Jim
**Cc:** Fyfe, Bruce (Capita Symonds); Lennon, Mark (Capita Symonds); Nicholl, David
**Subject:** RE: Aldershot

The North end of Queen's Ave fields by Hammersley Lines is prone to flooding but has not done so for a number of years.

Some land drainage work before contract improved it but it should be a matter to keep an eye on when they rebuild Hammersley as HQ Sp Comd.

Robbie

---

**From:** Wills, Robin (Capita Symonds) [mailto:Robin.Wills@capita.co.uk]
**Sent:** Fri 13/01/2012 14:18
**To:** Griffiths, Jim
**Cc:** Fyfe, Bruce (Capita Symonds); Lennon, Mark (Capita Symonds); Campbell, Robbie; Nicholl, David
**Subject:** RE: Aldershot

Thanks Jim much appreciated.

Regards
**Robin Wills CEng MCIWEM, MIWater**
**Associate (Development Infrastructure)**
**CAPITA SYMONDS**
Capita Symonds House, Wood Street
East Grinstead, RH19 1UU
Tel: 01342 327161
Mobile: 07795 612578
Fax: 01342 315927
Email: robin.wills@capita.co.uk
Web: www.capitasymonds.co.uk

**From:** Griffiths, Jim [mailto:jim.griffiths@veoliawater.co.uk]
**Sent:** 13 January 2012 11:49
**To:** Wills, Robin (Capita Symonds)
**Cc:** Fyfe, Bruce (Capita Symonds); Lennon, Mark (Capita Symonds); Campbell, Robbie; Nicholl, David
**Subject:** RE: Aldershot

Good morning Robin,

Happy to entertain questions as they arise.

Regarding your current queries I can say we have no SW pumping stations. All SW systems either gravitate to the canal via various key interceptors or silt traps or discharge to ditches / water courses, some of which may well find there way to the canal eventually.

Other than some occasional localised flooding probably related to blocked road gullies or the like we have no experience of meaningful land flooding. That said, but not seen by us since Contract commencement in 2004, there were rumours that the Queens Ave playing fields did flood and the MoD were apparently preparing to spend a large sum of money to alleviate this matter.

Southern Gas Networks
A Scotia Gas Networks Company

Network Quotation Ref: L12128470
Requester Reference: E26632-60987

FAO: Mark Lennon,
Capita Symonds
Sundial House
63 Cheap Street
Newbury
Berkshire
RG14 5BT

St Lawrence House
Station Approach, Horley
Surrey
RH6 9HJ

Date: 17 February 2012
Network Contact: Joe Lewis
Tel: 01293 818266
Fax: 0845 070 1640

Dear Mark Lennon,

Re: DEV @, ., MANDORA ROAD, ALDERSHOT, HAMPSHIRE, GU11 2DH

Thank you for your enquiry dated 15 February 2012, which we received on 16 February 2012.

The nearest relevant main is Intermediate Pressure and 250 metre(s) from the site boundary.

Plan Attached: Yes

Gas Diversionary or abandonment works may be required. For Further details please write to SGN at the above address. Reinforcement of SGN network to support the proposed load is not anticipated. As previous agreement, Network analysis performed from nearest available IP main. Network analyisis concluded no reinforcement would be required to accept the proposed load from the 16" ST IP main, please see attached plans.

For new supply/alteration/disconnection quotations please refer to www.scotiagasnetworks.co.uk. Go to Related Links to download relevant request form.

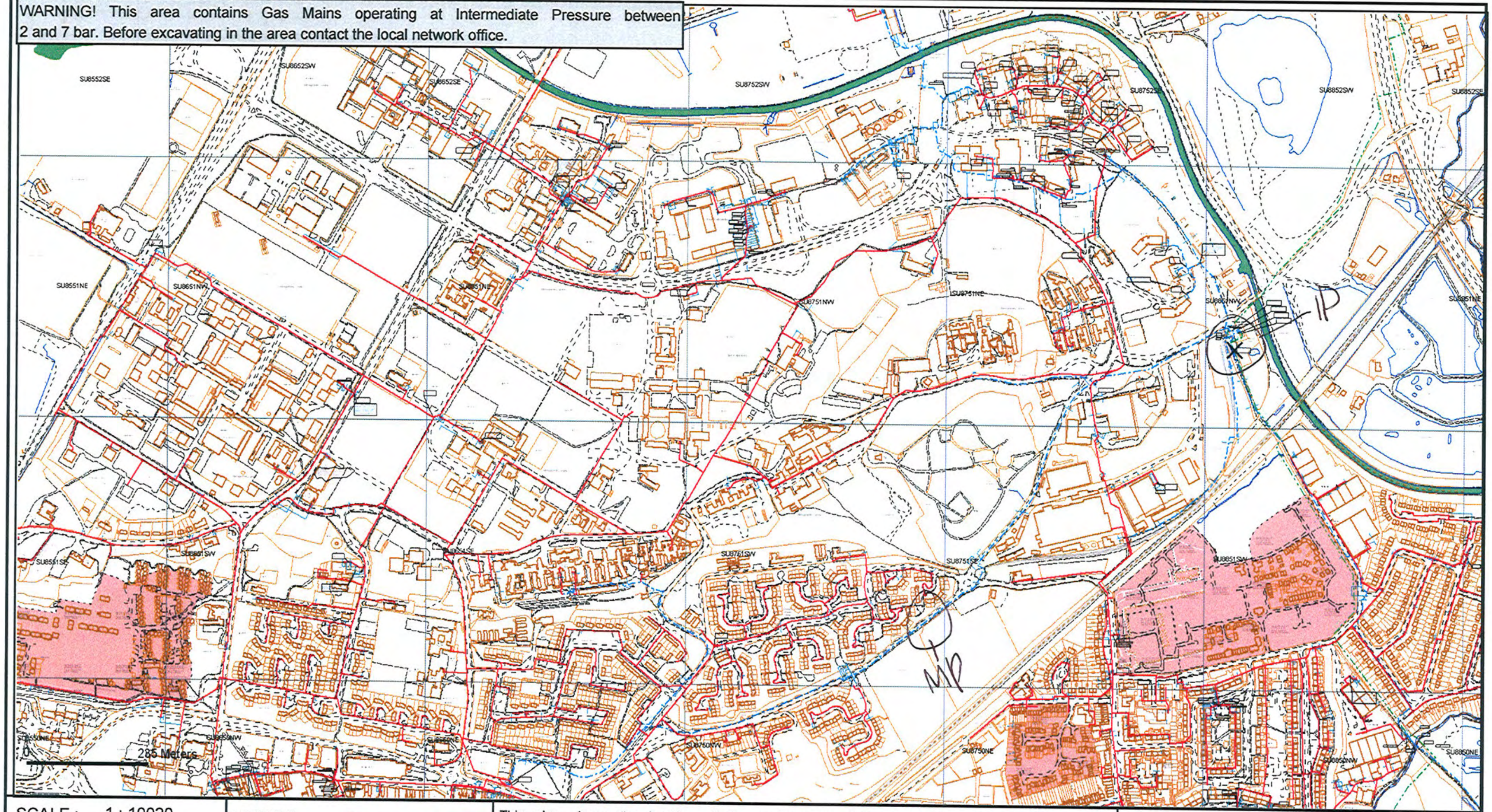
If you have any queries, please contact Joe Lewis on the number above.

Yours sincerely

Leigh Keegan
( Network Support Manager )

SO 16"ST IP - NW No 8011999 - APPROX 250M TO SITE

WARNING! This area contains Gas Mains operating at Intermediate Pressure between 2 and 7 bar. Before excavating in the area contact the local network office.




| | |
|---|---|
| SCALE : | 1 : 10020 |
| USER ID : | jl94179 |
| DATE : | 16/02/2012 |
| INTERNAL USE ONLY | |
| GRID REFERENCE : E487124, N151535, SU8751 | |

LP MAINS
MP MAINS
IP MAINS
LHP MAINS
HISTORY DATA
LAs
GTs
SSSIs

Some examples of Plant Items

Valve · Syphon · Depth of Cover · Diameter Change · Material Change

This plan shows the location of those pipes owned by Scotia Gas Networks ("SGN") by virtue of being a licensed Gas Transporter (GT). Gas pipes owned by other GTs, or third parties, may also be present in this area and are not shown on this plan. Information with regard to such pipes should be obtained from the relevant owners. No warranties with regard to the accuracy of the information shown on this plan. Service pipes, valves, siphons, sub-connections, etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by SGN or its agents, servants or sub-contractors for any error or omission contained herein. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (whether direct labour or sub-contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

Intranet MAPS Version 1.8

Hampshire County Area



Scotia Gas Networks

*EXISTING INFRASTRUCTURE ENCOMPASSED BY PROPOSED BOUNDARY*

# Appendix C – Calculations

## Time Area Diagram for Existing

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|---|---|---|---|---|---|
| 0-4 | 3.269 | 4-8 | 7.916 | 8-12 | 1.953 |

Total Area Contributing (ha) = 13.139

Total Pipe Volume (m³) = 492.429

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.000 | 21.386 | 1.120 | 19.1 | 0.143 | 4.00 | 0.0 | 0.600 | o | 152 |
| E1.001 | 54.472 | 2.785 | 19.6 | 0.088 | 0.00 | 0.0 | 0.600 | o | 152 |
| E1.002 | 95.477 | 2.225 | 42.9 | 0.296 | 0.00 | 0.0 | 0.600 | o | 229 |
| E1.003 | 78.353 | 0.990 | 79.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E1.004 | 76.604 | 2.844 | 26.9 | 0.979 | 0.00 | 0.0 | 0.600 | o | 381 |
| E2.000 | 19.637 | 0.149 | 131.8 | 0.066 | 4.00 | 0.0 | 0.600 | o | 152 |
| E2.001 | 12.202 | 0.092 | 132.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 152 |
| E2.002 | 47.662 | 1.454 | 32.8 | 0.040 | 0.00 | 0.0 | 0.600 | o | 152 |
| E2.003 | 63.985 | 1.682 | 38.0 | 0.216 | 0.00 | 0.0 | 0.600 | o | 152 |
| E3.000 | 35.929 | 0.380 | 94.6 | 0.003 | 4.00 | 0.0 | 0.600 | o | 152 |
| E4.000 | 61.523 | 1.570 | 39.2 | 0.150 | 4.00 | 0.0 | 0.600 | o | 152 |
| E5.000 | 25.155 | 0.700 | 35.9 | 0.066 | 4.00 | 0.0 | 0.600 | o | 152 |
| E3.001 | 82.931 | 1.697 | 48.9 | 0.007 | 0.00 | 0.0 | 0.600 | o | 229 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.000 | 106.480 | 0.143 | 0.0 | 2.34 | 42.4 |
| E1.001 | 105.360 | 0.231 | 0.0 | 2.31 | 41.9 |
| E1.002 | 102.498 | 0.527 | 0.0 | 2.03 | 83.4 |
| E1.003 | 100.197 | 0.527 | 0.0 | 1.79 | 130.6 |
| E1.004 | 99.207 | 1.506 | 0.0 | 3.54 | 403.4 |
| E2.000 | 109.210 | 0.066 | 0.0 | 0.88 | 16.0 |
| E2.001 | 109.061 | 0.066 | 0.0 | 0.88 | 15.9 |
| E2.002 | 108.969 | 0.106 | 0.0 | 1.78 | 32.3 |
| E2.003 | 107.515 | 0.322 | 0.0 | 1.65 | 30.0 |
| E3.000 | 107.910 | 0.003 | 0.0 | 1.04 | 18.9 |
| E4.000 | 109.100 | 0.150 | 0.0 | 1.63 | 29.5 |
| E5.000 | 108.230 | 0.066 | 0.0 | 1.70 | 30.8 |
| E3.001 | 107.451 | 0.226 | 0.0 | 1.90 | 78.1 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E6.000 | 31.590 | 1.145 | 27.6 | 0.050 | 4.00 | 0.0 | 0.600 | o | 152 |
| E2.004 | 27.236 | 0.944 | 28.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 227 |
| E7.000 | 19.034 | 0.687 | 27.7 | 0.014 | 4.00 | 0.0 | 0.600 | o | 152 |
| E7.001 | 21.077 | 0.574 | 36.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E8.000 | 19.925 | 0.630 | 31.6 | 0.033 | 4.00 | 0.0 | 0.600 | o | 152 |
| E8.001 | 44.682 | 0.660 | 67.7 | 0.060 | 0.00 | 0.0 | 0.600 | o | 152 |
| E8.002 | 27.892 | 0.211 | 132.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 152 |
| E2.005 | 91.169 | 4.051 | 22.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E2.006 | 30.865 | 1.397 | 22.1 | 0.335 | 0.00 | 0.0 | 0.600 | o | 305 |
| E2.007 | 29.802 | 1.349 | 22.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E2.008 | 8.199 | 0.371 | 22.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E2.009 | 29.707 | 0.845 | 35.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E2.010 | 6.227 | 0.284 | 21.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E6.000 | 106.980 | 0.050 | 0.0 | 1.94 | 35.2 |
| E2.004 | 105.758 | 0.598 | 0.0 | 2.46 | 99.5 |
| E7.000 | 106.150 | 0.014 | 0.0 | 1.94 | 35.1 |
| E7.001 | 105.310 | 0.014 | 0.0 | 2.63 | 192.2 |
| E8.000 | 106.390 | 0.033 | 0.0 | 1.81 | 32.9 |
| E8.001 | 105.760 | 0.093 | 0.0 | 1.23 | 22.4 |
| E8.002 | 105.100 | 0.093 | 0.0 | 0.88 | 16.0 |
| E2.005 | 104.736 | 0.705 | 0.0 | 3.36 | 245.8 |
| E2.006 | 100.685 | 1.040 | 0.0 | 3.39 | 248.0 |
| E2.007 | 99.288 | 1.040 | 0.0 | 3.40 | 248.0 |
| E2.008 | 97.939 | 1.040 | 0.0 | 3.39 | 248.0 |
| E2.009 | 97.568 | 1.040 | 0.0 | 2.69 | 196.4 |
| E2.010 | 96.723 | 1.040 | 0.0 | 3.41 | 249.0 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.005 | 74.694 | 0.629 | 118.8 | 0.133 | 0.00 | 0.0 | 0.600 | o | 381 |
| E1.006 | 81.335 | 2.029 | 40.1 | 0.191 | 0.00 | 0.0 | 0.600 | o | 381 |
| E9.000 | 53.393 | 1.993 | 26.8 | 0.169 | 4.00 | 0.0 | 0.600 | o | 229 |
| E9.001 | 16.546 | 0.617 | 26.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E9.002 | 24.424 | 0.360 | 67.8 | 0.066 | 0.00 | 0.0 | 0.600 | o | 229 |
| E9.003 | 64.801 | 2.190 | 29.6 | 0.044 | 0.00 | 0.0 | 0.600 | o | 229 |
| E9.004 | 36.417 | 0.290 | 125.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E9.005 | 19.702 | 0.946 | 20.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E9.006 | 30.262 | 0.456 | 66.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E10.000 | 44.918 | 0.916 | 49.0 | 0.218 | 4.00 | 0.0 | 0.600 | o | 229 |
| E9.007 | 189.715 | 6.902 | 27.5 | 0.756 | 0.00 | 0.0 | 0.600 | o | 305 |
| E1.007 | 50.942 | 1.460 | 34.9 | 0.050 | 0.00 | 0.0 | 0.600 | o | 381 |
| E1.008 | 50.942 | 1.050 | 48.5 | 0.050 | 0.00 | 0.0 | 0.600 | o | 381 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.005 | 96.363 | 2.679 | 0.0 | 1.68 | 191.4 |
| E1.006 | 95.734 | 2.870 | 0.0 | 2.90 | 330.4 |
| E9.000 | 107.390 | 0.169 | 0.0 | 2.57 | 105.7 |
| E9.001 | 105.397 | 0.169 | 0.0 | 2.57 | 105.7 |
| E9.002 | 104.780 | 0.235 | 0.0 | 1.61 | 66.2 |
| E9.003 | 104.420 | 0.279 | 0.0 | 2.44 | 100.6 |
| E9.004 | 102.230 | 0.279 | 0.0 | 1.18 | 48.5 |
| E9.005 | 101.940 | 0.279 | 0.0 | 2.91 | 120.0 |
| E9.006 | 100.994 | 0.279 | 0.0 | 1.63 | 67.0 |
| E10.000 | 101.530 | 0.218 | 0.0 | 1.89 | 78.0 |
| E9.007 | 100.538 | 1.253 | 0.0 | 3.04 | 222.3 |
| E1.007 | 93.560 | 4.173 | 0.0 | 3.11 | 354.3 |
| E1.008 | 92.100 | 4.223 | 0.0 | 2.63 | 300.2 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.009 | 75.733 | 1.480 | 51.2 | 0.368 | 0.00 | 0.0 | 0.600 | o | 610 |
| E1.010 | 52.218 | 0.750 | 69.6 | 0.072 | 0.00 | 0.0 | 0.600 | o | 610 |
| E1.011 | 83.074 | 0.260 | 319.5 | 0.072 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.000 | 13.730 | 0.510 | 26.9 | 0.025 | 4.00 | 0.0 | 0.600 | o | 102 |
| E11.001 | 34.102 | 1.430 | 23.8 | 0.116 | 0.00 | 0.0 | 0.600 | o | 102 |
| E11.002 | 16.478 | 0.810 | 20.3 | 0.009 | 0.00 | 0.0 | 0.600 | o | 102 |
| E11.003 | 41.949 | 0.480 | 87.4 | 0.037 | 0.00 | 0.0 | 0.600 | o | 152 |
| E11.004 | 10.707 | 0.123 | 87.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E11.005 | 12.572 | 1.170 | 10.7 | 0.129 | 0.00 | 0.0 | 0.600 | o | 229 |
| E12.000 | 16.513 | 0.125 | 132.1 | 0.023 | 4.00 | 0.0 | 0.600 | o | 102 |
| E12.001 | 88.124 | 2.575 | 34.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 152 |
| E12.002 | 29.459 | 0.490 | 60.1 | 0.176 | 0.00 | 0.0 | 0.600 | o | 152 |
| E12.003 | 60.963 | 0.960 | 63.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E11.006 | 61.683 | 3.230 | 19.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E11.007 | 22.340 | 0.460 | 48.6 | 0.223 | 0.00 | 0.0 | 0.600 | o | 305 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.009 | 91.050 | 4.591 | 0.0 | 3.45 | 1006.8 |
| E1.010 | 89.420 | 4.663 | 0.0 | 2.95 | 862.6 |
| E1.011 | 88.670 | 4.735 | 0.0 | 1.37 | 400.7 |
| E11.000 | 106.100 | 0.025 | 0.0 | 1.51 | 12.4 |
| E11.001 | 105.590 | 0.141 | 0.0 | 1.61 | 13.1 |
| E11.002 | 104.160 | 0.150 | 0.0 | 1.74 | 14.2 |
| E11.003 | 103.350 | 0.187 | 0.0 | 1.09 | 19.7 |
| E11.004 | 102.793 | 0.187 | 0.0 | 1.42 | 58.4 |
| E11.005 | 102.670 | 0.316 | 0.0 | 4.06 | 167.2 |
| E12.000 | 105.650 | 0.023 | 0.0 | 0.68 | 5.5 |
| E12.001 | 105.525 | 0.023 | 0.0 | 1.74 | 31.6 |
| E12.002 | 102.950 | 0.199 | 0.0 | 1.31 | 23.8 |
| E12.003 | 102.460 | 0.199 | 0.0 | 1.66 | 68.5 |
| E11.006 | 101.500 | 0.515 | 0.0 | 3.65 | 266.9 |
| E11.007 | 98.270 | 0.738 | 0.0 | 2.29 | 167.0 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E11.008 | 74.969 | 1.434 | 52.3 | 0.054 | 0.00 | 0.0 | 0.600 | o | 381 |
| E11.009 | 19.796 | 0.161 | 123.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.010 | 37.906 | 0.810 | 46.8 | 0.054 | 0.00 | 0.0 | 0.600 | o | 610 |
| E13.000 | 26.063 | 0.932 | 28.0 | 0.000 | 4.00 | 0.0 | 0.600 | o | 229 |
| E13.001 | 25.234 | 1.030 | 24.5 | 0.091 | 0.00 | 0.0 | 0.600 | o | 229 |
| E13.002 | 59.920 | 1.708 | 35.1 | 0.148 | 0.00 | 0.0 | 0.600 | o | 229 |
| E13.003 | 77.784 | 1.720 | 45.2 | 0.229 | 0.00 | 0.0 | 0.600 | o | 305 |
| E13.004 | 29.247 | 0.200 | 146.2 | 0.461 | 0.00 | 0.0 | 0.600 | o | 305 |
| E13.005 | 26.283 | 1.495 | 17.6 | 0.068 | 0.00 | 0.0 | 0.600 | o | 305 |
| E11.011 | 37.930 | 0.400 | 94.8 | 0.496 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.012 | 58.768 | 1.410 | 41.7 | 0.235 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.013 | 34.677 | 1.440 | 24.1 | 0.680 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.014 | 29.088 | 1.390 | 20.9 | 0.197 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.015 | 25.993 | 1.060 | 24.5 | 0.187 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.016 | 124.161 | 0.830 | 149.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 610 |
| E11.017 | 3.804 | 0.160 | 23.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 610 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E11.008 | 97.734 | 0.792 | 0.0 | 2.54 | 289.1 |
| E11.009 | 96.071 | 0.792 | 0.0 | 2.22 | 648.2 |
| E11.010 | 95.910 | 0.846 | 0.0 | 3.60 | 1053.0 |
| E13.000 | 102.490 | 0.000 | 0.0 | 2.51 | 103.5 |
| E13.001 | 101.558 | 0.091 | 0.0 | 2.68 | 110.6 |
| E13.002 | 100.528 | 0.239 | 0.0 | 2.24 | 92.3 |
| E13.003 | 98.820 | 0.468 | 0.0 | 2.37 | 173.1 |
| E13.004 | 97.100 | 0.929 | 0.0 | 1.31 | 95.8 |
| E13.005 | 96.900 | 0.997 | 0.0 | 3.81 | 278.2 |
| E11.011 | 95.100 | 2.339 | 0.0 | 2.53 | 738.6 |
| E11.012 | 94.700 | 2.574 | 0.0 | 3.82 | 1116.0 |
| E11.013 | 93.290 | 3.254 | 0.0 | 5.03 | 1469.4 |
| E11.014 | 91.850 | 3.451 | 0.0 | 5.39 | 1576.5 |
| E11.015 | 90.460 | 3.638 | 0.0 | 4.98 | 1456.1 |
| E11.016 | 89.400 | 3.638 | 0.0 | 2.01 | 587.3 |
| E11.017 | 88.570 | 3.638 | 0.0 | 5.06 | 1478.8 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.012 | 30.719 | 0.148 | 207.6 | 0.135 | 0.00 | 0.0 | 0.600 | o | 762 |
| E14.000 | 27.861 | 0.830 | 33.6 | 0.177 | 4.00 | 0.0 | 0.600 | o | 229 |
| E14.001 | 19.638 | 0.130 | 151.1 | 0.354 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.002 | 13.507 | 1.114 | 12.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.003 | 47.200 | 0.710 | 66.5 | 0.155 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.004 | 26.692 | 1.000 | 26.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.005 | 38.777 | 1.210 | 32.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.006 | 38.407 | 1.420 | 27.0 | 0.033 | 0.00 | 0.0 | 0.600 | o | 305 |
| E15.000 | 34.359 | 1.300 | 26.4 | 0.271 | 4.00 | 0.0 | 0.600 | o | 229 |
| E15.001 | 44.653 | 1.660 | 26.9 | 0.193 | 0.00 | 0.0 | 0.600 | o | 229 |
| E15.002 | 28.420 | 1.240 | 22.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E15.003 | 42.599 | 0.940 | 45.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E15.004 | 63.163 | 2.200 | 28.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 229 |
| E15.005 | 28.566 | 1.190 | 24.0 | 0.083 | 0.00 | 0.0 | 0.600 | o | 305 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.012 | 88.258 | 8.508 | 0.0 | 1.96 | 892.9 |
| E14.000 | 98.380 | 0.177 | 0.0 | 2.29 | 94.4 |
| E14.001 | 97.474 | 0.531 | 0.0 | 1.29 | 94.3 |
| E14.002 | 97.344 | 0.531 | 0.0 | 4.59 | 335.2 |
| E14.003 | 96.230 | 0.686 | 0.0 | 1.95 | 142.6 |
| E14.004 | 95.520 | 0.686 | 0.0 | 3.09 | 225.6 |
| E14.005 | 94.520 | 0.686 | 0.0 | 2.82 | 205.8 |
| E14.006 | 93.310 | 0.719 | 0.0 | 3.07 | 224.1 |
| E15.000 | 100.420 | 0.271 | 0.0 | 2.58 | 106.4 |
| E15.001 | 99.120 | 0.464 | 0.0 | 2.56 | 105.5 |
| E15.002 | 97.460 | 0.464 | 0.0 | 2.78 | 114.3 |
| E15.003 | 96.220 | 0.464 | 0.0 | 1.97 | 81.2 |
| E15.004 | 95.280 | 0.464 | 0.0 | 2.48 | 102.1 |
| E15.005 | 93.080 | 0.547 | 0.0 | 3.26 | 237.9 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E14.007 | 14.686 | 0.424 | 34.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E14.008 | 31.647 | 0.250 | 126.6 | 0.172 | 0.00 | 0.0 | 0.600 | o | 381 |
| E14.009 | 63.992 | 1.300 | 49.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |
| E14.010 | 2.385 | 0.041 | 58.2 | 0.269 | 0.00 | 0.0 | 0.600 | o | 381 |
| E14.011 | 25.353 | 0.357 | 71.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |
| E14.012 | 55.293 | 0.951 | 58.1 | 1.760 | 0.00 | 0.0 | 0.600 | o | 457 |
| E1.013 | 123.688 | 1.880 | 65.8 | 0.081 | 0.00 | 0.0 | 0.600 | o | 762 |
| E1.014 | 50.533 | 0.549 | 92.0 | 0.031 | 0.00 | 0.0 | 0.600 | o | 762 |
| E16.000 | 21.518 | 0.965 | 22.3 | 0.005 | 4.00 | 0.0 | 0.600 | o | 305 |
| E16.001 | 25.931 | 0.710 | 36.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 305 |
| E16.002 | 50.769 | 1.602 | 31.7 | 1.047 | 0.00 | 0.0 | 0.600 | o | 458 |
| E16.003 | 17.716 | 0.500 | 35.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 458 |
| E16.004 | 13.150 | 1.609 | 8.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 458 |
| E1.015 | 29.544 | 0.320 | 92.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 762 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E14.007 | 91.890 | 1.266 | 0.0 | 2.71 | 197.9 |
| E14.008 | 91.390 | 1.438 | 0.0 | 1.63 | 185.3 |
| E14.009 | 91.140 | 1.438 | 0.0 | 2.61 | 298.0 |
| E14.010 | 89.840 | 1.707 | 0.0 | 2.40 | 274.0 |
| E14.011 | 89.799 | 1.707 | 0.0 | 2.17 | 247.9 |
| E14.012 | 89.366 | 3.467 | 0.0 | 2.70 | 442.3 |
| E1.013 | 88.110 | 12.056 | 0.0 | 3.49 | 1590.5 |
| E1.014 | 86.230 | 12.087 | 0.0 | 2.95 | 1343.7 |
| E16.000 | 91.520 | 0.005 | 0.0 | 3.38 | 246.9 |
| E16.001 | 90.555 | 0.005 | 0.0 | 2.64 | 192.7 |
| E16.002 | 89.692 | 1.052 | 0.0 | 3.66 | 603.3 |
| E16.003 | 88.090 | 1.052 | 0.0 | 3.46 | 570.4 |
| E16.004 | 87.590 | 1.052 | 0.0 | 7.22 | 1190.1 |
| E1.015 | 85.681 | 13.139 | 0.0 | 2.94 | 1341.7 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E17.000 | 89.884 | 2.410 | 37.3 | 0.000 | 4.00 | 0.0 | 0.600 | o | 152 |
| E17.001 | 18.981 | 2.159 | 8.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 533 |
| E1.016 | 8.284 | 0.091 | 91.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 762 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E17.000 | 90.530 | 0.000 | 0.0 | 1.67 | 30.3 |
| E17.001 | 87.737 | 0.000 | 0.0 | 7.66 | 1708.6 |
| E1.016 | 85.361 | 13.139 | 0.0 | 2.96 | 1351.2 |

## Simulation Criteria for Existing

| | | | |
|---|---|---|---|
| Volumetric Runoff Coeff | 0.750 | Foul Sewage per hectare (l/s) | 0.000 |
| PIMP (% impervious) | 100 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start (mins) | 0 | Inlet Coeffiecient | 0.800 |
| Hot Start Level (mm) | 0 | Run Time (mins) | 60 |
| Manhole Headloss Coeff (Global) | 0.500 | Output Interval (mins) | 1 |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 0 |
| Number of Online Controls | 0 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | | |

## Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| Return Period (years) | 1 |
| Site Location | 487000 152100 SU 87000 52100 |
| C (1km) | -0.025 |
| D1 (1km) | 0.301 |
| D2 (1km) | 0.275 |
| D3 (1km) | 0.307 |
| E (1km) | 0.300 |
| F (1km) | 2.648 |
| Summer Storms | Yes |
| Winter Storms | No |
| Cv (Summer) | 0.750 |

## Synthetic Rainfall Details

| | |
|---|---|
| Cv (Winter) | 0.840 |
| Storm Duration (mins) | 30 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2
Climate Change (%) 0

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Summer | 2 | 0% | | | | | |
| E1.001 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.002 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.003 | 15 Winter | 2 | 0% | | | | | |
| E1.004 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E2.000 | 15 Winter | 2 | 0% | | | | | |
| E2.001 | 15 Winter | 2 | 0% | | | | | |
| E2.002 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E2.003 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E3.000 | 15 Winter | 2 | 0% | | | | | |
| E4.000 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E5.000 | 15 Winter | 2 | 0% | | | | | |
| E3.001 | 15 Winter | 2 | 0% | | | | | |
| E6.000 | 15 Winter | 2 | 0% | | | | | |
| E2.004 | 15 Winter | 2 | 0% | | | | | |
| E7.000 | 15 Winter | 2 | 0% | | | | | |
| E7.001 | 15 Summer | 2 | 0% | | | | | |
| E8.000 | 15 Winter | 2 | 0% | | | | | |
| E8.001 | 15 Winter | 2 | 0% | | | | | |
| E8.002 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E2.005 | 15 Winter | 2 | 0% | | | | | |
| E2.006 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E2.007 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E2.008 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E2.009 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E2.010 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.005 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.006 | 15 Winter | 2 | 0% | 2/15 Summer | 2/15 Summer | | | 3 |
| E9.000 | 15 Winter | 2 | 0% | | | | | |
| E9.001 | 15 Winter | 2 | 0% | | | | | |
| E9.002 | 15 Winter | 2 | 0% | | | | | |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E9.003 | 15 Winter | 2 | 0% | | | | | |
| E9.004 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E9.005 | 15 Winter | 2 | 0% | | | | | |
| E9.006 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E10.000 | 15 Winter | 2 | 0% | | | | | |
| E9.007 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E1.007 | 15 Winter | 2 | 0% | 2/15 Summer | 2/15 Summer | | | 5 |
| E1.008 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.009 | 15 Winter | 2 | 0% | | | | | |
| E1.010 | 15 Winter | 2 | 0% | | | | | |
| E1.011 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E11.000 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E11.001 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E11.002 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E11.003 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E11.004 | 15 Winter | 2 | 0% | | | | | |
| E11.005 | 15 Winter | 2 | 0% | | | | | |
| E12.000 | 15 Winter | 2 | 0% | | | | | |
| E12.001 | 15 Winter | 2 | 0% | | | | | |
| E12.002 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E12.003 | 15 Winter | 2 | 0% | | | | | |
| E11.006 | 15 Winter | 2 | 0% | | | | | |
| E11.007 | 15 Winter | 2 | 0% | | | | | |
| E11.008 | 15 Winter | 2 | 0% | | | | | |
| E11.009 | 15 Winter | 2 | 0% | | | | | |
| E11.010 | 15 Winter | 2 | 0% | | | | | |
| E13.000 | 360 Winter | 2 | 0% | | | | | |
| E13.001 | 15 Winter | 2 | 0% | | | | | |
| E13.002 | 15 Winter | 2 | 0% | | | | | |
| E13.003 | 15 Winter | 2 | 0% | | | | | |
| E13.004 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E13.005 | 15 Winter | 2 | 0% | | | | | |
| E11.011 | 15 Winter | 2 | 0% | | | | | |
| E11.012 | 15 Winter | 2 | 0% | | | | | |
| E11.013 | 15 Winter | 2 | 0% | | | | | |
| E11.014 | 15 Winter | 2 | 0% | | | | | |
| E11.015 | 15 Winter | 2 | 0% | | | | | |
| E11.016 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E11.017 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.012 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.000 | 15 Winter | 2 | 0% | | | | | |
| E14.001 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.002 | 15 Winter | 2 | 0% | | | | | |
| E14.003 | 15 Winter | 2 | 0% | | | | | |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E14.004 | 15 Winter | 2 | 0% | | | | | |
| E14.005 | 15 Winter | 2 | 0% | | | | | |
| E14.006 | 15 Winter | 2 | 0% | | | | | |
| E15.000 | 15 Summer | 2 | 0% | | | | | |
| E15.001 | 15 Winter | 2 | 0% | | | | | |
| E15.002 | 15 Winter | 2 | 0% | 2/15 Winter | | | | |
| E15.003 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E15.004 | 15 Winter | 2 | 0% | | | | | |
| E15.005 | 15 Winter | 2 | 0% | | | | | |
| E14.007 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.008 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.009 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.010 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.011 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E14.012 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.013 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.014 | 15 Winter | 2 | 0% | 2/15 Summer | 2/15 Summer | | | 5 |
| E16.000 | 15 Winter | 2 | 0% | | | | | |
| E16.001 | 15 Summer | 2 | 0% | | | | | |
| E16.002 | 15 Winter | 2 | 0% | | | | | |
| E16.003 | 15 Winter | 2 | 0% | | | | | |
| E16.004 | 15 Winter | 2 | 0% | | | | | |
| E1.015 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E17.000 | 360 Winter | 2 | 0% | | | | | |
| E17.001 | 360 Winter | 2 | 0% | | | | | |
| E1.016 | 15 Summer | 2 | 0% | 2/15 Summer | | | | |

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 106.585 | -0.047 | 0.000 | 0.81 | 0.0 | 32.4 | OK |
| E1.001 | E2 | 105.801 | 0.289 | 0.000 | 1.01 | 0.0 | 41.4 | SURCHARGED |
| E1.002 | E3 | 102.976 | 0.249 | 0.000 | 1.05 | 0.0 | 85.8 | SURCHARGED |
| E1.003 | E4 | 100.382 | -0.120 | 0.000 | 0.68 | 0.0 | 85.4 | OK |
| E1.004 | E5 | 99.802 | 0.214 | 0.000 | 0.61 | 0.0 | 233.8 | SURCHARGED |
| E2.000 | E17 | 109.333 | -0.029 | 0.000 | 0.99 | 0.0 | 14.8 | OK |
| E2.001 | E18 | 109.189 | -0.024 | 0.000 | 1.00 | 0.0 | 14.4 | OK |
| E2.002 | E19 | 109.149 | 0.028 | 0.000 | 0.66 | 0.0 | 20.6 | SURCHARGED |
| E2.003 | E20 | 108.896 | 1.229 | 0.000 | 1.31 | 0.0 | 38.6 | FLOOD RISK |
| E3.000 | E27 | 107.929 | -0.133 | 0.000 | 0.04 | 0.0 | 0.7 | OK |
| E4.000 | E29 | 109.368 | 0.116 | 0.000 | 1.03 | 0.0 | 29.8 | SURCHARGED |
| E5.000 | E30 | 108.307 | -0.075 | 0.000 | 0.51 | 0.0 | 14.9 | OK |
| E3.001 | E28 | 107.580 | -0.100 | 0.000 | 0.59 | 0.0 | 45.3 | OK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E6.000 | E31 | 107.040 | -0.092 | 0.000 | 0.33 | 0.0 | 11.3 | OK |
| E2.004 | E21 | 105.937 | -0.048 | 0.000 | 0.98 | 0.0 | 90.1 | OK |
| E7.000 | E32 | 106.181 | -0.121 | 0.000 | 0.10 | 0.0 | 3.2 | OK |
| E7.001 | E33 | 105.338 | -0.277 | 0.000 | 0.02 | 0.0 | 3.2 | OK |
| E8.000 | E34 | 106.440 | -0.102 | 0.000 | 0.24 | 0.0 | 7.5 | OK |
| E8.001 | E35 | 105.867 | -0.045 | 0.000 | 0.82 | 0.0 | 17.8 | OK |
| E8.002 | E36 | 105.306 | 0.054 | 0.000 | 1.13 | 0.0 | 17.3 | SURCHARGED |
| E2.005 | E23 | 104.882 | -0.159 | 0.000 | 0.46 | 0.0 | 109.4 | OK |
| E2.006 | E24 | 101.002 | 0.012 | 0.000 | 0.73 | 0.0 | 165.2 | SURCHARGED |
| E2.007 | E25 | 100.532 | 0.939 | 0.000 | 0.68 | 0.0 | 153.3 | SURCHARGED |
| E2.008 | E26 | 100.087 | 1.843 | 0.000 | 0.84 | 0.0 | 133.1 | SURCHARGED |
| E2.009 | E27 | 99.849 | 1.976 | 0.000 | 0.73 | 0.0 | 129.0 | SURCHARGED |
| E2.010 | E28 | 99.416 | 2.388 | 0.000 | 0.93 | 0.0 | 128.4 | FLOOD RISK |
| E1.005 | E6 | 99.172 | 2.428 | 0.000 | 1.75 | 0.0 | 318.0 | FLOOD RISK |
| E1.006 | E7 | 97.235 | 1.120 | 5.339 | 0.99 | 0.0 | 311.8 | FLOOD |
| E9.000 | E37 | 107.487 | -0.132 | 0.000 | 0.38 | 0.0 | 38.1 | OK |
| E9.001 | E38 | 105.498 | -0.128 | 0.000 | 0.41 | 0.0 | 38.0 | OK |
| E9.002 | E39 | 104.939 | -0.070 | 0.000 | 0.81 | 0.0 | 49.5 | OK |
| E9.003 | E40 | 104.548 | -0.101 | 0.000 | 0.59 | 0.0 | 57.3 | OK |
| E9.004 | E41 | 102.603 | 0.144 | 0.000 | 1.22 | 0.0 | 55.8 | SURCHARGED |
| E9.005 | E42 | 102.057 | -0.112 | 0.000 | 0.52 | 0.0 | 55.8 | OK |
| E9.006 | E43 | 101.256 | 0.033 | 0.000 | 0.87 | 0.0 | 54.2 | SURCHARGED |
| E10.000 | E45 | 101.666 | -0.093 | 0.000 | 0.66 | 0.0 | 49.0 | OK |
| E9.007 | E44 | 100.921 | 0.078 | 0.000 | 0.91 | 0.0 | 198.1 | SURCHARGED |
| E1.007 | E8 | 95.251 | 1.310 | 40.996 | 1.15 | 0.0 | 377.2 | FLOOD |
| E1.008 | E9 | 93.353 | 0.872 | 0.000 | 1.36 | 0.0 | 377.4 | SURCHARGED |
| E1.009 | E10 | 91.344 | -0.316 | 0.000 | 0.47 | 0.0 | 428.0 | OK |
| E1.010 | E11 | 89.917 | -0.113 | 0.000 | 0.58 | 0.0 | 435.8 | OK |
| E1.011 | E12 | 89.702 | 0.422 | 0.000 | 1.16 | 0.0 | 427.3 | SURCHARGED |
| E11.000 | E46 | 106.355 | 0.153 | 0.000 | 0.47 | 0.0 | 5.5 | SURCHARGED |
| E11.001 | E47 | 106.344 | 0.652 | 0.000 | 1.12 | 0.0 | 14.4 | FLOOD RISK |
| E11.002 | E48 | 104.544 | 0.282 | 0.000 | 1.14 | 0.0 | 15.4 | SURCHARGED |
| E11.003 | E49 | 103.550 | 0.048 | 0.000 | 1.05 | 0.0 | 20.1 | SURCHARGED |
| E11.004 | E49 | 102.895 | -0.127 | 0.000 | 0.41 | 0.0 | 20.1 | OK |
| E11.005 | E50 | 102.755 | -0.144 | 0.000 | 0.29 | 0.0 | 42.2 | OK |
| E12.000 | E61 | 105.731 | -0.021 | 0.000 | 0.97 | 0.0 | 5.1 | OK |
| E12.001 | E62 | 105.566 | -0.111 | 0.000 | 0.16 | 0.0 | 5.0 | OK |
| E12.002 | E63 | 103.438 | 0.336 | 0.000 | 1.30 | 0.0 | 29.6 | SURCHARGED |
| E12.003 | E64 | 102.567 | -0.122 | 0.000 | 0.45 | 0.0 | 29.4 | OK |
| E11.006 | E51 | 101.608 | -0.197 | 0.000 | 0.27 | 0.0 | 68.9 | OK |
| E11.007 | E52 | 98.465 | -0.110 | 0.000 | 0.73 | 0.0 | 106.9 | OK |
| E11.008 | E53 | 97.907 | -0.208 | 0.000 | 0.42 | 0.0 | 115.8 | OK |
| E11.009 | E54 | 96.290 | -0.391 | 0.000 | 0.28 | 0.0 | 116.0 | OK |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E11.010 | E55 | 96.062 | -0.458 | 0.000 | 0.14 | 0.0 | 125.0 | OK |
| E13.000 | E65 | 102.490 | -0.229 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E13.001 | E66 | 101.619 | -0.168 | 0.000 | 0.16 | 0.0 | 16.3 | OK |
| E13.002 | E67 | 100.641 | -0.116 | 0.000 | 0.48 | 0.0 | 42.5 | OK |
| E13.003 | E68 | 98.974 | -0.151 | 0.000 | 0.50 | 0.0 | 82.5 | OK |
| E13.004 | E69 | 97.827 | 0.422 | 0.000 | 1.77 | 0.0 | 153.8 | SURCHARGED |
| E13.005 | E70 | 97.082 | -0.123 | 0.000 | 0.66 | 0.0 | 163.9 | OK |
| E11.011 | E56 | 95.440 | -0.270 | 0.000 | 0.59 | 0.0 | 368.2 | OK |
| E11.012 | E57 | 94.971 | -0.339 | 0.000 | 0.41 | 0.0 | 404.9 | OK |
| E11.013 | E58 | 93.567 | -0.333 | 0.000 | 0.42 | 0.0 | 516.8 | OK |
| E11.014 | E59 | 92.136 | -0.324 | 0.000 | 0.45 | 0.0 | 546.3 | OK |
| E11.015 | E60 | 90.781 | -0.289 | 0.000 | 0.54 | 0.0 | 573.8 | OK |
| E11.016 | E99 | 90.205 | 0.195 | 0.000 | 0.99 | 0.0 | 548.5 | SURCHARGED |
| E11.017 | E70 | 89.595 | 0.415 | 0.000 | 1.16 | 0.0 | 482.0 | SURCHARGED |
| E1.012 | E13 | 89.381 | 0.361 | 0.000 | 1.41 | 0.0 | 892.4 | SURCHARGED |
| E14.000 | E73 | 98.488 | -0.121 | 0.000 | 0.46 | 0.0 | 40.0 | OK |
| E14.001 | E74 | 97.840 | 0.061 | 0.000 | 1.24 | 0.0 | 101.3 | SURCHARGED |
| E14.002 | E75 | 97.473 | -0.176 | 0.000 | 0.37 | 0.0 | 101.7 | OK |
| E14.003 | E76 | 96.466 | -0.069 | 0.000 | 0.95 | 0.0 | 126.9 | OK |
| E14.004 | E77 | 95.697 | -0.128 | 0.000 | 0.63 | 0.0 | 126.6 | OK |
| E14.005 | E78 | 94.704 | -0.121 | 0.000 | 0.67 | 0.0 | 127.4 | OK |
| E14.006 | E79 | 93.489 | -0.126 | 0.000 | 0.64 | 0.0 | 133.1 | OK |
| E15.000 | E85 | 100.550 | -0.099 | 0.000 | 0.61 | 0.0 | 61.3 | OK |
| E15.001 | E86 | 99.297 | -0.052 | 0.000 | 0.95 | 0.0 | 95.3 | OK |
| E15.002 | E87 | 97.705 | 0.016 | 0.000 | 0.88 | 0.0 | 93.1 | SURCHARGED |
| E15.003 | E88 | 96.808 | 0.359 | 0.000 | 1.18 | 0.0 | 90.7 | SURCHARGED |
| E15.004 | E89 | 95.452 | -0.057 | 0.000 | 0.92 | 0.0 | 90.3 | OK |
| E15.005 | E90 | 93.230 | -0.155 | 0.000 | 0.48 | 0.0 | 103.4 | OK |
| E14.007 | E80 | 92.979 | 0.784 | 0.000 | 1.36 | 0.0 | 223.9 | FLOOD RISK |
| E14.008 | E81 | 92.314 | 0.543 | 0.000 | 1.45 | 0.0 | 238.6 | SURCHARGED |
| E14.009 | E82 | 91.867 | 0.346 | 0.000 | 0.81 | 0.0 | 225.5 | SURCHARGED |
| E14.010 | E100 | 91.063 | 0.842 | 0.000 | 2.20 | 0.0 | 245.2 | FLOOD RISK |
| E14.011 | E83 | 90.698 | 0.518 | 0.000 | 1.15 | 0.0 | 247.3 | SURCHARGED |
| E14.012 | E84 | 90.238 | 0.415 | 0.000 | 1.18 | 0.0 | 475.9 | SURCHARGED |
| E1.013 | E14 | 89.073 | 0.201 | 0.000 | 0.90 | 0.0 | 1328.1 | SURCHARGED |
| E1.014 | E15 | 87.577 | 0.585 | 86.849 | 1.01 | 0.0 | 1140.9 | FLOOD |
| E16.000 | E91 | 91.528 | -0.297 | 0.000 | 0.01 | 0.0 | 1.1 | OK |
| E16.001 | E92 | 90.565 | -0.295 | 0.000 | 0.01 | 0.0 | 1.1 | OK |
| E16.002 | E93 | 89.870 | -0.280 | 0.000 | 0.32 | 0.0 | 175.5 | OK |
| E16.003 | E94 | 88.298 | -0.250 | 0.000 | 0.43 | 0.0 | 175.6 | OK |
| E16.004 | E95 | 87.741 | -0.307 | 0.000 | 0.24 | 0.0 | 175.6 | OK |
| E1.015 | E16 | 87.060 | 0.617 | 0.000 | 1.29 | 0.0 | 1176.1 | SURCHARGED |
| E17.000 | E99 | 90.530 | -0.152 | 0.000 | 0.00 | 0.0 | 0.0 | OK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E17.001 | E100 | 87.737 | -0.533 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E1.016 | E99 | 86.523 | 0.400 | 0.000 | 1.85 | 0.0 | 1169.7 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 30
Climate Change (%) 0

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E1.001 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E1.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E1.003 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.004 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E2.000 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E2.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E2.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E2.003 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 7 |
| E3.000 | 15 Winter | 30 | 0% | | | | | |
| E4.000 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E5.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E3.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E6.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E2.004 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E7.000 | 15 Winter | 30 | 0% | | | | | |
| E7.001 | 15 Winter | 30 | 0% | | | | | |
| E8.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E8.001 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E8.002 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E2.005 | 15 Winter | 30 | 0% | | | | | |
| E2.006 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E2.007 | 15 Summer | 30 | 0% | 30/15 Summer | | | | |
| E2.008 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E2.009 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E2.010 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 7 |
| E1.005 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 7 |
| E1.006 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 9 |
| E9.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E9.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E9.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 3 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E9.003 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E9.004 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E9.005 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E9.006 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E10.000 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E9.007 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E1.007 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 11 |
| E1.008 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.009 | 15 Winter | 30 | 0% | | | | | |
| E1.010 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.011 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E11.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.001 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 7 |
| E11.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Winter | | | 1 |
| E11.003 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.004 | 15 Winter | 30 | 0% | | | | | |
| E11.005 | 15 Winter | 30 | 0% | | | | | |
| E12.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E12.001 | 15 Winter | 30 | 0% | | | | | |
| E12.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E12.003 | 15 Winter | 30 | 0% | | | | | |
| E11.006 | 15 Winter | 30 | 0% | | | | | |
| E11.007 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.008 | 15 Winter | 30 | 0% | | | | | |
| E11.009 | 15 Winter | 30 | 0% | | | | | |
| E11.010 | 15 Winter | 30 | 0% | | | | | |
| E13.000 | 360 Winter | 30 | 0% | | | | | |
| E13.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E13.002 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E13.003 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E13.004 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E13.005 | 15 Summer | 30 | 0% | 30/15 Summer | | | | |
| E11.011 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.012 | 15 Winter | 30 | 0% | 30/15 Winter | | | | |
| E11.013 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.014 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E11.015 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E11.016 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E11.017 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E1.012 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.001 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E14.002 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.003 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E14.004 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.005 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.006 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E15.000 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 2 |
| E15.001 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E15.002 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E15.003 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E15.004 | 30 Winter | 30 | 0% | 30/15 Summer | | | | |
| E15.005 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.007 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 6 |
| E14.008 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E14.009 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E14.010 | 30 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 7 |
| E14.011 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E14.012 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 3 |
| E1.013 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.014 | 60 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 11 |
| E16.000 | 15 Summer | 30 | 0% | | | | | |
| E16.001 | 15 Summer | 30 | 0% | | | | | |
| E16.002 | 15 Winter | 30 | 0% | | | | | |
| E16.003 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E16.004 | 15 Winter | 30 | 0% | | | | | |
| E1.015 | 60 Winter | 30 | 0% | 30/15 Summer | | | | |
| E17.000 | 360 Winter | 30 | 0% | | | | | |
| E17.001 | 360 Winter | 30 | 0% | | | | | |
| E1.016 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 107.270 | 0.638 | 9.933 | 0.83 | 0.0 | 33.2 | FLOOD |
| E1.001 | E2 | 106.718 | 1.206 | 8.139 | 1.10 | 0.0 | 45.1 | FLOOD |
| E1.002 | E3 | 104.023 | 1.296 | 22.868 | 1.21 | 0.0 | 98.8 | FLOOD |
| E1.003 | E4 | 100.967 | 0.465 | 0.000 | 0.76 | 0.0 | 95.8 | SURCHARGED |
| E1.004 | E5 | 100.395 | 0.807 | 84.567 | 0.66 | 0.0 | 251.8 | FLOOD |
| E2.000 | E17 | 110.562 | 1.200 | 1.894 | 1.34 | 0.0 | 20.1 | FLOOD |
| E2.001 | E18 | 110.382 | 1.169 | 0.000 | 1.43 | 0.0 | 20.6 | FLOOD RISK |
| E2.002 | E19 | 110.231 | 1.110 | 0.853 | 0.91 | 0.0 | 28.6 | FLOOD |
| E2.003 | E20 | 109.033 | 1.366 | 33.169 | 1.35 | 0.0 | 39.5 | FLOOD |
| E3.000 | E27 | 108.018 | -0.044 | 0.000 | 0.09 | 0.0 | 1.6 | OK |
| E4.000 | E29 | 110.458 | 1.206 | 7.762 | 1.33 | 0.0 | 38.4 | FLOOD |
| E5.000 | E30 | 108.712 | 0.330 | 0.000 | 1.08 | 0.0 | 31.7 | SURCHARGED |
| E3.001 | E28 | 108.010 | 0.330 | 0.000 | 0.88 | 0.0 | 66.8 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E6.000 | E31 | 107.235 | 0.103 | 0.000 | 0.76 | 0.0 | 25.6 | SURCHARGED |
| E2.004 | E21 | 106.698 | 0.713 | 0.000 | 1.33 | 0.0 | 122.3 | FLOOD RISK |
| E7.000 | E32 | 106.200 | -0.102 | 0.000 | 0.24 | 0.0 | 7.8 | OK |
| E7.001 | E33 | 105.352 | -0.263 | 0.000 | 0.05 | 0.0 | 7.8 | OK |
| E8.000 | E34 | 107.040 | 0.498 | 0.000 | 0.55 | 0.0 | 16.9 | SURCHARGED |
| E8.001 | E35 | 106.832 | 0.920 | 2.450 | 1.34 | 0.0 | 29.1 | FLOOD |
| E8.002 | E36 | 105.742 | 0.490 | 0.000 | 1.83 | 0.0 | 28.0 | SURCHARGED |
| E2.005 | E23 | 104.916 | -0.125 | 0.000 | 0.65 | 0.0 | 154.8 | OK |
| E2.006 | E24 | 102.822 | 1.832 | 21.825 | 0.87 | 0.0 | 197.2 | FLOOD |
| E2.007 | E25 | 101.761 | 2.168 | 0.000 | 0.88 | 0.0 | 196.8 | FLOOD RISK |
| E2.008 | E26 | 100.728 | 2.484 | 18.569 | 1.08 | 0.0 | 171.0 | FLOOD |
| E2.009 | E27 | 100.301 | 2.428 | 0.000 | 0.96 | 0.0 | 170.9 | SURCHARGED |
| E2.010 | E28 | 99.550 | 2.522 | 60.197 | 1.79 | 0.0 | 247.3 | FLOOD |
| E1.005 | E6 | 99.343 | 2.599 | 43.109 | 1.81 | 0.0 | 328.0 | FLOOD |
| E1.006 | E7 | 97.301 | 1.186 | 70.639 | 0.99 | 0.0 | 312.2 | FLOOD |
| E9.000 | E37 | 107.774 | 0.155 | 0.000 | 0.85 | 0.0 | 86.3 | SURCHARGED |
| E9.001 | E38 | 106.387 | 0.761 | 0.000 | 0.86 | 0.0 | 80.3 | FLOOD RISK |
| E9.002 | E39 | 105.938 | 0.929 | 8.105 | 1.40 | 0.0 | 85.4 | FLOOD |
| E9.003 | E40 | 105.548 | 0.899 | 0.000 | 0.92 | 0.0 | 89.8 | FLOOD RISK |
| E9.004 | E41 | 103.880 | 1.421 | 0.197 | 1.79 | 0.0 | 82.1 | FLOOD |
| E9.005 | E42 | 102.951 | 0.782 | 0.000 | 0.76 | 0.0 | 82.1 | SURCHARGED |
| E9.006 | E43 | 102.412 | 1.189 | 12.608 | 0.96 | 0.0 | 60.2 | FLOOD |
| E10.000 | E45 | 102.885 | 1.126 | 4.749 | 0.99 | 0.0 | 73.9 | FLOOD |
| E9.007 | E44 | 102.025 | 1.182 | 75.331 | 0.99 | 0.0 | 216.0 | FLOOD |
| E1.007 | E8 | 95.415 | 1.474 | 204.765 | 1.17 | 0.0 | 383.5 | FLOOD |
| E1.008 | E9 | 93.467 | 0.986 | 0.000 | 1.39 | 0.0 | 387.2 | FLOOD RISK |
| E1.009 | E10 | 91.461 | -0.199 | 0.000 | 0.64 | 0.0 | 587.5 | OK |
| E1.010 | E11 | 90.922 | 0.892 | 0.000 | 0.76 | 0.0 | 576.9 | FLOOD RISK |
| E1.011 | E12 | 90.489 | 1.209 | 19.407 | 1.33 | 0.0 | 490.3 | FLOOD |
| E11.000 | E46 | 106.955 | 0.753 | 0.000 | 0.97 | 0.0 | 11.4 | FLOOD RISK |
| E11.001 | E47 | 106.468 | 0.776 | 18.012 | 1.18 | 0.0 | 15.2 | FLOOD |
| E11.002 | E48 | 105.160 | 0.898 | 0.084 | 1.22 | 0.0 | 16.6 | FLOOD |
| E11.003 | E49 | 104.261 | 0.759 | 0.000 | 1.59 | 0.0 | 30.4 | FLOOD RISK |
| E11.004 | E49 | 102.924 | -0.098 | 0.000 | 0.62 | 0.0 | 30.4 | OK |
| E11.005 | E50 | 102.812 | -0.087 | 0.000 | 0.69 | 0.0 | 98.7 | OK |
| E12.000 | E61 | 106.161 | 0.409 | 0.000 | 2.06 | 0.0 | 10.9 | SURCHARGED |
| E12.001 | E62 | 105.587 | -0.090 | 0.000 | 0.34 | 0.0 | 10.7 | OK |
| E12.002 | E63 | 104.115 | 1.013 | 14.596 | 1.76 | 0.0 | 40.0 | FLOOD |
| E12.003 | E64 | 102.589 | -0.100 | 0.000 | 0.61 | 0.0 | 40.0 | OK |
| E11.006 | E51 | 101.661 | -0.144 | 0.000 | 0.54 | 0.0 | 136.4 | OK |
| E11.007 | E52 | 99.495 | 0.920 | 0.000 | 1.71 | 0.0 | 251.4 | SURCHARGED |
| E11.008 | E53 | 98.112 | -0.003 | 0.000 | 0.99 | 0.0 | 272.4 | OK |
| E11.009 | E54 | 96.433 | -0.248 | 0.000 | 0.65 | 0.0 | 272.2 | OK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E11.010 | E55 | 96.154 | -0.366 | 0.000 | 0.33 | 0.0 | 296.2 | OK |
| E13.000 | E65 | 102.490 | -0.229 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E13.001 | E66 | 102.029 | 0.242 | 0.000 | 0.45 | 0.0 | 46.2 | SURCHARGED |
| E13.002 | E67 | 101.832 | 1.075 | 2.497 | 1.00 | 0.0 | 89.1 | FLOOD |
| E13.003 | E68 | 100.122 | 0.997 | 12.029 | 0.83 | 0.0 | 138.6 | FLOOD |
| E13.004 | E69 | 98.931 | 1.526 | 30.979 | 2.89 | 0.0 | 250.8 | FLOOD |
| E13.005 | E70 | 97.613 | 0.408 | 0.000 | 1.05 | 0.0 | 261.0 | SURCHARGED |
| E11.011 | E56 | 95.996 | 0.286 | 0.000 | 1.27 | 0.0 | 787.0 | SURCHARGED |
| E11.012 | E57 | 95.399 | 0.089 | 0.000 | 0.85 | 0.0 | 846.3 | SURCHARGED |
| E11.013 | E58 | 94.365 | 0.465 | 0.000 | 0.91 | 0.0 | 1110.6 | FLOOD RISK |
| E11.014 | E59 | 93.182 | 0.722 | 21.783 | 0.87 | 0.0 | 1060.8 | FLOOD |
| E11.015 | E60 | 92.145 | 1.075 | 35.122 | 0.99 | 0.0 | 1050.8 | FLOOD |
| E11.016 | E99 | 91.284 | 1.274 | 235.267 | 1.26 | 0.0 | 698.2 | FLOOD |
| E11.017 | E70 | 90.300 | 1.120 | 79.978 | 1.54 | 0.0 | 636.8 | FLOOD |
| E1.012 | E13 | 90.066 | 1.046 | 0.000 | 1.65 | 0.0 | 1038.5 | FLOOD RISK |
| E14.000 | E73 | 99.786 | 1.177 | 0.000 | 0.98 | 0.0 | 85.9 | FLOOD RISK |
| E14.001 | E74 | 98.968 | 1.189 | 8.206 | 2.45 | 0.0 | 200.2 | FLOOD |
| E14.002 | E75 | 98.193 | 0.544 | 0.000 | 0.73 | 0.0 | 200.1 | SURCHARGED |
| E14.003 | E76 | 97.604 | 1.069 | 24.320 | 1.50 | 0.0 | 200.3 | FLOOD |
| E14.004 | E77 | 96.310 | 0.485 | 0.000 | 0.90 | 0.0 | 181.9 | SURCHARGED |
| E14.005 | E78 | 95.517 | 0.692 | 0.000 | 0.95 | 0.0 | 181.3 | SURCHARGED |
| E14.006 | E79 | 94.446 | 0.831 | 0.000 | 0.91 | 0.0 | 188.0 | FLOOD RISK |
| E15.000 | E85 | 101.775 | 1.126 | 4.799 | 1.00 | 0.0 | 99.7 | FLOOD |
| E15.001 | E86 | 100.493 | 1.144 | 22.982 | 1.15 | 0.0 | 115.5 | FLOOD |
| E15.002 | E87 | 98.767 | 1.078 | 0.000 | 1.00 | 0.0 | 106.3 | FLOOD RISK |
| E15.003 | E88 | 97.614 | 1.165 | 0.000 | 1.33 | 0.0 | 102.4 | SURCHARGED |
| E15.004 | E89 | 95.968 | 0.459 | 0.000 | 1.03 | 0.0 | 102.1 | SURCHARGED |
| E15.005 | E90 | 93.743 | 0.358 | 0.000 | 0.63 | 0.0 | 135.9 | SURCHARGED |
| E14.007 | E80 | 93.318 | 1.123 | 78.262 | 1.33 | 0.0 | 219.3 | FLOOD |
| E14.008 | E81 | 92.745 | 0.974 | 5.278 | 1.52 | 0.0 | 250.4 | FLOOD |
| E14.009 | E82 | 92.222 | 0.701 | 0.000 | 0.87 | 0.0 | 242.2 | SURCHARGED |
| E14.010 | E100 | 91.339 | 1.118 | 149.409 | 2.71 | 0.0 | 302.1 | FLOOD |
| E14.011 | E83 | 91.262 | 1.082 | 72.123 | 1.60 | 0.0 | 343.4 | FLOOD |
| E14.012 | E84 | 91.315 | 1.492 | 24.912 | 1.49 | 0.0 | 603.9 | FLOOD |
| E1.013 | E14 | 89.690 | 0.818 | 0.000 | 1.05 | 0.0 | 1545.0 | FLOOD RISK |
| E1.014 | E15 | 87.950 | 0.958 | 461.439 | 1.10 | 0.0 | 1251.3 | FLOOD |
| E16.000 | E91 | 91.539 | -0.286 | 0.000 | 0.01 | 0.0 | 2.8 | OK |
| E16.001 | E92 | 90.579 | -0.281 | 0.000 | 0.02 | 0.0 | 2.8 | OK |
| E16.002 | E93 | 90.020 | -0.130 | 0.000 | 0.84 | 0.0 | 462.4 | OK |
| E16.003 | E94 | 88.675 | 0.127 | 0.000 | 1.13 | 0.0 | 465.4 | SURCHARGED |
| E16.004 | E95 | 87.892 | -0.156 | 0.000 | 0.63 | 0.0 | 463.4 | OK |
| E1.015 | E16 | 87.282 | 0.839 | 0.000 | 1.42 | 0.0 | 1296.8 | SURCHARGED |
| E17.000 | E99 | 90.530 | -0.152 | 0.000 | 0.00 | 0.0 | 0.0 | OK |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E17.001 | E100 | 87.737 | -0.533 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E1.016 | E99 | 86.639 | 0.516 | 0.000 | 2.06 | 0.0 | 1297.9 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 0

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E1.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E1.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E1.003 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.004 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E2.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E2.001 | 15 Summer | 100 | 0% | 100/15 Summer | | | | |
| E2.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E2.003 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E3.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E4.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E5.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E3.001 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E6.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E2.004 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E7.000 | 15 Winter | 100 | 0% | | | | | |
| E7.001 | 15 Winter | 100 | 0% | | | | | |
| E8.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E8.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E8.002 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E2.005 | 15 Winter | 100 | 0% | | | | | |
| E2.006 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E2.007 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E2.008 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E2.009 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E2.010 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 11 |
| E1.005 | 60 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E1.006 | 60 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 11 |
| E9.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E9.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 3 |
| E9.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E9.003 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E9.004 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E9.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E9.006 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E10.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E9.007 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E1.007 | 60 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 13 |
| E1.008 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Winter | | | 1 |
| E1.009 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.010 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.011 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E11.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 11 |
| E11.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.003 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E11.004 | 15 Winter | 100 | 0% | | | | | |
| E11.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E12.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E12.001 | 15 Winter | 100 | 0% | | | | | |
| E12.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E12.003 | 15 Winter | 100 | 0% | | | | | |
| E11.006 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.007 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E11.008 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.009 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.010 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E13.000 | 360 Winter | 100 | 0% | | | | | |
| E13.001 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E13.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E13.003 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E13.004 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E13.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.011 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.012 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.013 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E11.014 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E11.015 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E11.016 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E11.017 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E1.012 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 3 |
| E14.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E14.002 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.003 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E14.004 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.006 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E15.000 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 4 |
| E15.001 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E15.002 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Winter | | | 1 |
| E15.003 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E15.004 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E15.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.007 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E14.008 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E14.009 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E14.010 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 9 |
| E14.011 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E14.012 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 5 |
| E1.013 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.014 | 60 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 13 |
| E16.000 | 15 Summer | 100 | 0% | | | | | |
| E16.001 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E16.002 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E16.003 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E16.004 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.015 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E17.000 | 360 Winter | 100 | 0% | | | | | |
| E17.001 | 360 Winter | 100 | 0% | | | | | |
| E1.016 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 107.285 | 0.653 | 24.539 | 0.82 | 0.0 | 32.9 | FLOOD |
| E1.001 | E2 | 106.728 | 1.216 | 17.959 | 1.12 | 0.0 | 46.0 | FLOOD |
| E1.002 | E3 | 104.054 | 1.327 | 53.657 | 1.21 | 0.0 | 99.0 | FLOOD |
| E1.003 | E4 | 101.059 | 0.557 | 0.000 | 0.76 | 0.0 | 95.6 | SURCHARGED |
| E1.004 | E5 | 100.497 | 0.909 | 187.152 | 0.66 | 0.0 | 251.6 | FLOOD |
| E2.000 | E17 | 110.568 | 1.206 | 8.047 | 1.33 | 0.0 | 19.9 | FLOOD |
| E2.001 | E18 | 110.382 | 1.169 | 0.000 | 1.48 | 0.0 | 21.3 | FLOOD RISK |
| E2.002 | E19 | 110.234 | 1.113 | 4.426 | 0.91 | 0.0 | 28.5 | FLOOD |
| E2.003 | E20 | 109.060 | 1.393 | 60.400 | 1.35 | 0.0 | 39.7 | FLOOD |
| E3.000 | E27 | 108.402 | 0.340 | 0.000 | 0.15 | 0.0 | 2.8 | SURCHARGED |
| E4.000 | E29 | 110.473 | 1.221 | 23.009 | 1.33 | 0.0 | 38.5 | FLOOD |
| E5.000 | E30 | 109.481 | 1.099 | 1.194 | 1.34 | 0.0 | 39.2 | FLOOD |
| E3.001 | E28 | 108.393 | 0.713 | 0.000 | 0.98 | 0.0 | 74.5 | FLOOD RISK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E6.000 | E31 | 108.012 | 0.880 | 0.000 | 1.04 | 0.0 | 35.2 | SURCHARGED |
| E2.004 | E21 | 106.754 | 0.769 | 3.895 | 1.35 | 0.0 | 124.6 | FLOOD |
| E7.000 | E32 | 106.212 | -0.090 | 0.000 | 0.36 | 0.0 | 11.7 | OK |
| E7.001 | E33 | 105.362 | -0.253 | 0.000 | 0.07 | 0.0 | 11.7 | OK |
| E8.000 | E34 | 107.321 | 0.779 | 0.000 | 0.85 | 0.0 | 26.2 | SURCHARGED |
| E8.001 | E35 | 106.841 | 0.929 | 10.635 | 1.35 | 0.0 | 29.4 | FLOOD |
| E8.002 | E36 | 105.745 | 0.493 | 0.000 | 1.84 | 0.0 | 28.0 | SURCHARGED |
| E2.005 | E23 | 104.922 | -0.119 | 0.000 | 0.68 | 0.0 | 162.6 | OK |
| E2.006 | E24 | 102.860 | 1.870 | 60.402 | 0.89 | 0.0 | 200.5 | FLOOD |
| E2.007 | E25 | 101.785 | 2.192 | 0.000 | 0.88 | 0.0 | 198.6 | FLOOD RISK |
| E2.008 | E26 | 100.748 | 2.504 | 37.814 | 1.08 | 0.0 | 170.8 | FLOOD |
| E2.009 | E27 | 100.327 | 2.454 | 0.000 | 0.96 | 0.0 | 170.8 | SURCHARGED |
| E2.010 | E28 | 99.592 | 2.564 | 102.424 | 1.77 | 0.0 | 243.7 | FLOOD |
| E1.005 | E6 | 99.383 | 2.639 | 82.571 | 1.81 | 0.0 | 327.9 | FLOOD |
| E1.006 | E7 | 97.363 | 1.248 | 133.029 | 0.99 | 0.0 | 311.7 | FLOOD |
| E9.000 | E37 | 108.742 | 1.123 | 1.965 | 1.09 | 0.0 | 110.2 | FLOOD |
| E9.001 | E38 | 106.399 | 0.773 | 8.746 | 0.86 | 0.0 | 80.2 | FLOOD |
| E9.002 | E39 | 105.954 | 0.945 | 23.525 | 1.42 | 0.0 | 86.6 | FLOOD |
| E9.003 | E40 | 105.611 | 0.962 | 0.952 | 0.95 | 0.0 | 92.8 | FLOOD |
| E9.004 | E41 | 103.881 | 1.422 | 1.144 | 1.79 | 0.0 | 82.1 | FLOOD |
| E9.005 | E42 | 102.962 | 0.793 | 0.000 | 0.76 | 0.0 | 82.1 | SURCHARGED |
| E9.006 | E43 | 102.427 | 1.204 | 27.560 | 0.96 | 0.0 | 59.9 | FLOOD |
| E10.000 | E45 | 102.903 | 1.144 | 23.092 | 0.99 | 0.0 | 73.6 | FLOOD |
| E9.007 | E44 | 102.108 | 1.265 | 158.306 | 0.99 | 0.0 | 216.8 | FLOOD |
| E1.007 | E8 | 95.540 | 1.599 | 330.003 | 1.19 | 0.0 | 389.2 | FLOOD |
| E1.008 | E9 | 93.750 | 1.269 | 0.031 | 1.40 | 0.0 | 388.9 | FLOOD |
| E1.009 | E10 | 91.868 | 0.208 | 0.000 | 0.71 | 0.0 | 651.4 | SURCHARGED |
| E1.010 | E11 | 91.127 | 1.097 | 0.000 | 0.91 | 0.0 | 686.7 | FLOOD RISK |
| E1.011 | E12 | 90.539 | 1.259 | 69.581 | 1.30 | 0.0 | 479.9 | FLOOD |
| E11.000 | E46 | 107.001 | 0.799 | 1.422 | 1.02 | 0.0 | 12.0 | FLOOD |
| E11.001 | E47 | 106.484 | 0.792 | 34.060 | 1.18 | 0.0 | 15.2 | FLOOD |
| E11.002 | E48 | 105.162 | 0.900 | 1.539 | 1.40 | 0.0 | 19.0 | FLOOD |
| E11.003 | E49 | 104.451 | 0.949 | 1.291 | 1.73 | 0.0 | 33.0 | FLOOD |
| E11.004 | E49 | 102.995 | -0.027 | 0.000 | 0.71 | 0.0 | 35.0 | OK |
| E11.005 | E50 | 102.942 | 0.043 | 0.000 | 0.93 | 0.0 | 132.7 | SURCHARGED |
| E12.000 | E61 | 106.690 | 0.938 | 0.000 | 2.88 | 0.0 | 15.2 | SURCHARGED |
| E12.001 | E62 | 105.600 | -0.077 | 0.000 | 0.48 | 0.0 | 14.8 | OK |
| E12.002 | E63 | 104.134 | 1.032 | 34.413 | 1.77 | 0.0 | 40.3 | FLOOD |
| E12.003 | E64 | 102.589 | -0.100 | 0.000 | 0.61 | 0.0 | 40.2 | OK |
| E11.006 | E51 | 102.078 | 0.273 | 0.000 | 0.64 | 0.0 | 163.0 | SURCHARGED |
| E11.007 | E52 | 100.755 | 2.180 | 4.746 | 2.01 | 0.0 | 294.8 | FLOOD |
| E11.008 | E53 | 99.156 | 1.041 | 0.000 | 1.17 | 0.0 | 320.3 | SURCHARGED |
| E11.009 | E54 | 97.298 | 0.617 | 0.000 | 0.85 | 0.0 | 353.7 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E11.010 | E55 | 97.234 | 0.714 | 0.000 | 0.44 | 0.0 | 389.5 | SURCHARGED |
| E13.000 | E65 | 102.490 | -0.229 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E13.001 | E66 | 102.381 | 0.594 | 0.000 | 0.70 | 0.0 | 71.2 | SURCHARGED |
| E13.002 | E67 | 101.851 | 1.094 | 21.142 | 1.00 | 0.0 | 89.1 | FLOOD |
| E13.003 | E68 | 100.146 | 1.021 | 35.574 | 0.83 | 0.0 | 138.1 | FLOOD |
| E13.004 | E69 | 98.992 | 1.587 | 91.700 | 2.93 | 0.0 | 253.7 | FLOOD |
| E13.005 | E70 | 98.228 | 1.023 | 0.000 | 1.05 | 0.0 | 262.4 | FLOOD RISK |
| E11.011 | E56 | 97.115 | 1.405 | 0.000 | 1.42 | 0.0 | 886.3 | SURCHARGED |
| E11.012 | E57 | 96.277 | 0.967 | 0.000 | 1.05 | 0.0 | 1040.8 | SURCHARGED |
| E11.013 | E58 | 94.683 | 0.783 | 43.088 | 1.01 | 0.0 | 1228.7 | FLOOD |
| E11.014 | E59 | 93.275 | 0.815 | 115.690 | 0.89 | 0.0 | 1082.0 | FLOOD |
| E11.015 | E60 | 92.207 | 1.137 | 96.953 | 0.99 | 0.0 | 1057.3 | FLOOD |
| E11.016 | E99 | 91.453 | 1.443 | 406.976 | 1.18 | 0.0 | 652.5 | FLOOD |
| E11.017 | E70 | 90.400 | 1.220 | 180.241 | 1.48 | 0.0 | 611.5 | FLOOD |
| E1.012 | E13 | 90.148 | 1.128 | 0.000 | 1.65 | 0.0 | 1039.8 | FLOOD RISK |
| E14.000 | E73 | 100.027 | 1.418 | 7.229 | 1.12 | 0.0 | 98.1 | FLOOD |
| E14.001 | E74 | 99.003 | 1.224 | 42.633 | 2.46 | 0.0 | 200.9 | FLOOD |
| E14.002 | E75 | 98.223 | 0.574 | 0.000 | 0.73 | 0.0 | 200.8 | SURCHARGED |
| E14.003 | E76 | 97.633 | 1.098 | 53.456 | 1.51 | 0.0 | 202.5 | FLOOD |
| E14.004 | E77 | 96.365 | 0.540 | 0.000 | 0.90 | 0.0 | 181.4 | SURCHARGED |
| E14.005 | E78 | 95.594 | 0.769 | 0.000 | 0.95 | 0.0 | 181.5 | FLOOD RISK |
| E14.006 | E79 | 94.565 | 0.950 | 0.000 | 0.95 | 0.0 | 196.5 | FLOOD RISK |
| E15.000 | E85 | 101.796 | 1.147 | 26.202 | 1.00 | 0.0 | 99.8 | FLOOD |
| E15.001 | E86 | 100.519 | 1.170 | 49.300 | 1.15 | 0.0 | 115.5 | FLOOD |
| E15.002 | E87 | 98.810 | 1.121 | 0.023 | 1.00 | 0.0 | 105.9 | FLOOD |
| E15.003 | E88 | 97.673 | 1.224 | 0.000 | 1.33 | 0.0 | 102.5 | SURCHARGED |
| E15.004 | E89 | 96.050 | 0.541 | 0.000 | 1.04 | 0.0 | 102.8 | SURCHARGED |
| E15.005 | E90 | 93.935 | 0.550 | 0.000 | 0.74 | 0.0 | 158.8 | SURCHARGED |
| E14.007 | E80 | 93.384 | 1.189 | 144.904 | 1.32 | 0.0 | 217.2 | FLOOD |
| E14.008 | E81 | 92.760 | 0.989 | 19.972 | 1.55 | 0.0 | 254.3 | FLOOD |
| E14.009 | E82 | 92.268 | 0.747 | 0.000 | 0.87 | 0.0 | 242.3 | SURCHARGED |
| E14.010 | E100 | 91.448 | 1.227 | 258.075 | 2.72 | 0.0 | 303.6 | FLOOD |
| E14.011 | E83 | 91.343 | 1.163 | 153.324 | 1.62 | 0.0 | 345.9 | FLOOD |
| E14.012 | E84 | 91.436 | 1.613 | 145.676 | 1.52 | 0.0 | 616.3 | FLOOD |
| E1.013 | E14 | 89.809 | 0.937 | 0.000 | 1.05 | 0.0 | 1547.9 | FLOOD RISK |
| E1.014 | E15 | 88.126 | 1.134 | 636.314 | 1.18 | 0.0 | 1333.7 | FLOOD |
| E16.000 | E91 | 91.548 | -0.277 | 0.000 | 0.02 | 0.0 | 4.2 | OK |
| E16.001 | E92 | 91.307 | 0.447 | 0.000 | 0.08 | 0.0 | 14.0 | SURCHARGED |
| E16.002 | E93 | 91.308 | 1.158 | 0.000 | 1.09 | 0.0 | 595.5 | FLOOD RISK |
| E16.003 | E94 | 89.430 | 0.882 | 0.000 | 1.42 | 0.0 | 585.5 | SURCHARGED |
| E16.004 | E95 | 88.442 | 0.394 | 0.000 | 0.79 | 0.0 | 584.9 | SURCHARGED |
| E1.015 | E16 | 87.493 | 1.050 | 0.000 | 1.53 | 0.0 | 1398.2 | SURCHARGED |
| E17.000 | E99 | 90.530 | -0.152 | 0.000 | 0.00 | 0.0 | 0.0 | OK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E17.001 | E100 | 87.737 | -0.533 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E1.016 | E99 | 86.744 | 0.621 | 0.000 | 2.21 | 0.0 | 1397.5 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 30

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 8 |
| E1.001 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E1.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E1.003 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.004 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 11 |
| E2.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E2.001 | 15 Summer | 100 | +30% | 100/15 Summer | | | | |
| E2.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E2.003 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 12 |
| E3.000 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E4.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E5.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E3.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E6.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 2 |
| E2.004 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E7.000 | 15 Winter | 100 | +30% | | | | | |
| E7.001 | 15 Winter | 100 | +30% | | | | | |
| E8.000 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E8.001 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E8.002 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E2.005 | 15 Winter | 100 | +30% | | | | | |
| E2.006 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 8 |
| E2.007 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E2.008 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E2.009 | 60 Winter | 100 | +30% | 100/15 Summer | | | | |
| E2.010 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 13 |
| E1.005 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 12 |
| E1.006 | 120 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 13 |
| E9.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 3 |
| E9.001 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E9.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E9.003 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E9.004 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E9.005 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E9.006 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 8 |
| E10.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E9.007 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E1.007 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 15 |
| E1.008 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 3 |
| E1.009 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.010 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 2 |
| E1.011 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 10 |
| E11.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.001 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 13 |
| E11.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E11.003 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.004 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E11.005 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E12.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 2 |
| E12.001 | 15 Winter | 100 | +30% | | | | | |
| E12.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E12.003 | 15 Winter | 100 | +30% | 100/15 Winter | | | | |
| E11.006 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E11.007 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.008 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E11.009 | 15 Summer | 100 | +30% | 100/15 Summer | | | | |
| E11.010 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 2 |
| E13.000 | 15 Winter | 100 | +30% | | | | | |
| E13.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E13.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E13.003 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E13.004 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E13.005 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 3 |
| E11.011 | 15 Summer | 100 | +30% | 100/15 Summer | | | | |
| E11.012 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Winter | | | 1 |
| E11.013 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E11.014 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E11.015 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E11.016 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 11 |
| E11.017 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 11 |
| E1.012 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 2 |
| E14.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E14.001 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E14.002 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E14.003 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E14.004 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E14.005 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E14.006 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Winter | | | 1 |
| E15.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E15.001 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E15.002 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E15.003 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E15.004 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E15.005 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E14.007 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 11 |
| E14.008 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E14.009 | 60 Winter | 100 | +30% | 100/15 Summer | | | | |
| E14.010 | 60 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 12 |
| E14.011 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E14.012 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 6 |
| E1.013 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.014 | 120 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 15 |
| E16.000 | 15 Winter | 100 | +30% | | | | | |
| E16.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E16.002 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E16.003 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E16.004 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.015 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E17.000 | 360 Winter | 100 | +30% | | | | | |
| E17.001 | 360 Winter | 100 | +30% | | | | | |
| E1.016 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 107.299 | 0.667 | 38.658 | 0.84 | 0.0 | 33.6 | FLOOD |
| E1.001 | E2 | 106.737 | 1.225 | 27.189 | 1.14 | 0.0 | 46.7 | FLOOD |
| E1.002 | E3 | 104.083 | 1.356 | 83.336 | 1.21 | 0.0 | 98.4 | FLOOD |
| E1.003 | E4 | 101.144 | 0.642 | 0.000 | 0.76 | 0.0 | 95.4 | FLOOD RISK |
| E1.004 | E5 | 100.593 | 1.005 | 282.620 | 0.66 | 0.0 | 254.2 | FLOOD |
| E2.000 | E17 | 110.574 | 1.212 | 14.167 | 1.31 | 0.0 | 19.6 | FLOOD |
| E2.001 | E18 | 110.389 | 1.176 | 0.000 | 1.48 | 0.0 | 21.3 | FLOOD RISK |
| E2.002 | E19 | 110.238 | 1.117 | 8.146 | 0.91 | 0.0 | 28.5 | FLOOD |
| E2.003 | E20 | 109.088 | 1.421 | 87.790 | 1.36 | 0.0 | 39.9 | FLOOD |
| E3.000 | E27 | 108.423 | 0.361 | 0.000 | 0.17 | 0.0 | 3.0 | SURCHARGED |
| E4.000 | E29 | 110.488 | 1.236 | 37.545 | 1.34 | 0.0 | 38.6 | FLOOD |
| E5.000 | E30 | 109.486 | 1.104 | 5.709 | 1.36 | 0.0 | 40.0 | FLOOD |
| E3.001 | E28 | 108.405 | 0.725 | 0.000 | 0.99 | 0.0 | 75.0 | FLOOD RISK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E6.000 | E31 | 108.331 | 1.199 | 1.341 | 1.17 | 0.0 | 39.7 | FLOOD |
| E2.004 | E21 | 106.758 | 0.773 | 8.377 | 1.35 | 0.0 | 124.8 | FLOOD |
| E7.000 | E32 | 106.222 | -0.080 | 0.000 | 0.46 | 0.0 | 15.2 | OK |
| E7.001 | E33 | 105.372 | -0.243 | 0.000 | 0.09 | 0.0 | 15.2 | OK |
| E8.000 | E34 | 107.640 | 1.098 | 0.000 | 1.09 | 0.0 | 33.8 | FLOOD RISK |
| E8.001 | E35 | 106.849 | 0.937 | 18.941 | 1.35 | 0.0 | 29.3 | FLOOD |
| E8.002 | E36 | 105.749 | 0.497 | 0.000 | 1.84 | 0.0 | 28.1 | SURCHARGED |
| E2.005 | E23 | 104.925 | -0.116 | 0.000 | 0.70 | 0.0 | 166.8 | OK |
| E2.006 | E24 | 102.896 | 1.906 | 95.903 | 0.91 | 0.0 | 204.6 | FLOOD |
| E2.007 | E25 | 101.798 | 2.205 | 0.000 | 0.89 | 0.0 | 199.5 | FLOOD RISK |
| E2.008 | E26 | 100.766 | 2.522 | 56.014 | 1.08 | 0.0 | 170.6 | FLOOD |
| E2.009 | E27 | 100.352 | 2.479 | 0.000 | 0.96 | 0.0 | 170.5 | SURCHARGED |
| E2.010 | E28 | 99.637 | 2.609 | 146.741 | 1.78 | 0.0 | 245.8 | FLOOD |
| E1.005 | E6 | 99.425 | 2.681 | 124.709 | 1.81 | 0.0 | 327.9 | FLOOD |
| E1.006 | E7 | 97.425 | 1.310 | 196.575 | 0.99 | 0.0 | 310.8 | FLOOD |
| E9.000 | E37 | 108.752 | 1.133 | 11.645 | 1.09 | 0.0 | 110.3 | FLOOD |
| E9.001 | E38 | 106.405 | 0.779 | 15.707 | 0.86 | 0.0 | 80.2 | FLOOD |
| E9.002 | E39 | 105.965 | 0.956 | 34.520 | 1.40 | 0.0 | 85.4 | FLOOD |
| E9.003 | E40 | 105.614 | 0.965 | 3.517 | 0.95 | 0.0 | 92.7 | FLOOD |
| E9.004 | E41 | 103.882 | 1.423 | 2.172 | 1.79 | 0.0 | 82.1 | FLOOD |
| E9.005 | E42 | 102.973 | 0.804 | 0.000 | 0.76 | 0.0 | 82.1 | SURCHARGED |
| E9.006 | E43 | 102.445 | 1.222 | 44.921 | 0.96 | 0.0 | 60.3 | FLOOD |
| E10.000 | E45 | 102.922 | 1.163 | 42.238 | 0.99 | 0.0 | 73.7 | FLOOD |
| E9.007 | E44 | 102.183 | 1.340 | 232.694 | 1.00 | 0.0 | 217.6 | FLOOD |
| E1.007 | E8 | 95.648 | 1.707 | 439.897 | 1.20 | 0.0 | 394.6 | FLOOD |
| E1.008 | E9 | 93.756 | 1.275 | 5.792 | 1.46 | 0.0 | 405.0 | FLOOD |
| E1.009 | E10 | 92.182 | 0.522 | 0.000 | 0.78 | 0.0 | 719.7 | SURCHARGED |
| E1.010 | E11 | 91.226 | 1.196 | 5.921 | 0.97 | 0.0 | 736.8 | FLOOD |
| E1.011 | E12 | 90.592 | 1.312 | 122.133 | 1.27 | 0.0 | 468.3 | FLOOD |
| E11.000 | E46 | 107.003 | 0.801 | 3.292 | 1.02 | 0.0 | 12.0 | FLOOD |
| E11.001 | E47 | 106.499 | 0.807 | 48.798 | 1.19 | 0.0 | 15.2 | FLOOD |
| E11.002 | E48 | 105.163 | 0.901 | 2.658 | 1.42 | 0.0 | 19.4 | FLOOD |
| E11.003 | E49 | 104.455 | 0.953 | 5.002 | 1.73 | 0.0 | 33.1 | FLOOD |
| E11.004 | E49 | 103.600 | 0.578 | 0.000 | 0.86 | 0.0 | 42.2 | SURCHARGED |
| E11.005 | E50 | 103.565 | 0.666 | 0.000 | 1.01 | 0.0 | 145.4 | SURCHARGED |
| E12.000 | E61 | 107.000 | 1.248 | 0.465 | 3.32 | 0.0 | 17.5 | FLOOD |
| E12.001 | E62 | 105.607 | -0.070 | 0.000 | 0.56 | 0.0 | 17.5 | OK |
| E12.002 | E63 | 104.153 | 1.051 | 53.497 | 1.78 | 0.0 | 40.5 | FLOOD |
| E12.003 | E64 | 102.703 | 0.014 | 0.000 | 0.63 | 0.0 | 41.9 | SURCHARGED |
| E11.006 | E51 | 102.388 | 0.583 | 0.000 | 0.70 | 0.0 | 178.9 | SURCHARGED |
| E11.007 | E52 | 100.779 | 2.204 | 29.563 | 2.14 | 0.0 | 314.1 | FLOOD |
| E11.008 | E53 | 99.561 | 1.446 | 0.000 | 1.18 | 0.0 | 323.5 | SURCHARGED |
| E11.009 | E54 | 97.859 | 1.178 | 0.000 | 0.86 | 0.0 | 358.6 | FLOOD RISK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E11.010 | E55 | 97.792 | 1.272 | 2.606 | 0.45 | 0.0 | 400.8 | FLOOD |
| E13.000 | E65 | 102.713 | -0.006 | 0.000 | 0.03 | 0.0 | 2.9 | OK |
| E13.001 | E66 | 102.722 | 0.935 | 0.000 | 0.89 | 0.0 | 91.1 | FLOOD RISK |
| E13.002 | E67 | 101.871 | 1.114 | 41.021 | 1.00 | 0.0 | 89.1 | FLOOD |
| E13.003 | E68 | 100.168 | 1.043 | 58.364 | 0.83 | 0.0 | 138.0 | FLOOD |
| E13.004 | E69 | 99.050 | 1.645 | 150.807 | 2.95 | 0.0 | 256.1 | FLOOD |
| E13.005 | E70 | 98.262 | 1.057 | 12.279 | 1.09 | 0.0 | 270.7 | FLOOD |
| E11.011 | E56 | 97.722 | 2.012 | 0.000 | 1.55 | 0.0 | 962.8 | FLOOD RISK |
| E11.012 | E57 | 96.770 | 1.460 | 0.207 | 1.20 | 0.0 | 1188.7 | FLOOD |
| E11.013 | E58 | 94.768 | 0.868 | 128.377 | 1.02 | 0.0 | 1243.5 | FLOOD |
| E11.014 | E59 | 93.332 | 0.872 | 174.054 | 0.89 | 0.0 | 1089.1 | FLOOD |
| E11.015 | E60 | 92.280 | 1.210 | 169.986 | 0.98 | 0.0 | 1042.6 | FLOOD |
| E11.016 | E99 | 91.584 | 1.574 | 535.993 | 1.17 | 0.0 | 647.9 | FLOOD |
| E11.017 | E70 | 90.507 | 1.327 | 287.139 | 1.40 | 0.0 | 580.3 | FLOOD |
| E1.012 | E13 | 90.214 | 1.194 | 3.545 | 1.61 | 0.0 | 1016.9 | FLOOD |
| E14.000 | E73 | 100.040 | 1.431 | 19.559 | 1.12 | 0.0 | 98.1 | FLOOD |
| E14.001 | E74 | 99.034 | 1.255 | 74.175 | 2.47 | 0.0 | 201.8 | FLOOD |
| E14.002 | E75 | 98.248 | 0.599 | 0.000 | 0.74 | 0.0 | 201.6 | SURCHARGED |
| E14.003 | E76 | 97.659 | 1.124 | 79.433 | 1.51 | 0.0 | 201.3 | FLOOD |
| E14.004 | E77 | 96.414 | 0.589 | 0.000 | 0.90 | 0.0 | 181.5 | SURCHARGED |
| E14.005 | E78 | 95.670 | 0.845 | 0.000 | 0.95 | 0.0 | 181.5 | FLOOD RISK |
| E14.006 | E79 | 94.660 | 1.045 | 0.009 | 0.98 | 0.0 | 203.9 | FLOOD |
| E15.000 | E85 | 101.819 | 1.170 | 49.019 | 1.00 | 0.0 | 99.9 | FLOOD |
| E15.001 | E86 | 100.542 | 1.193 | 71.584 | 1.13 | 0.0 | 113.2 | FLOOD |
| E15.002 | E87 | 98.811 | 1.122 | 0.957 | 0.99 | 0.0 | 105.6 | FLOOD |
| E15.003 | E88 | 97.727 | 1.278 | 0.000 | 1.33 | 0.0 | 102.5 | SURCHARGED |
| E15.004 | E89 | 96.169 | 0.660 | 0.000 | 1.04 | 0.0 | 102.7 | SURCHARGED |
| E15.005 | E90 | 94.120 | 0.735 | 0.000 | 0.83 | 0.0 | 178.5 | SURCHARGED |
| E14.007 | E80 | 93.436 | 1.241 | 197.108 | 1.27 | 0.0 | 209.3 | FLOOD |
| E14.008 | E81 | 92.775 | 1.004 | 35.277 | 1.51 | 0.0 | 247.7 | FLOOD |
| E14.009 | E82 | 92.312 | 0.791 | 0.000 | 0.86 | 0.0 | 240.9 | SURCHARGED |
| E14.010 | E100 | 91.528 | 1.307 | 337.932 | 2.72 | 0.0 | 303.6 | FLOOD |
| E14.011 | E83 | 91.406 | 1.226 | 216.181 | 1.59 | 0.0 | 340.0 | FLOOD |
| E14.012 | E84 | 91.562 | 1.739 | 272.169 | 1.52 | 0.0 | 616.2 | FLOOD |
| E1.013 | E14 | 89.886 | 1.014 | 0.000 | 1.05 | 0.0 | 1551.9 | FLOOD RISK |
| E1.014 | E15 | 88.223 | 1.231 | 733.008 | 1.18 | 0.0 | 1336.6 | FLOOD |
| E16.000 | E91 | 91.552 | -0.273 | 0.000 | 0.03 | 0.0 | 5.4 | OK |
| E16.001 | E92 | 91.409 | 0.549 | 0.000 | 0.14 | 0.0 | 23.3 | SURCHARGED |
| E16.002 | E93 | 91.407 | 1.257 | 57.335 | 1.12 | 0.0 | 613.1 | FLOOD |
| E16.003 | E94 | 89.571 | 1.023 | 0.000 | 1.44 | 0.0 | 595.8 | FLOOD RISK |
| E16.004 | E95 | 88.587 | 0.539 | 0.000 | 0.80 | 0.0 | 594.5 | SURCHARGED |
| E1.015 | E16 | 87.622 | 1.179 | 0.000 | 1.59 | 0.0 | 1455.9 | SURCHARGED |
| E17.000 | E99 | 90.530 | -0.152 | 0.000 | 0.00 | 0.0 | 0.0 | OK |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E17.001 | E100 | 87.737 | -0.533 | 0.000 | 0.00 | 0.0 | 0.0 | OK |
| E1.016 | E99 | 86.807 | 0.684 | 0.000 | 2.31 | 0.0 | 1456.5 | SURCHARGED |

## Time Area Diagram for Existing

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|---|---|---|---|---|---|
| 0-4 | 2.280 | 4-8 | 0.364 | 8-12 | 0.000 |

Total Area Contributing (ha) = 2.644

Total Pipe Volume ($m^3$) = 236.891

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.000 | 13.634 | 0.462 | 29.5 | 0.711 | 2.00 | 0.0 | 0.600 | o | 450 |
| E1.001 | 13.634 | 0.318 | 42.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 |
| E2.000 | 87.870 | 0.567 | 155.0 | 0.000 | 2.00 | 5.6 | 0.600 | o | 450 |
| E2.001 | 20.506 | 0.248 | 82.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 |
| E1.002 | 24.482 | 2.125 | 11.5 | 0.000 | 0.00 | 1.4 | 0.600 | o | 525 |
| E3.000 | 56.476 | 0.600 | 94.1 | 0.042 | 2.00 | 7.0 | 0.600 | o | 375 |
| E3.001 | 18.940 | 0.675 | 28.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 375 |
| E1.003 | 44.535 | 2.100 | 21.2 | 0.073 | 0.00 | 2.8 | 0.600 | o | 525 |
| E4.000 | 10.000 | 0.067 | 149.3 | 0.086 | 5.00 | 0.0 | 0.600 | o | 225 |
| E4.001 | 59.070 | 0.400 | 147.7 | 0.043 | 2.00 | 5.6 | 0.600 | o | 450 |
| E5.000 | 20.000 | 1.700 | 11.8 | 0.069 | 5.00 | 0.0 | 0.600 | o | 225 |
| E5.001 | 37.940 | 2.700 | 14.1 | 0.030 | 2.00 | 5.6 | 0.600 | o | 225 |
| E4.002 | 65.295 | 0.300 | 217.7 | 0.062 | 0.00 | 7.0 | 0.600 | o | 450 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.000 | 105.800 | 0.711 | 0.0 | 3.75 | 597.0 |
| E1.001 | 105.338 | 0.711 | 0.0 | 3.11 | 494.9 |
| E2.000 | 105.690 | 0.000 | 5.6 | 1.63 | 259.4 |
| E2.001 | 105.123 | 0.000 | 5.6 | 2.24 | 355.8 |
| E1.002 | 104.875 | 0.711 | 7.0 | 6.62 | 1434.1 |
| E3.000 | 104.100 | 0.042 | 7.0 | 1.87 | 206.3 |
| E3.001 | 103.500 | 0.042 | 7.0 | 3.43 | 379.1 |
| E1.003 | 102.750 | 0.826 | 16.8 | 4.88 | 1056.3 |
| E4.000 | 102.092 | 0.086 | 0.0 | 1.07 | 42.5 |
| E4.001 | 101.800 | 0.129 | 5.6 | 1.67 | 265.7 |
| E5.000 | 106.000 | 0.069 | 0.0 | 3.84 | 152.5 |
| E5.001 | 104.300 | 0.099 | 5.6 | 3.51 | 139.5 |
| E4.002 | 101.375 | 0.290 | 18.2 | 1.37 | 218.5 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E4.003 | 16.292 | 0.425 | 38.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 |
| E1.004 | 46.673 | 1.600 | 29.2 | 0.047 | 0.00 | 7.0 | 0.600 | o | 525 |
| E6.000 | 127.913 | 1.150 | 111.2 | 0.090 | 2.00 | 16.8 | 0.600 | o | 525 |
| E6.001 | 16.281 | 0.650 | 25.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 525 |
| E1.005 | 45.880 | 1.786 | 25.7 | 0.053 | 0.00 | 5.6 | 0.600 | o | 525 |
| E1.006 | 10.000 | 0.389 | 25.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |
| E7.000 | 155.705 | 2.975 | 52.3 | 0.527 | 2.00 | 7.0 | 0.600 | o | 381 |
| E1.007 | 127.659 | 3.725 | 34.3 | 0.189 | 0.00 | 5.6 | 0.600 | o | 381 |
| E8.000 | 84.835 | 3.100 | 27.4 | 0.153 | 2.00 | 0.0 | 0.600 | o | 300 |
| E8.001 | 9.846 | 0.475 | 20.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 |
| E9.000 | 76.751 | 0.675 | 113.7 | 0.052 | 2.00 | 11.2 | 0.600 | o | 450 |
| E9.001 | 12.164 | 0.475 | 25.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E4.003 | 101.075 | 0.290 | 18.2 | 3.29 | 523.5 |
| E1.004 | 100.575 | 1.163 | 42.0 | 4.16 | 900.2 |
| E6.000 | 100.700 | 0.090 | 16.8 | 2.12 | 459.6 |
| E6.001 | 99.550 | 0.090 | 16.8 | 4.49 | 971.7 |
| E1.005 | 98.900 | 1.306 | 64.4 | 4.43 | 959.5 |
| E1.006 | 97.114 | 1.306 | 64.4 | 3.62 | 413.0 |
| E7.000 | 99.700 | 0.527 | 7.0 | 2.53 | 289.0 |
| E1.007 | 96.725 | 2.022 | 77.0 | 3.14 | 357.5 |
| E8.000 | 99.300 | 0.153 | 0.0 | 3.02 | 213.3 |
| E8.001 | 96.200 | 0.153 | 0.0 | 3.47 | 245.2 |
| E9.000 | 100.400 | 0.052 | 11.2 | 1.91 | 303.1 |
| E9.001 | 99.725 | 0.052 | 11.2 | 4.03 | 641.0 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E10.000 | 15.264 | 0.400 | 38.2 | 0.155 | 2.00 | 0.0 | 0.600 | o | 225 |
| E10.001 | 39.332 | 1.225 | 32.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 |
| E11.000 | 37.389 | 1.200 | 31.2 | 0.041 | 2.00 | 5.6 | 0.600 | o | 300 |
| E10.002 | 33.811 | 0.900 | 37.6 | 0.041 | 0.00 | 1.4 | 0.600 | o | 375 |
| E10.003 | 46.007 | 1.200 | 38.3 | 0.000 | 0.00 | 5.6 | 0.600 | o | 375 |
| E10.004 | 9.731 | 0.100 | 97.3 | 0.028 | 0.00 | 0.0 | 0.600 | o | 450 |
| E9.002 | 50.352 | 1.675 | 30.1 | 0.028 | 0.00 | 4.2 | 0.600 | o | 450 |
| E12.000 | 75.107 | 1.198 | 62.7 | 0.057 | 2.00 | 11.2 | 0.600 | o | 450 |
| E12.001 | 14.054 | 0.327 | 43.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 |
| E9.003 | 31.000 | 1.900 | 16.3 | 0.000 | 0.00 | 1.4 | 0.600 | o | 525 |
| E8.002 | 42.353 | 1.950 | 21.7 | 0.067 | 0.00 | 0.0 | 0.600 | o | 525 |
| E8.003 | 14.134 | 0.550 | 25.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |
| E1.008 | 28.341 | 0.800 | 35.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E10.000 | 103.200 | 0.155 | 0.0 | 2.12 | 84.5 |
| E10.001 | 102.800 | 0.155 | 0.0 | 2.32 | 92.1 |
| E11.000 | 102.700 | 0.041 | 5.6 | 2.83 | 199.8 |
| E10.002 | 101.425 | 0.237 | 7.0 | 2.96 | 327.4 |
| E10.003 | 100.525 | 0.237 | 12.6 | 2.93 | 324.1 |
| E10.004 | 99.250 | 0.265 | 12.6 | 2.06 | 327.8 |
| E9.002 | 99.150 | 0.345 | 28.0 | 3.72 | 591.5 |
| E12.000 | 99.000 | 0.057 | 11.2 | 2.57 | 408.9 |
| E12.001 | 97.802 | 0.057 | 11.2 | 3.11 | 494.3 |
| E9.003 | 97.400 | 0.402 | 40.6 | 5.56 | 1204.6 |
| E8.002 | 95.500 | 0.622 | 40.6 | 4.82 | 1043.7 |
| E8.003 | 93.550 | 0.622 | 40.6 | 3.62 | 413.0 |
| E1.008 | 93.000 | 2.644 | 117.6 | 3.08 | 351.6 |

## Existing Network Details for Existing

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| E1.009 | 29.464 | 0.832 | 35.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 381 |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Vel (m/s) | Cap (l/s) |
|---|---|---|---|---|---|
| E1.009 | 92.200 | 2.644 | 117.6 | 3.08 | 351.6 |

## Free Flowing Outfall Details for Existing

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---|---|---|---|---|---|---|
| E1.009 | E | 95.200 | 91.368 | 91.368 | 0 | 0 |

## Simulation Criteria for Existing

| | | | |
|---|---|---|---|
| Volumetric Runoff Coeff | 0.750 | Foul Sewage per hectare (l/s) | 0.000 |
| PIMP (% impervious) | 100 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start (mins) | 0 | Inlet Coeffiecient | 0.800 |
| Hot Start Level (mm) | 0 | Run Time (mins) | 60 |
| Manhole Headloss Coeff (Global) | 0.500 | Output Interval (mins) | 1 |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 22 |
| Number of Online Controls | 12 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | | |

## Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| Return Period (years) | 2 |
| Site Location | 487000 152100 SU 87000 52100 |
| C (1km) | -0.025 |
| D1 (1km) | 0.301 |
| D2 (1km) | 0.275 |
| D3 (1km) | 0.307 |
| E (1km) | 0.300 |
| F (1km) | 2.648 |
| Summer Storms | Yes |
| Winter Storms | No |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |
| Storm Duration (mins) | 30 |

## Online Controls for Existing

### Hydro-Brake® Manhole: E3, DS/PN: E2.001, Volume (m³): 16.4

Design Head (m) 0.942 Diameter (mm) 96
Design Flow (l/s) 5.0 Invert Level (m) 105.123
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 2.9 | 1.200 | 5.8 | 3.000 | 9.1 | 7.000 | 13.9 |
| 0.200 | 4.3 | 1.400 | 6.2 | 3.500 | 9.8 | 7.500 | 14.4 |
| 0.300 | 4.1 | 1.600 | 6.7 | 4.000 | 10.5 | 8.000 | 14.9 |
| 0.400 | 4.0 | 1.800 | 7.1 | 4.500 | 11.2 | 8.500 | 15.3 |
| 0.500 | 4.0 | 2.000 | 7.4 | 5.000 | 11.8 | 9.000 | 15.8 |
| 0.600 | 4.2 | 2.200 | 7.8 | 5.500 | 12.3 | 9.500 | 16.2 |
| 0.800 | 4.7 | 2.400 | 8.1 | 6.000 | 12.9 | | |
| 1.000 | 5.3 | 2.600 | 8.5 | 6.500 | 13.4 | | |

### Hydro-Brake® Manhole: E5, DS/PN: E3.001, Volume (m³): 9.0

Design Head (m) 0.975 Diameter (mm) 133
Design Flow (l/s) 10.0 Invert Level (m) 103.500
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 4.3 | 1.200 | 11.1 | 3.000 | 17.5 | 7.000 | 26.7 |
| 0.200 | 9.0 | 1.400 | 12.0 | 3.500 | 18.9 | 7.500 | 27.6 |
| 0.300 | 9.7 | 1.600 | 12.8 | 4.000 | 20.2 | 8.000 | 28.5 |
| 0.400 | 9.4 | 1.800 | 13.5 | 4.500 | 21.4 | 8.500 | 29.4 |
| 0.500 | 9.0 | 2.000 | 14.3 | 5.000 | 22.6 | 9.000 | 30.3 |
| 0.600 | 8.9 | 2.200 | 15.0 | 5.500 | 23.7 | 9.500 | 31.1 |
| 0.800 | 9.4 | 2.400 | 15.6 | 6.000 | 24.7 | | |
| 1.000 | 10.2 | 2.600 | 16.3 | 6.500 | 25.7 | | |

### Hydro-Brake® Manhole: E7, DS/PN: E4.001, Volume (m³): 2.9

Design Head (m) 1.292 Diameter (mm) 104
Design Flow (l/s) 7.0 Invert Level (m) 101.800
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 3.2 | 1.000 | 6.2 | 2.400 | 9.6 | 5.500 | 14.5 |
| 0.200 | 5.2 | 1.200 | 6.8 | 2.600 | 10.0 | 6.000 | 15.1 |
| 0.300 | 5.1 | 1.400 | 7.3 | 3.000 | 10.7 | 6.500 | 15.7 |
| 0.400 | 4.9 | 1.600 | 7.8 | 3.500 | 11.5 | 7.000 | 16.3 |
| 0.500 | 4.9 | 1.800 | 8.3 | 4.000 | 12.3 | 7.500 | 16.9 |
| 0.600 | 5.0 | 2.000 | 8.7 | 4.500 | 13.1 | 8.000 | 17.5 |
| 0.800 | 5.6 | 2.200 | 9.2 | 5.000 | 13.8 | 8.500 | 18.0 |

Hydro-Brake® Manhole: E7, DS/PN: E4.001, Volume (m³): 2.9

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|
| 9.000 | 18.5 | 9.500 | 19.0 |

Hydro-Brake® Manhole: E9, DS/PN: E4.003, Volume (m³): 13.9

| | | | |
|---|---|---|---|
| Design Head (m) | 1.172 | Diameter (mm) | 160 |
| Design Flow (l/s) | 16.0 | Invert Level (m) | 101.075 |
| Hydro-Brake® Type | Md6 SW Only | | |

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 5.3 | 1.200 | 16.2 | 3.000 | 25.3 | 7.000 | 38.6 |
| 0.200 | 12.4 | 1.400 | 17.4 | 3.500 | 27.3 | 7.500 | 40.0 |
| 0.300 | 15.3 | 1.600 | 18.5 | 4.000 | 29.2 | 8.000 | 41.3 |
| 0.400 | 15.4 | 1.800 | 19.6 | 4.500 | 31.0 | 8.500 | 42.6 |
| 0.500 | 14.8 | 2.000 | 20.7 | 5.000 | 32.7 | 9.000 | 43.8 |
| 0.600 | 14.4 | 2.200 | 21.7 | 5.500 | 34.3 | 9.500 | 45.0 |
| 0.800 | 14.3 | 2.400 | 22.6 | 6.000 | 35.8 | | |
| 1.000 | 15.1 | 2.600 | 23.6 | 6.500 | 37.2 | | |

Hydro-Brake® Manhole: E12, DS/PN: E6.001, Volume (m³): 30.5

| | | | |
|---|---|---|---|
| Design Head (m) | 1.675 | Diameter (mm) | 184 |
| Design Flow (l/s) | 25.0 | Invert Level (m) | 99.550 |
| Hydro-Brake® Type | Md6 SW Only | | |

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 6.1 | 1.200 | 21.7 | 3.000 | 33.5 | 7.000 | 51.1 |
| 0.200 | 15.3 | 1.400 | 23.1 | 3.500 | 36.1 | 7.500 | 52.9 |
| 0.300 | 20.9 | 1.600 | 24.5 | 4.000 | 38.6 | 8.000 | 54.6 |
| 0.400 | 21.9 | 1.800 | 26.0 | 4.500 | 41.0 | 8.500 | 56.3 |
| 0.500 | 21.6 | 2.000 | 27.3 | 5.000 | 43.2 | 9.000 | 57.9 |
| 0.600 | 20.9 | 2.200 | 28.7 | 5.500 | 45.3 | 9.500 | 59.5 |
| 0.800 | 20.1 | 2.400 | 29.9 | 6.000 | 47.3 | | |
| 1.000 | 20.6 | 2.600 | 31.1 | 6.500 | 49.2 | | |

Hydro-Brake® Manhole: E18, DS/PN: E8.001, Volume (m³): 8.5

| | | | |
|---|---|---|---|
| Design Head (m) | 3.100 | Diameter (mm) | 55 |
| Design Flow (l/s) | 3.0 | Invert Level (m) | 96.200 |
| Hydro-Brake® Type | Md6 SW Only | | |

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 1.1 | 0.500 | 1.2 | 1.200 | 1.9 | 2.000 | 2.4 |
| 0.200 | 1.0 | 0.600 | 1.3 | 1.400 | 2.0 | 2.200 | 2.6 |
| 0.300 | 1.0 | 0.800 | 1.5 | 1.600 | 2.2 | 2.400 | 2.7 |
| 0.400 | 1.1 | 1.000 | 1.7 | 1.800 | 2.3 | 2.600 | 2.8 |

## Hydro-Brake® Manhole: E18, DS/PN: E8.001, Volume (m³): 8.5

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 3.000 | 3.0 | 5.000 | 3.9 | 7.000 | 4.6 | 9.000 | 5.2 |
| 3.500 | 3.2 | 5.500 | 4.0 | 7.500 | 4.7 | 9.500 | 5.3 |
| 4.000 | 3.5 | 6.000 | 4.2 | 8.000 | 4.9 | | |
| 4.500 | 3.7 | 6.500 | 4.4 | 8.500 | 5.0 | | |

## Hydro-Brake® Manhole: E25, DS/PN: E9.001, Volume (m³): 14.7

Design Head (m) 0.675 Diameter (mm) 140
Design Flow (l/s) 10.0 Invert Level (m) 99.725
Hydro-Brake® Type Md5 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 4.6 | 1.200 | 12.9 | 3.000 | 20.4 | 7.000 | 31.2 |
| 0.200 | 8.5 | 1.400 | 14.0 | 3.500 | 22.1 | 7.500 | 32.3 |
| 0.300 | 9.2 | 1.600 | 14.9 | 4.000 | 23.6 | 8.000 | 33.4 |
| 0.400 | 9.1 | 1.800 | 15.8 | 4.500 | 25.0 | 8.500 | 34.4 |
| 0.500 | 9.2 | 2.000 | 16.7 | 5.000 | 26.4 | 9.000 | 35.4 |
| 0.600 | 9.5 | 2.200 | 17.5 | 5.500 | 27.7 | 9.500 | 36.4 |
| 0.800 | 10.6 | 2.400 | 18.3 | 6.000 | 28.9 | | |
| 1.000 | 11.8 | 2.600 | 19.0 | 6.500 | 30.1 | | |

## Hydro-Brake® Manhole: E20, DS/PN: E10.001, Volume (m³): 3.1

Design Head (m) 1.000 Diameter (mm) 73
Design Flow (l/s) 3.0 Invert Level (m) 102.800
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 1.9 | 1.200 | 3.3 | 3.000 | 5.3 | 7.000 | 8.0 |
| 0.200 | 2.1 | 1.400 | 3.6 | 3.500 | 5.7 | 7.500 | 8.3 |
| 0.300 | 2.0 | 1.600 | 3.8 | 4.000 | 6.1 | 8.000 | 8.6 |
| 0.400 | 2.0 | 1.800 | 4.1 | 4.500 | 6.4 | 8.500 | 8.9 |
| 0.500 | 2.2 | 2.000 | 4.3 | 5.000 | 6.8 | 9.000 | 9.1 |
| 0.600 | 2.4 | 2.200 | 4.5 | 5.500 | 7.1 | 9.500 | 9.4 |
| 0.800 | 2.7 | 2.400 | 4.7 | 6.000 | 7.4 | | |
| 1.000 | 3.0 | 2.600 | 4.9 | 6.500 | 7.8 | | |

## Hydro-Brake® Manhole: E21, DS/PN: E10.002, Volume (m³): 7.0

Design Head (m) 1.500 Diameter (mm) 169
Design Flow (l/s) 20.0 Invert Level (m) 101.425
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 5.6 | 0.200 | 13.5 | 0.300 | 17.3 | 0.400 | 17.7 |

## Hydro-Brake® Manhole: E21, DS/PN: E10.002, Volume (m³): 7.0

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.500 | 17.2 | 1.800 | 21.9 | 4.000 | 32.6 | 7.500 | 44.6 |
| 0.600 | 16.6 | 2.000 | 23.1 | 4.500 | 34.6 | 8.000 | 46.1 |
| 0.800 | 16.3 | 2.200 | 24.2 | 5.000 | 36.4 | 8.500 | 47.5 |
| 1.000 | 17.0 | 2.400 | 25.2 | 5.500 | 38.2 | 9.000 | 48.9 |
| 1.200 | 18.1 | 2.600 | 26.3 | 6.000 | 39.9 | 9.500 | 50.2 |
| 1.400 | 19.4 | 3.000 | 28.2 | 6.500 | 41.5 | | |
| 1.600 | 20.7 | 3.500 | 30.5 | 7.000 | 43.1 | | |

## Hydro-Brake® Manhole: E22, DS/PN: E10.003, Volume (m³): 6.6

Design Head (m) 1.275 Hydro-Brake® Type Md2 Invert Level (m) 100.525
Design Flow (l/s) 150.0 Diameter (mm) 356

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 9.4 | 1.200 | 145.6 | 3.000 | 229.1 | 7.000 | 350.0 |
| 0.200 | 36.4 | 1.400 | 156.6 | 3.500 | 247.5 | 7.500 | 362.2 |
| 0.300 | 72.0 | 1.600 | 167.3 | 4.000 | 264.5 | 8.000 | 374.1 |
| 0.400 | 105.8 | 1.800 | 177.5 | 4.500 | 280.6 | 8.500 | 385.6 |
| 0.500 | 128.6 | 2.000 | 187.1 | 5.000 | 295.8 | 9.000 | 396.8 |
| 0.600 | 141.5 | 2.200 | 196.2 | 5.500 | 310.2 | 9.500 | 407.7 |
| 0.800 | 138.2 | 2.400 | 204.9 | 6.000 | 324.0 | | |
| 1.000 | 136.4 | 2.600 | 213.3 | 6.500 | 337.2 | | |

## Hydro-Brake® Manhole: E29, DS/PN: E12.001, Volume (m³): 14.6

Design Head (m) 1.648 Diameter (mm) 202
Design Flow (l/s) 30.0 Invert Level (m) 97.802
Hydro-Brake® Type Md6 SW Only

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 6.7 | 1.200 | 26.6 | 3.000 | 40.3 | 7.000 | 61.6 |
| 0.200 | 17.4 | 1.400 | 28.1 | 3.500 | 43.6 | 7.500 | 63.8 |
| 0.300 | 25.3 | 1.600 | 29.7 | 4.000 | 46.6 | 8.000 | 65.8 |
| 0.400 | 27.5 | 1.800 | 31.3 | 4.500 | 49.4 | 8.500 | 67.9 |
| 0.500 | 27.5 | 2.000 | 33.0 | 5.000 | 52.1 | 9.000 | 69.8 |
| 0.600 | 26.9 | 2.200 | 34.6 | 5.500 | 54.6 | 9.500 | 71.8 |
| 0.800 | 25.5 | 2.400 | 36.1 | 6.000 | 57.0 | | |
| 1.000 | 25.6 | 2.600 | 37.5 | 6.500 | 59.4 | | |

## Hydro-Brake® Manhole: E20, DS/PN: E8.003, Volume (m³): 16.4

Design Head (m) 1.950 Diameter (mm) 288
Design Flow (l/s) 70.0 Invert Level (m) 93.550
Hydro-Brake® Type Md5 SW Only

Hydro-Brake® Manhole: E20, DS/PN: E8.003, Volume ($m^3$): 16.4

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 10.4 | 0.200 | 27.1 | 0.300 | 42.1 | 0.400 | 50.8 |

Hydro-Brake® Manhole: E20, DS/PN: E8.003, Volume (m³): 16.4

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.500 | 54.8 | 1.800 | 67.3 | 4.000 | 99.8 | 7.500 | 136.7 |
| 0.600 | 55.9 | 2.000 | 70.7 | 4.500 | 105.9 | 8.000 | 141.2 |
| 0.800 | 55.2 | 2.200 | 74.1 | 5.000 | 111.6 | 8.500 | 145.5 |
| 1.000 | 55.5 | 2.400 | 77.4 | 5.500 | 117.1 | 9.000 | 149.8 |
| 1.200 | 57.5 | 2.600 | 80.5 | 6.000 | 122.3 | 9.500 | 153.9 |
| 1.400 | 60.4 | 3.000 | 86.5 | 6.500 | 127.3 | | |
| 1.600 | 63.8 | 3.500 | 93.4 | 7.000 | 132.1 | | |

## Storage Structures for Existing

### Porous Car Park Manhole: E5, DS/PN: E3.001

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 80.0 |
| Max Percolation (l/s) | 115.6 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 104.850 | Cap Volume Depth (m) | 0.000 |

### Porous Car Park Manhole: E3, DS/PN: E1.003

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 70.0 |
| Max Percolation (l/s) | 120.6 | Slope (1:X) | 50.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 102.750 | Cap Volume Depth (m) | 0.000 |

### Cellular Storage Manhole: E8, DS/PN: E4.000

| | | | |
|---|---|---|---|
| Invert Level (m) | 102.092 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00655 | | |

| **Depth (m)** | **Area (m²)** | **Inf. Area (m²)** | **Depth (m)** | **Area (m²)** | **Inf. Area (m²)** |
|---|---|---|---|---|---|
| 0.000 | 225.0 | 225.0 | 1.300 | 0.0 | 288.0 |
| 0.100 | 225.0 | 231.0 | 1.400 | 0.0 | 288.0 |
| 0.200 | 225.0 | 237.0 | 1.500 | 0.0 | 288.0 |
| 0.300 | 225.0 | 243.0 | 1.600 | 0.0 | 288.0 |
| 0.400 | 225.0 | 249.0 | 1.700 | 0.0 | 288.0 |
| 0.500 | 225.0 | 255.0 | 1.800 | 0.0 | 288.0 |
| 0.600 | 225.0 | 261.0 | 1.900 | 0.0 | 288.0 |
| 0.700 | 225.0 | 267.0 | 2.000 | 0.0 | 288.0 |
| 0.800 | 225.0 | 273.0 | 2.100 | 0.0 | 288.0 |
| 0.900 | 225.0 | 279.0 | 2.200 | 0.0 | 288.0 |
| 1.000 | 225.0 | 285.0 | 2.300 | 0.0 | 288.0 |
| 1.100 | 0.0 | 288.0 | 2.400 | 0.0 | 288.0 |
| 1.200 | 0.0 | 288.0 | 2.500 | 0.0 | 288.0 |

### Porous Car Park Manhole: E7, DS/PN: E4.001

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.9 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 61.0 |
| Max Percolation (l/s) | 100.0 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 102.950 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E8, DS/PN: E5.001

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.6 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 44.0 |
| Max Percolation (l/s) | 68.4 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 105.150 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E8, DS/PN: E4.002

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.9 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 63.0 |
| Max Percolation (l/s) | 103.3 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 102.950 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E9, DS/PN: E4.003

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.9 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 18.0 |
| Max Percolation (l/s) | 29.5 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 103.050 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E4, DS/PN: E1.004

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.4 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 47.0 |
| Max Percolation (l/s) | 83.6 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.575 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E11, DS/PN: E6.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 126.0 |
| Max Percolation (l/s) | 217.0 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 102.050 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E12, DS/PN: E6.001

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.30 |
| Membrane Percolation (mm/hr) | 1000 | Invert Level (m) | 100.650 |
| Max Percolation (l/s) | 27.6 | Width (m) | 6.2 |
| Safety Factor | 2.0 | Length (m) | 16.0 |

## Porous Car Park Manhole: E12, DS/PN: E6.001

| | | | |
|---|---|---|---|
| Slope (1:X) | 0.0 | Evaporation (mm/day) | 3 |
| Depression Storage (mm) | 5 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E5, DS/PN: E1.005

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 54.0 |
| Max Percolation (l/s) | 90.0 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.550 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E15, DS/PN: E7.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.5 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 196.0 |
| Max Percolation (l/s) | 353.9 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.850 | Cap Volume Depth (m) | 0.000 |

## Cellular Storage Manhole: E18, DS/PN: E8.001

| | | | |
|---|---|---|---|
| Invert Level (m) | 96.200 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00655 | | |

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 240.0 | 0.0 | 1.300 | 0.0 | 0.0 |
| 0.100 | 240.0 | 0.0 | 1.400 | 0.0 | 0.0 |
| 0.200 | 240.0 | 0.0 | 1.500 | 0.0 | 0.0 |
| 0.300 | 240.0 | 0.0 | 1.600 | 0.0 | 0.0 |
| 0.400 | 240.0 | 0.0 | 1.700 | 0.0 | 0.0 |
| 0.500 | 240.0 | 0.0 | 1.800 | 0.0 | 0.0 |
| 0.600 | 240.0 | 0.0 | 1.900 | 0.0 | 0.0 |
| 0.700 | 240.0 | 0.0 | 2.000 | 0.0 | 0.0 |
| 0.800 | 240.0 | 0.0 | 2.100 | 0.0 | 0.0 |
| 0.900 | 240.0 | 0.0 | 2.200 | 0.0 | 0.0 |
| 1.000 | 240.0 | 0.0 | 2.300 | 0.0 | 0.0 |
| 1.100 | 0.0 | 0.0 | 2.400 | 0.0 | 0.0 |
| 1.200 | 0.0 | 0.0 | 2.500 | 0.0 | 0.0 |

## Porous Car Park Manhole: E24, DS/PN: E9.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.30 |
| Membrane Percolation (mm/hr) | 1000 | Invert Level (m) | 102.050 |
| Max Percolation (l/s) | 195.6 | Width (m) | 8.0 |
| Safety Factor | 2.0 | Length (m) | 88.0 |

## Porous Car Park Manhole: E24, DS/PN: E9.000

| | | | |
|---|---|---|---|
| Slope (1:X) | 0.0 | Evaporation (mm/day) | 3 |
| Depression Storage (mm) | 5 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E25, DS/PN: E9.001

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 11.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 55.0 |
| Max Percolation (l/s) | 168.1 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.950 | Cap Volume Depth (m) | 0.000 |

## Cellular Storage Manhole: E19, DS/PN: E10.000

| | | | |
|---|---|---|---|
| Invert Level (m) | 103.200 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00655 | | |

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 40.0 | 40.0 | 1.300 | 0.0 | 66.6 |
| 0.100 | 40.0 | 42.5 | 1.400 | 0.0 | 66.6 |
| 0.200 | 40.0 | 45.1 | 1.500 | 0.0 | 66.6 |
| 0.300 | 40.0 | 47.6 | 1.600 | 0.0 | 66.6 |
| 0.400 | 40.0 | 50.1 | 1.700 | 0.0 | 66.6 |
| 0.500 | 40.0 | 52.6 | 1.800 | 0.0 | 66.6 |
| 0.600 | 40.0 | 55.2 | 1.900 | 0.0 | 66.6 |
| 0.700 | 40.0 | 57.7 | 2.000 | 0.0 | 66.6 |
| 0.800 | 40.0 | 60.2 | 2.100 | 0.0 | 66.6 |
| 0.900 | 40.0 | 62.8 | 2.200 | 0.0 | 66.6 |
| 1.000 | 40.0 | 65.3 | 2.300 | 0.0 | 66.6 |
| 1.100 | 0.0 | 66.6 | 2.400 | 0.0 | 66.6 |
| 1.200 | 0.0 | 66.6 | 2.500 | 0.0 | 66.6 |

## Cellular Storage Manhole: E20, DS/PN: E10.001

| | | | |
|---|---|---|---|
| Invert Level (m) | 102.800 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00655 | | |

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 100.0 | 100.0 | 0.800 | 100.0 | 132.0 |
| 0.100 | 100.0 | 104.0 | 0.900 | 100.0 | 136.0 |
| 0.200 | 100.0 | 108.0 | 1.000 | 100.0 | 140.0 |
| 0.300 | 100.0 | 112.0 | 1.100 | 0.0 | 142.0 |
| 0.400 | 100.0 | 116.0 | 1.200 | 0.0 | 142.0 |
| 0.500 | 100.0 | 120.0 | 1.300 | 0.0 | 142.0 |
| 0.600 | 100.0 | 124.0 | 1.400 | 0.0 | 142.0 |
| 0.700 | 100.0 | 128.0 | 1.500 | 0.0 | 142.0 |

## Cellular Storage Manhole: E20, DS/PN: E10.001

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 1.600 | 0.0 | 142.0 | 2.100 | 0.0 | 142.0 |
| 1.700 | 0.0 | 142.0 | 2.200 | 0.0 | 142.0 |
| 1.800 | 0.0 | 142.0 | 2.300 | 0.0 | 142.0 |
| 1.900 | 0.0 | 142.0 | 2.400 | 0.0 | 142.0 |
| 2.000 | 0.0 | 142.0 | 2.500 | 0.0 | 142.0 |

## Porous Car Park Manhole: E21, DS/PN: E11.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 7.3 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 53.0 |
| Max Percolation (l/s) | 107.5 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 103.550 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E21, DS/PN: E10.002

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 7.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 54.0 |
| Max Percolation (l/s) | 108.0 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 102.850 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E22, DS/PN: E10.003

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 5.8 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 54.0 |
| Max Percolation (l/s) | 87.0 | Slope (1:X) | 46.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.525 | Cap Volume Depth (m) | 0.000 |

## Porous Car Park Manhole: E28, DS/PN: E12.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00655 | Width (m) | 6.8 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 87.0 |
| Max Percolation (l/s) | 164.3 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 100.550 | Cap Volume Depth (m) | 0.000 |

## Cellular Storage Manhole: E19, DS/PN: E8.002

| | | | |
|---|---|---|---|
| Invert Level (m) | 95.500 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00655 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00655 | | |

Cellular Storage Manhole: E19, DS/PN: E8.002

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 300.0 | 300.0 | 0.100 | 300.0 | 306.9 |

Cellular Storage Manhole: E19, DS/PN: E8.002

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.200 | 300.0 | 313.9 | 1.400 | 0.0 | 393.5 |
| 0.300 | 300.0 | 320.8 | 1.500 | 0.0 | 393.5 |
| 0.400 | 300.0 | 327.7 | 1.600 | 0.0 | 393.5 |
| 0.500 | 300.0 | 334.6 | 1.700 | 0.0 | 393.5 |
| 0.600 | 300.0 | 341.6 | 1.800 | 0.0 | 393.5 |
| 0.700 | 300.0 | 348.5 | 1.900 | 0.0 | 393.5 |
| 0.800 | 300.0 | 355.4 | 2.000 | 0.0 | 393.5 |
| 0.900 | 300.0 | 362.4 | 2.100 | 0.0 | 393.5 |
| 1.000 | 300.0 | 369.3 | 2.200 | 0.0 | 393.5 |
| 1.100 | 300.0 | 376.2 | 2.300 | 0.0 | 393.5 |
| 1.200 | 300.0 | 383.1 | 2.400 | 0.0 | 393.5 |
| 1.300 | 300.0 | 390.1 | 2.500 | 0.0 | 393.5 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| | | | |
|---|---|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 2 |
| Climate Change (%) | 0 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Summer | 2 | 0% | | | | | |
| E1.001 | 15 Summer | 2 | 0% | | | | | |
| E2.000 | 360 Winter | 2 | 0% | 2/120 Summer | | | | |
| E2.001 | 360 Summer | 2 | 0% | 2/60 Summer | | | | |
| E1.002 | 15 Summer | 2 | 0% | | | | | |
| E3.000 | 15 Summer | 2 | 0% | | | | | |
| E3.001 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.003 | 15 Summer | 2 | 0% | | | | | |
| E4.000 | 360 Winter | 2 | 0% | 2/120 Summer | | | | |
| E4.001 | 360 Winter | 2 | 0% | 2/15 Summer | | | | |
| E5.000 | 15 Winter | 2 | 0% | | | | | |
| E5.001 | 15 Summer | 2 | 0% | | | | | |
| E4.002 | 360 Summer | 2 | 0% | 2/15 Summer | | | | |
| E4.003 | 360 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.004 | 15 Summer | 2 | 0% | | | | | |
| E6.000 | 15 Summer | 2 | 0% | | | | | |
| E6.001 | 30 Winter | 2 | 0% | | | | | |
| E1.005 | 15 Summer | 2 | 0% | | | | | |
| E1.006 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E7.000 | 15 Summer | 2 | 0% | | | | | |
| E1.007 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E8.000 | 15 Summer | 2 | 0% | | | | | |
| E8.001 | 360 Winter | 2 | 0% | | | | | |
| E9.000 | 360 Summer | 2 | 0% | 2/240 Winter | | | | |
| E9.001 | 360 Summer | 2 | 0% | 2/15 Summer | | | | |
| E10.000 | 15 Summer | 2 | 0% | | | | | |
| E10.001 | 120 Winter | 2 | 0% | | | | | |
| E11.000 | 15 Summer | 2 | 0% | | | | | |
| E10.002 | 30 Winter | 2 | 0% | | | | | |
| E10.003 | 30 Winter | 2 | 0% | | | | | |
| E10.004 | 15 Winter | 2 | 0% | | | | | |
| E9.002 | 15 Winter | 2 | 0% | | | | | |
| E12.000 | 15 Summer | 2 | 0% | | | | | |
| E12.001 | 15 Winter | 2 | 0% | | | | | |
| E9.003 | 15 Winter | 2 | 0% | | | | | |
| E8.002 | 30 Winter | 2 | 0% | | | | | |
| E8.003 | 30 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.008 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |
| E1.009 | 15 Winter | 2 | 0% | 2/15 Summer | | | | |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 106.035 | -0.215 | 0.000 | 0.53 | 0.0 | 203.1 | OK |
| E1.001 | E2 | 105.604 | -0.184 | 0.000 | 0.64 | 0.0 | 203.1 | OK |
| E2.000 | E2 | 106.260 | 0.120 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E2.001 | E3 | 106.257 | 0.684 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E1.002 | E2 | 105.029 | -0.371 | 0.000 | 0.19 | 0.0 | 207.0 | OK |
| E3.000 | E4 | 104.178 | -0.297 | 0.000 | 0.10 | 0.0 | 18.6 | OK |
| E3.001 | E5 | 103.913 | 0.038 | 0.000 | 0.03 | 0.0 | 9.7 | SURCHARGED |
| E1.003 | E3 | 102.927 | -0.348 | 0.000 | 0.24 | 0.0 | 225.9 | OK |
| E4.000 | E8 | 102.536 | 0.219 | 0.000 | 0.02 | 0.0 | 0.7 | SURCHARGED |
| E4.001 | E7 | 102.740 | 0.490 | 0.000 | 0.02 | 0.0 | 5.2 | SURCHARGED |
| E5.000 | E10 | 106.049 | -0.176 | 0.000 | 0.11 | 0.0 | 14.6 | OK |
| E5.001 | E8 | 104.371 | -0.154 | 0.000 | 0.20 | 0.0 | 26.2 | OK |
| E4.002 | E8 | 102.650 | 0.825 | 0.000 | 0.10 | 0.0 | 20.3 | SURCHARGED |
| E4.003 | E9 | 102.815 | 1.290 | 0.000 | 0.05 | 0.0 | 16.8 | SURCHARGED |
| E1.004 | E4 | 100.775 | -0.325 | 0.000 | 0.29 | 0.0 | 231.3 | OK |
| E6.000 | E11 | 100.809 | -0.416 | 0.000 | 0.08 | 0.0 | 32.9 | OK |
| E6.001 | E12 | 99.976 | -0.099 | 0.000 | 0.03 | 0.0 | 21.3 | OK |
| E1.005 | E5 | 99.109 | -0.316 | 0.000 | 0.32 | 0.0 | 272.1 | OK |
| E1.006 | E16 | 97.908 | 0.413 | 0.000 | 0.94 | 0.0 | 237.8 | SURCHARGED |
| E7.000 | E15 | 99.903 | -0.178 | 0.000 | 0.48 | 0.0 | 134.0 | OK |
| E1.007 | E6 | 97.592 | 0.486 | 0.000 | 1.00 | 0.0 | 347.0 | SURCHARGED |
| E8.000 | E17 | 99.393 | -0.207 | 0.000 | 0.21 | 0.0 | 43.5 | OK |
| E8.001 | E18 | 96.311 | -0.189 | 0.000 | 0.01 | 0.0 | 1.1 | OK |
| E9.000 | E24 | 100.879 | 0.029 | 0.000 | 0.05 | 0.0 | 12.8 | SURCHARGED |
| E9.001 | E25 | 100.871 | 0.696 | 0.000 | 0.03 | 0.0 | 12.6 | SURCHARGED |
| E10.000 | E19 | 103.315 | -0.110 | 0.000 | 0.48 | 0.0 | 35.6 | OK |
| E10.001 | E20 | 102.984 | -0.041 | 0.000 | 0.02 | 0.0 | 2.2 | OK |
| E11.000 | E21 | 102.761 | -0.239 | 0.000 | 0.07 | 0.0 | 13.4 | OK |
| E10.002 | E21 | 101.779 | -0.021 | 0.000 | 0.06 | 0.0 | 17.7 | OK |
| E10.003 | E22 | 100.682 | -0.218 | 0.000 | 0.08 | 0.0 | 23.2 | OK |
| E10.004 | E26 | 99.366 | -0.334 | 0.000 | 0.15 | 0.0 | 26.7 | OK |
| E9.002 | E23 | 99.236 | -0.364 | 0.000 | 0.08 | 0.0 | 44.0 | OK |
| E12.000 | E28 | 99.079 | -0.371 | 0.000 | 0.06 | 0.0 | 21.6 | OK |
| E12.001 | E29 | 98.037 | -0.215 | 0.000 | 0.06 | 0.0 | 20.8 | OK |
| E9.003 | E24 | 97.487 | -0.438 | 0.000 | 0.06 | 0.0 | 65.5 | OK |
| E8.002 | E19 | 95.591 | -0.434 | 0.000 | 0.07 | 0.0 | 64.7 | OK |
| E8.003 | E20 | 94.770 | 0.839 | 0.000 | 0.19 | 0.0 | 57.7 | SURCHARGED |
| E1.008 | E7 | 94.064 | 0.683 | 0.000 | 1.20 | 0.0 | 368.9 | SURCHARGED |
| E1.009 | E35 | 92.909 | 0.328 | 0.000 | 1.19 | 0.0 | 368.4 | SURCHARGED |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| | | | |
|---|---|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 30 |
| Climate Change (%) | 0 |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Summer | 30 | 0% | 30/15 Summer | | | | |
| E1.001 | 15 Summer | 30 | 0% | 30/15 Summer | | | | |
| E2.000 | 360 Winter | 30 | 0% | 30/120 Summer | | | | |
| E2.001 | 360 Summer | 30 | 0% | 30/60 Summer | | | | |
| E1.002 | 15 Summer | 30 | 0% | | | | | |
| E3.000 | 15 Winter | 30 | 0% | 30/15 Winter | | | | |
| E3.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.003 | 15 Summer | 30 | 0% | | | | | |
| E4.000 | 360 Winter | 30 | 0% | 30/30 Winter | | | | |
| E4.001 | 360 Winter | 30 | 0% | 30/15 Summer | | | | |
| E5.000 | 15 Winter | 30 | 0% | | | | | |
| E5.001 | 15 Summer | 30 | 0% | | | | | |
| E4.002 | 120 Summer | 30 | 0% | 30/15 Summer | | | | |
| E4.003 | 120 Summer | 30 | 0% | 30/15 Summer | | | | |
| E1.004 | 15 Summer | 30 | 0% | | | | | |
| E6.000 | 15 Summer | 30 | 0% | | | | | |
| E6.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.005 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.006 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 4 |
| E7.000 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.007 | 15 Winter | 30 | 0% | 30/15 Summer | 30/15 Summer | | | 5 |
| E8.000 | 15 Summer | 30 | 0% | | | | | |
| E8.001 | 360 Winter | 30 | 0% | | | | | |
| E9.000 | 180 Winter | 30 | 0% | 30/60 Summer | | | | |
| E9.001 | 180 Winter | 30 | 0% | 30/15 Summer | | | | |
| E10.000 | 15 Summer | 30 | 0% | 30/15 Summer | | | | |
| E10.001 | 120 Winter | 30 | 0% | 30/15 Summer | | | | |
| E11.000 | 15 Winter | 30 | 0% | | | | | |
| E10.002 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E10.003 | 15 Winter | 30 | 0% | | | | | |
| E10.004 | 15 Winter | 30 | 0% | | | | | |
| E9.002 | 15 Winter | 30 | 0% | | | | | |
| E12.000 | 15 Summer | 30 | 0% | | | | | |
| E12.001 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E9.003 | 15 Winter | 30 | 0% | | | | | |
| E8.002 | 30 Winter | 30 | 0% | | | | | |
| E8.003 | 60 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.008 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |
| E1.009 | 15 Winter | 30 | 0% | 30/15 Summer | | | | |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 106.673 | 0.423 | 0.000 | 1.09 | 0.0 | 419.3 | FLOOD RISK |
| E1.001 | E2 | 106.049 | 0.261 | 0.000 | 1.34 | 0.0 | 425.2 | SURCHARGED |
| E2.000 | E2 | 106.260 | 0.120 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E2.001 | E3 | 106.257 | 0.684 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E1.002 | E2 | 105.102 | -0.298 | 0.000 | 0.39 | 0.0 | 434.0 | OK |
| E3.000 | E4 | 104.549 | 0.074 | 0.000 | 0.17 | 0.0 | 32.7 | SURCHARGED |
| E3.001 | E5 | 104.540 | 0.665 | 0.000 | 0.03 | 0.0 | 10.4 | SURCHARGED |
| E1.003 | E3 | 103.018 | -0.257 | 0.000 | 0.52 | 0.0 | 483.1 | OK |
| E4.000 | E8 | 102.907 | 0.590 | 0.000 | 0.02 | 0.0 | 0.7 | SURCHARGED |
| E4.001 | E7 | 102.952 | 0.702 | 0.000 | 0.02 | 0.0 | 5.2 | SURCHARGED |
| E5.000 | E10 | 106.078 | -0.147 | 0.000 | 0.26 | 0.0 | 35.9 | OK |
| E5.001 | E8 | 104.406 | -0.119 | 0.000 | 0.43 | 0.0 | 57.4 | OK |
| E4.002 | E8 | 103.049 | 1.224 | 0.000 | 0.17 | 0.0 | 35.3 | SURCHARGED |
| E4.003 | E9 | 103.139 | 1.614 | 0.000 | 0.06 | 0.0 | 20.3 | SURCHARGED |
| E1.004 | E4 | 100.960 | -0.140 | 0.000 | 0.57 | 0.0 | 454.5 | OK |
| E6.000 | E11 | 100.850 | -0.375 | 0.000 | 0.16 | 0.0 | 69.6 | OK |
| E6.001 | E12 | 100.671 | 0.596 | 0.000 | 0.04 | 0.0 | 21.8 | SURCHARGED |
| E1.005 | E5 | 100.515 | 1.090 | 0.000 | 0.53 | 0.0 | 445.9 | SURCHARGED |
| E1.006 | E16 | 100.028 | 2.533 | 28.237 | 1.32 | 0.0 | 333.9 | FLOOD |
| E7.000 | E15 | 100.871 | 0.790 | 0.000 | 0.81 | 0.0 | 229.1 | SURCHARGED |
| E1.007 | E6 | 99.377 | 2.271 | 77.174 | 1.17 | 0.0 | 404.4 | FLOOD |
| E8.000 | E17 | 99.454 | -0.146 | 0.000 | 0.51 | 0.0 | 104.9 | OK |
| E8.001 | E18 | 96.456 | -0.044 | 0.000 | 0.01 | 0.0 | 1.1 | OK |
| E9.000 | E24 | 100.979 | 0.129 | 0.000 | 0.06 | 0.0 | 16.2 | SURCHARGED |
| E9.001 | E25 | 100.970 | 0.795 | 0.000 | 0.03 | 0.0 | 13.2 | SURCHARGED |
| E10.000 | E19 | 103.444 | 0.019 | 0.000 | 1.03 | 0.0 | 76.5 | SURCHARGED |
| E10.001 | E20 | 103.262 | 0.237 | 0.000 | 0.02 | 0.0 | 2.2 | SURCHARGED |
| E11.000 | E21 | 102.897 | -0.103 | 0.000 | 0.17 | 0.0 | 31.1 | OK |
| E10.002 | E21 | 102.881 | 1.081 | 0.000 | 0.07 | 0.0 | 19.7 | SURCHARGED |
| E10.003 | E22 | 100.689 | -0.211 | 0.000 | 0.08 | 0.0 | 25.3 | OK |
| E10.004 | E26 | 99.393 | -0.307 | 0.000 | 0.21 | 0.0 | 38.0 | OK |
| E9.002 | E23 | 99.256 | -0.344 | 0.000 | 0.12 | 0.0 | 66.7 | OK |
| E12.000 | E28 | 99.109 | -0.341 | 0.000 | 0.13 | 0.0 | 50.0 | OK |
| E12.001 | E29 | 98.420 | 0.168 | 0.000 | 0.08 | 0.0 | 27.0 | SURCHARGED |
| E9.003 | E24 | 97.508 | -0.417 | 0.000 | 0.09 | 0.0 | 94.6 | OK |
| E8.002 | E19 | 95.677 | -0.348 | 0.000 | 0.10 | 0.0 | 89.0 | OK |
| E8.003 | E20 | 95.660 | 1.729 | 0.000 | 0.24 | 0.0 | 72.3 | SURCHARGED |
| E1.008 | E7 | 94.946 | 1.565 | 0.000 | 1.41 | 0.0 | 433.2 | SURCHARGED |
| E1.009 | E35 | 93.362 | 0.781 | 0.000 | 1.40 | 0.0 | 433.2 | SURCHARGED |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| | | | |
|---|---|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 100 |
| Climate Change (%) | 0 |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Summer | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 2 |
| E1.001 | 15 Summer | 100 | 0% | 100/15 Summer | | | | |
| E2.000 | 360 Summer | 100 | 0% | 100/120 Summer | | | | |
| E2.001 | 360 Summer | 100 | 0% | 100/60 Summer | | | | |
| E1.002 | 15 Summer | 100 | 0% | | | | | |
| E3.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E3.001 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.003 | 15 Summer | 100 | 0% | | | | | |
| E4.000 | 360 Winter | 100 | 0% | 100/15 Summer | | | | |
| E4.001 | 360 Winter | 100 | 0% | 100/15 Summer | | | | |
| E5.000 | 15 Winter | 100 | 0% | | | | | |
| E5.001 | 15 Summer | 100 | 0% | | | | | |
| E4.002 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E4.003 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.004 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E6.000 | 30 Winter | 100 | 0% | | | | | |
| E6.001 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.005 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.006 | 15 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 6 |
| E7.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.007 | 30 Winter | 100 | 0% | 100/15 Summer | 100/15 Summer | | | 7 |
| E8.000 | 15 Summer | 100 | 0% | | | | | |
| E8.001 | 360 Winter | 100 | 0% | 100/60 Winter | | | | |
| E9.000 | 180 Winter | 100 | 0% | 100/15 Summer | | | | |
| E9.001 | 180 Winter | 100 | 0% | 100/15 Summer | | | | |
| E10.000 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E10.001 | 120 Winter | 100 | 0% | 100/15 Summer | | | | |
| E11.000 | 15 Winter | 100 | 0% | | | | | |
| E10.002 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E10.003 | 15 Winter | 100 | 0% | | | | | |
| E10.004 | 15 Winter | 100 | 0% | | | | | |
| E9.002 | 15 Winter | 100 | 0% | | | | | |
| E12.000 | 15 Summer | 100 | 0% | | | | | |
| E12.001 | 15 Winter | 100 | 0% | 100/15 Summer | | | | |
| E9.003 | 15 Winter | 100 | 0% | | | | | |
| E8.002 | 60 Winter | 100 | 0% | | | | | |
| E8.003 | 120 Summer | 100 | 0% | 100/15 Summer | | | | |
| E1.008 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |
| E1.009 | 30 Winter | 100 | 0% | 100/15 Summer | | | | |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 106.777 | 0.527 | 27.200 | 1.20 | 0.0 | 459.4 | FLOOD |
| E1.001 | E2 | 106.112 | 0.324 | 0.000 | 1.44 | 0.0 | 459.3 | SURCHARGED |
| E2.000 | E2 | 106.260 | 0.120 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E2.001 | E3 | 106.257 | 0.684 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E1.002 | E2 | 105.112 | -0.288 | 0.000 | 0.42 | 0.0 | 464.9 | OK |
| E3.000 | E4 | 104.888 | 0.413 | 0.000 | 0.21 | 0.0 | 41.3 | SURCHARGED |
| E3.001 | E5 | 104.874 | 0.999 | 0.000 | 0.04 | 0.0 | 11.8 | SURCHARGED |
| E1.003 | E3 | 103.037 | -0.238 | 0.000 | 0.58 | 0.0 | 537.6 | OK |
| E4.000 | E8 | 102.934 | 0.617 | 0.000 | 0.02 | 0.0 | 0.8 | SURCHARGED |
| E4.001 | E7 | 102.952 | 0.702 | 0.000 | 0.02 | 0.0 | 5.2 | SURCHARGED |
| E5.000 | E10 | 106.098 | -0.127 | 0.000 | 0.39 | 0.0 | 53.9 | OK |
| E5.001 | E8 | 104.433 | -0.092 | 0.000 | 0.63 | 0.0 | 83.4 | OK |
| E4.002 | E8 | 103.163 | 1.338 | 0.000 | 0.22 | 0.0 | 45.6 | SURCHARGED |
| E4.003 | E9 | 103.150 | 1.625 | 0.000 | 0.06 | 0.0 | 21.0 | SURCHARGED |
| E1.004 | E4 | 101.245 | 0.145 | 0.000 | 0.62 | 0.0 | 491.7 | SURCHARGED |
| E6.000 | E11 | 100.914 | -0.311 | 0.000 | 0.15 | 0.0 | 66.3 | OK |
| E6.001 | E12 | 100.902 | 0.827 | 0.000 | 0.04 | 0.0 | 22.6 | SURCHARGED |
| E1.005 | E5 | 100.655 | 1.230 | 0.000 | 0.58 | 0.0 | 491.6 | SURCHARGED |
| E1.006 | E16 | 100.083 | 2.588 | 83.091 | 1.32 | 0.0 | 332.8 | FLOOD |
| E7.000 | E15 | 100.977 | 0.896 | 0.000 | 0.83 | 0.0 | 234.2 | SURCHARGED |
| E1.007 | E6 | 99.454 | 2.348 | 153.672 | 1.13 | 0.0 | 391.5 | FLOOD |
| E8.000 | E17 | 99.500 | -0.100 | 0.000 | 0.76 | 0.0 | 157.3 | OK |
| E8.001 | E18 | 96.565 | 0.065 | 0.000 | 0.01 | 0.0 | 1.1 | SURCHARGED |
| E9.000 | E24 | 101.006 | 0.156 | 0.000 | 0.06 | 0.0 | 18.2 | SURCHARGED |
| E9.001 | E25 | 100.997 | 0.822 | 0.000 | 0.03 | 0.0 | 13.3 | SURCHARGED |
| E10.000 | E19 | 103.633 | 0.208 | 0.000 | 1.21 | 0.0 | 89.7 | SURCHARGED |
| E10.001 | E20 | 103.425 | 0.400 | 0.000 | 0.03 | 0.0 | 2.4 | SURCHARGED |
| E11.000 | E21 | 102.969 | -0.031 | 0.000 | 0.23 | 0.0 | 42.4 | OK |
| E10.002 | E21 | 102.953 | 1.153 | 0.000 | 0.07 | 0.0 | 20.2 | SURCHARGED |
| E10.003 | E22 | 100.691 | -0.209 | 0.000 | 0.09 | 0.0 | 25.8 | OK |
| E10.004 | E26 | 99.409 | -0.291 | 0.000 | 0.27 | 0.0 | 47.8 | OK |
| E9.002 | E23 | 99.270 | -0.330 | 0.000 | 0.16 | 0.0 | 85.0 | OK |
| E12.000 | E28 | 99.130 | -0.320 | 0.000 | 0.18 | 0.0 | 69.8 | OK |
| E12.001 | E29 | 98.904 | 0.652 | 0.000 | 0.08 | 0.0 | 26.9 | SURCHARGED |
| E9.003 | E24 | 97.516 | -0.409 | 0.000 | 0.11 | 0.0 | 111.7 | OK |
| E8.002 | E19 | 95.781 | -0.244 | 0.000 | 0.09 | 0.0 | 82.2 | OK |
| E8.003 | E20 | 96.265 | 2.334 | 0.000 | 0.25 | 0.0 | 73.6 | SURCHARGED |
| E1.008 | E7 | 94.976 | 1.595 | 0.000 | 1.41 | 0.0 | 435.2 | SURCHARGED |
| E1.009 | E35 | 93.377 | 0.796 | 0.000 | 1.41 | 0.0 | 435.2 | SURCHARGED |

## Summary of Critical Results by Maximum Level (Rank 1) for Existing

| | | | |
|---|---|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

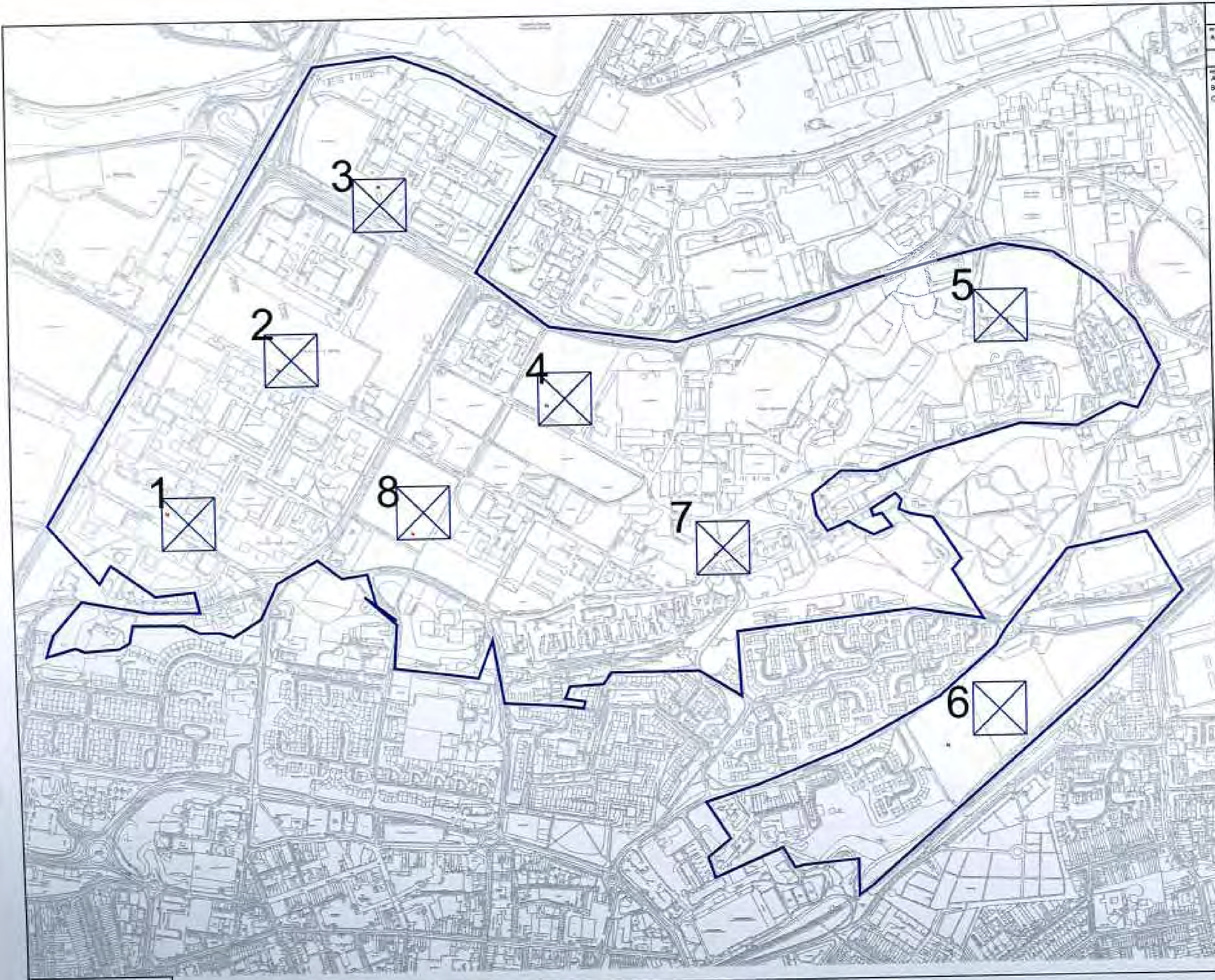
| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 100 |
| Climate Change (%) | 30 |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | Storm | Return Period | Climate Change | First X Surcharge | First Y Flood | First Z Overflow | O/F Act. | Lvl Exc. |
|---|---|---|---|---|---|---|---|---|
| E1.000 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 4 |
| E1.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E2.000 | 360 Summer | 100 | +30% | 100/120 Summer | | | | |
| E2.001 | 360 Summer | 100 | +30% | 100/60 Summer | | | | |
| E1.002 | 15 Winter | 100 | +30% | | | | | |
| E3.000 | 15 Summer | 100 | +30% | 100/15 Summer | | | | |
| E3.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.003 | 15 Summer | 100 | +30% | | | | | |
| E4.000 | 360 Winter | 100 | +30% | 100/15 Summer | | | | |
| E4.001 | 360 Winter | 100 | +30% | 100/15 Summer | | | | |
| E5.000 | 15 Winter | 100 | +30% | | | | | |
| E5.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E4.002 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E4.003 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.004 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E6.000 | 30 Winter | 100 | +30% | | | | | |
| E6.001 | 30 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.005 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.006 | 15 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 7 |
| E7.000 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.007 | 30 Winter | 100 | +30% | 100/15 Summer | 100/15 Summer | | | 9 |
| E8.000 | 15 Summer | 100 | +30% | 100/15 Summer | | | | |
| E8.001 | 360 Winter | 100 | +30% | 100/15 Winter | | | | |
| E9.000 | 180 Winter | 100 | +30% | 100/15 Summer | | | | |
| E9.001 | 180 Winter | 100 | +30% | 100/15 Summer | | | | |
| E10.000 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E10.001 | 180 Winter | 100 | +30% | 100/15 Summer | | | | |
| E11.000 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E10.002 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E10.003 | 15 Winter | 100 | +30% | | | | | |
| E10.004 | 15 Winter | 100 | +30% | | | | | |
| E9.002 | 15 Winter | 100 | +30% | | | | | |
| E12.000 | 15 Winter | 100 | +30% | | | | | |
| E12.001 | 15 Winter | 100 | +30% | 100/15 Summer | | | | |
| E9.003 | 15 Winter | 100 | +30% | | | | | |
| E8.002 | 60 Winter | 100 | +30% | | | | | |
| E8.003 | 120 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.008 | 120 Winter | 100 | +30% | 100/15 Summer | | | | |
| E1.009 | 120 Winter | 100 | +30% | 100/15 Summer | | | | |

Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN | US/MH Name | Water Level (m) | Surch'ed Depth (m) | Flooded Volume (m³) | Flow / Cap. | O'flow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| E1.000 | E1 | 106.818 | 0.568 | 67.934 | 1.22 | 0.0 | 466.5 | FLOOD |
| E1.001 | E2 | 106.132 | 0.344 | 0.000 | 1.47 | 0.0 | 466.4 | SURCHARGED |
| E2.000 | E2 | 106.260 | 0.120 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E2.001 | E3 | 106.257 | 0.684 | 0.000 | 0.02 | 0.0 | 5.6 | SURCHARGED |
| E1.002 | E2 | 105.112 | -0.288 | 0.000 | 0.42 | 0.0 | 472.0 | OK |
| E3.000 | E4 | 104.922 | 0.447 | 0.000 | 0.27 | 0.0 | 51.4 | SURCHARGED |
| E3.001 | E5 | 104.907 | 1.032 | 0.000 | 0.04 | 0.0 | 12.0 | SURCHARGED |
| E1.003 | E3 | 103.046 | -0.229 | 0.000 | 0.60 | 0.0 | 562.0 | OK |
| E4.000 | E8 | 102.990 | 0.673 | 0.000 | 0.00 | 0.0 | 0.0 | SURCHARGED |
| E4.001 | E7 | 102.990 | 0.740 | 0.000 | 0.02 | 0.0 | 5.2 | SURCHARGED |
| E5.000 | E10 | 106.114 | -0.111 | 0.000 | 0.51 | 0.0 | 70.1 | OK |
| E5.001 | E8 | 104.725 | 0.200 | 0.000 | 0.77 | 0.0 | 102.0 | SURCHARGED |
| E4.002 | E8 | 103.286 | 1.461 | 0.000 | 0.23 | 0.0 | 45.7 | SURCHARGED |
| E4.003 | E9 | 103.273 | 1.748 | 0.000 | 0.06 | 0.0 | 21.7 | SURCHARGED |
| E1.004 | E4 | 101.401 | 0.301 | 0.000 | 0.64 | 0.0 | 511.6 | SURCHARGED |
| E6.000 | E11 | 101.144 | -0.081 | 0.000 | 0.18 | 0.0 | 80.9 | OK |
| E6.001 | E12 | 101.133 | 1.058 | 0.000 | 0.04 | 0.0 | 23.9 | FLOOD RISK |
| E1.005 | E5 | 100.761 | 1.336 | 0.000 | 0.61 | 0.0 | 518.5 | SURCHARGED |
| E1.006 | E16 | 100.132 | 2.637 | 132.111 | 1.32 | 0.0 | 332.8 | FLOOD |
| E7.000 | E15 | 101.085 | 1.004 | 0.000 | 0.83 | 0.0 | 234.4 | SURCHARGED |
| E1.007 | E6 | 99.532 | 2.426 | 232.200 | 1.14 | 0.0 | 392.9 | FLOOD |
| E8.000 | E17 | 99.651 | 0.051 | 0.000 | 0.98 | 0.0 | 202.3 | SURCHARGED |
| E8.001 | E18 | 96.688 | 0.188 | 0.000 | 0.01 | 0.0 | 1.2 | SURCHARGED |
| E9.000 | E24 | 101.038 | 0.188 | 0.000 | 0.07 | 0.0 | 20.2 | SURCHARGED |
| E9.001 | E25 | 101.029 | 0.854 | 0.000 | 0.03 | 0.0 | 13.5 | SURCHARGED |
| E10.000 | E19 | 103.840 | 0.415 | 0.000 | 1.35 | 0.0 | 100.6 | SURCHARGED |
| E10.001 | E20 | 103.603 | 0.578 | 0.000 | 0.03 | 0.0 | 2.7 | SURCHARGED |
| E11.000 | E21 | 103.038 | 0.038 | 0.000 | 0.29 | 0.0 | 54.4 | SURCHARGED |
| E10.002 | E21 | 103.021 | 1.221 | 0.000 | 0.07 | 0.0 | 20.6 | SURCHARGED |
| E10.003 | E22 | 100.692 | -0.208 | 0.000 | 0.09 | 0.0 | 26.2 | OK |
| E10.004 | E26 | 99.422 | -0.278 | 0.000 | 0.31 | 0.0 | 55.4 | OK |
| E9.002 | E23 | 99.283 | -0.317 | 0.000 | 0.19 | 0.0 | 100.8 | OK |
| E12.000 | E28 | 99.439 | -0.011 | 0.000 | 0.21 | 0.0 | 79.6 | OK |
| E12.001 | E29 | 99.419 | 1.167 | 0.000 | 0.09 | 0.0 | 29.8 | SURCHARGED |
| E9.003 | E24 | 97.525 | -0.400 | 0.000 | 0.13 | 0.0 | 127.8 | OK |
| E8.002 | E19 | 95.878 | -0.147 | 0.000 | 0.09 | 0.0 | 84.7 | OK |
| E8.003 | E20 | 97.136 | 3.205 | 0.000 | 0.30 | 0.0 | 90.1 | SURCHARGED |
| E1.008 | E7 | 95.580 | 2.199 | 0.000 | 1.49 | 0.0 | 457.4 | FLOOD RISK |
| E1.009 | E35 | 93.651 | 1.070 | 0.000 | 1.47 | 0.0 | 455.7 | SURCHARGED |




Original Drawing Size - A1

**DESCRIPTION**

| REV | DATE | FIRST ISSUE | DWN | CHK | APP |
|---|---|---|---|---|---|
| A | [illegible] | FIRST ISSUE | RC | - | - |

**REVISIONS**

| REV | DATE | | DWN | CHK | APP |
|---|---|---|---|---|---|
| A | [illegible] | Preliminary Draft | RC | - | - |
| B | Nov 04 | Agreed locations and notes | RC | - | - |
| C | [illegible] | Dug locations | RC | - | - |

NOTES:

- Site Boundary
- General Trial Pit Locations
- Actual Trial Pit Locations

SCALES: NTS

PROJECT TITLE: Allenby/Connaught

DRAWING TITLE: Aldershot Military Town Developments Soakaway Trial Pit Locations

CLIENT: DE DEFENCE ESTATES

REF: 10021

**Entec**

Gables House, Kenilworth Road, ROYAL LEAMINGTON SPA, Warwickshire, CV32 5JX Tel 01926 439000 Fax 01926 439010

JOB No. 10883-13

DRAWING No. L097

Results of Soakaway trial pits carried out in December 04

Infiltration Rate Summary

| Pit | soil infiltration rate m/s | soil infiltration rate m/hr |
|---|---|---|
| 1 | 3.34E-07 | 1.20E-03 |
| 2 | 6.27E-07 | 2.26E-03 |
| 3 | 1.48E-08 | 5.33E-05 |
| 4 | 1.23E-07 | 4.42E-04 |
| 5 | 8.26E-06 | 2.97E-02 |
| 6 | 5.38E-06 | 1.94E-02 |
| 7 | 2.33E-06 | 8.40E-03 |
| 8 | 1.82E-06 | 6.55E-03 |

Results of Soakaway trial pits carried out in December 04

Infiltration rate calculations for trial pit tests derived using Digest 365 method

| Pit | Test | depth (m) | elective depth (m) | width (m) | length (m) | depth 75% to 50% (m) | depth 75% to 25% (m) | Volume 75% to 50% (m^3) | Volume 75% to 25% (m^3) | base (m^2) | depth 25% (m) | depth 50% (m) | Wetted area 75% to 50% (m^2) | Wetted area 50% to 25% (m^2) | Wetted area 75% to 25% (m^2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.4 | 2 | 0.8 | 1.3 | 0.50 | 1.00 | 0.52 | 1.04 | 1.04 | 0.50 | 1.00 | 6.29 | 4.19 | 5.24 |
| 2 | 1 | 2.6 | 2 | 1 | 1.3 | 0.50 | 1.00 | 0.65 | 1.30 | 1.30 | 0.50 | 1.00 | 7.05 | 4.75 | 5.90 |
| 3 | 1 | 2.4 | 2 | 0.8 | 1.1 | 0.50 | 1.00 | 0.44 | 0.88 | 0.88 | 0.50 | 1.00 | 5.63 | 3.73 | 4.68 |
| 4 | 1 | 2.6 | 2 | 0.9 | 1.3 | 0.50 | 1.00 | 0.59 | 1.17 | 1.17 | 0.50 | 1.00 | 6.67 | 4.47 | 5.57 |
| 5 | 1 | 2.5 | 2 | 0.9 | 1.3 | 0.50 | 1.00 | 0.59 | 1.17 | 1.17 | 0.50 | 1.00 | 6.67 | 4.47 | 5.57 |
| 5 | 2 | 2.4 | 1.9 | 0.9 | 1.3 | 0.48 | 0.95 | 0.56 | 1.11 | 1.17 | 0.48 | 0.95 | 6.40 | 4.31 | 5.35 |
| 5 | 3 | 2.34 | 1.84 | 0.9 | 1.3 | 0.46 | 0.92 | 0.54 | 1.08 | 1.17 | 0.46 | 0.92 | 6.23 | 4.21 | 5.22 |
| 6 | 1 | 2.5 | 2 | 0.9 | 1.2 | 0.50 | 1.00 | 0.54 | 1.08 | 1.08 | 0.50 | 1.00 | 6.33 | 4.23 | 5.28 |
| 6 | 2 | 2.2 | 1.7 | 0.9 | 1.2 | 0.43 | 0.85 | 0.46 | 0.92 | 1.08 | 0.43 | 0.85 | 5.54 | 3.76 | 4.65 |
| 6 | 3 | 2.15 | 1.65 | 0.9 | 1.2 | 0.41 | 0.83 | 0.45 | 0.89 | 1.08 | 0.41 | 0.83 | 5.41 | 3.68 | 4.55 |
| 7 | 1 | 2.6 | 2 | 1 | 1.2 | 0.50 | 1.00 | 0.60 | 1.20 | 1.20 | 0.50 | 1.00 | 6.70 | 4.50 | 5.60 |
| 8 | 1 | 2.5 | 2 | 0.9 | 1.2 | 0.50 | 1.00 | 0.54 | 1.08 | 1.08 | 0.50 | 1.00 | 6.33 | 4.23 | 5.28 |

| Pit | Test | time @75% of depth (s) | time @50% of depth (s) | time @25% of depth (s) | time 75% to 50% (s) | time 50% to 25% (s) | time 75% to 25% (s) | soil infiltration rate 75% to 50% (m/s) | soil infiltration rate 50% to 25% (m/s) | soil infiltration rate 75% to 25% (m/s) | soil infiltration rate 75% to 50% (m/hr) | soil infiltration rate 50% to 25% (m/hr) | soil infiltration rate 75% to 25% (m/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | -1 | -1 | -1 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 1 | -1 | -1 | -1 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 3 | 1 | -1 | -1 | -1 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4 | 1 | -1 | -1 | -1 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 5 | 1 | 5400 | 10800 | 22200 | 5400 | 11400 | 16800 | 1.62E-05 | 1.15E-05 | 1.25E-05 | 5.85E-02 | 4.13E-02 | 4.50E-02 |
| 5 | 2 | 6000 | 13800 | 26400 | 7800 | 12600 | 20400 | 1.11E-05 | 1.02E-05 | 1.02E-05 | 4.01E-02 | 3.69E-02 | 3.67E-02 |
| 5 | 3 | 7800 | 16200 | 32400 | 8400 | 16200 | 24600 | 1.03E-05 | 7.90E-06 | 8.39E-06 | 3.70E-02 | 2.84E-02 | 3.02E-02 |
| 6 | 1 | 6600 | 15600 | 39600 | 9000 | 24000 | 33000 | 9.48E-06 | 5.32E-06 | 6.20E-06 | 3.41E-02 | 1.91E-02 | 2.23E-02 |
| 6 | 2 | 8400 | 19600 | 50400 | 11200 | 30800 | 42000 | 7.39E-06 | 3.97E-06 | 4.70E-06 | 2.66E-02 | 1.43E-02 | 1.69E-02 |
| 6 | 3 | 12600 | 26400 | 50000 | 13800 | 23600 | 37400 | 5.97E-06 | 5.13E-06 | 5.24E-06 | 2.15E-02 | 1.85E-02 | 1.89E-02 |
| 7 | 1 | 16200 | 51600 | 108000 | 35400 | 56400 | 91800 | 2.53E-06 | 2.36E-06 | 2.33E-06 | 9.11E-03 | 8.51E-03 | 8.40E-03 |
| 8 | 1 | 27600 | 73200 | 140000 | 45600 | 66800 | 112400 | 1.87E-06 | 1.91E-06 | 1.82E-06 | 6.73E-03 | 6.88E-03 | 6.55E-03 |

Infiltration rate calculations for trial pit tests derived using avaliable data

| Pit | Test | depth (m) | width (m) | length (m) | depth change over time (m) | Volume change (m^3) | avg Wetted hight (m) | avg Wetted area (m^2) | time chamge (minutes) | time chamge (s) | soil infiltration rate (m/s) | soil infiltration rate (m/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.4 | 0.8 | 1.3 | 0.24 | 0.2496 | 1.69 | 8.978 | 1150 | 69000 | 4.03E-07 | 1.45E-03 |
| 1 | 1 | 2.4 | 0.8 | 1.3 | 0.09 | 0.0936 | 1.815 | 8.663 | 681 | 40860 | 2.64E-07 | 9.52E-04 |
| 2 | 1 | 2.6 | 1 | 1.3 | 0.2 | 0.26 | 1.66 | 8.936 | 773 | 46380 | 6.27E-07 | 2.26E-03 |
| 3 | 1 | 2.4 | 0.8 | 1.1 | 0.01 | 0.0088 | 2.2 | 9.24 | 1073 | 64380 | 1.48E-08 | 5.33E-05 |
| 4 | 1 | 2.6 | 0.9 | 1.3 | 0.05 | 0.0585 | 2.265 | 11.136 | 713 | 42780 | 1.23E-07 | 4.42E-04 |

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