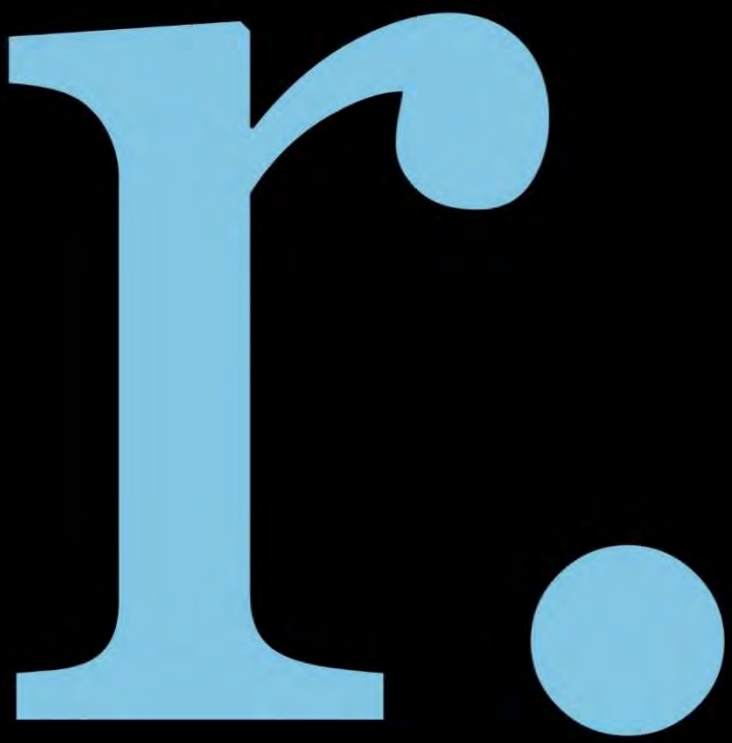
reside.

Land south of Funtley Road, Funtley

Flood Risk Assessment and Drainage Strategy



Land South of Funtley Road, Funtley

Flood Risk Assessment and Drainage Strategy

For

Reside Developments Limited

motion

Document Control Sheet

Flood Risk Assessment and Drainage Strategy

Land South of Funtley Road, Funtley

Reside Development Limited

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
02/10/20	Final	VBH	NJ

Contents

Appendices

1.0 Introduction

1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared on behalf of Reside Developments Limited in relation to development proposals on the land south of Funtley Road, Funtley, PO15 6DW.

1.2 In January 2018 GTA Civils produced an FRA for the proposed development site which was for up to 55 dwellings, three custom build plots (Use Class C3) and a community building incorporating a local shop, and planning permission was granted (P/18/0067/OA).

1.3 This report considers a revised consisting of an new outline application to provide up to 125 one, two, three and four-bedroom dwellings including 6 Self/Custom build plots, Community Building or Local Shop (Use Class E & F.2) with associated infrastructure, new community park, landscaping and access.

1.4 The aim of this report is to satisfy the requirements of the Local Planning Authority, Lead Local Flood Authority (LLFA) and Environment Agency (EA) in relation to development and flood risk. Specific objectives of this FRA are to:

- Assess the proposed development against the requirements of the National Planning Policy Framework (NPPF).
- Assess whether the proposed development has taken appropriate consideration of the risk of flooding from all potential flood sources.
- Detail how the proposed development will be safe with respect to flooding during its lifetime and will not increase the risk of flooding to other sites.
- Produce a Drainage Strategy that will detail how the proposed development will not result in an increase in surface water that could cause flood risk to both the development and the neighbouring sites.

1.5 This report considers the requirements for carrying out an FRA as set out in the NPPF and has been prepared to comply with current EA and Flood Risk policy.

2.0 Site Description

Site Location and Description

2.1 The proposed 15.98 hectares (ha) development with a net developable area of 6.09ha and is currently undeveloped and can be described as greenfield. The site is bounded to the north by Funtley Road and existing residential development, to the east by open field and woodland, to the west by Honey Lane and to the south by the M27 and then residential development. The centre of the site is at grid reference 455712E, 108109N. A site location plan can be found in **Appendix A.**

Topography

2.2 A topographical survey of the existing site was undertaken by Solent Surveys in February 2015, which is provided in **Appendix C** of this report.

2.3 The topography of the site falls from the highest point located along the southern boundary of the site with an elevation of approximately 54.88mAOD, towards the northern boundary of the site to an approximate elevation of 18.80mAOD.

Geology

2.4 The British Geological Survey (BGS) online Geoindex Mapping indicates that the site is underlain by two strata's both predominately clay. The south of the site is underlain by London clay with no superficial deposits and the north of the site is underlain by the Lambeth Group made up of clay, silt and sand with no superficial deposits.

2.5 Borehole records from the surrounding area have been obtained from the BGS online index, these can be found in **Appendix D.** These Borehole record support the findings of the BGS mapping.

Hydrogeology

2.6 The MagicMap data shows that on the western parcel of the site there are superficial deposits classified as Secondary Undifferentiated. The rest of the site is classified as a Secondary 'A' Aquifer. Secondary Undifferentiated Aquifers have been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. The bedrock geology is classed as a Secondary A Aquifer. Secondary A Aquifers are classed as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Existing Drainage Regime

2.7 The site is currently Greenfield with no formal surface water drainage system. It is assumed that all surface water currently flows along the lay of the land from south to north. The Environment Agency surface flood maps (**Appendix F**). show that surface water runs off the site and onto the land north of Funtley Road where the new development site is located and currently being constructed.

3.0 Legislative and Policy Framework

Flood and Water Management Act

3.1 The Flood and Water Management Act 2010 (FWMA) received Royal Assent on 8th April 2010. The Act was introduced to enforce some of the key proposals set out within UK Government flood and water strategies along with UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods.

3.2 LLFA's including Hampshire County Council (HCC) have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from surface run-off, groundwater and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers'.

3.3 Relevant to the site, the FWMA will encourage the uptake of SuDS by removing the automatic right to connect to sewers and providing for LLFA to adopt SuDS for new developments.

3.4 The development proposals will adhere to the Act through the provision of SuDS as a fundamental element of the surface water drainage system. Furthermore, the client is committed to work with the relevant stakeholders, such as the EA and HCC (the lead local flood authority), in implementing the requirements of the FWMA where necessary.

National Planning Policy Framework

3.5 The NPPF and the PPG set out the Government's planning policies for England and how these are expected to be applied. This includes ensuring that flood risk is taken into account at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.

3.6 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the EA). The FRA should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

The Sequential and Exception Tests

3.7 The NPPF Sequential Test classifies proposed development into one of four Flood Zones, detailed in Table 3.1.

Flood Zone	Annual Probability of Flooding (%)	Corresponding Annual Chance of Flooding (1 in x)
✓ Low Probability	Fluvial <0.1% Tidal <0.1%	>1,000 >1,000
✓ Medium Probability	Fluvial 0.1 – 1.0% Tidal 0.1 – 0.5%	1,000 – 100 1,000 – 200
✓ a) High Probability	Fluvial >1.0% Tidal >0.5%	<100 <200
✓ b) The Functional Floodplain	Fluvial >5.0%* Tidal >5.0%* *Starting point for consideration. LPAs should identify Functional Floodplain, which should not be defined solely by rigid probability parameters.	<20 <20

Table 3.1 Flood Zones

3.8 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The NPPF provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 3.2.

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b	Exception test required	✓	✓	✓	✓

Key:
✓ Development is appropriate
× Development should not be permitted

Table 3.2 Flood Risk Vulnerability Classification

3.9 The proposed development site is located within an area designated as Flood Zone 1, having a less than 1 in 1000 chance per annum of flooding from rivers or seas. More vulnerable development (residential as per the proposals) are shown to be acceptable within this flood zone negating the need for a sequential or exception test.

Partnership for Urban South Hampshire Flood Risk Assessment (SFRA)

3.10 A Strategic Flood Risk Assessment (SFRA) was completed by Atkins in 2007 for Urban South Hampshire (Ref 3). The primary objective of the SFRA is to help local authorities identify the areas that are at risk from all forms of flooding and to allocate development away from vulnerable flood risk areas. The SFRA recognises development on land outside Flood Zones 2 and 3 should be pursued first.

Lead Local Flood Authority

3.11 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. HCC is the LLFA for Funtley and the wider Fareham area.

Environment Agency Flood Map

3.12 As part of this FRA a 'Flood Product 4' data request was submitted to the EA. The 'Flood Product 4' provided confirmation of the sites flood zone classification. The EA response to this Flood Product data request is provided in **Appendix E.**

3.13 The EA Flood Map shows that the entirety of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.0 Flood Risk

4.1 In this section a number of potential sources of flooding have been considered and the probability of any likely impacts assessed.

Flooding from Rivers and the Sea

4.2 The EA Flood Map shows that the whole of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.3 The nearest watercourse to the site is the River Meon which is approximately 0.4km to the west. There are a number of drainage ditches in close vicinity to the site and one which runs along the site's northern boundary.

It is therefore concluded that the site is at very low risk of flooding from rivers and the sea.

Groundwater Flooding

4.4 Groundwater flooding occurs when water originating in aquifers reaches the surface, typically as a result of high groundwater levels caused by prolonged rainfall. It has been identified using public data provided by the BGS that the site is underlain by London Clay and Lambeth Group with no superficial deposits.

4.5 The SFRA has no records of the site being affected by Groundwater flooding.

It is therefore concluded that the site is at very low risk of flooding from Groundwater.

Surface Water Flooding

4.6 Flooding from overland flow occurs when intense rainfall is unable to infiltrate into the ground or enter drainage systems resulting in localised flooding in low spots that provide no means of outfall.

4.7 The surface water flood map is found in full in **Appendix F.** The Surface Water flood map provides information concerning the risk of surface water flooding to the site. The Map shows that the majority of the site is at 'Very Low' risk of surface water flooding (outside of the modelled 1 in 1000 rainfall event). However, there are areas small areas shown at 'Low' risk of surface water flooding (between the modelled 1 in 1000 and 1 in 100 rainfall event). There is a small area shown at high risk of surface water flooding within the Community Park area, however this is associated with an existing dry pond, which can be seen on the topographical survey, and therefore water naturally ponds in this area.

It is therefore concluded that the site is at low risk of flooding from surface water.

Flooding from Infrastructure Failure

4.8 In order to control and convey surface water runoff from impermeable surfaces in urban areas, underground surface water sewers or combined sewers (foul and surface water) are often utilised in urban areas. Pipes, culverts etc. have a finite capacity and therefore pose a risk of flooding due to the risk of siltation, blockage or collapse.

4.9 Southern Water records found in **Appendix J** which demonstrate there are no surface water sewers close to the site.

4.10 There is existing highway drainage within Funtley Road, which includes the existing ditch and outfall to piped system, which drains under the old railway line. Historically there has been flooding on Funtley Road, which has been due to lack of capacity in the existing system.

It is therefore concluded that the site is at medium risk of flooding from infrastructure failure, however mitigation measures will be provided as part of the proposed development.

Flooding from Artificial sources

4.11 The EA provides a map showing the maximum potential flood extent, in the event that all reservoirs with a capacity of greater than 25,000 cubic metres were to fail and release the water they hold. The map shows that the site would not experience flooding in this scenario. There are no other significant artificial waterbodies in proximity of the site.

It is therefore concluded that the site is at low risk of flooding from artificial sources.

5.0 SuDS Assessment

Sustainable Drainage Overview & Hierarchy

5.1 Current planning policy and EA guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that the site surface water drainage closely reflects the natural hydrology and hydrogeology of the site.

5.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with National Planning Policy Framework and EA policies.

5.3 This use of SuDS is needed to replicate the pre-developed Greenfield conditions so as not to increase flood risk to the site or surrounding sites by managing excess run-off at the source.

5.4 Source control systems treat water close to the point of collection, in features such as soakaways, permeable paving and dry swales.

5.5 The key benefits of SuDS are as follows:

- Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g. roads);
- Improving amenity through the provision of open green space and wildlife habitat; and
- Enabling a natural drainage regime which recharges groundwater (where possible).

5.6 SuDS provide a flexible approach to drainage, with a wide range of components from house soakaways to large-scale basins or ponds. The individual techniques should be used where possible in a management train which mimics the natural pre-development pattern of drainage. The Interim Code of Practice for SuDS sets out the hierarchy of techniques. These are:

- Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution;
- Source control – control of runoff at or very near its source (such as permeable paving or soakaways for individual houses);
- Site control – management of water from several sub-catchments (including routeing water from roofs and car parks to one large soakaway or infiltration basin for the whole site); and
- Regional control – management of runoff from several sites, typically in a detention pond or wetland.

Greenfield Runoff Rates

5.7 The greenfield runoff rates for the site are set out in the table below and the calculations can be found in **Appendix G**:

Return period	Runoff rate developable area l/s	Runoff rate Community Park l/s	Runoff rate total site area l/s
Qbar	24.2	22.7	46.9
1	20.7	19.4	40.1
30	54.8	51.4	106.2
100	77.3	72.5	149.8

Table 5.1 Greenfield runoff rates for various return periods

5.8 The proposed discharge rates for the whole of the catchment draining to Funtley Road were set out in the FRA prepared for the previous scheme and it is proposed to keep the total discharge from the site to the previously agreed QBAR rate of 46.9l/s. The catchment area draining to the ditch on Funtley Road is 11.8ha and this equates to 3.97l/s/ha.

5.9 The total area of the site is 15.98ha but the net developable area of site is 6.09ha. Therefore, it is proposed to use 24.2l/s as the allowable discharge rate from the developable area and 22.7l/s from the Community Park.

Proposed Sustainable Drainage Strategy

5.10 The proposed development will result in an increase in the amount of hardstanding areas on site from the new residential development and associated access roads. Therefore, there will be an increase in surface water runoff from the development. However, a drainage strategy has been put in place so that the proposed development does not result in an increase in surface water runoff that could increase flood risk to both the development and the neighbouring sites.

5.11 Due to the anticipated existing ground conditions it is unlikely that infiltration will be feasible and therefore no allowance for infiltration has been allowed within the calculations. However, if at the detailed design stage further investigations indicate that infiltration will be feasible then infiltration will be incorporated into the scheme.

5.12 The drainage strategy incorporates a series of ponds, swales, permeable paving and cellular storage tanks to provide the necessary surface water storage for the site, to allow the runoff from the site to be controlled to 46.9l/s. Surface water storage will be provided for the 1 in 100 year event with an allowance of 40% for climate change.

5.13 It is proposed to discharge into the existing highway drainage system in Funtley Road, which is adjacent to the northern boundary of the site.

5.14 The developable area of the site is 6.09ha and it has been assumed that the impermeable area of the site will be 50%, which equates to an impermeable area of 3.05ha.An additional 10% has been included to allow for Urban Creep and therefore a total impermeable area of 3.36ha has been used in the drainage calculations.

5.15 The model results can be found in full in **Appendix I.** The proposed drainage strategy for the site can be found in **Appendix H**. In order to attenuate the additional surface water from the development it is proposed to have swales, three ponds and a combination of permeable paving and attenuation tanks. The proposed drainage strategy is to have two pond towards the centre of the site, one has a storage volume of 300m3 and the other 720m3. The internal roads will have permeable paving will have 30% voids and will be 300mm deep and will provide a storage volume of 405m3. There will also be a series of swales which run along the north boundary of the site which provides a storage of 1400m3 and a pond which will provide a storage volume of 580m3. There will also be an attenuation tank to the north which will be 0.5m deep and a volume of 110m3. The SuDS features will also improve water quality onsite as the pond will act as a sedimentation process and the permeable paving will act as a filtration process.

5.16 The SuDS features will also improve water quality onsite as the ponds and swales will act as a sedimentation process and the permeable paving will act as a filtration process.

5.17 The runoff from the Community Park area above the development will be captured by a cut-off drain and the restricted to the Qbar rate of 22.7l/s. Storage will be provided on the southern boundary of the development to cater for the 1 in 100 year event with an additional allowance of 40% for climate change. The flow from the southern storage areas will be directed along the western boundary of the site in a swale and will outfall into the existing drainage system in Funtley Road.

5.18 A sensitivity test has been undertaken which looked at the effect of Urban creep in the catchment. A 10% increase to the impermeable area has been applied to the MicroDrainage model. The MicroDrainage model results for the urban creep can also be found in **Appendix I.** The MicroDrainage model results showed that there was a small increase in flooding in the catchment for the 1 in 100+CC (40% increase for climate change) event but that this increase in flooding could be managed locally within the development.

5.19 An Exceedance Routing Plan for surface water is found in **Appendix K**. This details where surface water would flow to on site and where it would be stored in an extreme event.

6.0 SuDS Maintenance Regime

6.1 This section describes the proposed management and schedules for the maintenance to reduce the risk of the proposed network flooding due to poor maintenance.

Piped Network Maintenance

6.2 The piped network shall be maintained by either Southern Water or an approved maintenance company in accordance with Sewers for Adoption (7th Ed.) and the manufacturers guidance.

6.3 This maintenance schedule should include; clearing gullies, removing any large obstructions within the pipes and cleaning catchpits at regular intervals to ensure the correct operation of the sewer network.

Attenuation Storage Tanks and Pond Maintenance

6.4 The proposed SuDS features are to have a routine maintenance schedule that conforms to CIRIA SuDS Manual (C753) 2015 guidance. An approved maintenance company is to adhere to the maintenance schedule provided in Tables 6.1. 6.2 and 6.3 for attenuation storage tanks, swales, ponds and permeable paving of the CIRIA guidance in order to ensure the correct operation of the drainage.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the treatment area
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 6.1 Operation and maintenance requirements for swales and ponds

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying.	As required - once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.	As requires
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Monthly for 3 months after installation. Three-monthly, 48h after large storms in first 6 months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Table 6.2 Operation and maintenance requirements for permeable paving

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents	Annually, or as required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 6.3 Operation and maintenance requirements for attenuation storage tanks

7.0 Foul Water Drainage

Existing Foul Water

7.1 As detailed in section 2.2, the site is currently Greenfield and does not have an existing foul water drainage system.

Proposed Foul Water

7.2 Southern Water's record plans show a foul sewer network to the north of the site. Southern Water sewer records can be found in **Appendix J**.

7.3 The peak foul flow rate from the proposed development has been based on the following assumptions as dictated by Sewers for Adoption 7th Edition:

7.4 4000 Litres per dwelling per day
4000 x 125 = 540, 000
540000/86400 = 5.75 l/s

7.5 The calculated peak foul flow rate from the site is therefore 5.75 l/s.

7.6 The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN: 752 drainage and sewer systems outside buildings, the local authority building control specifications and requirements, Sewers for Adoption 7th Edition and the Civil Engineering Specification for the Water Industry 7th Edition.

7.7 The nearest point of connection to the Southern Water network is located within Roebuck Avenue opposite the site. Southern Water will need to be consulted with regard to new connections to this network. If additional capacity is required to serve the development this will be funded by the New Infrastructure Charge.

8.0 Summary and Conclusions

8.1 Motion has been commissioned by Reside Developments Limited to undertake an FRA and Drainage Strategy in support of a planning application for the development of up to 15 residential units located at the land south of Funtely Road, Funtley, PO15 6DW.

8.2 In January 2018 GTA Civils produced an FRA for the proposed development site which was for up to 55 dwellings, three custom build plots (Use Class C3) and a community building incorporating a local shop, and planning permission was granted (P/18/0067/OA).

8.3 This report considers a revised consisting of an new outline application to provide up to 125 one, two, three and four-bedroom dwellings including 6 Self/Custom build plots, Community Building or Local Shop (Use Class E & F.2) with associated infrastructure, new community park, landscaping and access.

8.4 The application site is greater than one hectare (15.98 ha) with a net developable area of 6.09ha and is currently undeveloped and can be described as greenfield.

8.5 The EA Flood Map shows that the entirety of the site is located within Flood Zone 1, having less than 1 in 1000 chance of flooding per annum from the rivers or seas.

8.6 All other forms and causes of flooding have been assessed and the development site is considered to be at very low risk of flooding from sewers, groundwater and artificial sources.

8.7 The proposed development will increase the amount of hardstanding areas on site due to the new commercial area and associated access road. Therefore, there will be an increase in surface water runoff from the development.

8.8 The proposed discharge rates for the whole of the catchment draining to Funtley Road were set out in the FRA prepared for the previous scheme and it is proposed to keep the total discharge from the site to the previously agreed QBAR rate of 46.9l/s. The catchment area draining to the ditch on Funtley Road is 11.8ha and this equates to 3.97l/s/ha. The total area of the site is 15.98ha but the net developable area of site is 6.09ha. Therefore, it is proposed to use 24.2l/s as the allowable discharge rate from the developable area and 22.7l/s from the Community Park.

8.9 In order to attenuate the additional surface water from the development it is proposed to have swales, three ponds and a combination of permeable paving and attenuation tanks. The proposed drainage strategy is to have two pond towards the centre of the site, one has a storage volume of 300m3 and the other 7200m3. The internal roads will have permeable paving will have 30% voids and will be 300mm deep and will provide a storage volume of 405m3. There will also be a series of swales which run along the north boundary of the site which provides a storage of 1400m3 and a pond which will provide a storage volume of 580m3. There will also be an attenuation tank to the north which will be 0.5m deep and a volume of 110m3. The SuDS features will also improve water quality onsite as the pond will act as a sedimentation process and the permeable paving will act as a filtration process.

8.10 The proposed drainage strategy has been designed to cater for the 1 in 100 + 40% CC event in accordance with the requirements of the LLFA, the EA as well as the NPPF.

8.11 The nearest point of connection to the Southern Water network is located within Roebuck Avenue opposite the site. The estimated peak foul flow rate generated by the proposed development site has been calculated as 5.75 /s Southern Water will need to be consulted with regard to new connections to this network.

8.12 This FRA demonstrates that the flood risk for the proposed development can be managed on site without increasing the risk to any neighbouring developments or downstream areas, and therefore fulfils the requirements of the PPG and NPPF.

Appendix A

Site Location Plan

FUNTLEY ROAD

Community shop and hall

Play Area (LEAP)

MP 83

KEY

- Application boundary
- Developable area
- Green link
- Community Park
- Rural edge green space
- Beamond Coppice
- Access land
- Site access
- Cycle track
- Main access street
- Square
- Views to hillside trees
- Community shop & hall
- Local Equipped Area for Play (LEAP)
- Maintenance access route to telecom mast

1 Plan View

Scale: 1:1000

m 0 10 20 30 40 50 60 70 80 90 100
Scale 1:1,000

REV	DATE	DRAWN/CHECK	DESCRIPTION
P1	30.09.20	DO/RR	Planning issue

STATUS

PROJECT
RD173 Funtley Road, Fareham

DRAWING
Parameter Plan

DATE	DRAWN/CHECKED	SCALE @ A1	DRAWING NO.	REVISION NO.
15.09.20	DO/RR	1:1000	RD1731-F3-L107	P1

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Appendix B

Masterplan

FUNTLEY ROAD

Community shop and hall

Play Area (LEAP)

Community Park

MP 83

1 Plan View

Scale: 1:1000

m 0 10 20 30 40 50 60 70 80 90 100
Scale 1:1,000

REV	DATE	DRAWN/CHECKED	DESCRIPTION
P1	30.09.20	DO/RR	Planning issue

STATUS
PLANNING ISSUE

PROJECT
RD173 Funtley Road, Fareham

DRAWING
Illustrative masterplan

DATE	DRAWN/CHECKED	SCALE @ A1	DRAWING NO.	REVISION NO.
02.09/20	DO/RR	1:1000	RD1731-F3-L100	P1

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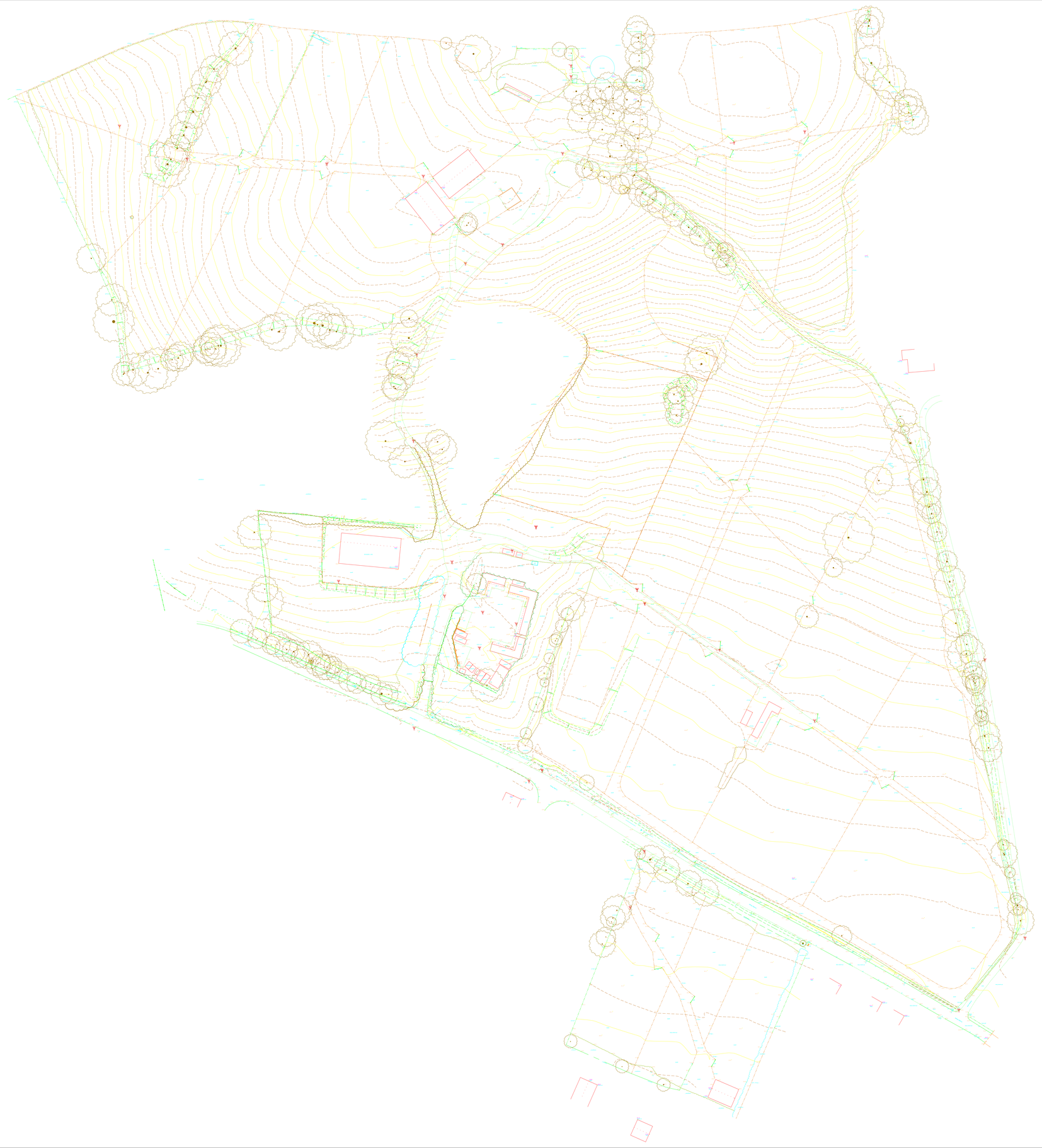
Appendix C

Topographic Survey



Appendix D

BGS Borehole Records

SU 50 NE/4 5528 0785

...nts County Council
...outh Coast Road

RECORD OF BOREHOLE No: 112

...cation : Park Gate to Portsmouth Harbour
...ontract No. : F69 901
...ype of Boring : Shell and Auger
...ite (started) : 16.7.68.

Borehole Dia : 6 ins.
Casing : Unlined.
Ground Level : 110.42 (33.66m)
Chainage : 111+00

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0'-0"		
						1'-0" (0.30m)	1'-0"	Soft topsoil.
		2'-6"	D	1			4'-0"	Soft to firm mottled brown CLAY.
		5'-0" - 6'-5"	U	2		5'-0" (1.52m)		
		6'-0" - 10'-0"	B	3				
							10'-0"	Firm mottled brown and light grey CLAY with a little fine gravel at 11'-6".
		10'-0" - 11'-4"	U	5				
		11'-6"	D	6				
		15'-0" - 16'-4"	U	7		15'-0" (4.57m)		
						End of Borehole.		

...ater encountered.

SU 50 NE / 1 5504 0784

...ts County Council
...th Coast Road

RECORD OF BOREHOLE No: 115

...cation : Park Gate to Portsmouth Harbour
...ntract No. : F69 901
...pe of Boring : Shell and Auger
...te (started) : 17.7.68.

Borehole Dia : 6 ins.
Casing : Unlined.
Ground Level : 73.87 (22.53M)
Chainage : 103+00

...epth ...ing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0'-0"	1'-0"	Topsoil.
		1'-0"	D	1		1'-0" (0.30M)		
		2'-6"	D	2				
		5'-0" - 6'-6"	U	3			14'-0"	Stiff mottled brown sandy silty CLAY
		7'-6"	D	4				
		10'-0" - 11'-6"	U	5				
		12'-6"	D	6				
		15'-0" - 16'-6"	U	7		15'-0" (4.57M)		
		17'-6"	D	8				
							10'-0"	Stiff mottled dark and light brown silty CLAY.
		20'-0" - 21'-6"	U	9				
		22'-6"	D	10				
		25'-0" - 26'-6"	U	11		25'-0" (7.62M)		
						End of Borehole.		

...water encountered.

Appendix E

EA Product 4

Flood map for planning

Your reference	Location (easting/northing)	Created
funtley	**455712/108109**	**15 Jan 2020 15:46**

Your selected location is in flood zone 1, an area with a low probability of flooding.

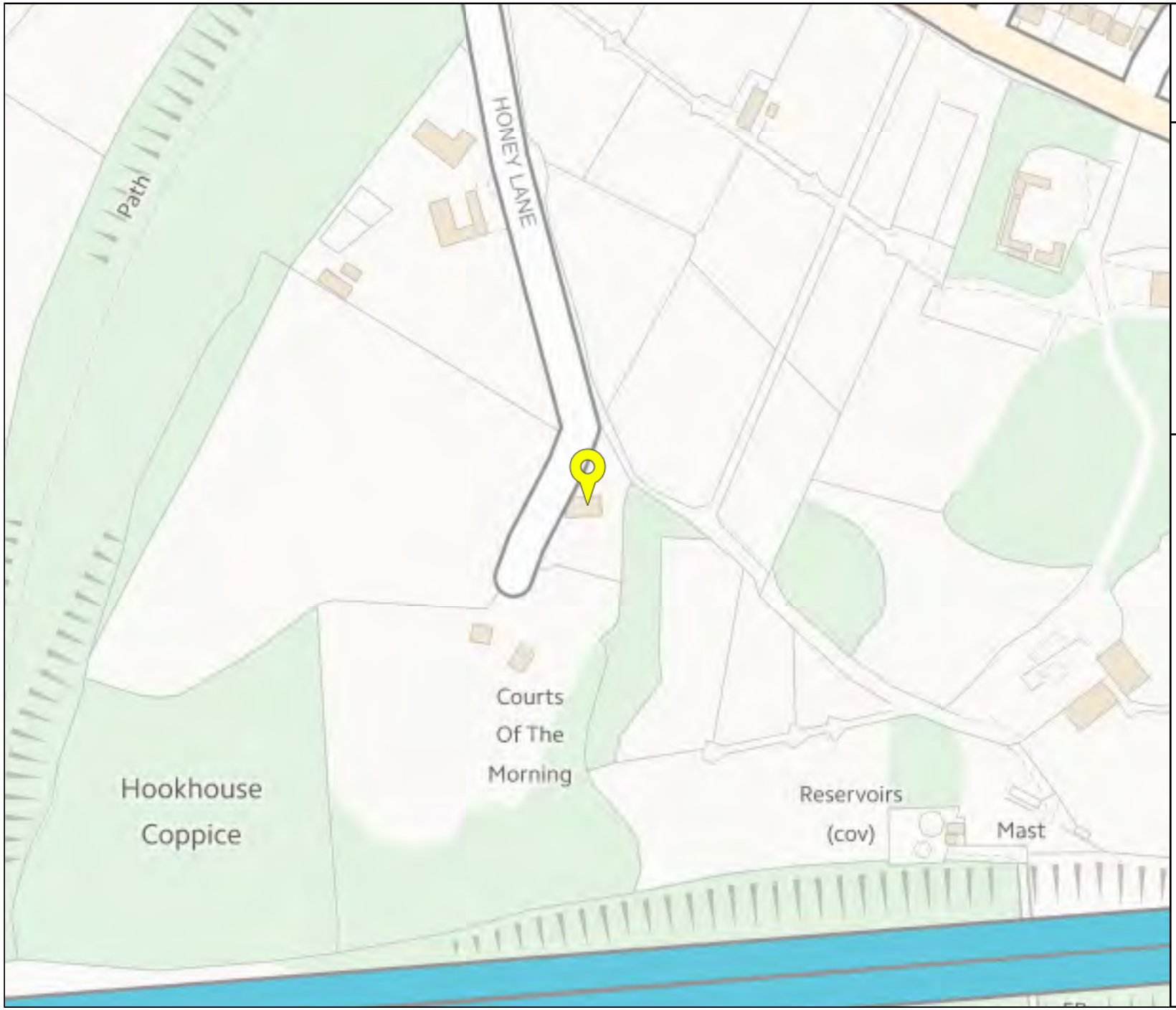
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
funtley

Location (easting/northing)
455712/108109

Scale
1:2500

Created
15 Jan 2020 15:46

- Selected point
- Flood zone 3
- Flood zone 3: areas bene tting from ood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix F

Surface Water Flood Maps


Flood risk
High
Medium
Low
Very low
Location you selected
Leachpond Copse
Mushes Plantation
Crockerhill
Knowle Road
Whiteley
Great Fontley Farm
Knowle
Charity Farm
Peghams Copse
Hazel Coppice
Funtley Hill
Gully Coppice
Funtley
The Scotchcart Farmhouse
Funtley Road
Fontley House Farm
Lee Ground
Great Beamond Coppice
M27
M27
M27
Whiteley Lane
Foxhill Farm
Funtley Hill
Highlands Road
Kiln Road
North Hill
Hill Park

Appendix G

QBar Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	10	Soil	0.400
Area (ha)	3.300	Urban	0.000
SAAR (mm)	800	Region Number	Region 7

Results l/s

QBAR Rural	13.1
QBAR Urban	13.1
Q10 years	21.3
Q1 year	11.2
Q30 years	29.7
Q100 years	41.9

Appendix H

Drainage Strategy

Hydrobrake to restrict discharge rate to 24.2 l/s

Offline attenuation tank: 0.5m deep and 110m² of area

FUNTLEY ROAD

Hydrobrake to restrict discharge rate to 5.0 l/s

Swale: 1m deep, 3m base, 1 in 3 slopes, providing 1400m³ of storage

Hydrobrake to restrict discharge rate to 5.0 l/s

Pond: 1m deep and 720m² of area

Swale: 1m deep, 3m base, 1 in 3 slopes, providing 1400m³ of storage

Hydrobrake to restrict discharge rate to 5.0 l/s

Pond: 1m deep and 580m² of area

Hydrobrake to restrict discharge rate to 5 l/s

Hydrobrake to restrict discharge rate to 3l/s

Community shop and hall

Swale: 1m deep, 3m base, 1 in 3 slopes, providing 1400m³ of storage

Hydrobrake to restrict discharge rate to 22.7 l/s

Pond: 1m deep and 300m² of area

Cut off drain redirecting overland flow route and storage

Community Park

Key:

- Surface water drainage
- Permeable Paving: 300mm deep, providing 122m³ of storage
- Pond
- Tank
- Swale
- Cut off drain

Revision Notes: | Drn | Chk | App | Date

Drawing Status:

motion

84 North Street
Guildford
Surrey
GU1 4AU

T: 01483 531 300

Cargo Works
1-2 Hatfields
London
SE1 9PG

T: 020 8065 5208

www.motion.co.uk

Client:
Reside Developments Limited

Project:
Land South of Funtley Road, Funtley

Title:
Foul Water Drainage Strategy

Scale: 1:1000	Size: A1	Date: 2020-09-30
Drawn:SM	Chk'd: VBH	Appr'd:NJ

Drawing: 1912032-0500-02

Revision: A

N:\Projects\1912032\Drawings\1912032-0500-01 A Surface Water Drainage Strategy.dwg

Appendix I

MicroDrainage model results

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	16.981	1.000	17.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	28.732	5.000	5.7	0.047	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	30.945	4.000	7.7	0.067	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	19.343	1.250	15.5	0.061	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	23.215	0.400	58.0	0.034	5.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	69.812	0.700	99.7	0.069	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	18.283	0.900	20.3	0.040	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	44.058	0.500	88.1	0.081	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	15.519	0.176	88.2	0.033	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	16.662	0.100	166.6	0.139	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	51.623	0.400	129.1	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	30.652	0.224	136.8	0.066	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	33.006	0.150	220.0	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.12	31.700	0.000	0.0	0.0	0.0	2.46	43.4	0.0
1.001	50.00	5.23	30.700	0.047	0.0	0.0	0.0	4.23	74.8	6.4
1.002	50.00	5.37	25.700	0.115	0.0	0.0	0.0	3.65	64.4	15.5
1.003	50.00	5.50	21.700	0.176	0.0	0.0	0.0	2.57	45.5	23.8
2.000	50.00	5.38	22.500	0.034	0.0	0.0	0.0	1.01	8.0	4.6
2.001	50.00	6.54	22.050	0.103	0.0	0.0	0.0	1.01	17.8	14.0
2.002	50.00	6.67	21.350	0.143	0.0	0.0	0.0	2.24	39.7	19.3
3.000	50.00	5.69	22.000	0.081	0.0	0.0	0.0	1.07	18.9	11.0
3.001	50.00	5.93	21.500	0.115	0.0	0.0	0.0	1.07	18.9	15.5
3.002	50.00	6.20	21.249	0.253	0.0	0.0	0.0	1.01	40.2	34.3
3.003	50.00	6.95	21.149	0.288	0.0	0.0	0.0	1.15	45.7	39.0
3.004	50.00	7.33	20.674	0.354	0.0	0.0	0.0	1.34	94.9	47.9
3.005	50.00	7.85	20.450	0.412	0.0	0.0	0.0	1.06	74.6	55.8

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	17.995	1.100	16.4	0.477	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	17.995	1.100	16.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	10.446	1.100	9.5	0.373	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	39.088	1.100	35.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	19.343	0.100	193.4	0.042	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	28.523	0.100	285.2	0.042	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.006	12.279	0.274	44.8	0.045	0.00	0.0	0.600	o	525	Pipe/Conduit	
6.000	57.105	0.600	95.2	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	20.208	0.600	33.7	0.315	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.002	33.837	0.200	169.2	0.276	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.003	21.498	0.500	43.0	0.322	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.004	20.710	0.700	29.6	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.005	25.362	0.100	253.6	0.027	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.006	44.266	0.675	65.6	0.030	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.08	22.500	0.477	0.0	0.0	0.0	3.91	276.1	64.6
4.001	50.00	5.15	21.400	0.477	0.0	0.0	0.0	3.91	276.1	64.6
5.000	50.00	5.03	22.500	0.373	0.0	0.0	0.0	5.13	362.7	50.5
5.001	50.00	5.28	21.400	0.373	0.0	0.0	0.0	2.65	187.0	50.5
1.004	50.00	8.07	20.150	1.624	0.0	0.0	0.0	1.46	231.9	219.9
1.005	50.00	8.43	19.975	1.665	0.0	0.0	0.0	1.32	286.0	225.5
1.006	50.00	8.49	19.875	1.710	0.0	0.0	0.0	3.35	725.7	231.6
6.000	50.00	5.92	23.300	0.000	0.0	0.0	0.0	1.03	18.2	0.0
6.001	50.00	6.07	22.625	0.315	0.0	0.0	0.0	2.26	89.9	42.7
6.002	50.00	6.54	21.950	0.591	0.0	0.0	0.0	1.21	85.2	80.0
6.003	50.00	6.69	21.750	0.913	0.0	0.0	0.0	2.40	170.0	123.6
6.004	50.00	6.81	21.250	0.937	0.0	0.0	0.0	2.90	205.1	126.9
6.005	50.00	7.14	20.400	0.965	0.0	0.0	0.0	1.27	202.3	130.6
6.006	50.00	7.43	20.300	0.995	0.0	0.0	0.0	2.51	399.8	134.7

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.000	16.146	0.100	161.5	0.083	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	16.146	0.200	80.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	15.161	0.100	151.6	0.410	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	15.161	0.200	75.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	120.013	1.250	96.0	0.052	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	18.144	0.050	362.9	0.139	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	19.312	0.100	193.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.000	50.00	5.34	20.000	0.083	0.0	0.0	0.0	0.79	13.9	11.2
7.001	50.00	5.58	19.900	0.083	0.0	0.0	0.0	1.12	19.8	11.2
8.000	50.00	5.20	20.000	0.410	0.0	0.0	0.0	1.27	90.1	55.6
8.001	50.00	5.34	19.900	0.410	0.0	0.0	0.0	1.81	127.8	55.6
1.007	50.00	9.46	19.700	3.251	0.0	0.0	0.0	2.08	330.0«	440.2
1.008	50.00	9.74	18.450	3.389	0.0	0.0	0.0	1.06	168.8«	459.0
1.009	50.00	10.09	18.400	3.389	0.0	0.0	0.0	0.94	37.3«	459.0

84 North Street
Guildford
GU1 4AU

Date 02/10/2020 09:05 | Designed by VictoriaBergHoldo
File POSTDEVLOPMENT_FUNTLEYV1... | Checked by
Innovyze | Network 2019.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	33.000	1.300	Open Manhole	1200	1.000	31.700	150				
2	32.000	1.300	Open Manhole	1200	1.001	30.700	150	1.000	30.700	150	
3	27.000	1.300	Open Manhole	1200	1.002	25.700	150	1.001	25.700	150	
4	23.000	1.300	Open Manhole	1200	1.003	21.700	150	1.002	21.700	150	
5	24.000	1.500	Open Manhole	1200	2.000	22.500	100				
6	23.200	1.150	Open Manhole	1200	2.001	22.050	150	2.000	22.100	100	
7	23.000	1.650	Open Manhole	1200	2.002	21.350	150	2.001	21.350	150	
8	24.000	2.000	Open Manhole	1200	3.000	22.000	150				
9	24.000	2.500	Open Manhole	1200	3.001	21.500	150	3.000	21.500	150	
9	24.100	2.851	Open Manhole	1200	3.002	21.249	225	3.001	21.324	150	
10	23.400	2.251	Open Manhole	1200	3.003	21.149	225	3.002	21.149	225	
11	23.100	2.426	Open Manhole	1200	3.004	20.674	300	3.003	20.749	225	
12	23.000	2.550	Open Manhole	1200	3.005	20.450	300	3.004	20.450	300	
14	24.000	1.500	Open Manhole	1200	4.000	22.500	300				
15	23.500	2.100	Open Manhole	1200	4.001	21.400	300	4.000	21.400	300	
15	24.000	1.500	Open Manhole	1200	5.000	22.500	300				
17	23.500	2.100	Open Manhole	1200	5.001	21.400	300	5.000	21.400	300	
5	23.000	2.850	Open Manhole	1350	1.004	20.150	450	1.003	20.450	150	
								2.002	20.450	150	
								3.005	20.300	300	
								4.001	20.300	300	
								5.001	20.300	300	
5	22.000	2.025	Open Manhole	1500	1.005	19.975	525	1.004	20.050	450	
6	21.200	1.325	Open Manhole	1500	1.006	19.875	525	1.005	19.875	525	
7	24.900	1.600	Open Manhole	1200	6.000	23.300	150				
8	24.450	1.825	Open Manhole	1200	6.001	22.625	225	6.000	22.700	150	
9	23.000	1.050	Open Manhole	1200	6.002	21.950	300	6.001	22.025	225	
10	22.900	1.150	Open Manhole	1200	6.003	21.750	300	6.002	21.750	300	
11	22.400	1.150	Open Manhole	1200	6.004	21.250	300	6.003	21.250	300	
12	21.700	1.300	Open Manhole	1350	6.005	20.400	450	6.004	20.550	300	
13	21.300	1.000	Open Manhole	1350	6.006	20.300	450	6.005	20.300	450	
26	22.000	2.000	Open Manhole	1200	7.000	20.000	150				
29	21.400	1.500	Open Manhole	1200	7.001	19.900	150	7.000	19.900	150	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
27	22.000	2.000	Open Manhole	1200	8.000	20.000	300				
30	22.000	2.100	Open Manhole	1200	8.001	19.900	300	8.000	19.900	300	
7	20.800	1.199	Open Manhole	1500	1.007	19.700	450	1.006	19.601	525	
								6.006	19.625	450	
								7.001	19.700	150	
								8.001	19.700	300	
8	19.500	1.050	Open Manhole	1350	1.008	18.450	450	1.007	18.450	450	
9	19.050	0.650	Open Manhole	1350	1.009	18.400	225	1.008	18.400	450	
	19.000	0.700	Open Manhole	0		OUTFALL		1.009	18.300	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	455747.890	108218.079	455747.890	108218.079	Required	
2	455753.891	108233.964	455753.891	108233.964	Required	
3	455766.599	108259.733	455766.599	108259.733	Required	
4	455783.190	108285.855	455783.190	108285.855	Required	
5	455693.175	108344.806	455693.175	108344.806	Required	
6	455716.120	108348.336	455716.120	108348.336	Required	
7	455777.542	108315.154	455777.542	108315.154	Required	
8	455925.636	108231.218	455925.636	108231.218	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
9	455888.975	108206.782	455888.975	108206.782	Required	
9	455874.264	108211.725	455874.264	108211.725	Required	
10	455860.850	108221.609	455860.850	108221.609	Required	
11	455814.607	108244.554	455814.607	108244.554	Required	
12	455799.781	108271.382	455799.781	108271.382	Required	
14	455755.644	108300.067	455755.644	108300.067	Required	
15	455773.565	108301.698	455773.565	108301.698	Required	
15	455790.219	108253.967	455790.219	108253.967	Required	
17	455788.880	108264.327	455788.880	108264.327	Required	
5	455791.486	108303.328	455791.486	108303.328	Required	
5	455799.781	108320.802	455799.781	108320.802	Required	
6	455816.725	108343.747	455816.725	108343.747	Required	
7	456018.288	108254.085	456018.288	108254.085	Required	
8	455965.691	108276.324	455965.691	108276.324	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
9	455946.629	108283.031	455946.629	108283.031	Required	
10	455915.565	108296.445	455915.565	108296.445	Required	
11	455896.856	108307.035	455896.856	108307.035	Required	
12	455878.853	108317.272	455878.853	108317.272	Required	
13	455858.026	108331.745	455858.026	108331.745	Required	
26	455833.026	108325.587	455833.026	108325.587	Required	
29	455826.817	108340.491	455826.817	108340.491	Required	
27	455790.768	108350.009	455790.768	108350.009	Required	
30	455805.688	108352.703	455805.688	108352.703	Required	
7	455820.608	108355.396	455820.608	108355.396	Required	
8	455716.473	108415.053	455716.473	108415.053	Required	
9	455702.000	108425.996	455702.000	108425.996	Required	
	455695.999	108444.352			No Entry	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	User	-	100	0.047	0.047	0.047
1.002	User	-	100	0.067	0.067	0.067
1.003	User	-	100	0.061	0.061	0.061
2.000	User	-	100	0.034	0.034	0.034
2.001	User	-	100	0.069	0.069	0.069
2.002	User	-	100	0.040	0.040	0.040
3.000	User	-	100	0.081	0.081	0.081
3.001	User	-	100	0.033	0.033	0.033
3.002	User	-	60	0.203	0.122	0.122
	User	-	100	0.017	0.017	0.139
3.003	User	-	100	0.034	0.034	0.034
3.004	User	-	100	0.066	0.066	0.066
3.005	User	-	100	0.058	0.058	0.058
4.000	User	-	60	0.796	0.477	0.477
4.001	-	-	100	0.000	0.000	0.000
5.000	User	-	60	0.622	0.373	0.373
5.001	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.042	0.042	0.042
1.005	User	-	100	0.042	0.042	0.042
1.006	User	-	100	0.045	0.045	0.045
6.000	-	-	100	0.000	0.000	0.000
6.001	User	-	60	0.337	0.202	0.202
	User	-	100	0.113	0.113	0.315
6.002	User	-	60	0.409	0.245	0.245
	User	-	100	0.030	0.030	0.276
6.003	User	-	100	0.034	0.034	0.034
	User	-	60	0.481	0.289	0.322
6.004	User	-	100	0.024	0.024	0.024
6.005	User	-	100	0.027	0.027	0.027
6.006	User	-	100	0.030	0.030	0.030
7.000	User	-	60	0.138	0.083	0.083
7.001	-	-	100	0.000	0.000	0.000
8.000	User	-	60	0.684	0.410	0.410
8.001	-	-	100	0.000	0.000	0.000
1.007	User	-	100	0.052	0.052	0.052
1.008	User	-	100	0.117	0.117	0.117
	User	-	100	0.021	0.021	0.139
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				4.857	3.389	3.389

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	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	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.300	Storm Duration (mins)	30
Ratio R	0.321		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 2.0

Unit Reference	MD-SHE-0105-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	105
Invert Level (m)	21.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0	Kick-Flo®	0.637	4.1
Flush-Flo™	0.296	5.0	Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.005, Volume (m³): 6.4

Unit Reference	MD-SHE-0098-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	19.975

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.005, Volume (m³): 6.4

Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0	Kick-Flo®	0.878	3.9
Flush-Flo™	0.431	4.9	Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Hydro-Brake® Optimum Manhole: 10, DS/PN: 6.003, Volume (m³): 3.6

Unit Reference	MD-SHE-0079-3000-1200-3000
Design Head (m)	1.200
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	21.750
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0	Kick-Flo®	0.707	2.4
Flush-Flo™	0.348	2.9	Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Hydro-Brake® Optimum Manhole: 10, DS/PN: 6.003, Volume (m³): 3.6

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Hydro-Brake® Optimum Manhole: 29, DS/PN: 7.001, Volume (m³): 2.0

Unit Reference	MD-SHE-0075-3000-1500-3000
Design Head (m)	1.500
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	19.900
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.0	Kick-Flo®	0.671	2.1
Flush-Flo™	0.329	2.6	Mean Flow over Head Range	-	2.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.7	3.000	4.1	7.000	6.1
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.3
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.5
0.400	2.6	1.800	3.3	4.500	5.0	8.500	6.7
0.500	2.5	2.000	3.4	5.000	5.2	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.2	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	5.9		

Hydro-Brake® Optimum Manhole: 30, DS/PN: 8.001, Volume (m³): 3.4

Unit Reference	MD-SHE-0104-5000-1100-5000
Design Head (m)	1.100
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	104
Invert Level (m)	19.900
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	5.0	Kick-Flo®	0.690	4.0
Flush-Flo™	0.323	5.0	Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	1.200	5.2	3.000	8.0	7.000	12.0
0.200	4.8	1.400	5.6	3.500	8.6	7.500	12.4
0.300	5.0	1.600	6.0	4.000	9.2	8.000	12.7
0.400	5.0	1.800	6.3	4.500	9.7	8.500	13.1
0.500	4.8	2.000	6.6	5.000	10.2	9.000	13.5
0.600	4.6	2.200	6.9	5.500	10.7	9.500	13.8
0.800	4.3	2.400	7.2	6.000	11.1		
1.000	4.8	2.600	7.5	6.500	11.5		

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.008, Volume (m³): 20.4

Unit Reference	MD-SHE-0215-2420-1100-2420
Design Head (m)	1.100
Design Flow (l/s)	24.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	215
Invert Level (m)	18.450
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.008, Volume (m³): 20.4

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	24.2	Kick-Flo®	0.786	20.6
Flush-Flo™	0.370	24.2	Mean Flow over Head Range	-	20.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.3	1.200	25.2	3.000	39.2	7.000	59.0
0.200	20.9	1.400	27.2	3.500	42.2	7.500	61.0
0.300	24.0	1.600	28.9	4.000	45.0	8.000	63.0
0.400	24.1	1.800	30.6	4.500	47.6	8.500	64.9
0.500	23.8	2.000	32.2	5.000	50.1	9.000	66.7
0.600	23.3	2.200	33.7	5.500	52.5	9.500	68.5
0.800	20.8	2.400	35.2	6.000	54.8		
1.000	23.1	2.600	36.5	6.500	56.9		

Storage Structures for Storm

Tank or Pond Manhole: 4, DS/PN: 1.003

Invert Level (m) 21.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	300.0	1.000	300.0

Tank or Pond Manhole: 14, DS/PN: 4.000

Invert Level (m) 22.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 15, DS/PN: 5.000

Invert Level (m) 22.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 5, DS/PN: 1.005

Invert Level (m) 19.975

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	720.0	1.000	720.0

Swale Manhole: 7, DS/PN: 6.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	57.1
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	95.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	23.300	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 8, DS/PN: 6.001

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	20.2
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	33.7
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	22.625	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 9, DS/PN: 6.002

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	33.8
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	169.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	21.950	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 10, DS/PN: 6.003

Invert Level (m) 21.750

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	580.0	1.000	580.0

Swale Manhole: 11, DS/PN: 6.004

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	20.7
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	29.6
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	21.250	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 12, DS/PN: 6.005

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	25.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	253.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	20.475	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 13, DS/PN: 6.006

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	44.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	88.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	20.375	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 26, DS/PN: 7.000

Invert Level (m) 20.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 27, DS/PN: 8.000

Invert Level (m) 20.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	500.0	0.450	500.0	0.460	0.0

Swale Manhole: 7, DS/PN: 1.007

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0
Infiltration Coefficient Side (m/hr)	0.00000	Porosity	1.00

Swale Manhole: 7, DS/PN: 1.007

Invert Level (m)	19.700	Slope (1:X)	133.0
Base Width (m)	3.0	Cap Volume Depth (m)	0.000
Length (m)	140.0	Cap Infiltration Depth (m)	0.000
Side Slope (1:X)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 8, DS/PN: 1.008

Invert Level (m) 18.450

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	110.0	0.500	110.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	1	+0%					31.700
1.001	2	15 Winter	1	+0%					30.727
1.002	3	15 Winter	1	+0%	100/15 Summer				25.746
1.003	4	240 Winter	1	+0%	100/15 Winter				21.767
2.000	5	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.555
2.001	6	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.143
2.002	7	15 Winter	1	+0%	100/15 Summer				21.418
3.000	8	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.083
3.001	9	15 Winter	1	+0%	30/15 Summer	100/15 Summer			21.603
3.002	9	15 Winter	1	+0%	30/15 Summer				21.405
3.003	10	15 Winter	1	+0%	30/15 Summer	100/15 Summer			21.295
3.004	11	15 Winter	1	+0%	30/15 Summer				20.815
3.005	12	15 Winter	1	+0%	30/15 Summer				20.627
4.000	14	30 Winter	1	+0%					22.579

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.123	0.000	0.07		5.3	OK	
1.002	3	-0.104	0.000	0.21		12.7	OK	
1.003	4	-0.083	0.000	0.05		2.0	OK	
2.000	5	-0.045	0.000	0.56		4.4	OK	4
2.001	6	-0.057	0.000	0.66		11.4	OK	6
2.002	7	-0.082	0.000	0.42		15.5	OK	
3.000	8	-0.067	0.000	0.57		10.4	OK	6
3.001	9	-0.047	0.000	0.81		14.1	OK	4
3.002	9	-0.069	0.000	0.82		29.2	OK	
3.003	10	-0.079	0.000	0.74		32.3	OK	4
3.004	11	-0.159	0.000	0.45		38.6	OK	
3.005	12	-0.123	0.000	0.64		43.9	OK	
4.000	14	-0.221	0.000	0.16		37.3	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	30 Winter	1	+0%	100/15 Summer				21.479
5.000	15	30 Winter	1	+0%					22.565
5.001	17	30 Winter	1	+0%	100/15 Summer				21.480
1.004	5	15 Winter	1	+0%	30/15 Summer				20.430
1.005	5	960 Winter	1	+0%	30/120 Summer				20.357
1.006	6	60 Winter	1	+0%					19.912
6.000	7	60 Winter	1	+0%					23.300
6.001	8	15 Winter	1	+0%	30/15 Summer				22.729
6.002	9	15 Winter	1	+0%	30/15 Summer				22.127
6.003	10	960 Winter	1	+0%	30/60 Summer				22.018
6.004	11	60 Winter	1	+0%					21.279
6.005	12	15 Winter	1	+0%					20.454
6.006	13	15 Winter	1	+0%					20.348
7.000	26	120 Winter	1	+0%	100/60 Winter				20.036
7.001	29	120 Winter	1	+0%	30/30 Summer				19.978
8.000	27	240 Winter	1	+0%	100/60 Summer				20.079
8.001	30	240 Winter	1	+0%	30/120 Winter				20.072
1.007	7	30 Winter	1	+0%					19.777
1.008	8	240 Winter	1	+0%	30/60 Winter	100/120 Winter			18.709
1.009	9	240 Winter	1	+0%					18.522

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	-0.221	0.000	0.16		37.3	OK	
5.000	15	-0.235	0.000	0.11		28.0	OK	
5.001	17	-0.220	0.000	0.16		27.9	OK	
1.004	5	-0.170	0.000	0.70		124.5	OK	
1.005	5	-0.143	0.000	0.02		4.9	OK	
1.006	6	-0.488	0.000	0.01		6.0	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	-0.121	0.000	0.43		35.0	OK	
6.002	9	-0.123	0.000	0.65		50.7	OK	
6.003	10	-0.032	0.000	0.02		2.7	OK	
6.004	11	-0.271	0.000	0.02		3.6	OK	
6.005	12	-0.396	0.000	0.03		5.9	OK	
6.006	13	-0.402	0.000	0.03		9.1	OK	
7.000	26	-0.114	0.000	0.13		1.7	OK	
7.001	29	-0.072	0.000	0.09		1.7	OK	
8.000	27	-0.221	0.000	0.06		4.7	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	-0.128	0.000	0.04		4.7	OK	
1.007	7	-0.373	0.000	0.07		21.4	OK	
1.008	8	-0.191	0.000	0.14		19.1	OK	3
1.009	9	-0.103	0.000	0.57		19.1	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	30	+0%					31.700
1.001	2	15 Winter	30	+0%					30.748
1.002	3	15 Winter	30	+0%	100/15 Summer				25.787
1.003	4	240 Winter	30	+0%	100/15 Winter				21.837
2.000	5	15 Winter	30	+0%	30/15 Summer	100/15 Summer			23.157
2.001	6	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.799
2.002	7	15 Winter	30	+0%	100/15 Summer				21.473
3.000	8	15 Winter	30	+0%	30/15 Summer	100/15 Summer			23.117
3.001	9	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.616
3.002	9	15 Winter	30	+0%	30/15 Summer				22.313
3.003	10	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.048
3.004	11	15 Winter	30	+0%	30/15 Summer				21.223
3.005	12	15 Winter	30	+0%	30/15 Summer				21.056
4.000	14	15 Winter	30	+0%					22.649

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.102	0.000	0.23		16.3	OK	
1.002	3	-0.063	0.000	0.64		39.6	OK	
1.003	4	-0.013	0.000	0.11		4.5	OK	
2.000	5	0.557	0.000	1.06		8.2	SURCHARGED	4
2.001	6	0.599	0.000	1.33		23.2	SURCHARGED	6
2.002	7	-0.027	0.000	0.90		33.3	OK	
3.000	8	0.967	0.000	1.00		18.5	SURCHARGED	6
3.001	9	0.966	0.000	1.51		26.4	SURCHARGED	4
3.002	9	0.839	0.000	1.62		57.9	SURCHARGED	
3.003	10	0.674	0.000	1.46		64.2	SURCHARGED	4
3.004	11	0.249	0.000	0.86		74.6	SURCHARGED	
3.005	12	0.306	0.000	1.23		83.9	SURCHARGED	
4.000	14	-0.151	0.000	0.48		114.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	15 Winter	30	+0%	100/15 Summer				21.548
5.000	15	15 Winter	30	+0%					22.621
5.001	17	15 Winter	30	+0%	100/15 Summer				21.553
1.004	5	1440 Winter	30	+0%	30/15 Summer				20.971
1.005	5	1440 Winter	30	+0%	30/120 Summer				20.970
1.006	6	15 Winter	30	+0%					19.944
6.000	7	60 Winter	30	+0%					23.300
6.001	8	15 Winter	30	+0%	30/15 Summer				22.914
6.002	9	960 Winter	30	+0%	30/15 Summer				22.345
6.003	10	960 Winter	30	+0%	30/60 Summer				22.343
6.004	11	15 Winter	30	+0%					21.296
6.005	12	15 Winter	30	+0%					20.499
6.006	13	15 Winter	30	+0%					20.384
7.000	26	120 Winter	30	+0%	100/60 Winter				20.085
7.001	29	120 Winter	30	+0%	30/30 Summer				20.074
8.000	27	240 Winter	30	+0%	100/60 Summer				20.217
8.001	30	240 Winter	30	+0%	30/120 Winter				20.212
1.007	7	15 Winter	30	+0%					19.832
1.008	8	120 Winter	30	+0%	30/60 Winter	100/120 Winter			18.990
1.009	9	120 Winter	30	+0%					18.541

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	-0.152	0.000	0.48		114.7	OK	
5.000	15	-0.179	0.000	0.33		87.8	OK	
5.001	17	-0.147	0.000	0.51		88.3	OK	
1.004	5	0.371	0.000	0.16		28.5	SURCHARGED	
1.005	5	0.470	0.000	0.02		4.9	SURCHARGED	
1.006	6	-0.456	0.000	0.04		16.3	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	0.064	0.000	1.03		83.8	SURCHARGED	
6.002	9	0.095	0.000	0.16		12.6	SURCHARGED	
6.003	10	0.293	0.000	0.02		2.8	SURCHARGED	
6.004	11	-0.254	0.000	0.05		9.7	OK	
6.005	12	-0.351	0.000	0.11		18.4	OK	
6.006	13	-0.366	0.000	0.08		27.8	OK	
7.000	26	-0.065	0.000	0.21		2.7	OK	
7.001	29	0.024	0.000	0.13		2.4	SURCHARGED	
8.000	27	-0.083	0.000	0.07		5.1	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	0.012	0.000	0.05		5.0	SURCHARGED	
1.007	7	-0.318	0.000	0.18		57.4	OK	
1.008	8	0.090	0.000	0.18		24.1	SURCHARGED	3
1.009	9	-0.084	0.000	0.72		24.1	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	100	+40%					31.700
1.001	2	15 Winter	100	+40%					30.767
1.002	3	15 Winter	100	+40%	100/15 Summer				26.216
1.003	4	240 Winter	100	+40%	100/15 Winter				21.978
2.000	5	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.001
2.001	6	15 Winter	100	+40%	30/15 Summer	100/15 Summer			23.206
2.002	7	15 Winter	100	+40%	100/15 Summer				22.259
3.000	8	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.010
3.001	9	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.001
3.002	9	15 Winter	100	+40%	30/15 Summer				24.012
3.003	10	15 Winter	100	+40%	30/15 Summer	100/15 Summer			23.403
3.004	11	15 Winter	100	+40%	30/15 Summer				22.300
3.005	12	15 Winter	100	+40%	30/15 Summer				21.958
4.000	14	15 Winter	100	+40%					22.743

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.083	0.000	0.41		29.6	OK	
1.002	3	0.366	0.000	1.04		64.5	SURCHARGED	
1.003	4	0.128	0.000	0.12		4.9	SURCHARGED	
2.000	5	1.401	0.765	1.41		10.9	FLOOD	4
2.001	6	1.006	5.653	1.54		27.0	FLOOD	6
2.002	7	0.759	0.000	0.98		36.2	SURCHARGED	
3.000	8	1.860	9.585	1.83		33.7	FLOOD	6
3.001	9	2.351	1.344	2.04		35.8	FLOOD	4
3.002	9	2.538	0.000	2.35		83.9	FLOOD RISK	
3.003	10	2.029	3.025	1.90		83.3	FLOOD	4
3.004	11	1.326	0.000	1.24		106.9	SURCHARGED	
3.005	12	1.208	0.000	1.92		131.2	SURCHARGED	
4.000	14	-0.057	0.000	0.82		194.3	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	15 Winter	100	+40%	100/15 Summer				22.055
5.000	15	15 Winter	100	+40%					22.687
5.001	17	15 Winter	100	+40%	100/15 Summer				22.309
1.004	5	1440 Winter	100	+40%	30/15 Summer				21.875
1.005	5	1440 Winter	100	+40%	30/120 Summer				21.873
1.006	6	15 Winter	100	+40%					19.971
6.000	7	60 Winter	100	+40%					23.300
6.001	8	15 Winter	100	+40%	30/15 Summer				23.223
6.002	9	1440 Winter	100	+40%	30/15 Summer				22.844
6.003	10	1440 Winter	100	+40%	30/60 Summer				22.841
6.004	11	15 Winter	100	+40%					21.313
6.005	12	15 Winter	100	+40%					20.529
6.006	13	15 Winter	100	+40%					20.409
7.000	26	120 Winter	100	+40%	100/60 Winter				20.179
7.001	29	120 Winter	100	+40%	30/30 Summer				20.167
8.000	27	360 Winter	100	+40%	100/60 Summer				21.345
8.001	30	360 Winter	100	+40%	30/120 Winter				21.340
1.007	7	15 Winter	100	+40%					19.878
1.008	8	120 Winter	100	+40%	30/60 Winter	100/120 Winter			19.574
1.009	9	960 Summer	100	+40%					18.541

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	0.355	0.000	0.81		191.1	SURCHARGED	
5.000	15	-0.113	0.000	0.62		162.3	OK	
5.001	17	0.609	0.000	0.92		160.3	SURCHARGED	
1.004	5	1.275	0.000	0.28		49.8	SURCHARGED	
1.005	5	1.373	0.000	0.02		5.6	FLOOD RISK	
1.006	6	-0.429	0.000	0.08		30.1	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	0.373	0.000	1.13		92.2	SURCHARGED	
6.002	9	0.594	0.000	0.16		12.9	FLOOD RISK	
6.003	10	0.791	0.000	0.02		2.9	FLOOD RISK	
6.004	11	-0.237	0.000	0.10		17.4	OK	
6.005	12	-0.321	0.000	0.18		31.0	OK	
6.006	13	-0.341	0.000	0.13		47.4	OK	
7.000	26	0.029	0.000	0.21		2.8	SURCHARGED	
7.001	29	0.117	0.000	0.14		2.6	SURCHARGED	
8.000	27	1.045	0.000	0.08		5.7	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	1.140	0.000	0.05		5.7	SURCHARGED	
1.007	7	-0.272	0.000	0.31		99.5	OK	
1.008	8	0.674	8.170	0.18		24.1	FLOOD	3
1.009	9	-0.084	0.000	0.72		24.1	OK	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	16.981	1.000	17.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	28.732	5.000	5.7	0.047	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	30.945	4.000	7.7	0.067	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	19.343	1.250	15.5	0.061	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	23.215	0.400	58.0	0.034	5.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	69.812	0.700	99.7	0.069	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	18.283	0.900	20.3	0.040	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	44.058	0.500	88.1	0.081	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	15.519	0.176	88.2	0.033	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	16.662	0.100	166.6	0.151	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	51.623	0.400	129.1	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	30.652	0.224	136.8	0.066	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	33.006	0.150	220.0	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.12	31.700	0.000	0.0	0.0	0.0	2.46	43.4	0.0
1.001	50.00	5.23	30.700	0.047	0.0	0.0	0.0	4.23	74.8	6.4
1.002	50.00	5.37	25.700	0.115	0.0	0.0	0.0	3.65	64.4	15.5
1.003	50.00	5.50	21.700	0.176	0.0	0.0	0.0	2.57	45.5	23.8
2.000	50.00	5.38	22.500	0.034	0.0	0.0	0.0	1.01	8.0	4.6
2.001	50.00	6.54	22.050	0.103	0.0	0.0	0.0	1.01	17.8	14.0
2.002	50.00	6.67	21.350	0.143	0.0	0.0	0.0	2.24	39.7	19.3
3.000	50.00	5.69	22.000	0.081	0.0	0.0	0.0	1.07	18.9	11.0
3.001	50.00	5.93	21.500	0.115	0.0	0.0	0.0	1.07	18.9	15.5
3.002	50.00	6.20	21.249	0.266	0.0	0.0	0.0	1.01	40.2	36.0
3.003	50.00	6.95	21.149	0.300	0.0	0.0	0.0	1.15	45.7	40.6
3.004	50.00	7.33	20.674	0.366	0.0	0.0	0.0	1.34	94.9	49.6
3.005	50.00	7.85	20.450	0.424	0.0	0.0	0.0	1.06	74.6	57.5

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	17.995	1.100	16.4	0.525	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	17.995	1.100	16.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	10.446	1.100	9.5	0.410	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	39.088	1.100	35.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	19.343	0.100	193.4	0.042	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.005	28.523	0.100	285.2	0.042	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.006	12.279	0.274	44.8	0.045	0.00	0.0	0.600	o	525	Pipe/Conduit	
6.000	57.105	0.600	95.2	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	20.208	0.600	33.7	0.335	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.002	33.837	0.200	169.2	0.300	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.003	21.498	0.500	43.0	0.351	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.004	20.710	0.700	29.6	0.024	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.005	25.362	0.100	253.6	0.027	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.006	44.266	0.675	65.6	0.030	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.08	22.500	0.525	0.0	0.0	0.0	3.91	276.1	71.1
4.001	50.00	5.15	21.400	0.525	0.0	0.0	0.0	3.91	276.1	71.1
5.000	50.00	5.03	22.500	0.410	0.0	0.0	0.0	5.13	362.7	55.6
5.001	50.00	5.28	21.400	0.410	0.0	0.0	0.0	2.65	187.0	55.6
1.004	50.00	8.05	20.075	1.721	0.0	0.0	0.0	1.61	347.9	233.0
1.005	50.00	8.41	19.975	1.763	0.0	0.0	0.0	1.32	286.0	238.7
1.006	50.00	8.47	19.875	1.808	0.0	0.0	0.0	3.35	725.7	244.8
6.000	50.00	5.92	23.300	0.000	0.0	0.0	0.0	1.03	18.2	0.0
6.001	50.00	6.07	22.625	0.335	0.0	0.0	0.0	2.26	89.9	45.4
6.002	50.00	6.48	21.875	0.635	0.0	0.0	0.0	1.39	153.5	86.0
6.003	50.00	6.61	21.675	0.987	0.0	0.0	0.0	2.77	305.9	133.6
6.004	50.00	6.71	21.175	1.011	0.0	0.0	0.0	3.34	369.1	136.9
6.005	50.00	7.04	20.400	1.038	0.0	0.0	0.0	1.27	202.3	140.6
6.006	50.00	7.34	20.300	1.068	0.0	0.0	0.0	2.51	399.8	144.7

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.000	16.146	0.100	161.5	0.091	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	16.146	0.200	80.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	15.161	0.100	151.6	0.451	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	15.161	0.200	75.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	120.013	1.250	96.0	0.052	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	18.144	0.050	362.9	0.139	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	19.312	0.100	193.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.000	50.00	5.34	20.000	0.091	0.0	0.0	0.0	0.79	13.9	12.3
7.001	50.00	5.58	19.900	0.091	0.0	0.0	0.0	1.12	19.8	12.3
8.000	50.00	5.20	20.000	0.451	0.0	0.0	0.0	1.27	90.1	61.1
8.001	50.00	5.34	19.900	0.451	0.0	0.0	0.0	1.81	127.8	61.1
1.007	50.00	9.44	19.700	3.471	0.0	0.0	0.0	2.08	330.0«	470.0
1.008	50.00	9.72	18.450	3.610	0.0	0.0	0.0	1.06	168.8«	488.8
1.009	50.00	10.07	18.400	3.610	0.0	0.0	0.0	0.94	37.3«	488.8

84 North Street
Guildford
GU1 4AU

Date 02/10/2020 09:14 | Designed by VictoriaBergHoldo
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Innovyze | Network 2019.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	33.000	1.300	Open Manhole	1200	1.000	31.700	150				
2	32.000	1.300	Open Manhole	1200	1.001	30.700	150	1.000	30.700	150	
3	27.000	1.300	Open Manhole	1200	1.002	25.700	150	1.001	25.700	150	
4	23.000	1.300	Open Manhole	1200	1.003	21.700	150	1.002	21.700	150	
5	24.000	1.500	Open Manhole	1200	2.000	22.500	100				
6	23.200	1.150	Open Manhole	1200	2.001	22.050	150	2.000	22.100	100	
7	23.000	1.650	Open Manhole	1200	2.002	21.350	150	2.001	21.350	150	
8	24.000	2.000	Open Manhole	1200	3.000	22.000	150				
9	24.000	2.500	Open Manhole	1200	3.001	21.500	150	3.000	21.500	150	
9	24.100	2.851	Open Manhole	1200	3.002	21.249	225	3.001	21.324	150	
10	23.400	2.251	Open Manhole	1200	3.003	21.149	225	3.002	21.149	225	
11	23.100	2.426	Open Manhole	1200	3.004	20.674	300	3.003	20.749	225	
12	23.000	2.550	Open Manhole	1200	3.005	20.450	300	3.004	20.450	300	
14	24.000	1.500	Open Manhole	1200	4.000	22.500	300				
15	23.500	2.100	Open Manhole	1200	4.001	21.400	300	4.000	21.400	300	
15	24.000	1.500	Open Manhole	1200	5.000	22.500	300				
17	23.500	2.100	Open Manhole	1200	5.001	21.400	300	5.000	21.400	300	
5	23.000	2.925	Open Manhole	1500	1.004	20.075	525	1.003	20.450	150	
								2.002	20.450	150	
								3.005	20.300	300	
								4.001	20.300	300	
								5.001	20.300	300	
5	22.000	2.025	Open Manhole	1500	1.005	19.975	525	1.004	19.975	525	
6	21.200	1.325	Open Manhole	1500	1.006	19.875	525	1.005	19.875	525	
7	24.900	1.600	Open Manhole	1200	6.000	23.300	150				
8	24.450	1.825	Open Manhole	1200	6.001	22.625	225	6.000	22.700	150	
9	23.000	1.125	Open Manhole	1350	6.002	21.875	375	6.001	22.025	225	
10	22.900	1.225	Open Manhole	1350	6.003	21.675	375	6.002	21.675	375	
11	22.400	1.225	Open Manhole	1350	6.004	21.175	375	6.003	21.175	375	
12	21.700	1.300	Open Manhole	1350	6.005	20.400	450	6.004	20.475	375	
13	21.300	1.000	Open Manhole	1350	6.006	20.300	450	6.005	20.300	450	
26	22.000	2.000	Open Manhole	1200	7.000	20.000	150				
29	21.400	1.500	Open Manhole	1200	7.001	19.900	150	7.000	19.900	150	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
27	22.000	2.000	Open Manhole	1200	8.000	20.000	300				
30	22.000	2.100	Open Manhole	1200	8.001	19.900	300	8.000	19.900	300	
7	20.800	1.199	Open Manhole	1500	1.007	19.700	450	1.006	19.601	525	
								6.006	19.625	450	
								7.001	19.700	150	
								8.001	19.700	300	
8	19.500	1.050	Open Manhole	1350	1.008	18.450	450	1.007	18.450	450	
9	19.050	0.650	Open Manhole	1350	1.009	18.400	225	1.008	18.400	450	
	19.000	0.700	Open Manhole	0		OUTFALL		1.009	18.300	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	455747.890	108218.079	455747.890	108218.079	Required	
2	455753.891	108233.964	455753.891	108233.964	Required	
3	455766.599	108259.733	455766.599	108259.733	Required	
4	455783.190	108285.855	455783.190	108285.855	Required	
5	455693.175	108344.806	455693.175	108344.806	Required	
6	455716.120	108348.336	455716.120	108348.336	Required	
7	455777.542	108315.154	455777.542	108315.154	Required	
8	455925.636	108231.218	455925.636	108231.218	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
9	455888.975	108206.782	455888.975	108206.782	Required	
9	455874.264	108211.725	455874.264	108211.725	Required	
10	455860.850	108221.609	455860.850	108221.609	Required	
11	455814.607	108244.554	455814.607	108244.554	Required	
12	455799.781	108271.382	455799.781	108271.382	Required	
14	455755.644	108300.067	455755.644	108300.067	Required	
15	455773.565	108301.698	455773.565	108301.698	Required	
15	455790.219	108253.967	455790.219	108253.967	Required	
17	455788.880	108264.327	455788.880	108264.327	Required	
5	455791.486	108303.328	455791.486	108303.328	Required	
5	455799.781	108320.802	455799.781	108320.802	Required	
6	455816.725	108343.747	455816.725	108343.747	Required	
7	456018.288	108254.085	456018.288	108254.085	Required	
8	455965.691	108276.324	455965.691	108276.324	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
9	455946.629	108283.031	455946.629	108283.031	Required	
10	455915.565	108296.445	455915.565	108296.445	Required	
11	455896.856	108307.035	455896.856	108307.035	Required	
12	455878.853	108317.272	455878.853	108317.272	Required	
13	455858.026	108331.745	455858.026	108331.745	Required	
26	455833.026	108325.587	455833.026	108325.587	Required	
29	455826.817	108340.491	455826.817	108340.491	Required	
27	455790.768	108350.009	455790.768	108350.009	Required	
30	455805.688	108352.703	455805.688	108352.703	Required	
7	455820.608	108355.396	455820.608	108355.396	Required	
8	455716.473	108415.053	455716.473	108415.053	Required	
9	455702.000	108425.996	455702.000	108425.996	Required	
	455695.999	108444.352			No Entry	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	User	-	100	0.047	0.047	0.047
1.002	User	-	100	0.067	0.067	0.067
1.003	User	-	100	0.061	0.061	0.061
2.000	User	-	100	0.034	0.034	0.034
2.001	User	-	100	0.069	0.069	0.069
2.002	User	-	100	0.040	0.040	0.040
3.000	User	-	100	0.081	0.081	0.081
3.001	User	-	100	0.033	0.033	0.033
3.002	User	-	66	0.203	0.134	0.134
	User	-	100	0.017	0.017	0.151
3.003	User	-	100	0.034	0.034	0.034
3.004	User	-	100	0.066	0.066	0.066
3.005	User	-	100	0.058	0.058	0.058
4.000	User	-	66	0.796	0.525	0.525
4.001	-	-	100	0.000	0.000	0.000
5.000	User	-	66	0.622	0.410	0.410
5.001	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.042	0.042	0.042
1.005	User	-	100	0.042	0.042	0.042
1.006	User	-	100	0.045	0.045	0.045
6.000	-	-	100	0.000	0.000	0.000
6.001	User	-	66	0.337	0.223	0.223
	User	-	100	0.113	0.113	0.335
6.002	User	-	66	0.409	0.270	0.270
	User	-	100	0.030	0.030	0.300
6.003	User	-	100	0.034	0.034	0.034
	User	-	66	0.481	0.318	0.351
6.004	User	-	100	0.024	0.024	0.024
6.005	User	-	100	0.027	0.027	0.027
6.006	User	-	100	0.030	0.030	0.030
7.000	User	-	66	0.138	0.091	0.091
7.001	-	-	100	0.000	0.000	0.000
8.000	User	-	66	0.684	0.451	0.451
8.001	-	-	100	0.000	0.000	0.000
1.007	User	-	100	0.052	0.052	0.052
1.008	User	-	100	0.117	0.117	0.117
	User	-	100	0.021	0.021	0.139
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				4.857	3.610	3.610

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009		19.000	18.300	18.325	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	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	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.300	Storm Duration (mins)	30
Ratio R	0.321		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 2.0

Unit Reference	MD-SHE-0105-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	105
Invert Level (m)	21.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0	Kick-Flo®	0.637	4.1
Flush-Flo™	0.296	5.0	Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.005, Volume (m³): 7.4

Unit Reference	MD-SHE-0098-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	19.975

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.005, Volume (m³): 7.4

Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0	Kick-Flo®	0.878	3.9
Flush-Flo™	0.431	4.9	Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Hydro-Brake® Optimum Manhole: 10, DS/PN: 6.003, Volume (m³): 5.3

Unit Reference	MD-SHE-0079-3000-1200-3000
Design Head (m)	1.200
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	21.675
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0	Kick-Flo®	0.707	2.4
Flush-Flo™	0.348	2.9	Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Hydro-Brake® Optimum Manhole: 10, DS/PN: 6.003, Volume (m³): 5.3

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Hydro-Brake® Optimum Manhole: 29, DS/PN: 7.001, Volume (m³): 2.0

Unit Reference	MD-SHE-0075-3000-1500-3000
Design Head (m)	1.500
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	19.900
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.0	Kick-Flo®	0.671	2.1
Flush-Flo™	0.329	2.6	Mean Flow over Head Range	-	2.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.7	3.000	4.1	7.000	6.1
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.3
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.5
0.400	2.6	1.800	3.3	4.500	5.0	8.500	6.7
0.500	2.5	2.000	3.4	5.000	5.2	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.2	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	5.9		

Hydro-Brake® Optimum Manhole: 30, DS/PN: 8.001, Volume (m³): 3.4

Unit Reference	MD-SHE-0104-5000-1100-5000
Design Head (m)	1.100
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	104
Invert Level (m)	19.900
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	5.0	Kick-Flo®	0.690	4.0
Flush-Flo™	0.323	5.0	Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	1.200	5.2	3.000	8.0	7.000	12.0
0.200	4.8	1.400	5.6	3.500	8.6	7.500	12.4
0.300	5.0	1.600	6.0	4.000	9.2	8.000	12.7
0.400	5.0	1.800	6.3	4.500	9.7	8.500	13.1
0.500	4.8	2.000	6.6	5.000	10.2	9.000	13.5
0.600	4.6	2.200	6.9	5.500	10.7	9.500	13.8
0.800	4.3	2.400	7.2	6.000	11.1		
1.000	4.8	2.600	7.5	6.500	11.5		

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.008, Volume (m³): 20.4

Unit Reference	MD-SHE-0215-2420-1100-2420
Design Head (m)	1.100
Design Flow (l/s)	24.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	215
Invert Level (m)	18.450
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.008, Volume (m³): 20.4

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	24.2	Kick-Flo®	0.786	20.6
Flush-Flo™	0.370	24.2	Mean Flow over Head Range	-	20.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.3	1.200	25.2	3.000	39.2	7.000	59.0
0.200	20.9	1.400	27.2	3.500	42.2	7.500	61.0
0.300	24.0	1.600	28.9	4.000	45.0	8.000	63.0
0.400	24.1	1.800	30.6	4.500	47.6	8.500	64.9
0.500	23.8	2.000	32.2	5.000	50.1	9.000	66.7
0.600	23.3	2.200	33.7	5.500	52.5	9.500	68.5
0.800	20.8	2.400	35.2	6.000	54.8		
1.000	23.1	2.600	36.5	6.500	56.9		

Storage Structures for Storm

Tank or Pond Manhole: 4, DS/PN: 1.003

Invert Level (m) 21.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	300.0	1.000	300.0

Tank or Pond Manhole: 14, DS/PN: 4.000

Invert Level (m) 22.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 15, DS/PN: 5.000

Invert Level (m) 22.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 5, DS/PN: 1.005

Invert Level (m) 19.975

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	720.0	1.000	720.0

Swale Manhole: 7, DS/PN: 6.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	57.1
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	95.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	23.300	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 8, DS/PN: 6.001

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	20.2
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	33.7
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	22.625	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 9, DS/PN: 6.002

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	33.8
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	169.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	21.950	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 10, DS/PN: 6.003

Invert Level (m) 21.675

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	580.0	1.000	580.0

Swale Manhole: 11, DS/PN: 6.004

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	20.7
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	29.6
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	21.250	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 12, DS/PN: 6.005

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	25.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	253.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	20.475	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Swale Manhole: 13, DS/PN: 6.006

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	44.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	88.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	20.375	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 26, DS/PN: 7.000

Invert Level (m) 20.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	0.300	200.0	0.310	0.0

Tank or Pond Manhole: 27, DS/PN: 8.000

Invert Level (m) 20.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	500.0	0.450	500.0	0.460	0.0

Swale Manhole: 7, DS/PN: 1.007

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0
Infiltration Coefficient Side (m/hr)	0.00000	Porosity	1.00

Swale Manhole: 7, DS/PN: 1.007

Invert Level (m)	19.700	Slope (1:X)	133.0
Base Width (m)	3.0	Cap Volume Depth (m)	0.000
Length (m)	140.0	Cap Infiltration Depth (m)	0.000
Side Slope (1:X)	3.0	Include Swale Volume	Yes

Tank or Pond Manhole: 8, DS/PN: 1.008

Invert Level (m) 18.450

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	110.0	0.500	110.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	1	+0%					31.700
1.001	2	15 Winter	1	+0%					30.727
1.002	3	15 Winter	1	+0%	100/15 Summer				25.746
1.003	4	240 Winter	1	+0%	100/15 Winter				21.767
2.000	5	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.555
2.001	6	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.143
2.002	7	15 Winter	1	+0%	100/15 Summer				21.418
3.000	8	15 Winter	1	+0%	30/15 Summer	100/15 Summer			22.083
3.001	9	15 Winter	1	+0%	30/15 Summer	100/15 Summer			21.603
3.002	9	15 Winter	1	+0%	30/15 Summer				21.410
3.003	10	15 Winter	1	+0%	30/15 Summer	100/15 Summer			21.299
3.004	11	15 Winter	1	+0%	30/15 Summer				20.818
3.005	12	15 Winter	1	+0%	30/15 Summer				20.630
4.000	14	30 Winter	1	+0%					22.584

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.123	0.000	0.07		5.3	OK	
1.002	3	-0.104	0.000	0.21		12.7	OK	
1.003	4	-0.083	0.000	0.05		2.0	OK	
2.000	5	-0.045	0.000	0.56		4.4	OK	4
2.001	6	-0.057	0.000	0.66		11.4	OK	6
2.002	7	-0.082	0.000	0.42		15.5	OK	
3.000	8	-0.067	0.000	0.57		10.4	OK	6
3.001	9	-0.047	0.000	0.81		14.1	OK	4
3.002	9	-0.064	0.000	0.86		30.5	OK	
3.003	10	-0.075	0.000	0.77		33.6	OK	4
3.004	11	-0.156	0.000	0.46		39.9	OK	
3.005	12	-0.120	0.000	0.66		45.2	OK	
4.000	14	-0.216	0.000	0.18		41.7	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	30 Winter	1	+0%	100/15 Summer				21.484
5.000	15	30 Winter	1	+0%					22.569
5.001	17	30 Winter	1	+0%	100/15 Summer				21.486
1.004	5	960 Winter	1	+0%	30/15 Summer				20.387
1.005	5	960 Winter	1	+0%	30/60 Winter				20.386
1.006	6	60 Winter	1	+0%					19.914
6.000	7	60 Winter	1	+0%					23.300
6.001	8	15 Winter	1	+0%	30/15 Summer				22.732
6.002	9	15 Winter	1	+0%	30/360 Winter				22.056
6.003	10	960 Winter	1	+0%	30/60 Winter				21.971
6.004	11	30 Winter	1	+0%					21.197
6.005	12	30 Winter	1	+0%					20.456
6.006	13	15 Winter	1	+0%					20.349
7.000	26	120 Winter	1	+0%	100/60 Summer				20.038
7.001	29	120 Winter	1	+0%	30/15 Winter				19.991
8.000	27	240 Winter	1	+0%	100/30 Winter	100/240 Winter			20.089
8.001	30	240 Winter	1	+0%	30/120 Summer	100/240 Winter			20.084
1.007	7	30 Winter	1	+0%					19.779
1.008	8	240 Winter	1	+0%	30/60 Winter	100/120 Winter			18.714
1.009	9	240 Winter	1	+0%					18.523

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	-0.216	0.000	0.18		41.7	OK	
5.000	15	-0.231	0.000	0.12		31.8	OK	
5.001	17	-0.214	0.000	0.18		31.8	OK	
1.004	5	-0.213	0.000	0.08		19.9	OK	
1.005	5	-0.114	0.000	0.02		4.9	OK	
1.006	6	-0.486	0.000	0.02		6.2	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	-0.118	0.000	0.46		37.2	OK	
6.002	9	-0.194	0.000	0.47		64.5	OK	
6.003	10	-0.079	0.000	0.01		2.7	OK	
6.004	11	-0.353	0.000	0.01		3.8	OK	
6.005	12	-0.394	0.000	0.04		6.2	OK	
6.006	13	-0.401	0.000	0.03		9.4	OK	
7.000	26	-0.112	0.000	0.15		1.9	OK	
7.001	29	-0.059	0.000	0.10		1.9	OK	
8.000	27	-0.211	0.000	0.06		4.8	OK	3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	-0.116	0.000	0.04		4.7	OK	3
1.007	7	-0.371	0.000	0.07		22.4	OK	
1.008	8	-0.186	0.000	0.15		19.5	OK	3
1.009	9	-0.102	0.000	0.58		19.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	30	+0%					31.700
1.001	2	15 Winter	30	+0%					30.748
1.002	3	15 Winter	30	+0%	100/15 Summer				25.787
1.003	4	240 Winter	30	+0%	100/15 Winter				21.837
2.000	5	15 Winter	30	+0%	30/15 Summer	100/15 Summer			23.157
2.001	6	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.799
2.002	7	15 Winter	30	+0%	100/15 Summer				21.464
3.000	8	15 Winter	30	+0%	30/15 Summer	100/15 Summer			23.174
3.001	9	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.673
3.002	9	15 Winter	30	+0%	30/15 Summer				22.386
3.003	10	15 Winter	30	+0%	30/15 Summer	100/15 Summer			22.090
3.004	11	15 Winter	30	+0%	30/15 Summer				21.141
3.005	12	1440 Winter	30	+0%	30/15 Summer				21.045
4.000	14	15 Winter	30	+0%					22.659

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.102	0.000	0.23		16.3	OK	
1.002	3	-0.063	0.000	0.64		39.6	OK	
1.003	4	-0.013	0.000	0.11		4.5	OK	
2.000	5	0.557	0.000	1.06		8.2	SURCHARGED	4
2.001	6	0.599	0.000	1.33		23.2	SURCHARGED	6
2.002	7	-0.036	0.000	0.91		33.6	OK	
3.000	8	1.024	0.000	1.01		18.6	SURCHARGED	6
3.001	9	1.023	0.000	1.53		26.9	SURCHARGED	4
3.002	9	0.912	0.000	1.71		61.0	SURCHARGED	
3.003	10	0.716	0.000	1.54		67.6	SURCHARGED	4
3.004	11	0.167	0.000	0.91		79.0	SURCHARGED	
3.005	12	0.295	0.000	0.11		7.7	SURCHARGED	
4.000	14	-0.141	0.000	0.54		128.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	15 Winter	30	+0%	100/15 Summer				21.558
5.000	15	15 Winter	30	+0%					22.629
5.001	17	15 Winter	30	+0%	100/15 Summer				21.564
1.004	5	1440 Winter	30	+0%	30/15 Summer				21.044
1.005	5	1440 Winter	30	+0%	30/60 Winter				21.042
1.006	6	15 Winter	30	+0%					19.944
6.000	7	60 Winter	30	+0%					23.300
6.001	8	15 Winter	30	+0%	30/15 Summer				22.939
6.002	9	1440 Winter	30	+0%	30/360 Winter				22.339
6.003	10	1440 Winter	30	+0%	30/60 Winter				22.338
6.004	11	15 Winter	30	+0%					21.220
6.005	12	15 Winter	30	+0%					20.500
6.006	13	15 Winter	30	+0%					20.385
7.000	26	120 Winter	30	+0%	100/60 Summer				20.095
7.001	29	120 Winter	30	+0%	30/15 Winter				20.084
8.000	27	240 Winter	30	+0%	100/30 Winter	100/240 Winter			20.245
8.001	30	240 Winter	30	+0%	30/120 Summer	100/240 Winter			20.240
1.007	7	15 Winter	30	+0%					19.833
1.008	8	120 Winter	30	+0%	30/60 Winter	100/120 Winter			18.997
1.009	9	120 Winter	30	+0%					18.541

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	-0.142	0.000	0.54		127.7	OK	
5.000	15	-0.171	0.000	0.38		99.0	OK	
5.001	17	-0.136	0.000	0.57		99.0	OK	
1.004	5	0.444	0.000	0.12		30.2	SURCHARGED	
1.005	5	0.542	0.000	0.02		4.9	SURCHARGED	
1.006	6	-0.456	0.000	0.04		16.5	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	0.089	0.000	1.08		87.6	SURCHARGED	
6.002	9	0.089	0.000	0.08		10.3	SURCHARGED	
6.003	10	0.288	0.000	0.01		2.9	SURCHARGED	
6.004	11	-0.330	0.000	0.03		10.3	OK	
6.005	12	-0.350	0.000	0.11		18.9	OK	
6.006	13	-0.365	0.000	0.08		28.3	OK	
7.000	26	-0.055	0.000	0.21		2.7	OK	
7.001	29	0.034	0.000	0.13		2.4	SURCHARGED	
8.000	27	-0.055	0.000	0.07		5.2	OK	3

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	0.040	0.000	0.05		5.0	SURCHARGED	3
1.007	7	-0.317	0.000	0.18		58.3	OK	
1.008	8	0.097	0.000	0.18		24.1	SURCHARGED	3
1.009	9	-0.084	0.000	0.72		24.1	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.336
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Winter	100	+40%					31.700
1.001	2	15 Winter	100	+40%					30.767
1.002	3	15 Winter	100	+40%	100/15 Summer				26.216
1.003	4	240 Winter	100	+40%	100/15 Winter				21.979
2.000	5	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.001
2.001	6	15 Winter	100	+40%	30/15 Summer	100/15 Summer			23.205
2.002	7	15 Winter	100	+40%	100/15 Summer				22.041
3.000	8	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.010
3.001	9	15 Winter	100	+40%	30/15 Summer	100/15 Summer			24.002
3.002	9	15 Winter	100	+40%	30/15 Summer				24.070
3.003	10	15 Winter	100	+40%	30/15 Summer	100/15 Summer			23.403
3.004	11	15 Winter	100	+40%	30/15 Summer				22.102
3.005	12	1440 Winter	100	+40%	30/15 Summer				21.971
4.000	14	15 Winter	100	+40%					22.762

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.00		0.0	OK	
1.001	2	-0.083	0.000	0.41		29.6	OK	
1.002	3	0.366	0.000	1.04		64.5	SURCHARGED	
1.003	4	0.129	0.000	0.12		4.9	SURCHARGED	
2.000	5	1.401	0.764	1.41		10.9	FLOOD	4
2.001	6	1.005	5.209	1.56		27.2	FLOOD	6
2.002	7	0.541	0.000	1.04		38.8	SURCHARGED	
3.000	8	1.860	10.306	1.87		34.4	FLOOD	6
3.001	9	2.352	1.917	2.05		35.9	FLOOD	4
3.002	9	2.596	0.000	2.44		87.3	FLOOD RISK	
3.003	10	2.029	2.744	2.02		88.4	FLOOD	4
3.004	11	1.128	0.000	1.31		112.8	SURCHARGED	
3.005	12	1.221	0.000	0.19		13.0	SURCHARGED	
4.000	14	-0.038	0.000	0.89		212.3	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.001	15	1440 Winter	100	+40%	100/15 Summer				21.971
5.000	15	15 Winter	100	+40%					22.700
5.001	17	15 Winter	100	+40%	100/15 Summer				22.216
1.004	5	1440 Winter	100	+40%	30/15 Summer				21.969
1.005	5	1440 Winter	100	+40%	30/60 Winter				21.967
1.006	6	15 Winter	100	+40%					19.971
6.000	7	60 Winter	100	+40%					23.300
6.001	8	15 Winter	100	+40%	30/15 Summer				23.245
6.002	9	1440 Winter	100	+40%	30/360 Winter				22.873
6.003	10	1440 Winter	100	+40%	30/60 Winter				22.871
6.004	11	15 Winter	100	+40%					21.232
6.005	12	15 Winter	100	+40%					20.530
6.006	13	15 Winter	100	+40%					20.410
7.000	26	120 Winter	100	+40%	100/60 Summer				20.201
7.001	29	120 Winter	100	+40%	30/15 Winter				20.190
8.000	27	360 Winter	100	+40%	100/30 Winter	100/240 Winter			22.018
8.001	30	360 Winter	100	+40%	30/120 Summer	100/240 Winter			22.011
1.007	7	15 Winter	100	+40%					19.879
1.008	8	240 Winter	100	+40%	30/60 Winter	100/120 Winter			19.600
1.009	9	960 Summer	100	+40%					18.541

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	15	0.271	0.000	0.07		16.8	SURCHARGED	
5.000	15	-0.100	0.000	0.68		179.3	OK	
5.001	17	0.516	0.000	1.03		177.9	SURCHARGED	
1.004	5	1.369	0.000	0.21		52.9	SURCHARGED	
1.005	5	1.467	0.000	0.02		5.7	FLOOD RISK	
1.006	6	-0.429	0.000	0.08		30.3	OK	
6.000	7	-0.150	0.000	0.00		0.0	OK	
6.001	8	0.395	0.000	1.21		98.9	SURCHARGED	
6.002	9	0.623	0.000	0.10		13.9	FLOOD RISK	
6.003	10	0.821	0.000	0.01		3.0	FLOOD RISK	
6.004	11	-0.318	0.000	0.06		17.6	OK	
6.005	12	-0.320	0.000	0.18		31.3	OK	
6.006	13	-0.340	0.000	0.13		47.9	OK	
7.000	26	0.051	0.000	0.21		2.8	SURCHARGED	
7.001	29	0.140	0.000	0.14		2.6	SURCHARGED	
8.000	27	1.718	1.648	0.19		14.3	FLOOD	3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	30	1.811	11.479	0.06		6.8	FLOOD	3
1.007	7	-0.271	0.000	0.32		100.3	OK	
1.008	8	0.700	10.969	0.18		24.1	FLOOD	3
1.009	9	-0.084	0.000	0.72		24.1	OK	

Appendix J

Southern Water records

Southern Water

Motion
84
North Street
Guildford
Surrey
GU1 4AU

Your ref	funtley
Our ref	367511
Date	17 January 2020
Contact	searches@southernwater.co.uk Tel 0845 272 0845 0330 303 0276 Fax 01634 844514

Attention: Victoria Berg Holdo

Dear Customer

Re: **Provision of public sewer record extract**

Location: **Land south of Funtley Road, Funtley, Hampshire, PO15 6DW**

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

Motion
North Street
Guildford
Surrey
GU1 4AU

VAT registration number: 813 0378 56
Order reference: 367511
Your reference: funtley

Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
Land south of Funtley Road Funtley Hampshire PO15 6DW	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	**Paid in full**

Thank you for your payment:

Received on: 15 January 2020

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:

Tel: 0845 270 0212
0330 303 0276 (individual consumers)

Email: searches@southernwater.co.uk

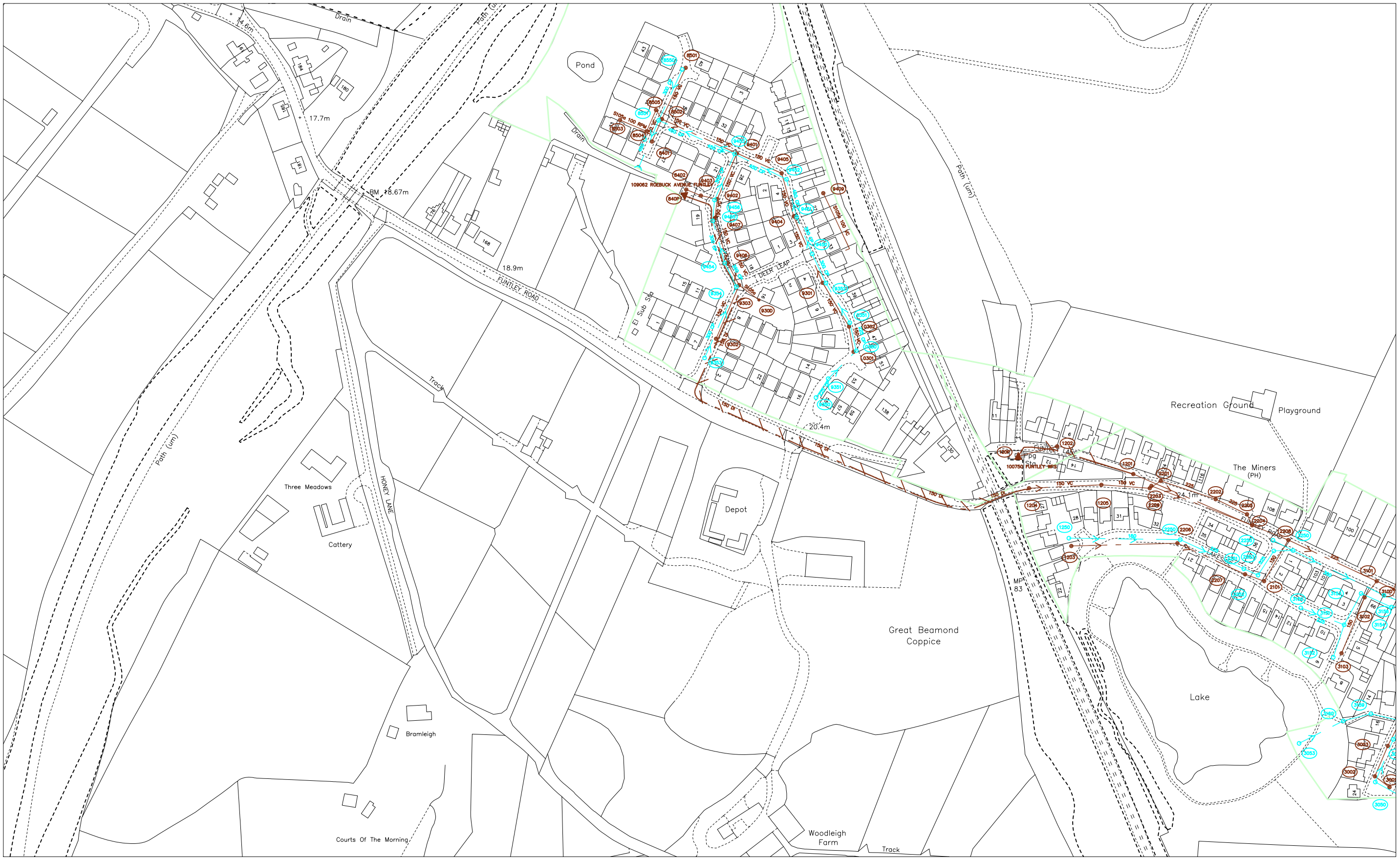
Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA

Southern Water

SEWER RECORDS PAGE 1 OF 2

108589



108011

455430

456370

O.S. REF. SU5508SE	Drawn by: rohandas	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may Include Bonded Asbestos Cement
	Scale: 1:2500	
Title: 367511_Land south of Funtley R	Date: 17/01/2020	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

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Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape
0301X	19.19	17.02	150	VC	CIRC
0302X	18.7	16.65	150	VC	CIRC
0350X	19.24	17.58	225	CP	CIRC
0351X	18.7	17.15	300	CP	CIRC
1201X	22.693	21.153	UNK	UNK	CIRC
1202X	20.717	19.621	UNK	UNK	CIRC
1203X	23.4	22.1	UNK	UNK	CIRC
1204X			150	VC	CIRC
1205X			150	VC	CIRC
120PX			OTHER	PE	CIRC
1250X	23.48	22.38	150	UNK	CIRC
2101X	22.88	21.15	150	UNK	CIRC
2201X	23.452	21.938	225	UNK	CIRC
2202X	24.009	21.341	225	UNK	CIRC
2203X	23.218	22.184	UNK	UNK	CIRC
2204X	23.605		UNK	UNK	CIRC
2205X	23.729	20.829	UNK	UNK	CIRC
2206X	23.15	21.62	UNK	UNK	CIRC
2207X	22.96	21.2	UNK	UNK	CIRC
2208X	23.04		225	UNK	CIRC
2209X			150	VC	CIRC
2250X	23.13	21.87	225	UNK	CIRC
2251X	23.07	21.36	UNK	UNK	CIRC
2252X	22.91	21.26	525	UNK	CIRC
2253X	23.01	21.12	UNK	UNK	CIRC
2255X			UNK	UNK	CIRC
3001X	22.625	20.595	UNK	UNK	CIRC
3002X	22.485	20.481	UNK	UNK	CIRC
3003X	22.611	20.295	UNK	UNK	CIRC
3050X	22.455	20.723	UNK	UNK	CIRC
3051X	22.636	20.555	UNK	UNK	CIRC
3053X	22.022	20.805	UNK	UNK	CIRC
3101X	21.606		225	UNK	CIRC
3102X	22.03	20.21	UNK	UNK	CIRC
3103X	22.35	20.84	150	UNK	CIRC
310DX			225	UNK	CIRC
3150X	22.56	21.17	225	UNK	CIRC
3151X	22.24	20.89	UNK	UNK	CIRC
3152X	22.37	21.35	UNK	UNK	CIRC
3153X	21.93	20.49	UNK	UNK	CIRC
3154X	21.41	20.16	UNK	UNK	CIRC
3156X			UNK	UNK	CIRC
3159X	22.652	20.483	UNK	UNK	CIRC
3160X	22.568	20.621	UNK	UNK	CIRC
3250X	22.82	21.02	300	UNK	CIRC
8401X	16.74	15.01	150	VC	CIRC
8402X	16.64	14.16	150	VC	CIRC
840PX			150	DI	CIRC
8501X	17.18	15.18	150	VC	CIRC
8502X	16.97	14.92	150	VC	CIRC
8503X			100	RPM	CIRC
8504X			100	RPM	CIRC
8505X			100	RPM	CIRC
8550X	17.19	15.94	300	CP	CIRC
8551X	16.96	15.36	450	CP	CIRC
9301X	18.25	16.37	150	VC	CIRC
9302X	18.85	16.93	150	VC	CIRC
9303X	18.5	16.52	150	VC	CIRC
930DX			UNK	UNK	CIRC
9350X	19.55	17.97	225	CP	CIRC
9351X	19.27	17.79	225	CP	CIRC
9352X	18.32	16.9	300	CP	CIRC
9353X	18.99	17.42	300	CP	CIRC
9354X	18.53	16.96	300	CP	CIRC
9401X	17.62	14.56	150	VC	CIRC
9402X	17.25	14.32	150	VC	CIRC
9403X	17.3	14.24	150	VC	CIRC
9404X	17.41	15.58	150	VC	CIRC
9405X	17.36	15.03	150	VC	CIRC
9406X	17.96	16.36	150	VC	CIRC
9407X	17.3	15.62	150	VC	CIRC
9450X	17.84	16.7	300	CP	CIRC
9451X	17.47	16.27	450	CP	CIRC
9452X	17.37	15.89	450	CP	CIRC
9453X	14.64	15.56	450	CP	CIRC
9454X	17.93	16.53	300	CP	CIRC
9455X	17.29	16.19	300	CP	CIRC
9456X	17.26	15.96	300	CP	CIRC

LINE STYLES / COLOURS

- Brown — Foul
- Foul Syphon Sewer
- Foul Vacuum Main
- Foul Rising Main
- Red — Combined
- Combined Syphon Sewer
- Combined Rising Main
- Lateral Drain
- Orange — Building Over Agreement Area
- Dark Blue — Treated Effluent
- Purple — Sludge
- Sewer Catchment
- Section 104 Area
- Light Blue — Surface Water
- Surface Water Rising Main
- Yellow — Private
- Green — Access Shaft
- Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

- Manhole (SW)
- Manhole (F&C)
- Lamp hole (SW)
- Lamp hole (F&C)
- Pumping Station (SW)
- Pumping Station (F&C)
- Side entry manhole (SW)
- Side entry Manhole (F&C)
- Blind shaft (SW)
- Blind shaft (F&C)
- Ejector station (SW)
- Ejector station (F&C)
- Watertight door (SW)
- Watertight door (F&C)
- Flushing ch. Mn-e (SW)
- Flushing ch. Mn-e (F&C)
- Flushing ch. No-e (SW)
- Flushing ch. No-e (F&C)
- Demarcation Chamber
- Washout (SW)
- Washout (F&C)
- Rodding Eye (SW)
- Rodding Eye (F&C)
- Gauging point (SW)
- Gauging point (F&C)
- Intercept chamber (SW)
- Intercept chamber (F&C)
- Storm Tank (SW)
- Storm Tank (F&C)
- Vortex chamber (SW)
- Vortex chamber (F&C)
- Label ellipse
- Dummy/S24 manhole
- Outfall
- Penstock chamber
- Damboards
- Storm Overflow
- Backdrop manhole
- Other (s)
- Other
- Change in sewer (s)
- Change in sewer
- Reflux valve
- Flap valve
- Cascade
- Anode
- Valve
- Closed Valve
- Air Valve
- Hatch box (SW)
- Hatch box (F&C)
- Direction arrow
- Emptying valve
- Catchpit
- Soakaway
- Inlet
- Balancing Pond
- Wastewater treatment works
- Marine treatment works
- Outfall headworks
- Vent
- Vent column
- Tidal storage tank
- Blank end
- Head of Public Sewer
- Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

- 1st digit: hundred metre easting identifier
- 2nd digit: hundred metre northing identifier
- 3rd digit: sewer type identifier
  - 0-4 = Foul/Combined
  - 5-9 = Surface Water
- 4th digit: next sequential node

Drawn by:	rohandas
Title:	367511_Land south of Funtley R
Date:	17/01/2020

Southern Water

Appendix K

Exceedance Plan

Key:

Exceedance Flow Direction

Exceedance Storage Area

Revision Notes: | Drn | Chk | App | Date

Drawing Status:

motion

84 North Street
Guildford
Surrey
GU1 4AU

T: 01483 531 300

Cargo Works
1-2 Hatfields
London
SE1 9PG

T: 020 8065 5208

www.motion.co.uk

Client:
Reside Developments Limited

Project:
Land South of Funtley Road, Funtley

Title:
Exceedance Route Plan

Scale: 1:1000	Size: A1	Date: 2020-09-30
Drawn:SM	Chk'd: VBH	Appr'd:NJ

Drawing: 1912032-0500-03 | Revision: A

N:\Projects\1xrf\xn 1912032\Drawings\1912032-0500-03 A Exceedance Route Plan.dwg

Report presented by

Reside Developments Ltd
The Dutch House
132-134 High Street
Dorking RH4 1BG

Telephone: 01306 877500
Email: amunton@residedevelopments.co.uk
residedevelopments.co.uk