

**New Lane, Stanbridge
Road**

Havant

**Flood Risk
Assessment &
Drainage Strategy
Report**

Project Ref: **13383**

Report Ref: **R100**

Fifth Issue

August 2023

Client:

Hellier Langston

**Baynham Meikle
Partnership Limited**



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REPORT STATUS

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Report Type	Flood Risk Assessment & Outline Drainage Strategy
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1 Introduction

- 1.1.1 Baynham Meikle Partnership Limited has been commissioned by Hellier Langston to prepare a Flood Risk Assessment and Drainage Strategy to support the full planning application for a new development on the site off of New Lane, Havant.
- 1.1.2 The Flood Risk Assessment will be part of a Full planning application to be made to Havant Council.
- 1.1.3 The proposed development is for a planning application comprising the construction of commercial units with associated yards, car parking and landscaping.
- 1.1.4 The development lies entirely within Flood Zone 1 where there is a low probability of fluvial flooding occurring. New Lane Road, running parallel to the sites north west boundary is identified within Flood Zone 2.
- 1.1.5 A product 4 information pack has been requested from the EA, once received this report will be updated to suit.
- 1.1.6 This Flood Risk Assessment follows government and local guidance on development and flood risk (National Planning Policy Framework NPPF¹) and is undertaken in consultation with the relevant bodies.
- 1.1.7 It is a requirement for development applications to consider the potential risk of flooding to the proposed development over its expected lifetime and any possible impacts on flood risk elsewhere in terms of its effects on flood flows and run off.
- 1.1.8 The following aspects of flood risk should be addressed in all planning applications in flood risk areas:
- The area liable to flooding.
 - The probability of flooding occurring now and over time.
 - The extent and standard of existing flood defences and their effectiveness over time.
 - The rates of flow likely to be involved.
 - The likelihood of impacts to other areas, properties and habitats.
 - The effects of climate change which currently requires designs to include 1 in 100 - year rainfall events + 40% climate change allowance.
 - The nature and current expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

¹ Communities and Local Government, July 2021, National Planning Policy Framework (NPPF)

2 Site Location and Description

2.1.1 The development site is located off Stanbridge Road, circa 200m west of the railways lines. The Ordnance Survey National Grid reference to the centre of the site is E472561, N107451.

A site location Plan and aerial view can be found in Appendix A.

The site comprises of commercial units, service yard, carparking and landscaping.

2.1.2 The neighbouring land use is as follows:

- **North** New Lane, beyond which there are residential properties, and Stanbridge Road, with industrial units beyond.
- **East** New Lane, with residential properties beyond.
- **South** Commercial Units
- **West** Commercial unit, with railway line beyond.

2.1.3 The site slopes gradually from the east towards the west from approximately 16.65 mAOD to 15.75 mAOD.

2.1.4 The site is regular in shape and occupies a total area of 0.987Ha.

2.1.5 Access to the site will be via Stanbridge Road.

2.1.6 A Topographical Survey can be found in Appendix B.

3 Development Proposals

- 3.1.1 The proposed application is the Erection of an commercial units together with associated service yards, car parking, landscaping, and other associated works. A copy of the site's layout plan can be found in Appendix B.
- 3.1.2 The proposed development will have a total impermeable area of 0.853ha and permeable area of 0.134ha.
- 3.1.3 The proposed site levels have been designed such that they follow the approved contours of the existing site to prevent the requirement for any new retaining walls and also adhere to best practice and building regulation design standards.
- 3.1.4 The proposed development will also minimise any potential for surface water flooding from the new development drainage network and ensure that should any flooding occur it is controlled and kept within the new development demise and not affect neighbouring properties or highway land.

4 Existing Ground Conditions

4.1 Site Geology and Hydrology

- 4.1.1 At the time of writing the report there was no site-specific investigation report available. To understand the sites ground conditions, ground investigation information was used from the neighbouring site to the east – Velocity, as well as available information on British Geology Survey (BGS) website.

4.2 Ground Conditions

4.2.1 Ground Geology

A phase 1/2 Geo-Environmental Assessment was carried out at the Velocity site in February 2015 by Delta Simons.

The report concluded that the identified ground conditions across the site consisted of Made Ground up to 1.5m bgl overlaid on non-continuous firm / stiff Head Deposits over River Terrace Deposits – at an average depth of 2.0m bgl, and the solid geology comprising of a London Clay Formation.

A copy of the site investigation borehole data is appended to the report.

4.2.2 Hydrogeology

Groundwater Vulnerability Map produced by the MAGIC Map indicates that the site is in a Low Aquifer Zone.

The site is also indicated to be located in a Source Protection Zone, Zone I – Subsurface activity.

Groundwater was recorded as being stuck in all the boreholes. Post investigation monitoring found the water level to be typically 4.0m bgl within the River Terrace Gravels and London Clay Formation. Therefore, this will be considered in terms of positioning the new proposed soakaway units, discussed later in this report.

4.2.3 Soakaway Design

The site-specific soakaway tests have not been carried out at the time of writing this report. However, the neighbouring site to the east (next plot – Velocity) had a full site investigation carried out in February 2015 which confirmed good infiltration rates varying between 3.76×10^{-4} m/s to 6.41×10^{-5} m/s.

The proposed drainage system has been designed to the lowest confirmed infiltration rate of 6.41×10^{-5} m/s (0.23m/hr).

It is expected that the ground conditions at the proposed site development will be the same as Velocity site (BGS information suggests the same), therefore, infiltration rates are likely to be the same.

However, the calculations as well as this report are to be reviewed once a site specific ground investigation has been carried out.

Refer to appended borehole logs and infiltration rates calculations within appendix D.

4.2.4 Hydrology (surface water features)

The nearest watercourse is an unnamed watercourse located to the northwest, west and south west of the site, running to the west of New Lane.

The unnamed watercourse is an EA Statutory Main River.

The unnamed watercourse is approximately 18m northwest and west of the site.



Bridge Lake is located approximately 2.11km south of the site.

There are no surface water abstractions listed within 250m of the site.

5 Consultation and Policy

5.1 Drainage Authority

5.1.1 The sewerage service for the area is provided by Southern Water. There are existing public storm and foul water sewers within Stanbridge Road and New Lane.

5.1.2 Additional note:

Since 1st October 2011 many private sewers have been transferred into the ownership of the water authority as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.

5.2 Lead Local Flood Authority

5.2.1 The Lead Local Flood Authority (LLFA) is Hampshire County Council.

5.2.2 East Hampshire District have published a Level 1 Strategic Flood Risk Assessment² which define flooding and drainage requirements.

5.2.3 The purpose of the Level 1 SFRA is to collate and analyse the most up to date flood risk information for use by EHDC to inform the development of the Local Plan, and to inform site-specific flood risk assessments. The SFRA will assess the risks now and in the future from all types of flooding in accordance with the NPPF1 and PPG2. The SFRA will build on existing hydraulic modelling and available information.

5.3 Environment Agency

5.3.1 Coastal/Rivers

Tidal or flooding from rivers is considered 'very low' risk for the site. Refer to the EA Map showing the effect of flooding from rivers and the sea in Appendix A of this report. This map shows the possible extent of fluvial flooding for the 1 in 100 year flood (which would have a 1% probability of being exceeded each year). In this scenario there is a less than 0.1% chance of flooding within the site.

5.3.2 Reservoirs

It is considered 'very low' risk for the site. Refer to the EA Map showing the effect of flooding from reservoirs in Appendix A of this report.

² East Hampshire District Council, Level 1 Strategic Flood Risk Assessment, May 2022.

5.3.3 Surface Water

The full extent of the existing site is brownfield and drains into existing drainage on site. Therefore the proposed development will not be increasing the likelihood of flooding from surface water. The attached EA map shows the site to be at 'very low' risk of flooding from surface water. The development incorporates soakaways which will reduce the impact on the public sewers.

5.4 Applicable Policy

5.4.1 Applicable Planning Policy

Planning Practice Guidance to the National Planning Policy Framework (NPPF) was introduced in March 2014 and was most recently updated in July 2021; it deals specifically with development planning zones. All plans should apply a sequential, risk-based approach to the location of the development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.

The aim of the sequential test is to steer new developments to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.

6 Flood Risk

- 6.1.1 In line with the latest NPPF guidance an appraisal was made of the site and surrounding areas to assess the potential risk of flooding at the site from the various sources:
- 6.1.2 Sea (Tidal) and River (Fluvial) – The site is not located in the vicinity of the coast, and is therefore not at risk of flooding due to Tidal Flows. There's an EA main river to the north west of the site that is indicated to be a source of flooding. A product 4 data has been requested from the EA and this report will be updated to suit the findings.
- 6.1.3 Surface (Pluvial) – Flood Map Data indicate that the site is in Flood Zone 1 – Low probability of flooding. The buildings ground floor levels will be set 150mm above surrounding ground levels.
- 6.1.4 Sewers – there has not been any historical risk of flooding from sewers located in the vicinity of the site. The proposed drainage will be designed in accordance with best practice and industry guidance; there will be negligible risk of flooding from sewers.
- 6.1.5 Groundwater – the BGS data indicates the site does lie within a ground water Source Protection Zone, Zone I – Subsurface activity.
- 6.1.6 Artificial Sources – There are no major artificial water sources such as canals, reservoirs or water tanks within the vicinity of the site, and therefore there is no flood risk due to artificial sources.

Table 4 – Flood Risk Assessment Summary

Aspects of Flood Risk	Assessment/Comment
Area liable to flooding	The development site lies almost entirely within Flood Zone 1 of the Environment Agency Flood Zone Map.
Probability of flooding occurring	Flooding from surface water at the site will be considered during the level and drainage design.
Standard of existing flood defences and their effectiveness	N/A
Likely depth of flooding	N/A
Rates of flow likely to be involved	N/A
Likelihood of impacts to other areas, properties and habitats	Any increase in the surface area, SuDS will be used for surface water management.
Effects of climate	The effects of climate change on flooding at the site are likely to be limited, due to the use of SuDS techniques and the system will be designed for 1 in 100 year storm event plus 40% climate change.

6.1.7 Sequential Test

The Sequential Test is intended to take into account all sources of flood risk and the current and future impacts of climate change, to avoid flood risk to people and property.

As the development extents of the site are within Flood Zone 1 and is in the Less Vulnerable category, the development can be considered appropriate for the proposed use, and therefore passes the Sequential Test.

6.1.8 Exception Test

The Exception Test is not required as the site is located within Flood Zone 1 and passes the Sequential Test.

7 Sustainable Drainage Proposals

7.1 Storm Water Management and SuDS

- 7.1.1 Sustainable Drainage Systems (SuDS) involve the management of storm water from developments effectively in order to reduce the impact of run-off both to the site in question and properties downstream, and not to exacerbate existing problems. This is achieved by not increasing peak flows that will otherwise result from the development. The philosophy of SuDS is to mimic as closely as possible, the natural drainage from a site before development, and to ensure that storm water runoff is treated so there is no detriment to water quality of the receiving watercourse.
- 7.1.2 Using SuDS may provide water quantity and quality control, as well as increased amenity value. Appropriately designed and maintained schemes may improve the sustainable water management at the site by:
- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream.
 - Reducing the volume, rate of discharge, and the frequency of water flowing directly to watercourses or sewers from the developed sites.
 - Improving water quality compared with conventional surface water sewers by removing pollutants.
- 7.1.3 The following section represents the considered views on suitable SuDS options appropriate to this site both as part of the detailed infrastructure scheme and outline illustrative masterplan. CIRIA C753³ The SuDS Manual was consulted to examine the use of SuDS on this site. Conclusions are based on the assessment of the site and the evaluation of the relevant design requirements and regulatory consultation.

7.2 Potential SuDS Techniques Considered for this Site

7.2.1 Green Roofs

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows.

Cost to the structure can be considerable and poor maintenance will leave it looking unsightly.

Not recommended

7.2.2 Soakaways

Soakaways are square or circular excavations either filled with rubble or lined with brickwork, precast concrete or polyethylene rings/perforated storage structures surrounded by granular backfill. They can be grouped and linked together to drain large areas including highways. The supporting structure and backfill can be substituted by modular geocellular units. Soakaways provide storm water attenuation, storm water treatment and groundwater recharge.

Soakaway tests have not been carried out at the time of writing this report. However, ground investigation report has been carried out on the neighbouring plot – Velocity and confirmed good

³ CIRIA, 2016. The SuDS Manual C753

infiltration rates, therefore, we have used the lowest confirmed infiltration rate of 0.23m/hr for design purposes at this stage. Upon receipt of the site-specific ground investigation report and soakaway testing results, the drainage strategy will be reviewed and amended accordingly.

Recommended and proposed for the site.

7.2.3 Swales

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, thus providing effective pollutant removal. Roadside swales can replace conventional gullies and drainage pipes.

Due to insufficient space on site, swales have not been incorporated into the landscape design.

Not Recommended.

7.2.4 Pervious Pavements

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored between infiltration to the ground, reuse or discharge to a watercourse or other drainage system. Pavements with aggregate sub-bases can provide good water quality treatment.

Recommended and proposed for the site.

7.2.5 Geo-cellular/Modular Systems

Modular plastic geo-cellular systems with a high void ratio that can be used to create a below ground storage structure.

Modular tanks can be used for runoff attenuation but requires silt trap protection and a suitable means of access for cleaning and inspection.

Recommended and proposed for the site.

7.2.6 Ponds/Infiltration Basin

Ponds can provide both storm water attenuation and treatment. They are designed to support emergent and submerged aquatic vegetation along their shoreline. Run off from each rain event is detained and treated in the pool. The retention time promotes removal through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations.

Due to insufficient space on site, Ponds/Infiltration basins have not been incorporated into the landscaping design.

Not Recommended.

7.3 Sustainable Drainage Maintenance

7.3.1 The various SuDS features will remain privately owned and be maintained by the Development's Maintenance team. The exact details of this arrangement will be defined with the future development.

7.3.2 The SuDS operation and maintenance strategy will be in accordance with CIRIA C753 best practice, as tabled below:

Table 5 – SuDS Operation and Maintenance Requirements

Routine maintenance	Inspect flow control chamber for evidence of poor operation.	Monthly for 3 months then annually.
	Remove debris from catchment surface.	Monthly
	Remove sediment from catch-pits, flow control sumps, swales and ponds. Remove oil and silt from interceptors.	Annually, or as required by inspection
Remedial actions	Replace malfunctioning flow control parts.	As required
Monitoring	Inspect all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey and clear main attenuation pond.	Annually
	Survey inside of attenuation tanks for sediment build up and remove if necessary.	Every 5 years or as required by inspection.

Suds Maintenance plan has also been appended to this report, refer to Appendix D.

8 Drainage Strategy – Surface Water

8.1 Drainage Strategy

- 8.1.1 In accordance with LLFA guidance, surface water discharge should be via natural means before consideration of discharge to a sewer network. It has therefore been proposed that the site will discharge via a means of infiltration.

8.2 Proposed Surface Water Strategy

- 8.2.1 Taking onboard some of the techniques previously discussed we therefore propose to incorporate the following features within the storm drainage system:

- Provide a gravity pipe drainage system to discharge to suitable sized cellular soakaways / infiltration trenches.
- Cellular infiltration tanks to provide adequate underground storage volume.
- Underground storage is to be designed such that no surcharging occurs at the 1 in 1 year Surcharging will occur in dummy pipes which need to be modelled in windes, no flooding at 1 in 30 years storm event and managed flooding for the 100 year plus climate change (if any occurred).
- If required allow external contained landscaping and car parking areas to flood to a maximum depth of 100mm

The above are illustrated on the drainage strategy plan 13383 / 103 within appendix B.

8.2.2 Discharge Rates

Re-charge rates back into the existing ground will be governed by infiltration rates of the natural underlying strata.

8.2.3 Design Analysis

We have carried out a full suite of storm simulations and for different return periods and durations and these are all appended to this report.

The storm return periods that have been simulated are:

1 in 1 year

1 in 30 year

1 in 100 year + 40% for climate change

Duration tested ranged between:

15 minutes through to 1440 minutes for both the winter and summer profiles.

The simulation results show that the design is compliant with the criteria within the drainage system such that no surcharging is observed for 1 in 1 year, no flooding for 1 in 30 and nominal level of flooding for 1 in 100 years storm events + 40% climate change.

The designed nominal level of flooding:

Designed flooding ranges between 0.078m³ – 2.566m³ with the critical storm event being 120min winter duration for the 1 in 100 year plus climate change storm.

For calculations refer to Appendix C.

8.2.4 Design Analysis for Exceedance Storm Event

Furthermore, the Microdrainage calculations have been carried out for the exceedance storm event of 1 in 200 years plus climate change. The calculations have confirmed the approximate volume of flooding on site which would be contained within the proposed access road and new car parking areas. For flood routing plan as well as calculations for exceedance event refer to appendices.

8.3 Treatment and Management Train

A surface water treatment and management train begins with source control and uses surface conveyance wherever possible to link subsequent SUDS components in series. It provides potential for interception losses along its whole length as well as infiltration, evaporation and transpiration through the leaves of vegetation. The management train reduces the rate at which the run off flows though the site and provides treatment as it passes through each SUDS component.

SUDS components within the management train are as follow:

Source control:

Permeable surfaces: a soft landscaping strategy has been incorporated into scheme which contributes to limiting the developments impermeable areas.

Swales: swales have not been incorporated into the drainage strategy due to limited space on site, however, other SuDS features have been introduced which were described in above sections.

Rainwater harvesting: Rainwater harvesting will be disproportionate in terms of cost and function in regards to the proposed development features (Toilet, sinks etc.) Therefore, rainwater harvesting has been disregarded.

Site Controls:

Ponds / Detentions basins: the site layout does not allow the space required for any type of open feature within the surface water drainage system.

Filtration: it is proposed that the runoff from service yards will pass through petrol interceptor prior discharging into the proposed drainage system.

Attenuation: cellular storage tanks as well as porous stone layers underneath the car parking area is proposed as a way to store backed up water on site which will manage the remaining runoff volumes on site.

Regional Controls:

Discharge Control: The drainage strategy includes infiltration into the ground as the discharge method for surface water which will be limited by infiltration rates, which were discussed earlier within this report.

This SUDS Treatment and Management train will be able to deal with required run-off volumes while providing enough water quality treatment.

8.4 SUDS Water Quality

Adequate surface water run-off treatment must be delivered in order to remove pollutants through SUDS devices which are able to provide pollution mitigation. Pollution hazards and the SUDS Mitigation have been indexed and are shown within the Ciria SUDS manual.

The pollution hazard indices are summarised in Table 26.2 – Pollution hazard indices for different land use classifications, and are shown below:

Table 5. SUDS – Pollution Hazard Indices for Different Land Use Classifications

Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial / industrial roofs)	Low	0.3	0.2	0.05
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads / motorways	Medium	0.7	0.6	0.7

Although run-off from roof areas is considered to be uncontaminated, it is being treated by Porous Stone layers within parking areas and catchpits.

The mitigation indices of the proposed SUDS features are summarized within the Ciria SUDS Manual Table 26.3 and is shown below:

Table 6. SUDS – Indicative SUDS Mitigation Indices for Discharges to Surface Waters

Indicative SUDS Mitigation Indices for Discharges to Surface Waters			
	Mitigation Indices		
Type of SUDS component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Proprietary Treatment Systems (Petrol Interceptor)	Typically 0.8	Typically 0.6	Typically 0.9

The below table confirms that the surface water treatment provided by the SUDS devices is enough to remove the pollutants before discharging into the existing sewers:

Table 7. SUDS Mitigation Indices Summary Table

Proposed Hazard Treatment					
Land Use	Treatment	Pollution Hazard Level	TSS	Metals	Hydrocarbons
Roofs	Permeable pavement	Low	0.7 > 0.3	0.6 > 0.2	0.7 > 0.05
Commercial Yard / delivery areas	Proprietary Treatment Device	Medium	0.8 > 0.7	0.6 = 0.6	0.9 > 0.7

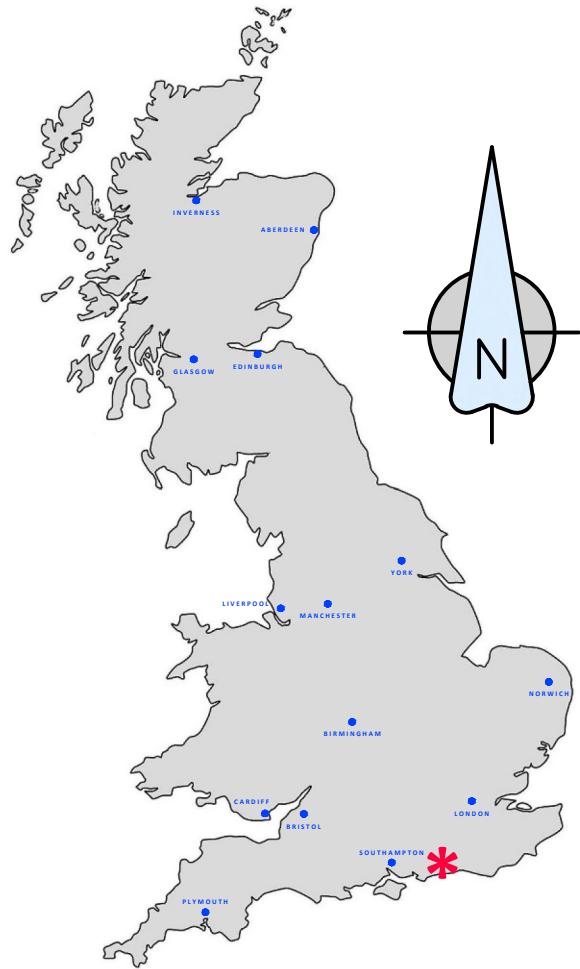
9 Drainage Strategy – Foul Water

- 9.1.1 The proposed foul drainage strategy is to discharge into Southern Water public sewer located on Stanbridge Road.
- 9.1.2 BMP have prepared a foul water strategy drawing which can be found in Appendix B.
- 9.1.3 Southern Water are to be contacted in order to ensure there is available capacity to take proposed foul water from site as well as obtain all approvals to discharge.

10 Conclusion

- 10.1.1 BMP was commissioned by Hellier Langston to prepare a Flood Risk Assessment for the Full planning application for the new development site off of New Lane, Havant.
- 10.1.2 The new development will be submitted for a full planning application comprising the construction of commercial units with associated yards, car parking and landscaping.
- 10.1.3 Foul water will discharge into Southern Water existing Foul sewer in Stanbridge Road.
- 10.1.4 Surface water will be designed to cater for storm events up to 1 in 100 plus 40% climate change. The site is proposed to soakaway at infiltration rate of 0.23m/hr. Some storage of exceedance flows at the surface in events in excess of the 30 - year event is considered providing they are safely contained within the site.
- 10.1.5 The use of sustainable drainage systems (SuDS) has been considered and can be incorporated within the design. Surface water discharge will be attenuated on site via underground cellular tanks and permeable paving.
- 10.1.6 The development is classified as Less Vulnerable usage; the area of the site to be developed is in Flood Zone 1 and meets the Sequential Test. The Exception Test is not therefore required.
- 10.1.7 The site does not pose any increased flood risk to the site itself or adjacent developments and is not susceptible to flooding by other techniques.
- 10.1.8 This report has been prepared to meet the requirements of National Planning Policy Framework (NPPF) for a site not at risk from flooding.
- 10.1.9 The hydraulic modelling indicates no flooding in the 1 in 1 and 1 in 30-year storm events and potential flood risk (controlled flooding) in the 1 in 100-year, 120-minute winter storm events, which will be contained on site without affecting any neighbouring properties.

Appendix A



SITE DETAILS		
Address:	New Lane, Stanbridge Road	
Nearest Postcode:	PO9 2JL	
Grid Co-Ordinates:	E: 472561	N: 107451

FOR INFORMATION

—	20/07/2022	FIRST ISSUE.	AB	AB
Rev	Date	Description	By	Chkd

Revision Schedule				
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Project Title	NEW LANE, STANBRIDGE ROAD HAVANT
Drawing Title	SITE LOCATION PLAN

Drawn by AB	Checked by AB	Project Engineer NSB
Date JULY 2022		Scale @ A3 NTS
Project No. 13383	Drawing No. 100	Rev —



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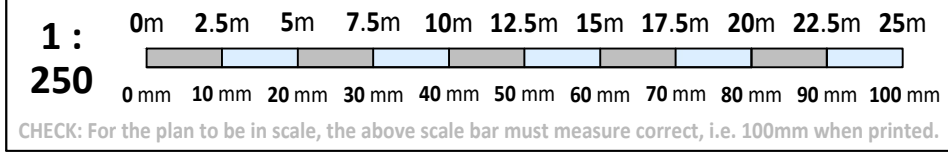
Revision Schedule

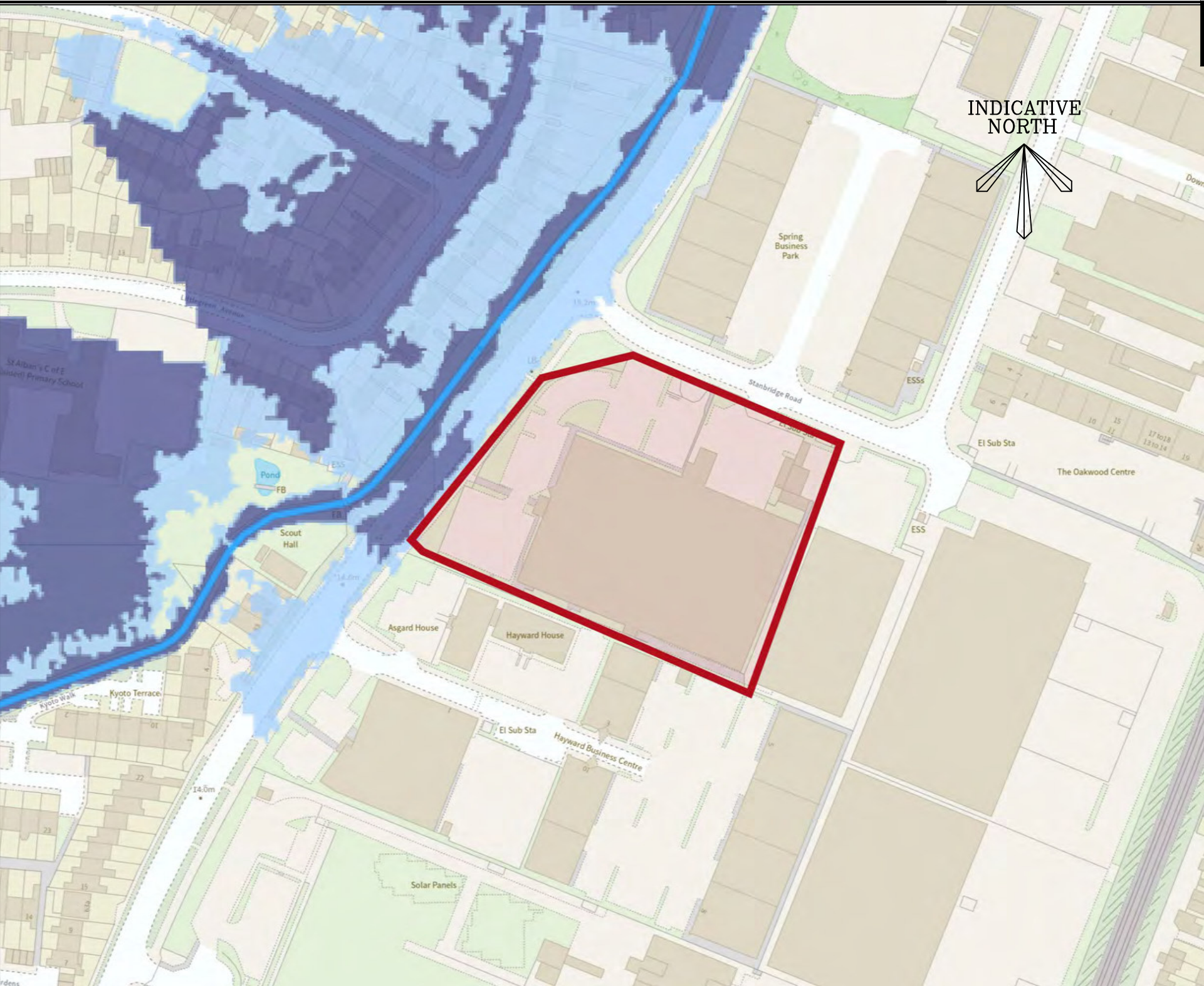
Project Title
NEW LANE HAVANT
Drawing Title
TOPOGRAPHICAL SURVEY PLAN

Drawn by	A.G.	Checked by	A.G.	Project Engineer	N.B.
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Date	Scale @ A1	Project No.	Drawing No.	Rev
JAN 2023	1 : 250	13383	106	-

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Selected area

Flood zone 3

Flood zone 2

Flood zone 1

Flood defence

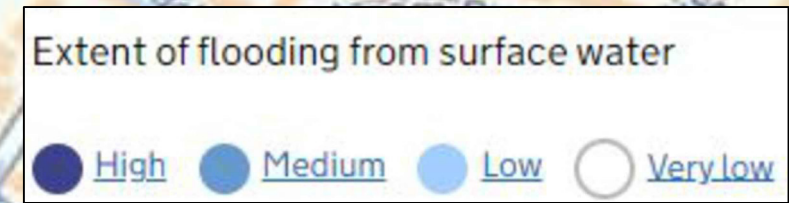
Main river

Water storage area

FOR INFORMATION

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Revision Schedule						
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Drawn by EB	Checked by NSB	Project Engineer NSB	Project Title NEW LANE, HAVANT			
Date JAN 2023		Scale NTS	Drawing Title EA FLOOD MAP			
Project No 13383	Drawing No SK101	Rev -				



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Revision Schedule

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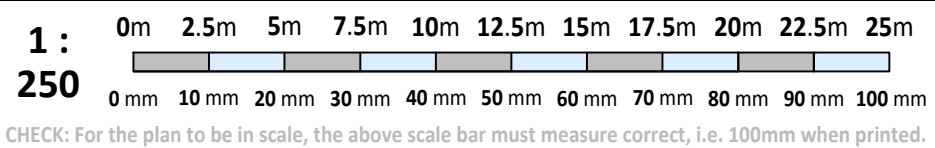
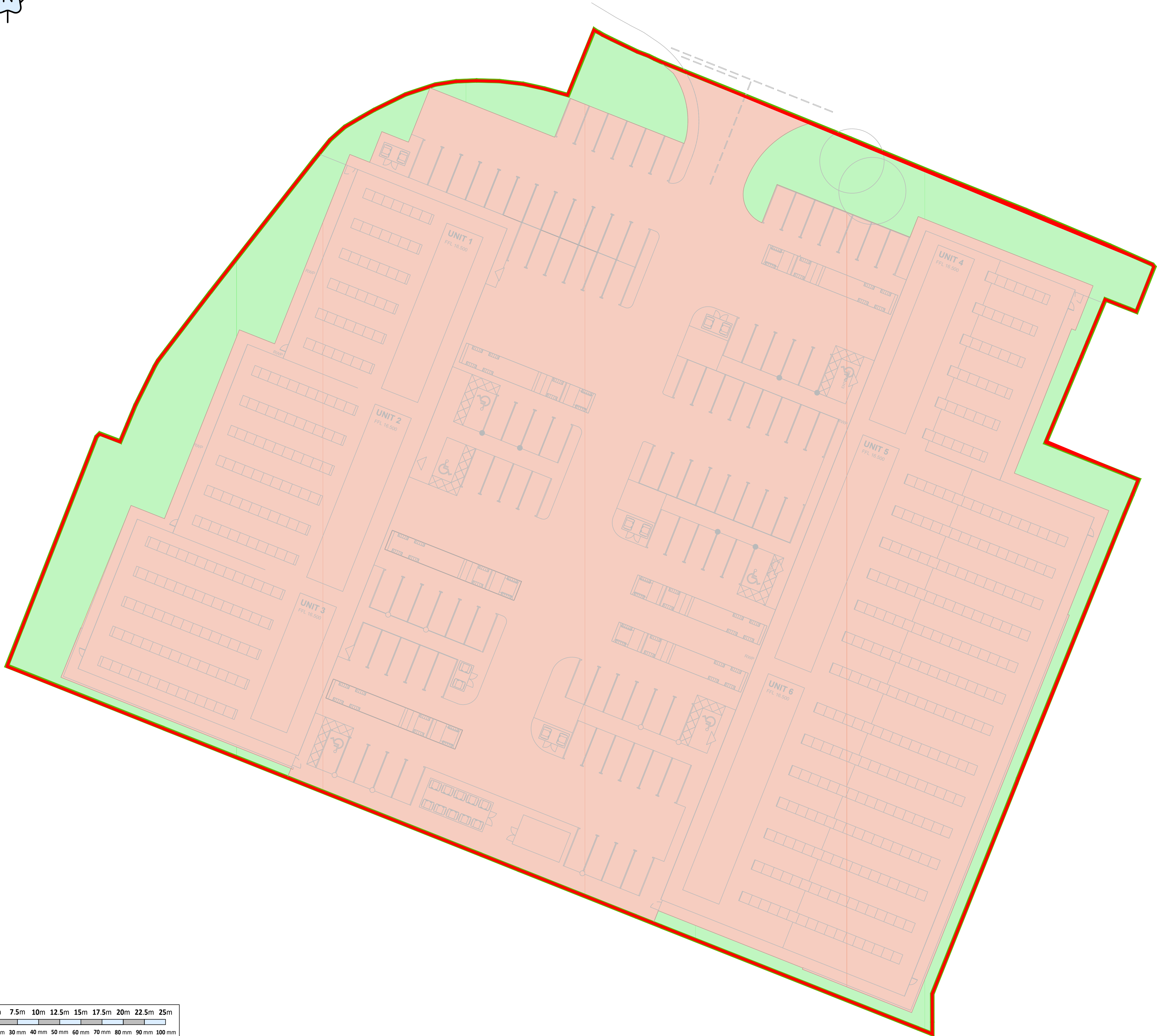
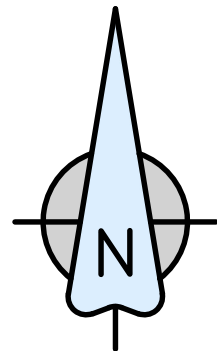
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Rev	Date	Description	By	Chkd By
Revision Schedule				
BAYNHAM MEIKLE Consulting Structural & Civil Engineers 8 Meadow Road, Edgbaston, Birmingham B17 8BU Tel: 0121 434 4100 Fax: 0121 434 4073 Email: admin@bm-p.co.uk 				

Appendix B



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- General:
1. This drawing is to be read in conjunction with all relevant Architects, Engineers and Specialists drawings and specifications.
 2. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
 3. The contractor is to check and verify all dimensions and levels before commencing work.
 4. Any discrepancies noted on site are to be reported to the Engineer immediately.
 5. Background plan based on topographic survey data created by others and supplied for the purpose of carrying out engineering works. We cannot be held responsible for the content, completeness and accuracy provided to us by others. Topographical survey taken from plan reference:
 - ENC/280422/5VV2/T
 6. Architectural layout taken from plan reference:
 - 22-015_HGP_XX_00_A_0011 - Proposed Site Plan

KEY	
	Proposed Permeable Area: 0.134 ha
	Proposed Impermeable Area: 0.853Ha

FOR INFORMATION

B	01/08/2023	UPDATED TO SUIT LATEST SITE LAYOUT.	MR	NSB
A	17/01/2023	UPDATED TO SUIT LATEST SITE LAYOUT.	EB	NSB
—	19/08/2022	FIRST ISSUE.	FJ	FJ
Rev	Date	Description	By	Chkd

Revision Schedule

Project Title
NEW LANE HAVANT
Drawing Title
PROPOSED IMPERMEABLE & PERMEABLE AREAS PLAN

Drawn by	Ferdi Jafar	Checked by	A.B.	Project Engineer	N.B.
Date	AUG 2022	Scale @ A1	1 : 250	Project No.	13383
				Drawing No.	101
				Rev	B

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Consulting Structural & Civil Engineers

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B

M



- General:
1. This drawing is to be read in conjunction with all relevant Architects, Engineers and Specialists drawings and specifications.
 2. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
 3. The contractor is to check and verify all dimensions and levels before commencing work.
 4. Any discrepancies noted on site are to be reported to the Engineer immediately.
 5. Background plan based on topographic survey data created by others and supplied for the purpose of carrying out our engineering works. We cannot be held responsible for the content, completeness and accuracy provided to us by others. Topographical survey taken from plan reference:
 - ENC/280422/5VV2/T
 6. Architectural layout taken from plan reference:
 - 22.015_HGP_XX_00_DR_A
 7. This drawing is for planning purposes only and subjected to developed design.

KEY	
	Application Boundary
	Proposed Levels
	Existing Levels
	Proposed Gradients
	Proposed Retaining Wall
	Proposed Drainage Channel

FOR PLANNING

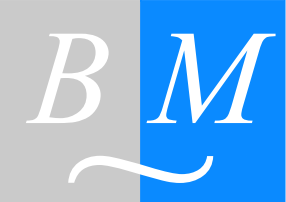
C	26/07/2023	AMENDED TO SUIT SITE LAYOUT	MR	NB
B	17/01/2023	LEVELS UPDATED.	EB	NB
A	09/11/2022	AMENDED TO SUIT SITE LAYOUT	AG	NB
—	24/08/2022	First Issue - Preliminary	FJ	AB
Rev	Date	Description	By	Chkd

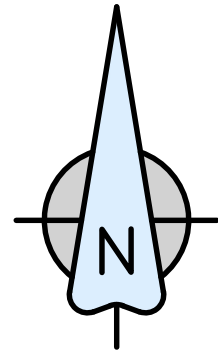
Revision Schedule

Project Title
NEW LANE HAVANT
Drawing Title
PROPOSED LEVELS STRATEGY PLAN

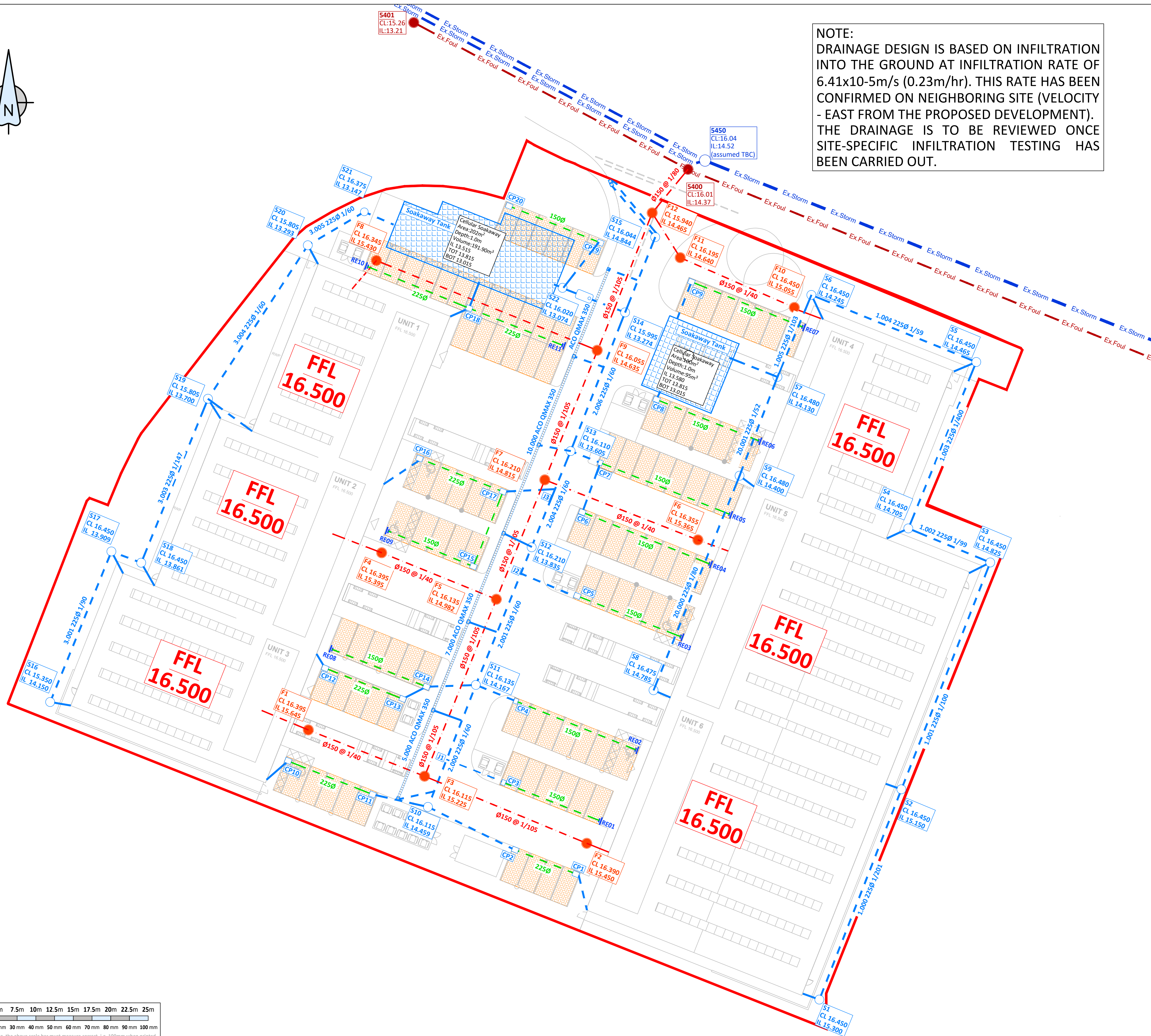
Drawn by	A.G.	Checked by	A.G.	Project Engineer	N.B.
Date	NOV 2022	Scale @ A1	1 : 250	Project No.	13383
				Drawing No.	102
				Rev	B

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NOTE:
DRAINAGE DESIGN IS BASED ON INFILTRATION INTO THE GROUND AT INFILTRATION RATE OF 6.41x10-5m/s (0.23m/hr). THIS RATE HAS BEEN CONFIRMED ON NEIGHBORING SITE (VELOCITY - EAST FROM THE PROPOSED DEVELOPMENT). THE DRAINAGE IS TO BE REVIEWED ONCE SITE-SPECIFIC INFILTRATION TESTING HAS BEEN CARRIED OUT.



- Do not scale this drawing. All dimensions must be checked / verified on site. If in doubt ask.
- This drawing is to be read in conjunction with all relevant Architects, Engineers and Specialists drawings and specifications.
- All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
- Any discrepancies noted on site are to be reported to the Engineer immediately.
- The base specification for drainage works shall be the Water Authority Association 'Sewers for Adoption (7th Edition).
- For details of ground conditions refer to the Ground Investigation Report.
- The following pipe strengths shall be adopted unless noted otherwise:
 - Pipes 150mm diameter up to and including 225mm to be clayware to BS EN 295 Class 160.
 - Pipes over 300mm diameter to be concrete to BS 5911 Class M.
- All pipe runs to be laid with flexible joints.
- All pipes entering and exiting manholes are to be connected with pipe soffits level unless noted otherwise.
- Bedding and surround to be as follows:-

Location	Cover to Soffit	Bedding
Roads	>1.2m	Class 'S' granular bed and surround.
	<1.2m	Class 'X' concrete surround.
Hard and soft landscaping	>0.6m	Class 'S' granular bed and surround.
	<0.6m	Class 'X' concrete surround.

12. The following concrete mixes are to be used (all in accordance with BS 5800):

Location	Mix Reference.
Concrete surround to pipes	ST4
Concrete base and surround to manholes	ST4

The above concrete mixes have been selected for BS 5800 Class 2 Sulphates.

- All precast concrete products (ie pipes, manholes rings etc.) shall be of suitable concrete mix to cater for Class 2 sulphates.
- Pre-formed channels are to be used in manholes where applicable.
- Granolithic concrete benching to be steel trowelled to a dense smooth face neatly shaped and finished to all branch connections and laid in accordance with the Specification.
- All connections to be turned in direction of flow using pipe bends.
- Manhole covers and frames to be ductile iron medium duty Grade D400 circular or rectangular to BS EN124 positions inside vehicular trafficked areas.
- First flexible joint in pipes adjacent to a manhole shall be a maximum of 600mm from inside face of manhole, connecting to rocker pipe.
The length of rocker pipe is as follows:-

Pipe Diameter	Length of Rocker pipe
150mm-600mm	600mm

- Manholes with outgoing pipes greater than 600mm diameter shall be fitted with guard bars, safety chains or other safety devices.
- The Principle Contractor shall be responsible for checking the existing line and invert levels of any connection points for both the foul and surface water systems, prior to undertaking installation of any new drainage works. Any deviation to the levels and positions indicated on the drawing should be brought to the immediate attention of the Project Engineer.
- All inverts specified are outgoing (except backdrop). All pipe are to be laid soffits levels U.N.O.
- All Foul pipes to be 100mm Diameter & Storm to 150mm Diameter unless marked otherwise.
- All connections to be made by purpose made junctions as far as practicable.
- Manhole covers in block paved areas to be recessed to receive required surface finish.
- The contractor is to protect existing and new buried pipes (particularly shallow pipes) and tree roots from damage caused by loads imposed by construction plant.
- This drawing is subject to detail design.

KEY		
	Ex.Foul	EXISTING FOUL SEWER
	Ex.Storm	EXISTING STORM SEWER
		PROPOSED PRIVATE STORM
		PROPOSED PERFORATED PIPE
		PROPOSED DRAINAGE CHANNEL
		PROPOSED GULLY
		PROPOSED CELLULAR SOAKAWAY
		PROPOSED PERMEABLE SURFACE (MIN 450mm DEEP)
		PROPOSED PRIVATE FOUL
		PROPOSED BY-PASS PETROL INTERCEPTOR

FOR PLANNING

D	25/07/2023	AMENDED TO SUIT UPDATED SITE LAYOUT	MR	L.H.
C	16/05/2023	TANK SIZES AMENDED	A.S.B.	L.H.
B	17/01/2023	DRAINAGE UPDATED.	E.B.	N.B.
A	09/11/2022	AMENDED TO SUIT SITE LAYOUT	A.G.	N.B.
—	23/08/2022	FIRST ISSUE.	AB	-

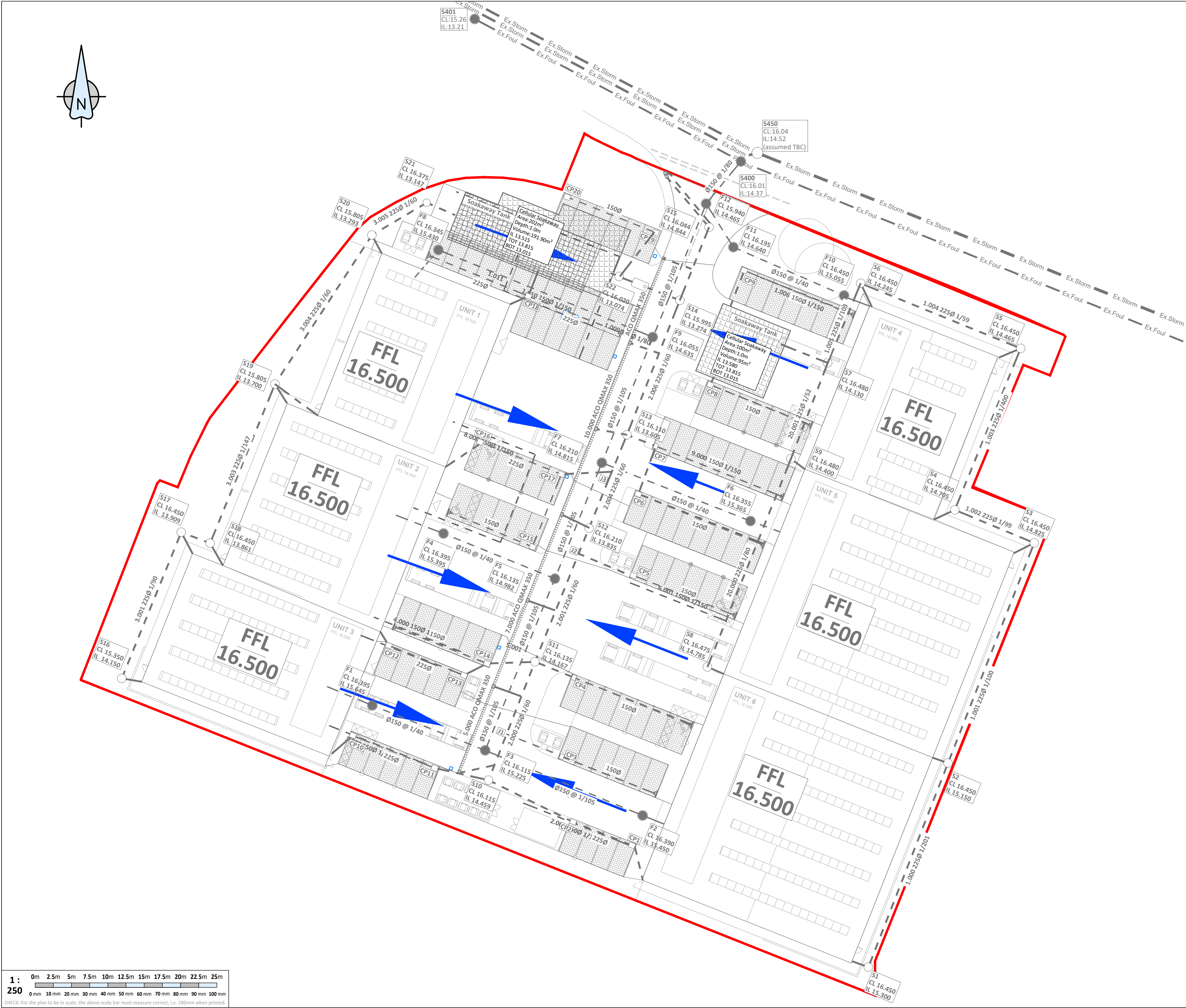
Rev	Date	Description	By	Chkd
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Revision Schedule

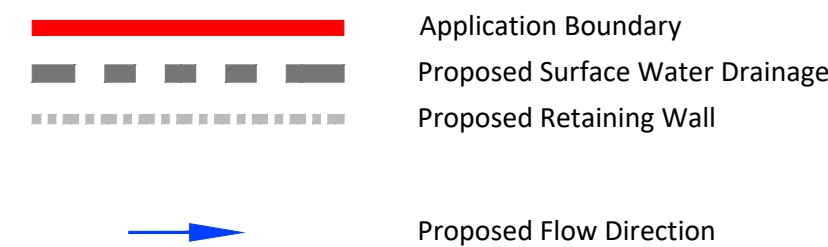
Project Title	NEW LANE HAVANT			
Drawing Title	PROPOSED DRAINAGE STRATEGY PLAN			

Drawn by	A.G.	Checked by	A.G.	Project Engineer	N.B.
Date	NOV 2022	Scale @ A1	1 : 250	Project No.	13383
		Drawing No.	103	Rev	D





KEY



FOR PLANNING

B	2023.08.03	AMENDED TO SUIT HYDRAULIC CALCS.	OC	AB
A	2023.08.01	UPDATED TO SUIT LATEST SITE LAYOUT.	MR	NSB
—	2023.01.18	FIRST ISSUE.	EB	NSB
Rev	Date	Description	By	Chkd

Revision Schedule

Project Title

**NEW LANE
HAVANT**

Drawing Title

PROPOSED FLOOD ROUTING PLAN
100 YEAR STORM EVENT + 40% CLIMATE CHANGE

Drawn by **A.G.**

Checked by **A.G.**

Project Engineer **N.B.**

Date
NOV 202

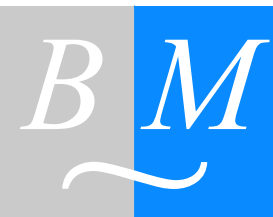
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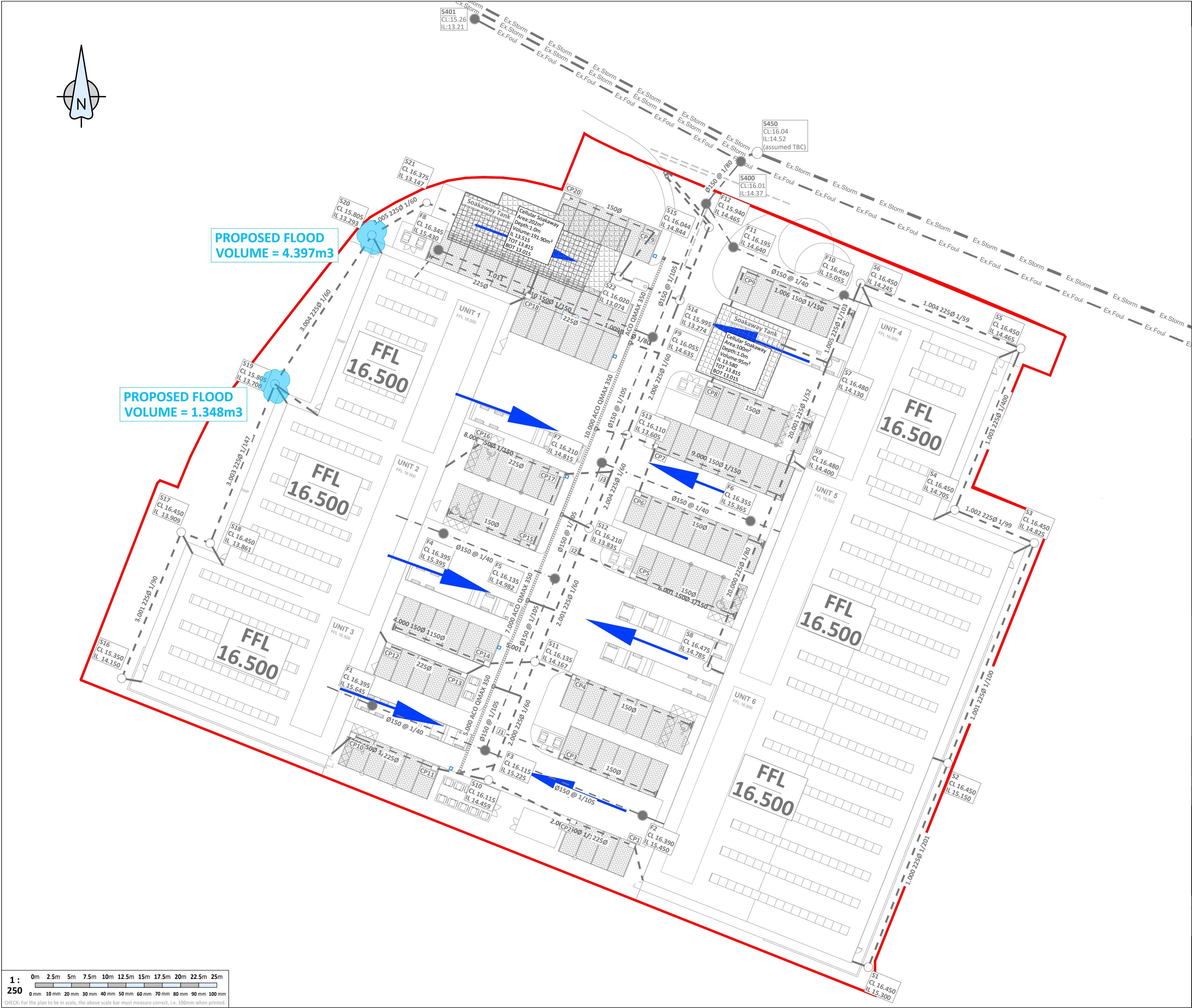
Project No.

wing No.

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- KEY
- Application Boundary
 - Proposed Surface Water Drainage
 - Proposed Retaining Wall
 - Proposed Flood Areas
 - Proposed Flood Direction

FOR PLANNING

B	2023.08.03	AMENDED TO SUIT HYDRAULIC CALCS.	OC	AB
A	2023.08.01	UPDATED TO SUIT LATEST SITE LAYOUT.	MR	NSB
—	2023.01.18	FIRST ISSUE.	EB	NSB
Rev	Date	Description	By	Chkd

Revision Schedule

Project Title	NEW LANE HAVANT
Drawing Title	PROPOSED FLOOD ROUTING PLAN - EXCEEDANCE EVENT 200 YEAR STORM EVENT + 40% CLIMATE CHANGE

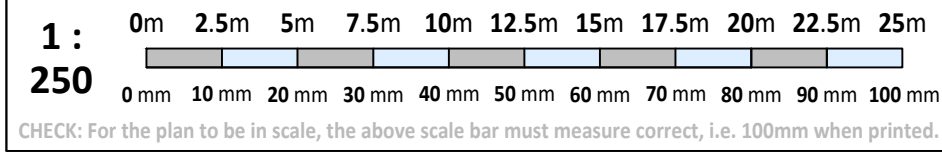
Drawn by	A.G.	Checked by	A.G.	Project Engineer	N.B.
Date	NOV 2022	Scale @ A1	1 : 250	Project No.	13383
				Drawing No.	105
				Rev	B

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Appendix C

Drainage Design Report

Flow

v10.1

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Network	Storm Network
Filename	13383_Storm Drainage_ Rev D MR.pfd
Username	Alla Bolton (alla.bolton@bm-p.co.uk)
Last analysed	03/08/2023 11:52:44
Report produced on	03/08/2023 11:54:37

Causeway Sales

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Email:	marketing@causeway.com
Web:	www.causeway.com

Technical support web portal:

<http://support.causeway.com>

Rainfall Methodology	FSR
Return Period (years)	2
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.400
CV	0.750
Time of Entry (mins)	5.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	Yes
Enforce best practice design rules	Yes

	Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Width (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)	Notes
	S1	0.024	5.00		16.450	Manhole	Adoptable	1200			472608.352	107360.096	1.150	
	S2	0.047	5.00		16.450	Manhole	Adoptable	1200			472619.309	107388.181	1.300	
	S3	0.024	5.00		16.450	Manhole	Adoptable	1200			472631.172	107418.475	1.625	
	S4	0.011	5.00		16.450	Manhole	Adoptable	1200			472620.243	107423.028	1.745	
	S5	0.011	5.00		16.450	Manhole	Adoptable	1200			472629.302	107445.251	1.805	
	S6	0.011	5.00		16.450	Manhole	Adoptable	1200			472607.289	107454.207	2.205	
	S7				16.480	Manhole	Adoptable	1200			472602.753	107443.261	2.350	
	S8	0.047	5.00		16.475	Manhole	Adoptable	1200			472586.210	107401.410	1.690	
	S9	0.035	5.00		16.480	Manhole	Adoptable	1200			472597.695	107430.062	2.080	
	S10	0.057	5.00		16.115	Manhole	Adoptable	1200			472556.082	107385.828	1.656	
	S11	0.057	5.00		16.135	Manhole	Adoptable	1200			472562.506	107402.113	1.968	
	S12	0.057	5.00		16.210	Manhole	Adoptable	1200			472569.940	107420.594	2.375	
	S13	0.057	5.00		16.110	Manhole	Adoptable	1200			472575.134	107433.357	2.505	
	S14	0.057	5.00		15.995	Manhole	Adoptable	1200			472582.407	107451.878	2.721	
	S15	0.010	5.00		16.044	Manhole	Adoptable	1200			472586.431	107461.929	1.200	
	S16	0.013	5.00		16.350	Manhole	Adoptable	1200			472505.625	107399.843	2.200	
	S17	0.013	5.00		16.450	Manhole	Adoptable	1200			472513.805	107419.951	2.541	
	S18	0.014	5.00		16.450	Manhole	Adoptable	1200			472517.779	107418.441	2.589	
	S19	0.026	5.00		15.805	Manhole	Adoptable	1200			472526.698	107440.334	2.105	
	S20	0.011	5.00		15.805	Manhole	Adoptable	1200			472540.039	107460.844	2.512	
	S21				16.375	Manhole	Adoptable	1200			472547.576	107465.304	3.228	
	S22				16.020	Manhole	Adoptable	1200			472574.054	107455.159	2.946	
	CP1	0.026	5.00		16.400	Manhole	Adoptable	600			472575.898	107376.830	1.000	
	CP2	0.002	5.00		16.280	Manhole	Adoptable	600			472567.728	107380.101	0.939	
	CP3	0.004	5.00		16.200	Manhole	Adoptable	600			472566.163	107389.079	0.710	
	CP4	0.004	5.00		16.215	Manhole	Adoptable	600			472567.823	107399.964	0.663	
	CP5	0.004	5.00		16.225	Manhole	Adoptable	600			472576.011	107414.012	0.649	
	CP6	0.005	5.00		16.115	Manhole	Adoptable	600			472576.688	107425.195	0.694	
	CP7	0.005	5.00		16.115	Manhole	Adoptable	600			472579.112	107431.789	0.764	
	CP8	0.004	5.00		16.220	Manhole	Adoptable	600			472586.605	107440.240	0.642	
	CP9	0.004	5.00		16.005	Manhole	Adoptable	600			472591.269	107455.964	0.570	
	CP10	0.016	5.00		16.445	Manhole	Adoptable	600			472537.407	107391.989	1.000	

CP11	0.003	5.00	16.150	Manhole	Adoptable	600	472548.673	107387.500	0.786
CP12	0.030	5.00	16.350	Manhole	Adoptable	600	472542.343	107404.371	1.000
CP13	0.003	5.00	16.050	Manhole	Adoptable	600	472552.699	107400.259	0.812
CP14	0.003	5.00	16.050	Manhole	Adoptable	600	472555.871	107401.882	0.848
CP15	0.003	5.00	16.115	Manhole	Adoptable	600	472562.140	107417.947	0.543
CP16	0.029	5.00	16.445	Manhole	Adoptable	600	472554.939	107432.367	1.000
CP17	0.003	5.00	16.115	Manhole	Adoptable	600	472566.098	107427.936	0.815
CP18	0.020	5.00	16.345	Manhole	Adoptable	600	472561.573	107452.437	1.207
CP19	0.003	5.00	16.165	Manhole	Adoptable	600	472579.100	107461.183	1.027
CP20	0.003	5.00	16.275	Manhole	Adoptable	600	472566.912	107466.085	1.005
RE1	0.004	5.00	16.380	Junction		150	472578.932	107384.028	0.750
RE2	0.004	5.00	16.475	Junction		150	472583.803	107393.471	0.750
RE3	0.004	5.00	16.475	Junction		150	472589.825	107408.571	0.750
RE4	0.005	5.00	16.355	Junction		150	472593.648	107418.300	0.750
RE5	0.005	5.00	16.355	Junction		150	472596.327	107424.934	0.750
RE6	0.004	5.00	16.475	Junction		150	472600.222	107434.748	0.750
RE7	0.004	5.00	16.345	Junction		150	472606.080	107449.941	0.750
RE8	0.003	5.00	16.350	Junction		150	472543.302	107406.872	0.655
RE9	0.003	5.00	16.445	Junction		150	472550.834	107422.655	0.750
RE10	0.005	5.00	16.345	Junction		225	472548.040	107457.989	1.000
RE11	0.008	5.00	16.085	Junction		225	472574.035	107447.499	0.750
SA1			16.065	Manhole	Adoptable	1200	472590.878	107446.050	3.050
SA2			16.210	Manhole	Adoptable	1200	472565.821	107458.593	3.198
SA3			16.210	Manhole	Adoptable	1200	472559.557	107461.027	3.199
SA4			16.210	Manhole	Adoptable	1200	472560.971	107463.998	3.200
J1			16.115	Junction			472558.552	107392.174	1.770
J2			16.135	Junction			472568.487	107417.000	2.236
J3			16.210	Junction			472573.050	107428.273	2.514

	Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)	Con Offset (m)	Min DS IL (m)	Lateral Area (ha)	Lateral Ins Point (%)	Lateral T of E (mins)
	1.000	S1	S2	30.147	0.600	Colebrook-White	15.300	15.150	0.150	201.0	225	Circular	5.55	50.0					
	1.001	S2	S3	32.534	0.600	Colebrook-White	15.150	14.825	0.325	100.1	225	Circular	5.96	50.0					
	1.002	S3	S4	11.839	0.600	Colebrook-White	14.825	14.705	0.120	98.7	225	Circular	6.11	50.0					
	1.003	S4	S5	23.998	0.600	Colebrook-White	14.705	14.645	0.060	400.0	225	Circular	6.73	50.0					
	1.004	S5	S6	23.765	0.600	Colebrook-White	14.645	14.245	0.400	59.4	225	Circular	6.96	50.0					
	1.005	S6	S7	11.849	0.600	Colebrook-White	14.245	14.130	0.115	103.0	225	Circular	7.12	50.0					
	1.006	S7	SA1	12.198	0.600	Colebrook-White	14.130	13.015	1.115	10.9	225	Circular	7.17	50.0					
	2.000	S10	J1	6.810	0.600	Colebrook-White	14.459	14.345	0.114	59.7	225	Circular	5.32	50.0					
	2.001	J1	S11	10.697	0.600	Colebrook-White	14.345	14.167	0.178	60.1	225	Circular	5.42	50.0					
	2.002	S11	J2	16.044	0.600	Colebrook-White	14.167	13.899	0.268	59.9	225	Circular	5.58	50.0					
	2.003	J2	S12	3.877	0.600	Colebrook-White	13.900	13.835	0.065	59.6	225	Circular	5.62	50.0					
	2.004	S12	J3	8.285	0.600	Colebrook-White	13.835	13.696	0.139	59.6	225	Circular	5.70	50.0					
	2.005	J3	S13	5.495	0.600	Colebrook-White	13.696	13.605	0.091	60.4	225	Circular	5.75	50.0					
	2.006	S13	S14	19.898	0.600	Colebrook-White	13.605	13.274	0.331	60.1	225	Circular	5.95	50.0					
	2.007	S14	S22	8.974	0.600	Colebrook-White	13.274	13.074	0.200	44.9	225	Circular	6.03	50.0					
	2.008	S22	SA2	8.920	0.600	Colebrook-White	13.074	13.015	0.059	151.2	225	Circular	6.17	50.0					
	2.009	SA2	SA3	6.720	0.600	Colebrook-White	13.012	13.011	0.001	6720.3	225	Circular	6.91	50.0					
	2.010	SA3	SA4	3.290	0.600	Colebrook-White	13.011	13.010	0.001	3290.3	225	Circular	7.16	50.0					
	3.001	S16	S17	21.708	0.600	Colebrook-White	14.150	13.909	0.241	90.1	225	Circular	5.26	50.0					
	3.002	S17	S18	4.251	0.600	Colebrook-White	13.909	13.861	0.048	88.6	225	Circular	5.31	50.0					
	3.003	S18	S19	23.640	0.600	Colebrook-White	13.861	13.700	0.161	146.8	225	Circular	5.68	50.0					
	3.004	S19	S20	24.467	0.600	Colebrook-White	13.700	13.293	0.407	60.1	225	Circular	5.92	50.0					
	3.005	S20	S21	8.758	0.600	Colebrook-White	13.293	13.147	0.146	60.0	225	Circular	6.01	50.0					
	3.006	S21	SA3	12.722	0.600	Colebrook-White	13.147	13.020	0.127	100.2	225	Circular	6.17	50.0					
	4.000	CP1	CP2	8.800	0.600	Colebrook-White	15.400	15.341	0.059	149.2	225	Circular	5.14	50.0					
	4.001	CP2	S10	12.978	0.600	Colebrook-White	15.341	15.016	0.325	39.9	225	Circular	5.24	50.0					
	5.000	RE1	CP3	13.732	0.600	Colebrook-White	15.630	15.490	0.140	98.1	150	Circular	5.23	50.0					
	5.001	CP3	J1	8.216	0.600	Colebrook-White	15.490	14.345	1.145	7.2	150	Circular	5.26	50.0					
	6.000	RE2	CP4	17.249	0.600	Colebrook-White	15.725	15.552	0.173	99.7	150	Circular	5.29	50.0					
	6.001	CP4	S11	5.735	0.600	Colebrook-White	15.552	15.409	0.143	40.1	150	Circular	5.35	50.0					
	7.000	RE3	CP5	14.847	0.600	Colebrook-White	15.725	15.576	0.149	99.6	150	Circular	5.25	50.0					
	7.001	CP5	J2	8.096	0.600	Colebrook-White	15.576	13.899	1.677	4.8	150	Circular	5.28	50.0					
	8.000	RE4	CP6	18.308	0.600	Colebrook-White	15.605	15.421	0.184	99.5	150	Circular	5.30	50.0					
	8.001	CP6	CP7	7.025	0.600	Colebrook-White	15.421	15.351	0.070	100.4	150	Circular	5.42	50.0					
	8.002	CP7	S13	4.276	0.600	Colebrook-White	15.351	15.244	0.107	40.0	150	Circular	5.46	50.0					
	9.000	RE6	CP8	14.683	0.600	Colebrook-White	15.725	15.578	0.147	99.9	150	Circular	5.24	50.0					
	9.001	CP8	S7	16.428	0.600	Colebrook-White	15.578	15.167	0.411	40.0	150	Circular	5.41	50.0					
	10.000	RE7	CP9	15.989	0.600	Colebrook-White	15.595	15.435	0.160	99.9	150	Circular	5.27	50.0					
	10.001	CP9	S7	17.124	0.600	Colebrook-White	15.435	15.007	0.428	40.0	150	Circular	5.44	50.0					
	11.000	CP10	CP11	12.127	0.600	Colebrook-White	15.445	15.364	0.081	149.7	225	Circular	5.19	50.0					
	11.001	CP11	S10	7.595	0.600	Colebrook-White	15.364	15.174	0.190	40.0	225	Circular	5.25	50.0					
	12.000	CP12	CP13	11.142	0.600	Colebrook-White	15.350	15.238	0.112	99.5	225	Circular	5.14	50.0					
	12.001	CP13	CP14	3.563	0.600	Colebrook-White	15.238	15.202	0.036	99.0	225	Circular	5.19	50.0					
	12.002	CP14	S11	6.639	0.600	Colebrook-White	15.202	15.036	0.166	40.0	225	Circular	5.24	50.0					
	13.000	RE9	CP15	12.247	0.600	Colebrook-White	15.695	15.572	0.123	99.6	150	Circular	5.20	50.0					
	13.001	CP15	CP17	10.745	0.600	Colebrook-White	15.572	15.300	0.272	39.5	150	Circular	5.31	50.0					

13.002	CP17	J3	6.960	0.600	Colebrook-White	15.300	13.696	1.604	4.3	225	Circular	5.33	50.0				
14.000	RE10	CP18	14.628	0.600	Colebrook-White	15.345	15.198	0.147	99.5	225	Circular	5.19	50.0				
14.001	CP18	SA3	8.823	0.600	Colebrook-White	15.198	14.978	0.220	40.1	225	Circular	5.26	50.0				
15.000	CP20	CP19	13.137	0.600	Colebrook-White	15.270	15.138	0.132	99.5	150	Circular	5.22	50.0				
15.001	CP19	S22	7.858	0.600	Colebrook-White	15.138	14.942	0.196	40.1	150	Circular	5.30	50.0				
16.000	RE11	CP18	13.405	0.600	Colebrook-White	15.335	15.138	0.197	68.0	225	Circular	5.14	50.0				
17.000	CP16	CP17	12.007	0.600	Colebrook-White	15.445	15.300	0.145	82.8	225	Circular	5.14	50.0				
18.000	RE8	CP14	13.523	0.600	Colebrook-White	15.695	15.202	0.493	27.4	150	Circular	5.12	50.0				
19.000	RE5	CP7	18.530	0.600	Colebrook-White	15.605	15.351	0.254	73.0	150	Circular	5.26	50.0				
20.000	S8	S9	30.868	0.600	Colebrook-White	14.785	14.400	0.385	80.2	225	Circular	5.35	50.0				
20.001	S9	S7	14.135	0.600	Colebrook-White	14.400	14.130	0.270	52.4	225	Circular	5.48	50.0				
21.000	S15	S14	10.827	0.600	Colebrook-White	14.844	14.573	0.271	40.0	150	Circular	5.11	50.0				

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)	US Node	Dia (mm)	Width (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Sump (m)	Node Type	MH Type
1.000	30.147	201.0	225	Circular	16.450	15.300	0.925	16.450	15.150	1.075	S1	1200			Manhole	Adoptable	S2	1200			Manhole	Adoptable
1.001	32.534	100.1	225	Circular	16.450	15.150	1.075	16.450	14.825	1.400	S2	1200			Manhole	Adoptable	S3	1200			Manhole	Adoptable
1.002	11.839	98.7	225	Circular	16.450	14.825	1.400	16.450	14.705	1.520	S3	1200			Manhole	Adoptable	S4	1200			Manhole	Adoptable
1.003	23.998	400.0	225	Circular	16.450	14.705	1.520	16.450	14.645	1.580	S4	1200			Manhole	Adoptable	S5	1200			Manhole	Adoptable
1.004	23.765	59.4	225	Circular	16.450	14.645	1.580	16.450	14.245	1.980	S5	1200			Manhole	Adoptable	S6	1200			Manhole	Adoptable
1.005	11.849	103.0	225	Circular	16.450	14.245	1.980	16.480	14.130	2.125	S6	1200			Manhole	Adoptable	S7	1200			Manhole	Adoptable
1.006	12.198	10.9	225	Circular	16.480	14.130	2.125	16.065	13.015	2.825	S7	1200			Manhole	Adoptable	SA1	1200			Manhole	Adoptable
2.000	6.810	59.7	225	Circular	16.115	14.459	1.431	16.115	14.345	1.545	S10	1200			Manhole	Adoptable	J1				Junction	
2.001	10.697	60.1	225	Circular	16.115	14.345	1.545	16.135	14.167	1.743	J1				Junction		S11	1200			Manhole	Adoptable
2.002	16.044	59.9	225	Circular	16.135	14.167	1.743	16.135	13.899	2.011	S11	1200			Manhole	Adoptable	J2				Junction	
2.003	3.877	59.6	225	Circular	16.135	13.900	2.010	16.210	13.835	2.150	J2				Junction		S12	1200			Manhole	Adoptable
2.004	8.285	59.6	225	Circular	16.210	13.835	2.150	16.210	13.696	2.289	S12	1200			Manhole	Adoptable	J3				Junction	
2.005	5.495	60.4	225	Circular	16.210	13.696	2.289	16.110	13.605	2.280	J3				Junction		S13	1200			Manhole	Adoptable
2.006	19.898	60.1	225	Circular	16.110	13.605	2.280	15.995	13.274	2.496	S13	1200			Manhole	Adoptable	S14	1200			Manhole	Adoptable
2.007	8.974	44.9	225	Circular	15.995	13.274	2.496	16.020	13.074	2.721	S14	1200			Manhole	Adoptable	S22	1200			Manhole	Adoptable
2.008	8.920	151.2	225	Circular	16.020	13.074	2.721	16.210	13.015	2.970	S22	1200			Manhole	Adoptable	SA2	1200			Manhole	Adoptable
2.009	6.720	6720.3	225	Circular	16.210	13.012	2.973	16.210	13.011	2.974	SA2	1200			Manhole	Adoptable	SA3	1200			Manhole	Adoptable
2.010	3.290	3290.3	225	Circular	16.210	13.011	2.974	16.210	13.010	2.975	SA3	1200			Manhole	Adoptable	SA4	1200			Manhole	Adoptable
3.001	21.708	90.1	225	Circular	16.350	14.150	1.975	16.450	13.909	2.316	S16	1200			Manhole	Adoptable	S17	1200			Manhole	Adoptable
3.002	4.251	88.6	225	Circular	16.450	13.909	2.316	16.450	13.861	2.364	S17	1200			Manhole	Adoptable	S18	1200			Manhole	Adoptable
3.003	23.640	146.8	225	Circular	16.450	13.861	2.364	15.805	13.700	1.880	S18	1200			Manhole	Adoptable	S19	1200			Manhole	Adoptable
3.004	24.467	60.1	225	Circular	15.805	13.700	1.880	15.805	13.293	2.287	S19	1200			Manhole	Adoptable	S20	1200			Manhole	Adoptable
3.005	8.758	60.0	225	Circular	15.805	13.293	2.287	16.375	13.147	3.003	S20	1200			Manhole	Adoptable	S21	1200			Manhole	Adoptable
3.006	12.722	100.2	225	Circular	16.375	13.147	3.003	16.210	13.020	2.965	S21	1200			Manhole	Adoptable	SA3	1200			Manhole	Adoptable
4.000	8.800	149.2	225	Circular	16.400	15.400	0.775	16.280	15.341	0.714	CP1	600			Manhole	Adoptable	CP2	600			Manhole	Adoptable
4.001	12.978	39.9	225	Circular	16.280	15.341	0.714	16.115	15.016	0.874	CP2	600			Manhole	Adoptable	S10	1200			Manhole	Adoptable
5.000	13.732	98.1	150	Circular	16.380	15.630	0.600	16.200	15.490	0.560	RE1	150			Junction		CP3	600			Manhole	Adoptable
5.001	8.216	7.2	150	Circular	16.200	15.490	0.560	16.115	14.345	1.620	CP3	600			Manhole	Adoptable	J1				Junction	
6.000	17.249	99.7	150	Circular	16.475	15.725	0.600	16.215	15.552	0.513	RE2	150			Junction		CP4	600			Manhole	Adoptable
6.001	5.735	40.1	150	Circular	16.215	15.552	0.513	16.135	15.409	0.576	CP4	600			Manhole	Adoptable	S11	1200			Manhole	Adoptable
7.000	14.847	99.6	150	Circular	16.475	15.725	0.600	16.225	15.576	0.499	RE3	150			Junction		CP5	600			Manhole	Adoptable
7.001	8.096	4.8	150	Circular	16.225	15.576	0.499	16.135	13.899	2.086	CP5	600			Manhole	Adoptable	J2				Junction	
8.000	18.308	99.5	150	Circular	16.355	15.605	0.600	16.115	15.421	0.544	RE4	150			Junction		CP6	600			Manhole	Adoptable
8.001	7.025	100.4	150	Circular	16.115	15.421	0.544	16.115	15.351	0.614	CP6	600			Manhole	Adoptable	CP7	600			Manhole	Adoptable
8.002	4.276	40.0	150	Circular	16.115	15.351	0.614	16.110	15.244	0.716	CP7	600			Manhole	Adoptable	S13	1200			Manhole	Adoptable
9.000	14.683	99.9	150	Circular	16.475	15.725	0.600	16.220	15.578	0.492	RE6	150			Junction		CP8	600			Manhole	Adoptable
9.001	16.428	40.0	150	Circular	16.220	15.578	0.492	16.480	15.167	1.163	CP8	600			Manhole	Adoptable	S7	1200			Manhole	Adoptable
10.000	15.989	99.9	150	Circular	16.345	15.595	0.600	16.005	15.435	0.420	RE7	150			Junction		CP9	600			Manhole	Adoptable
10.001	17.124	40.0	150	Circular	16.005	15.435	0.420	16.480	15.007	1.323	CP9	600			Manhole	Adoptable	S7	1200			Manhole	Adoptable
11.000	12.127	149.7	225	Circular	16.445	15.445	0.775	16.150	15.364	0.561	CP10	600			Manhole	Adoptable	CP11	600			Manhole	Adoptable
11.001	7.595	40.0	225	Circular	16.150	15.364	0.561	16.115	15.174	0.716	CP11	600			Manhole	Adoptable	S10	1200			Manhole	Adoptable
12.000	11.142	99.5	225	Circular	16.350	15.350	0.775	16.050	15.238	0.587	CP12	600			Manhole	Adoptable	CP13	600			Manhole	Adoptable
12.001	3.563	99.0	225	Circular	16.050	15.238	0.587	16.050	15.202	0.623	CP13	600			Manhole	Adoptable	CP14	600			Manhole	Adoptable
12.002	6.639	40.0	225	Circular	16.050	15.202	0.623	16.135	15.036	0.874	CP14	600			Manhole	Adoptable	S11	1200			Manhole	Adoptable
13.000	12.247	99.6	150	Circular	16.445	15.695	0.600	16.115	15.572	0.393	RE9	150			Junction		CP15	600			Manhole	Adoptable
13.001	10.745	39.5	150	Circular	16.115	15.572	0.393	16.115	15.300	0.665	CP15	600			Manhole	Adoptable	CP17	600			Manhole	Adoptable
13.002	6.960	4.3	225	Circular	16.115	15.300	0.590	16.210	13.696	2.289	CP17	600			Manhole	Adoptable	J3				Junction	
14.000	14.628	99.5	225	Circular	16.345	15.345	0.775	16.345	15.198	0.922	RE10	225			Junction		CP18	600			Manhole	Adoptable
14.001	8.823	40.1	225	Circular	16.345	15.198	0.922	16.210	14.978	1.007	CP18	600			Manhole	Adoptable	SA3	1200			Manhole	Adoptable
15.000	13.137	99.5	150	Circular	16.275	15.270	0.855	16.165	15.138	0.877	CP20	600			Manhole	Adoptable	CP19	600			Manhole	Adoptable
15.001	7.858	40.1	150	Circular	16.165	15.138	0.877	16.020	14.942	0.928	CP19	600			Manhole	Adoptable	S22	1200			Manhole	Adoptable
16.000	13.405	68.0	225	Circular	16.085	15.335	0.525	16.345	15.138	0.982	RE11	225			Junction		CP18	600			Manhole	Adoptable
17.000	12.007	82.8	225	Circular	16.445	15.445	0.775	16.115	15.300	0.590	CP16	600			Manhole	Adoptable	CP17	600			Manhole	Adoptable
18.000	13.523	27.4	150	Circular	16.350	15.695	0.505	16.050	15.202	0.698	RE8	150			Junction		CP14	600			Manhole	Adoptable



19.000	18.530	73.0	150	Circular	16.355	15.605	0.600	16.115	15.351	0.614	RE5	150		Junction		CP7	600		Manhole	Adoptable
20.000	30.868	80.2	225	Circular	16.475	14.785	1.465	16.480	14.400	1.855	S8	1200		Manhole	Adoptable	S9	1200		Manhole	Adoptable
20.001	14.135	52.4	225	Circular	16.480	14.400	1.855	16.480	14.130	2.125	S9	1200		Manhole	Adoptable	S7	1200		Manhole	Adoptable
21.000	10.827	40.0	150	Circular	16.044	14.844	1.050	15.995	14.573	1.272	S15	1200		Manhole	Adoptable	S14	1200		Manhole	Adoptable

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Sump (m)	Node Type	MH Type		Link	IL (m)	Dia (mm)	Link Type
S1	472608.352	107360.096	16.450	1.150	1200			Manhole	Adoptable					
										0	1.000	15.300	225	Circular
S2	472619.309	107388.181	16.450	1.300	1200			Manhole	Adoptable	1	1.000	15.150	225	Circular
										0	1.001	15.150	225	Circular
S3	472631.172	107418.475	16.450	1.625	1200			Manhole	Adoptable	1	1.001	14.825	225	Circular
										0	1.002	14.825	225	Circular
S4	472620.243	107423.028	16.450	1.745	1200			Manhole	Adoptable	1	1.002	14.705	225	Circular
										0	1.003	14.705	225	Circular
S5	472629.302	107445.251	16.450	1.805	1200			Manhole	Adoptable	1	1.003	14.645	225	Circular
										0	1.004	14.645	225	Circular
S6	472607.289	107454.207	16.450	2.205	1200			Manhole	Adoptable	1	1.004	14.245	225	Circular
										0	1.005	14.245	225	Circular
S7	472602.753	107443.261	16.480	2.350	1200			Manhole	Adoptable	1	20.001	14.130	225	Circular
										2	10.001	15.007	150	Circular
										3	9.001	15.167	150	Circular
										4	1.005	14.130	225	Circular
										0	1.006	14.130	225	Circular
S8	472586.210	107401.410	16.475	1.690	1200			Manhole	Adoptable					

										0	20.000	14.785	225	Circular
S9	472597.695	107430.062	16.480	2.080	1200			Manhole	Adoptable	1	20.000	14.400	225	Circular
										0	20.001	14.400	225	Circular
S10	472556.082	107385.828	16.115	1.656	1200			Manhole	Adoptable	1	11.001	15.174	225	Circular
										2	4.001	15.016	225	Circular
										0	2.000	14.459	225	Circular
S11	472562.506	107402.113	16.135	1.968	1200			Manhole	Adoptable	1	12.002	15.036	225	Circular
										2	6.001	15.409	150	Circular
										3	2.001	14.167	225	Circular
										0	2.002	14.167	225	Circular
S12	472569.940	107420.594	16.210	2.375	1200			Manhole	Adoptable	1	2.003	13.835	225	Circular
										0	2.004	13.835	225	Circular
S13	472575.134	107433.357	16.110	2.505	1200			Manhole	Adoptable	1	8.002	15.244	150	Circular
										2	2.005	13.605	225	Circular
										0	2.006	13.605	225	Circular
S14	472582.407	107451.878	15.995	2.721	1200			Manhole	Adoptable	1	21.000	14.573	150	Circular
										2	2.006	13.274	225	Circular
										0	2.007	13.274	225	Circular
S15	472586.431	107461.929	16.044	1.200	1200			Manhole	Adoptable					
										0	21.000	14.844	150	Circular
S16	472505.625	107399.843	16.350	2.200	1200			Manhole	Adoptable					
										0	3.001	14.150	225	Circular
S17	472513.805	107419.951	16.450	2.541	1200			Manhole	Adoptable	1	3.001	13.909	225	Circular

										0	3.002	13.909	225	Circular
S18	472517.779	107418.441	16.450	2.589	1200		Manhole	Adoptable	1	3.002	13.861	225	Circular	
										0	3.003	13.861	225	Circular
S19	472526.698	107440.334	15.805	2.105	1200		Manhole	Adoptable	1	3.003	13.700	225	Circular	
										0	3.004	13.700	225	Circular
S20	472540.039	107460.844	15.805	2.512	1200		Manhole	Adoptable	1	3.004	13.293	225	Circular	
										0	3.005	13.293	225	Circular
S21	472547.576	107465.304	16.375	3.228	1200		Manhole	Adoptable	1	3.005	13.147	225	Circular	
										0	3.006	13.147	225	Circular
S22	472574.054	107455.159	16.020	2.946	1200		Manhole	Adoptable	1	15.001	14.942	150	Circular	
									2	2.007	13.074	225	Circular	
									0	2.008	13.074	225	Circular	
CP1	472575.898	107376.830	16.400	1.000	600		Manhole	Adoptable						
										0	4.000	15.400	225	Circular
CP2	472567.728	107380.101	16.280	0.939	600		Manhole	Adoptable	1	4.000	15.341	225	Circular	
										0	4.001	15.341	225	Circular
CP3	472566.163	107389.079	16.200	0.710	600		Manhole	Adoptable	1	5.000	15.490	150	Circular	
										0	5.001	15.490	150	Circular
CP4	472567.823	107399.964	16.215	0.663	600		Manhole	Adoptable	1	6.000	15.552	150	Circular	

										0	6.001	15.552	150	Circular
CP5	472576.011	107414.012	16.225	0.649	600		Manhole	Adoptable	1	7.000	15.576	150	Circular	
										0	7.001	15.576	150	Circular
CP6	472576.688	107425.195	16.115	0.694	600		Manhole	Adoptable	1	8.000	15.421	150	Circular	
										0	8.001	15.421	150	Circular
CP7	472579.112	107431.789	16.115	0.764	600		Manhole	Adoptable	1	19.000	15.351	150	Circular	
									2	8.001	15.351	150	Circular	
									0	8.002	15.351	150	Circular	
CP8	472586.605	107440.240	16.220	0.642	600		Manhole	Adoptable	1	9.000	15.578	150	Circular	
										0	9.001	15.578	150	Circular
CP9	472591.269	107455.964	16.005	0.570	600		Manhole	Adoptable	1	10.000	15.435	150	Circular	
										0	10.001	15.435	150	Circular
CP10	472537.407	107391.989	16.445	1.000	600		Manhole	Adoptable						
										0	11.000	15.445	225	Circular
CP11	472548.673	107387.500	16.150	0.786	600		Manhole	Adoptable	1	11.000	15.364	225	Circular	
										0	11.001	15.364	225	Circular
CP12	472542.343	107404.371	16.350	1.000	600		Manhole	Adoptable						
										0	12.000	15.350	225	Circular

CP13	472552.699	107400.259	16.050	0.812	600		Manhole	Adoptable	1	12.000	15.238	225	Circular
									0	12.001	15.238	225	Circular
CP14	472555.871	107401.882	16.050	0.848	600		Manhole	Adoptable	1	18.000	15.202	150	Circular
									2	12.001	15.202	225	Circular
									0	12.002	15.202	225	Circular
CP15	472562.140	107417.947	16.115	0.543	600		Manhole	Adoptable	1	13.000	15.572	150	Circular
									0	13.001	15.572	150	Circular
CP16	472554.939	107432.367	16.445	1.000	600		Manhole	Adoptable					
									0	17.000	15.445	225	Circular
CP17	472566.098	107427.936	16.115	0.815	600		Manhole	Adoptable	1	17.000	15.300	225	Circular
									2	13.001	15.300	150	Circular
									0	13.002	15.300	225	Circular
CP18	472561.573	107452.437	16.345	1.207	600		Manhole	Adoptable	1	16.000	15.138	225	Circular
									2	14.000	15.198	225	Circular
									0	14.001	15.198	225	Circular
CP19	472579.100	107461.183	16.165	1.027	600		Manhole	Adoptable	1	15.000	15.138	150	Circular
									0	15.001	15.138	150	Circular
CP20	472566.912	107466.085	16.275	1.005	600		Manhole	Adoptable					
									0	15.000	15.270	150	Circular
RE1	472578.932	107384.028	16.380	0.750	150		Junction						

									0	5.000	15.630	150Circular
RE2	472583.803	107393.471	16.475	0.750	150		Junction					
									0	6.000	15.725	150Circular
RE3	472589.825	107408.571	16.475	0.750	150		Junction					
									0	7.000	15.725	150Circular
RE4	472593.648	107418.300	16.355	0.750	150		Junction					
									0	8.000	15.605	150Circular
RE5	472596.327	107424.934	16.355	0.750	150		Junction					
									0	19.000	15.605	150Circular
RE6	472600.222	107434.748	16.475	0.750	150		Junction					
									0	9.000	15.725	150Circular
RE7	472606.080	107449.941	16.345	0.750	150		Junction					
									0	10.000	15.595	150Circular
RE8	472543.302	107406.872	16.350	0.655	150		Junction					
									0	18.000	15.695	150Circular
RE9	472550.834	107422.655	16.445	0.750	150		Junction					
									0	13.000	15.695	150Circular
RE10	472548.040	107457.989	16.345	1.000	225		Junction					

										0	14.000	15.345	225	Circular
RE11	472574.035	107447.499	16.085	0.750	225		Junction							
										0	16.000	15.335	225	Circular
SA1	472590.878	107446.050	16.065	3.050	1200		Manhole	Adoptable	1	1.006		13.015	225	Circular
SA2	472565.821	107458.593	16.210	3.198	1200		Manhole	Adoptable	1	2.008		13.015	225	Circular
										0	2.009	13.012	225	Circular
SA3	472559.557	107461.027	16.210	3.199	1200		Manhole	Adoptable	1	14.001		14.978	225	Circular
										2	3.006	13.020	225	Circular
										3	2.009	13.011	225	Circular
										0	2.010	13.011	225	Circular
SA4	472560.971	107463.998	16.210	3.200	1200		Manhole	Adoptable	1	2.010		13.010	225	Circular
J1	472558.552	107392.174	16.115	1.770			Junction		1	5.001		14.345	150	Circular
										2	2.000	14.345	225	Circular
										0	2.001	14.345	225	Circular
J2	472568.487	107417.000	16.135	2.236			Junction		1	7.001		13.899	150	Circular
										2	2.002	13.899	225	Circular
										0	2.003	13.900	225	Circular
J3	472573.050	107428.273	16.210	2.514			Junction		1	13.002		13.696	225	Circular
										2	2.004	13.696	225	Circular
										0	2.005	13.696	225	Circular

Rainfall Methodology	FSR		Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
FSR Region	England and Wales		1	0	0	0
M5-60 (mm)	20.000		30	0	0	0
Ratio-R	0.400		100	0	0	0
Summer CV	0.750		100	40	0	0
Winter CV	0.840		200	40	0	0
Analysis Speed	Normal					
Skip Steady State	No					
Drain Down Time (mins)	240					
Additional Storage (m³/ha)	0.0					
Storm Durations (mins)	15					
	30					
	60					
	120					
	180					
	240					
	360					
	480					
	600					
	720					
	960					
	1440					
Check Discharge Rate(s)	No					
Check Discharge Volume	No					
100 year 360 minute (m³)						

Soakaway											
Node	Base Inf Coefficient (m/hr)	Side Inf Coefficient (m/hr)	Safety Factor	Porosity	Invert Level (m)	Time to half empty (mins)	Pit Width (m)	Pit Length (m)	Depth (m)	Inf Depth (m)	Number Required
SA1	0.23076	0.23076	2.0	0.95	13.015	206	9.946	10.000	1.000		1
SA4	0.23076	0.23076	2.0	0.95	13.010	216	13.851	13.851	1.000		1
Carpark											
Node	Base Inf Coefficient (m/hr)	Side Inf Coefficient (m/hr)	Safety Factor	Porosity	Invert Level (m)	Time to half empty (mins)	Width (m)	Length (m)	Slope (1:X)	Depth (m)	Inf Depth (m)
CP2	0.00000	0.00000	2.0	0.30	15.341	15	4.800	9.600	500.0	0.450	
CP3	0.00000	0.00000	2.0	0.30	15.490	14	4.800	14.500	500.0	0.350	
CP4	0.00000	0.00000	2.0	0.30	15.552	10	4.800	18.000	500.0	0.450	
CP5	0.00000	0.00000	2.0	0.30	15.576	60	4.800	15.700	500.0	0.350	
CP6	0.00000	0.00000	2.0	0.30	15.421	148	4.800	19.200	500.0	0.350	
CP7	0.00000	0.00000	2.0	0.30	15.351	204	4.800	19.200	500.0	0.350	
CP8	0.00000	0.00000	2.0	0.30	15.578	20	4.800	15.700	500.0	0.350	
CP9	0.00000	0.00000	2.0	0.30	15.435	36	4.800	16.900	500.0	0.350	
CP11	0.00000	0.00000	2.0	0.30	15.364	15	4.800	13.200	500.0	0.450	
CP13	0.00000	0.00000	2.0	0.30	15.238	25	4.800	12.100	500.0	0.450	
CP14	0.00000	0.00000	2.0	0.30	15.202	32	4.800	14.300	500.0	0.350	
CP15	0.00000	0.00000	2.0	0.30	15.572	56	4.800	13.300	500.0	0.350	
CP17	0.00000	0.00000	2.0	0.30	15.300	192	4.800	13.250	500.0	0.450	
CP18	0.00000	0.00000	2.0	0.30	15.138	300	9.700	13.250	500.0	0.450	
CP19	0.00000	0.00000	2.0	0.30	15.138	328	4.800	13.250	500.0	0.350	

Node Size	Yes
Node Losses	Yes
Link Size	Yes
Minimum Diameter (mm)	150
Link Length	Yes
Maximum Length (m)	100.000
Coordinates	Yes
Accuracy (m)	1.000
Crossings	Yes
Cover Depth	Yes
Minimum Cover Depth (m)	
Maximum Cover Depth (m)	3.000
Backdrops	Yes
Minimum Backdrop Height (m)	
Maximum Backdrop Height (m)	1.500
Full Bore Velocity	Yes
Minimum Full Bore Velocity (m/s)	
Maximum Full Bore Velocity (m/s)	3.000
Proportional Velocity	Yes
Return Period (years)	
Minimum Proportional Velocity (m/s)	0.750
Maximum Proportional Velocity (m/s)	3.000
Surcharged Depth	Yes
Return Period (years)	
Maximum Surcharged Depth (m)	0.100
Flooding	Yes
Return Period (years)	30
Time to Half Empty	No
Return Period (years)	
Discharge Rates	Yes
Discharge Volume	Yes
100 year 360 minute (m³)	

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991
1 year 15 minute winter	76.857	30.991
1 year 30 minute summer	71.439	20.215
1 year 30 minute winter	50.133	20.215
1 year 60 minute summer	48.435	12.800
1 year 60 minute winter	32.179	12.800
1 year 120 minute summer	30.053	7.942
1 year 120 minute winter	19.966	7.942
1 year 180 minute summer	23.233	5.979
1 year 180 minute winter	15.102	5.979
1 year 240 minute summer	18.475	4.882
1 year 240 minute winter	12.274	4.882
1 year 360 minute summer	14.169	3.646
1 year 360 minute winter	9.210	3.646
1 year 480 minute summer	11.185	2.956
1 year 480 minute winter	7.431	2.956
1 year 600 minute summer	9.182	2.511
1 year 600 minute winter	6.274	2.511
1 year 720 minute summer	8.203	2.199
1 year 720 minute winter	5.513	2.199
1 year 960 minute summer	6.768	1.782
1 year 960 minute winter	4.483	1.782
1 year 1440 minute summer	4.949	1.326
1 year 1440 minute winter	3.326	1.326
30 year 15 minute summer	268.706	76.035
30 year 15 minute winter	188.566	76.035
30 year 30 minute summer	174.929	49.499
30 year 30 minute winter	122.757	49.499
30 year 60 minute summer	116.589	30.811

30 year 60 minute winter	77.459	30.811
30 year 120 minute summer	70.438	18.615
30 year 120 minute winter	46.797	18.615
30 year 180 minute summer	53.298	13.715
30 year 180 minute winter	34.645	13.715
30 year 240 minute summer	41.604	10.995
30 year 240 minute winter	27.641	10.995
30 year 360 minute summer	31.221	8.034
30 year 360 minute winter	20.295	8.034
30 year 480 minute summer	24.324	6.428
30 year 480 minute winter	16.160	6.428
30 year 600 minute summer	19.756	5.404
30 year 600 minute winter	13.498	5.404
30 year 720 minute summer	17.490	4.687
30 year 720 minute winter	11.754	4.687
30 year 960 minute summer	14.215	3.743
30 year 960 minute winter	9.416	3.743
30 year 1440 minute summer	10.161	2.723
30 year 1440 minute winter	6.829	2.723
100 year 15 minute summer	348.738	98.681
100 year 15 minute winter	244.728	98.681
100 year 30 minute summer	228.965	64.789
100 year 30 minute winter	160.677	64.789
100 year 60 minute summer	153.288	40.510
100 year 60 minute winter	101.841	40.510
100 year 120 minute summer	92.562	24.461
100 year 120 minute winter	61.496	24.461
100 year 180 minute summer	69.806	17.964
100 year 180 minute winter	45.376	17.964
100 year 240 minute summer	54.269	14.342
100 year 240 minute winter	36.055	14.342
100 year 360 minute summer	40.484	10.418

100 year 360 minute winter	26.315	10.418
100 year 480 minute summer	31.414	8.302
100 year 480 minute winter	20.871	8.302
100 year 600 minute summer	25.431	6.956
100 year 600 minute winter	17.376	6.956
100 year 720 minute summer	22.452	6.017
100 year 720 minute winter	15.089	6.017
100 year 960 minute summer	18.166	4.784
100 year 960 minute winter	12.033	4.784
100 year 1440 minute summer	12.896	3.456
100 year 1440 minute winter	8.667	3.456
100 year +40% CC 15 minute summer	488.233	138.153
100 year +40% CC 15 minute winter	342.620	138.153
100 year +40% CC 30 minute summer	320.551	90.705
100 year +40% CC 30 minute winter	224.948	90.705
100 year +40% CC 60 minute summer	214.603	56.713
100 year +40% CC 60 minute winter	142.577	56.713
100 year +40% CC 120 minute summer	129.587	34.246
100 year +40% CC 120 minute winter	86.094	34.246
100 year +40% CC 180 minute summer	97.729	25.149
100 year +40% CC 180 minute winter	63.526	25.149
100 year +40% CC 240 minute summer	75.977	20.078
100 year +40% CC 240 minute winter	50.477	20.078
100 year +40% CC 360 minute summer	56.677	14.585
100 year +40% CC 360 minute winter	36.841	14.585
100 year +40% CC 480 minute summer	43.979	11.622
100 year +40% CC 480 minute winter	29.219	11.622
100 year +40% CC 600 minute summer	35.604	9.738
100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 960 minute summer	25.432	6.697

100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 1440 minute winter	12.134	4.839
200 year +40% CC 15 minute summer	567.297	160.526
200 year +40% CC 15 minute winter	398.103	160.526
200 year +40% CC 30 minute summer	374.286	105.910
200 year +40% CC 30 minute winter	262.657	105.910
200 year +40% CC 60 minute summer	251.224	66.391
200 year +40% CC 60 minute winter	166.907	66.391
200 year +40% CC 120 minute summer	151.654	40.078
200 year +40% CC 120 minute winter	100.755	40.078
200 year +40% CC 180 minute summer	114.153	29.375
200 year +40% CC 180 minute winter	74.202	29.375
200 year +40% CC 240 minute summer	88.538	23.398
200 year +40% CC 240 minute winter	58.822	23.398
200 year +40% CC 360 minute summer	65.820	16.938
200 year +40% CC 360 minute winter	42.785	16.938
200 year +40% CC 480 minute summer	50.957	13.466
200 year +40% CC 480 minute winter	33.855	13.466
200 year +40% CC 600 minute summer	41.176	11.262
200 year +40% CC 600 minute winter	28.134	11.262
200 year +40% CC 720 minute summer	36.295	9.727
200 year +40% CC 720 minute winter	24.392	9.727
200 year +40% CC 960 minute summer	29.289	7.712
200 year +40% CC 960 minute winter	19.401	7.712
200 year +40% CC 1440 minute summer	20.711	5.551
200 year +40% CC 1440 minute winter	13.919	5.551

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.85%																
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m²)	Status	Link Event (Outflow)	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	10	15.345	0.045	3.4	0.0512	0.0000	OK	15 minute winter	1.000	S2	3.3	0.438	0.090	0.2288	
15 minute winter	S2	11	15.215	0.065	9.9	0.0737	0.0000	OK	15 minute winter	1.001	S3	9.6	0.876	0.185	0.3588	
15 minute winter	S3	11	14.905	0.080	12.9	0.0900	0.0000	OK	15 minute winter	1.002	S4	13.0	0.783	0.248	0.1967	
15 minute winter	S4	11	14.821	0.116	14.5	0.1315	0.0000	OK	15 minute winter	1.003	S5	14.5	0.911	0.564	0.3841	
15 minute winter	S5	11	14.719	0.074	16.0	0.0835	0.0000	OK	15 minute winter	1.004	S6	15.9	1.155	0.235	0.3278	
15 minute winter	S6	11	14.342	0.097	17.4	0.1092	0.0000	OK	15 minute winter	1.005	S7	17.2	1.306	0.336	0.1624	
15 minute winter	S7	10	14.204	0.074	29.9	0.0833	0.0000	OK	15 minute winter	1.006	SA1	30.2	3.583	0.191	0.1529	
15 minute winter	S8	10	14.836	0.051	6.6	0.0572	0.0000	OK	15 minute winter	20.000	S9	6.5	0.851	0.112	0.2361	
15 minute winter	S9	10	14.461	0.061	11.4	0.0688	0.0000	OK	15 minute winter	20.001	S7	11.2	1.128	0.155	0.1408	
15 minute winter	S10	11	14.530	0.071	13.4	0.0805	0.0000	OK	15 minute winter	2.000	J1	13.4	1.248	0.199	0.0731	
15 minute winter	S11	11	14.264	0.097	26.0	0.1094	0.0000	OK	15 minute winter	2.002	J2	26.2	1.360	0.389	0.4445	
15 minute winter	S12	12	14.133	0.298	32.2	0.3375	0.0000	SURCHARGED	15 minute winter	2.004	J3	32.9	1.331	0.487	0.3295	
15 minute winter	S13	12	14.050	0.445	45.2	0.5032	0.0000	SURCHARGED	15 minute winter	2.006	S14	46.6	1.374	0.694	0.7914	
15 minute winter	S14	11	13.872	0.598	52.9	0.6762	0.0000	SURCHARGED	15 minute winter	2.007	S22	53.7	1.351	0.690	0.3569	
15 minute winter	S15	10	14.867	0.023	1.4	0.0260	0.0000	OK	15 minute winter	21.000	S14	1.4	0.817	0.048	0.0181	
15 minute winter	S16	10	14.178	0.028	1.8	0.0312	0.0000	OK	15 minute winter	3.001	S17	1.8	0.456	0.032	0.0851	
15 minute winter	S17	10	13.951	0.042	3.6	0.0473	0.0000	OK	15 minute winter	3.002	S18	3.5	0.558	0.063	0.0267	
15 minute winter	S18	11	13.916	0.055	5.5	0.0621	0.0000	OK	15 minute winter	3.003	S19	5.4	0.724	0.127	0.1780	
15 minute winter	S19	11	13.755	0.055	9.0	0.0626	0.0000	OK	15 minute winter	3.004	S20	9.0	0.938	0.134	0.5792	
15 minute winter	S20	10	13.613	0.320	10.5	0.3624	0.0000	SURCHARGED	15 minute winter	3.005	S21	15.9	0.771	0.236	0.3483	
15 minute winter	S21	10	13.604	0.457	15.9	0.5172	0.0000	SURCHARGED	15 minute winter	3.006	SA3	17.7	0.446	0.341	0.5060	
15 minute winter	S22	11	13.750	0.676	54.3	0.7646	0.0000	SURCHARGED	15 minute winter	2.008	SA2	55.8	1.403	1.323	0.3548	
15 minute winter	CP1	10	15.447	0.047	3.7	0.0133	0.0000	OK	15 minute winter	4.000	CP2	3.7	0.812	0.086	0.0412	
15 minute winter	CP2	11	15.374	0.033	4.0	0.3290	0.0000	OK	15 minute winter	4.001	S10	3.6	1.030	0.044	0.0455	
15 minute winter	CP3	11	15.503	0.013	1.2	0.0667	0.0000	OK	15 minute winter	5.001	J1	1.0	0.256	0.015	0.0368	
15 minute winter	CP4	12	15.571	0.019	1.2	0.1299	0.0000	OK	15 minute winter	6.001	S11	0.9	0.705	0.031	0.0070	
15 minute winter	CP5	11	15.588	0.012	1.2	0.0564	0.0000	OK	15 minute winter	7.001	J2	1.1	0.142	0.013	0.0739	
15 minute winter	CP6	13	15.446	0.025	1.4	0.2294	0.0000	OK	15 minute winter	8.001	CP7	1.0	0.494	0.057	0.0145	
15 minute winter	CP7	13	15.379	0.028	2.3	0.2856	0.0000	OK	15 minute winter	8.002	S13	1.9	0.875	0.067	0.0092	
15 minute winter	CP8	12	15.596	0.018	1.2	0.1249	0.0000	OK	15 minute winter	9.001	S7	0.9	0.713	0.030	0.0197	
15 minute winter	CP9	12	15.453	0.018	1.2	0.1240	0.0000	OK	15 minute winter	10.001	S7	0.9	0.713	0.030	0.0205	
15 minute winter	CP10	10	15.482	0.037	2.3	0.0106	0.0000	OK	15 minute winter	11.000	CP11	2.3	0.691	0.053	0.0403	
15 minute winter	CP11	12	15.390	0.026	2.7	0.2610	0.0000	OK	15 minute winter	11.001	S10	2.3	0.892	0.028	0.0194	
15 minute winter	CP12	10	15.395	0.045	4.2	0.0127	0.0000	OK	15 minute winter	12.000	CP13	4.2	0.836	0.080	0.0602	
15 minute winter	CP13	12	15.283	0.045	4.6	0.5801	0.0000	OK	15 minute winter	12.001	CP14	3.9	0.856	0.075	0.0167	
15 minute winter	CP14	13	15.237	0.035	4.5	0.4406	0.0000	OK	15 minute winter	12.002	S11	4.0	1.045	0.049	0.0255	
15 minute winter	CP15	12	15.588	0.016	0.8	0.0942	0.0000	OK	15 minute winter	13.001	CP17	0.7	0.556	0.023	0.0135	
15 minute winter	CP16	10	15.490	0.045	4.1	0.0128	0.0000	OK	15 minute winter	17.000	CP17	4.0	1.115	0.071	0.0453	
15 minute winter	CP17	11	15.322	0.022	5.0	0.1735	0.0000	OK	15 minute winter	13.002	J3	4.9	0.364	0.019	0.1452	
120 minute winter	CP18	76	15.217	0.079	1.5	2.5087	0.0000	OK	120 minute winter	14.001	SA3	1.1	0.723	0.013	0.0135	
15 minute winter	CP19	12	15.154	0.016	0.8	0.0971	0.0000	OK	15 minute winter	15.001	S22	0.6	0.649	0.023	0.0077	

15 minute summer	CP20	10	15.286	0.016	0.4	0.0045	0.0000	OK	15 minute summer	15.000	CP19	0.4	0.439	0.023	0.0126
15 minute winter	RE1	10	15.649	0.019	0.6	0.0000	0.0000	OK	15 minute winter	5.000	CP3	0.6	0.557	0.031	0.0139
15 minute winter	RE2	10	15.744	0.019	0.6	0.0000	0.0000	OK	15 minute winter	6.000	CP4	0.6	0.480	0.031	0.0207
15 minute winter	RE3	10	15.745	0.020	0.6	0.0000	0.0000	OK	15 minute winter	7.000	CP5	0.6	0.572	0.031	0.0146
15 minute winter	RE4	10	15.625	0.020	0.7	0.0000	0.0000	OK	15 minute winter	8.000	CP6	0.7	0.493	0.039	0.0294
15 minute winter	RE5	11	15.624	0.019	0.7	0.0000	0.0000	OK	15 minute winter	19.000	CP7	0.7	0.505	0.034	0.0311
15 minute winter	RE6	10	15.744	0.019	0.6	0.0000	0.0000	OK	15 minute winter	9.000	CP8	0.6	0.487	0.031	0.0174
15 minute winter	RE7	10	15.614	0.019	0.6	0.0000	0.0000	OK	15 minute winter	10.000	CP9	0.6	0.487	0.031	0.0190
15 minute summer	RE8	11	15.707	0.012	0.4	0.0000	0.0000	OK	15 minute summer	18.000	CP14	0.4	0.362	0.012	0.0233
15 minute summer	RE9	10	15.711	0.016	0.4	0.0000	0.0000	OK	15 minute summer	13.000	CP15	0.4	0.441	0.023	0.0117
15 minute winter	RE10	11	15.363	0.018	0.7	0.0000	0.0000	OK	15 minute winter	14.000	CP18	0.7	0.462	0.013	0.0221
15 minute winter	RE11	11	15.356	0.021	1.1	0.0000	0.0000	OK	15 minute winter	16.000	CP18	1.1	0.415	0.017	0.0679
60 minute winter	SA1	54	13.179	0.164	16.4	15.7246	0.0000	OK	60 minute winter	Infiltration		3.4			
15 minute winter	SA2	10	13.657	0.645	55.8	0.7297	0.0000	SURCHARGED	15 minute winter	2.009	SA3	57.0	1.435	9.534	0.2673
15 minute summer	SA3	10	13.589	0.578	71.1	0.6535	0.0000	SURCHARGED	15 minute winter	2.010	SA4	75.5	2.613	8.670	0.1041
60 minute winter	SA4	60	13.232	0.222	38.5	40.6463	0.0000	OK	60 minute winter	Infiltration		6.5			
15 minute winter	J1	11	14.416	0.071	14.4	0.0000	0.0000	OK	15 minute winter	2.001	S11	14.4	1.070	0.215	0.1446
15 minute winter	J2	12	14.149	0.250	27.2	0.0000	0.0000	SURCHARGED	15 minute winter	2.003	S12	26.9	1.194	0.398	0.1542
15 minute winter	J3	12	14.091	0.395	36.9	0.0000	0.0000	SURCHARGED	15 minute winter	2.005	S13	38.7	1.304	0.578	0.2185

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.85%																
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m²)	Status	Link Event (Outflow)	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	10	15.371	0.071	8.3	0.0809	0.0000	OK	15 minute winter	1.000	S2	8.1	0.549	0.222	0.4479	
15 minute winter	S2	10	15.258	0.108	24.4	0.1225	0.0000	OK	15 minute winter	1.001	S3	23.9	1.041	0.460	0.7658	
15 minute winter	S3	11	14.977	0.152	32.1	0.1718	0.0000	OK	15 minute winter	1.002	S4	31.1	0.935	0.594	0.4042	
15 minute winter	S4	11	14.937	0.232	34.8	0.2625	0.0000	SURCHARGED	15 minute winter	1.003	S5	34.4	1.111	1.336	0.7458	
15 minute winter	S5	11	14.769	0.124	38.0	0.1401	0.0000	OK	15 minute winter	1.004	S6	37.8	1.404	0.560	0.6387	
15 minute winter	S6	11	14.411	0.166	41.4	0.1875	0.0000	OK	15 minute winter	1.005	S7	41.4	1.662	0.808	0.3017	
15 minute winter	S7	10	14.244	0.114	72.9	0.1289	0.0000	OK	15 minute winter	1.006	SA1	73.5	3.909	0.464	0.3422	
15 minute winter	S8	10	14.865	0.080	16.3	0.0910	0.0000	OK	15 minute winter	20.000	S9	16.1	1.058	0.277	0.4704	
15 minute winter	S9	10	14.503	0.103	28.2	0.1167	0.0000	OK	15 minute winter	20.001	S7	27.8	1.478	0.386	0.2680	
15 minute winter	S10	13	15.430	0.971	34.1	1.0977	0.0000	SURCHARGED	15 minute summer	2.000	J1	26.3	1.375	0.390	0.2708	
15 minute winter	S11	14	15.399	1.232	50.7	1.3939	0.0000	SURCHARGED	15 minute winter	2.002	J2	52.4	1.400	0.778	0.6381	
15 minute winter	S12	12	15.352	1.517	56.9	1.7154	0.0000	SURCHARGED	15 minute winter	2.004	J3	58.3	1.467	0.865	0.3295	
15 minute winter	S13	12	15.233	1.628	70.8	1.8409	0.0000	SURCHARGED	15 minute winter	2.006	S14	71.4	1.797	1.063	0.7914	
15 minute winter	S14	12	14.799	1.525	89.8	1.7249	0.0000	SURCHARGED	15 minute winter	2.007	S22	87.3	2.194	1.121	0.3569	
15 minute winter	S15	10	14.881	0.037	3.5	0.0415	0.0000	OK	15 minute winter	21.000	S14	3.5	1.062	0.122	0.1121	
15 minute winter	S16	10	14.193	0.043	4.5	0.0487	0.0000	OK	15 minute winter	3.001	S17	4.4	0.557	0.081	0.1750	
15 minute winter	S17	10	13.981	0.072	8.9	0.0810	0.0000	OK	15 minute winter	3.002	S18	8.7	0.709	0.158	0.0524	
15 minute summer	S18	11	13.947	0.086	13.0	0.0976	0.0000	OK	15 minute winter	3.003	S19	13.4	0.853	0.312	0.4766	
15 minute winter	S19	10	13.843	0.143	22.3	0.1613	0.0000	OK	15 minute winter	3.004	S20	24.3	0.890	0.362	0.8111	
15 minute winter	S20	9	13.809	0.516	27.9	0.5832	0.0000	SURCHARGED	15 minute winter	3.005	S21	28.6	0.792	0.426	0.3483	
15 minute winter	S21	8	13.786	0.639	28.6	0.7230	0.0000	SURCHARGED	15 minute winter	3.006	SA3	29.0	0.729	0.558	0.5060	
15 minute winter	S22	12	14.412	1.338	88.9	1.5133	0.0000	SURCHARGED	15 minute winter	2.008	SA2	89.4	2.247	2.119	0.3548	
15 minute winter	CP1	10	15.474	0.074	9.0	0.0208	0.0000	OK	15 minute winter	4.000	CP2	8.9	1.006	0.210	0.1061	
15 minute winter	CP2	14	15.429	0.088	9.6	1.1039	0.0000	OK	15 minute winter	4.001	S10	9.2	1.243	0.112	0.3517	
15 minute winter	CP3	11	15.510	0.020	2.8	0.1554	0.0000	OK	15 minute winter	5.001	J1	2.6	0.259	0.039	0.0782	
15 minute winter	CP4	12	15.582	0.030	2.8	0.3304	0.0000	OK	15 minute winter	6.001	S11	2.2	0.924	0.079	0.0138	
15 minute winter	CP5	11	15.595	0.019	2.8	0.1302	0.0000	OK	15 minute winter	7.001	J2	2.6	0.235	0.032	0.0763	
15 minute winter	CP6	13	15.460	0.039	3.4	0.5496	0.0000	OK	15 minute winter	8.001	CP7	2.4	0.610	0.135	0.0276	
15 minute winter	CP7	13	15.395	0.044	5.4	0.6941	0.0000	OK	15 minute winter	8.002	S13	4.4	1.101	0.158	0.0173	
15 minute winter	CP8	12	15.607	0.029	2.8	0.3139	0.0000	OK	15 minute winter	9.001	S7	2.2	0.946	0.079	0.0388	
15 minute winter	CP9	12	15.464	0.029	2.8	0.3117	0.0000	OK	15 minute winter	10.001	S7	2.2	0.946	0.079	0.0404	
15 minute winter	CP10	10	15.502	0.057	5.5	0.0162	0.0000	OK	15 minute winter	11.000	CP11	5.5	0.878	0.129	0.0951	
15 minute winter	CP11	13	15.433	0.069	6.5	1.0783	0.0000	OK	15 minute winter	11.001	S10	8.5	1.122	0.103	0.1905	
15 minute winter	CP12	10	15.422	0.072	10.4	0.0203	0.0000	OK	15 minute winter	12.000	CP13	10.3	0.993	0.198	0.2170	
15 minute winter	CP13	14	15.406	0.168	19.5	2.7457	0.0000	OK	15 minute winter	12.001	CP14	12.7	1.079	0.243	0.1237	
15 minute winter	CP14	14	15.404	0.202	34.5	3.9260	0.0000	OK	15 minute winter	12.002	S11	31.2	1.425	0.378	0.2570	
15 minute winter	CP15	12	15.597	0.025	2.0	0.2302	0.0000	OK	15 minute winter	13.001	CP17	1.7	0.758	0.060	0.0258	
15 minute winter	CP16	10	15.516	0.071	10.0	0.0202	0.0000	OK	15 minute winter	17.000	CP17	9.9	1.426	0.174	0.0864	
15 minute winter	CP17	11	15.333	0.033	12.4	0.3923	0.0000	OK	15 minute winter	13.002	J3	12.2	0.467	0.049	0.1512	
30 minute winter	CP18	21	15.242	0.104	8.7	3.4938	0.0000	OK	30 minute winter	14.001	SA3	6.4	1.199	0.078	0.0471	
15 minute winter	CP19	12	15.164	0.025	2.0	0.2426	0.0000	OK	15 minute winter	15.001	S22	1.7	0.859	0.059	0.0152	

15 minute winter	CP20	10	15.295	0.025	1.0	0.0070	0.0000	OK	15 minute winter	15.000	CP19	1.0	0.566	0.057	0.0248
15 minute winter	RE1	10	15.660	0.030	1.4	0.0000	0.0000	OK	15 minute winter	5.000	CP3	1.4	0.723	0.076	0.0263
15 minute winter	RE2	10	15.754	0.029	1.4	0.0000	0.0000	OK	15 minute winter	6.000	CP4	1.4	0.612	0.077	0.0400
15 minute winter	RE3	10	15.755	0.030	1.4	0.0000	0.0000	OK	15 minute winter	7.000	CP5	1.4	0.746	0.077	0.0277
15 minute winter	RE4	10	15.636	0.031	1.7	0.0000	0.0000	OK	15 minute winter	8.000	CP6	1.7	0.617	0.094	0.0543
15 minute winter	RE5	10	15.634	0.029	1.7	0.0000	0.0000	OK	15 minute winter	19.000	CP7	1.7	0.627	0.080	0.0581
15 minute winter	RE6	10	15.754	0.029	1.4	0.0000	0.0000	OK	15 minute winter	9.000	CP8	1.4	0.621	0.077	0.0336
15 minute winter	RE7	10	15.624	0.029	1.4	0.0000	0.0000	OK	15 minute winter	10.000	CP9	1.4	0.621	0.077	0.0365
15 minute winter	RE8	11	15.713	0.018	1.0	0.0000	0.0000	OK	15 minute winter	18.000	CP14	1.0	0.416	0.029	0.1261
15 minute winter	RE9	10	15.720	0.025	1.0	0.0000	0.0000	OK	15 minute winter	13.000	CP15	1.0	0.572	0.057	0.0228
15 minute winter	RE10	10	15.373	0.028	1.7	0.0000	0.0000	OK	15 minute winter	14.000	CP18	1.7	0.598	0.032	0.0531
15 minute winter	RE11	10	15.367	0.032	2.8	0.0000	0.0000	OK	15 minute winter	16.000	CP18	2.8	0.496	0.044	0.1343
120 minute winter	SA1	118	13.524	0.509	24.4	48.7149	0.0000	OK	120 minute winter	Infiltration		3.8			
15 minute winter	SA2	12	14.007	0.995	89.4	1.1254	0.0000	SURCHARGED	15 minute winter	2.009	SA3	89.8	2.258	15.007	0.2673
15 minute winter	SA3	8	13.773	0.762	122.4	0.8618	0.0000	SURCHARGED	15 minute winter	2.010	SA4	123.0	3.537	14.130	0.1308
120 minute winter	SA4	120	13.713	0.703	56.8	128.9367	0.0000	OK	120 minute winter	Infiltration		7.4			
15 minute winter	J1	14	15.418	1.073	25.3	0.0000	0.0000	SURCHARGED	30 minute summer	2.001	S11	27.2	1.081	0.406	0.4254
15 minute winter	J2	12	15.361	1.462	53.0	0.0000	0.0000	SURCHARGED	15 minute winter	2.003	S12	54.6	1.373	0.809	0.1542
15 minute winter	J3	12	15.300	1.604	61.1	0.0000	0.0000	SURCHARGED	15 minute winter	2.005	S13	63.0	1.585	0.940	0.2185

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.85%																
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m²)	Status	Link Event (Outflow)	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	10	15.382	0.082	10.8	0.0929	0.0000	OK	15 minute winter	1.000	S2	10.6	0.595	0.290	0.5366	
15 minute winter	S2	10	15.274	0.124	31.7	0.1407	0.0000	OK	15 minute winter	1.001	S3	31.1	1.059	0.599	1.0130	
15 minute winter	S3	11	15.132	0.307	41.9	0.3470	0.0000	SURCHARGED	15 minute winter	1.002	S4	40.4	1.015	0.771	0.4708	
15 minute winter	S4	11	15.031	0.326	45.0	0.3683	0.0000	SURCHARGED	15 minute winter	1.003	S5	44.6	1.200	1.733	0.8149	
15 minute winter	S5	11	14.795	0.150	49.2	0.1698	0.0000	OK	15 minute winter	1.004	S6	48.7	1.458	0.721	0.7829	
15 minute winter	S6	11	14.448	0.203	53.3	0.2297	0.0000	OK	15 minute winter	1.005	S7	53.0	1.728	1.035	0.3637	
15 minute winter	S7	11	14.260	0.130	93.3	0.1465	0.0000	OK	15 minute winter	1.006	SA1	93.5	3.988	0.591	0.3793	
15 minute winter	S8	10	14.878	0.093	21.1	0.1052	0.0000	OK	15 minute winter	20.000	S9	20.9	1.114	0.359	0.5784	
15 minute winter	S9	10	14.522	0.122	36.6	0.1381	0.0000	OK	15 minute winter	20.001	S7	36.1	1.582	0.501	0.3226	
15 minute winter	S10	15	15.547	1.088	39.9	1.2307	0.0000	SURCHARGED	15 minute summer	2.000	J1	30.5	1.468	0.452	0.2708	
15 minute winter	S11	15	15.534	1.367	60.4	1.5461	0.0000	SURCHARGED	15 minute winter	2.002	J2	61.2	1.540	0.909	0.6381	
15 minute winter	S12	13	15.482	1.647	62.2	1.8633	0.0000	SURCHARGED	15 minute winter	2.004	J3	63.0	1.585	0.934	0.3295	
15 minute winter	S13	12	15.378	1.773	73.0	2.0048	0.0000	SURCHARGED	15 minute winter	2.006	S14	74.9	1.883	1.115	0.7914	
15 minute winter	S14	11	14.982	1.708	92.3	1.9321	0.0000	SURCHARGED	30 minute summer	2.007	S22	91.1	2.291	1.170	0.3569	
15 minute winter	S15	11	14.989	0.145	5.4	0.1636	0.0000	OK	15 minute summer	21.000	S14	4.7	1.097	0.165	0.1649	
15 minute winter	S16	10	14.199	0.049	5.8	0.0553	0.0000	OK	15 minute winter	3.001	S17	5.7	0.582	0.105	0.2444	
15 minute winter	S17	11	14.006	0.097	11.5	0.1094	0.0000	OK	15 minute summer	3.002	S18	10.9	0.745	0.198	0.0626	
15 minute winter	S18	11	14.005	0.144	17.1	0.1626	0.0000	OK	15 minute winter	3.003	S19	17.9	0.772	0.419	0.7867	
180 minute winter	S19	176	13.988	0.288	7.0	0.3261	0.0000	SURCHARGED	15 minute winter	3.004	S20	28.2	0.978	0.420	0.9731	
180 minute winter	S20	176	13.991	0.698	8.1	0.7892	0.0000	SURCHARGED	15 minute winter	3.005	S21	32.7	0.854	0.486	0.3483	
180 minute winter	S21	176	13.989	0.842	7.4	0.9520	0.0000	SURCHARGED	15 minute winter	3.006	SA3	33.0	0.830	0.636	0.5060	
15 minute winter	S22	11	14.565	1.491	92.6	1.6869	0.0000	SURCHARGED	15 minute winter	2.008	SA2	93.0	2.337	2.204	0.3548	
15 minute winter	CP1	15	15.548	0.148	11.7	0.0419	0.0000	OK	15 minute winter	4.000	CP2	11.4	1.078	0.268	0.2904	
15 minute winter	CP2	15	15.548	0.207	16.4	2.7708	0.0000	OK	15 minute winter	4.001	S10	15.1	1.230	0.183	0.5064	
15 minute winter	CP3	16	15.542	0.052	4.4	0.7986	0.0000	OK	15 minute winter	5.001	J1	7.2	0.557	0.108	0.0946	
15 minute winter	CP4	12	15.585	0.033	3.6	0.4127	0.0000	OK	15 minute winter	6.001	S11	3.1	0.936	0.109	0.0517	
15 minute winter	CP5	11	15.597	0.021	3.6	0.1658	0.0000	OK	15 minute winter	7.001	J2	3.4	0.300	0.042	0.0773	
15 minute winter	CP6	13	15.466	0.045	4.4	0.7173	0.0000	OK	15 minute winter	8.001	CP7	3.1	0.675	0.176	0.0324	
30 minute winter	CP7	21	15.400	0.049	5.9	0.8272	0.0000	OK	15 minute winter	8.002	S13	6.2	1.123	0.221	0.0457	
15 minute winter	CP8	12	15.611	0.033	3.6	0.4037	0.0000	OK	15 minute winter	9.001	S7	2.9	1.019	0.102	0.0466	
15 minute winter	CP9	12	15.468	0.033	3.6	0.4014	0.0000	OK	15 minute winter	10.001	S7	2.9	1.018	0.102	0.0485	
15 minute winter	CP10	15	15.551	0.106	7.2	0.0301	0.0000	OK	15 minute winter	11.000	CP11	7.2	0.935	0.169	0.3231	
15 minute winter	CP11	15	15.548	0.184	16.6	3.2701	0.0000	OK	15 minute winter	11.001	S10	15.7	1.141	0.191	0.2833	
15 minute winter	CP12	15	15.541	0.191	13.5	0.0542	0.0000	OK	15 minute winter	12.000	CP13	13.4	1.040	0.257	0.4222	
15 minute winter	CP13	15	15.539	0.301	28.0	5.0956	0.0000	SURCHARGED	15 minute winter	12.001	CP14	15.0	1.125	0.288	0.1417	
15 minute winter	CP14	15	15.539	0.336	46.3	6.7272	0.0000	SURCHARGED	15 minute winter	12.002	S11	-34.7	1.528	-0.421	0.2640	
15 minute winter	CP15	12	15.601	0.029	2.6	0.3001	0.0000	OK	15 minute winter	13.001	CP17	2.3	0.682	0.080	0.1026	
15 minute winter	CP16	10	15.527	0.082	13.0	0.0231	0.0000	OK	15 minute winter	17.000	CP17	13.1	1.511	0.230	0.1973	
15 minute winter	CP17	13	15.436	0.136	20.3	2.3864	0.0000	OK	15 minute winter	13.002	J3	21.8	0.691	0.087	0.2261	
30 minute winter	CP18	20	15.252	0.114	11.5	3.8770	0.0000	OK	15 minute winter	14.001	SA3	9.4	1.331	0.114	0.0623	
15 minute winter	CP19	12	15.167	0.029	2.6	0.3175	0.0000	OK	15 minute winter	15.001	S22	2.2	0.931	0.079	0.0187	

15 minute winter	CP20	10	15.298	0.028	1.3	0.0080	0.0000OK	15 minute winter	15.000	CP19	1.3	0.614	0.074	0.0301
15 minute winter	RE1	10	15.664	0.034	1.8	0.0000	0.0000OK	15 minute winter	5.000	CP3	1.8	0.780	0.099	0.0437
15 minute winter	RE2	10	15.758	0.033	1.8	0.0000	0.0000OK	15 minute winter	6.000	CP4	1.8	0.664	0.100	0.0481
15 minute winter	RE3	10	15.759	0.034	1.8	0.0000	0.0000OK	15 minute winter	7.000	CP5	1.8	0.806	0.100	0.0333
15 minute winter	RE4	10	15.640	0.035	2.2	0.0000	0.0000OK	15 minute winter	8.000	CP6	2.2	0.665	0.122	0.0661
15 minute winter	RE5	10	15.638	0.033	2.2	0.0000	0.0000OK	15 minute winter	19.000	CP7	2.2	0.670	0.104	0.0683
15 minute winter	RE6	10	15.758	0.033	1.8	0.0000	0.0000OK	15 minute winter	9.000	CP8	1.8	0.674	0.100	0.0404
15 minute winter	RE7	10	15.628	0.033	1.8	0.0000	0.0000OK	15 minute winter	10.000	CP9	1.8	0.674	0.100	0.0440
15 minute winter	RE8	11	15.715	0.020	1.3	0.0000	0.0000OK	15 minute winter	18.000	CP14	1.3	0.460	0.038	0.1285
15 minute winter	RE9	10	15.723	0.028	1.3	0.0000	0.0000OK	15 minute winter	13.000	CP15	1.3	0.621	0.074	0.0275
15 minute winter	RE10	10	15.377	0.032	2.2	0.0000	0.0000OK	15 minute winter	14.000	CP18	2.2	0.634	0.042	0.0738
15 minute winter	RE11	10	15.371	0.036	3.6	0.0000	0.0000OK	15 minute winter	16.000	CP18	3.6	0.523	0.056	0.1574
120 minute winter	SA1	120	13.732	0.717	32.3	68.5288	0.0000OK	120 minute winter	Infiltration		4.1			
15 minute winter	SA2	11	14.131	1.119	93.0	1.2657	0.0000SURCHARGED	15 minute winter	2.009	SA3	93.3	2.346	15.593	0.2673
180 minute winter	SA3	168	13.988	0.977	55.7	1.1051	0.0000SURCHARGED	15 minute winter	2.010	SA4	135.5	3.822	15.570	0.1308
180 minute winter	SA4	176	13.987	0.977	55.4	179.1466	0.0000OK	180 minute winter	Infiltration		7.9			
15 minute winter	J1	15	15.541	1.196	28.8	0.0000	0.0000SURCHARGED	15 minute winter	2.001	S11	29.6	1.134	0.441	0.4254
15 minute winter	J2	13	15.493	1.594	61.3	0.0000	0.0000SURCHARGED	15 minute winter	2.003	S12	62.2	1.564	0.922	0.1542
15 minute winter	J3	13	15.434	1.738	63.5	0.0000	0.0000SURCHARGED	15 minute winter	2.005	S13	64.9	1.633	0.969	0.2185

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.85%																
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link Event (Outflow)	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	12	15.611	0.311	15.1	0.3517	0.0000	SURCHARGED	15 minute summer	1.000	S2	14.9	0.622	0.408	1.1462	
15 minute winter	S2	12	15.589	0.439	41.3	0.4968	0.0000	SURCHARGED	15 minute summer	1.001	S3	36.2	1.068	0.698	1.2939	
15 minute winter	S3	12	15.406	0.581	49.6	0.6574	0.0000	SURCHARGED	15 minute winter	1.002	S4	48.1	1.210	0.919	0.4708	
15 minute winter	S4	12	15.264	0.559	54.1	0.6317	0.0000	SURCHARGED	15 minute winter	1.003	S5	53.7	1.349	2.084	0.9544	
15 minute winter	S5	12	14.950	0.305	59.6	0.3444	0.0000	SURCHARGED	15 minute winter	1.004	S6	59.1	1.485	0.874	0.9452	
180 minute winter	S6	176	14.854	0.609	18.7	0.6888	0.0000	SURCHARGED	15 minute winter	1.005	S7	64.5	1.743	1.260	0.4214	
180 minute winter	S7	176	14.854	0.724	33.1	0.8185	0.0000	SURCHARGED	15 minute winter	1.006	SA1	120.0	4.076	0.758	0.4339	
15 minute winter	S8	10	14.899	0.114	29.5	0.1289	0.0000	OK	15 minute winter	20.000	S9	29.2	1.177	0.502	0.7625	
180 minute winter	S9	176	14.854	0.454	12.0	0.5134	0.0000	SURCHARGED	15 minute winter	20.001	S7	50.5	1.691	0.701	0.4226	
15 minute winter	S10	14	15.735	1.276	44.9	1.4435	0.0000	SURCHARGED	15 minute summer	2.000	J1	29.3	1.410	0.435	0.2708	
30 minute winter	S11	25	15.707	1.540	56.6	1.7414	0.0000	SURCHARGED	15 minute summer	2.002	J2	61.3	1.542	0.911	0.6381	
15 minute winter	S12	13	15.661	1.826	61.4	2.0649	0.0000	SURCHARGED	15 minute summer	2.004	J3	63.0	1.584	0.934	0.3295	
240 minute winter	S13	236	15.568	1.963	43.4	2.2197	0.0000	SURCHARGED	15 minute winter	2.006	S14	79.8	2.007	1.188	0.7914	
240 minute winter	S14	236	15.565	2.291	50.7	2.5906	0.0000	SURCHARGED	30 minute summer	2.007	S22	94.7	2.382	1.217	0.3569	
240 minute winter	S15	236	15.565	0.721	1.5	0.8154	0.0000	SURCHARGED	15 minute winter	21.000	S14	5.6	1.047	0.198	0.1906	
240 minute winter	S16	232	15.560	1.410	3.3	1.5944	0.0000	SURCHARGED	60 minute winter	3.001	S17	-9.5	0.548	-0.174	0.8634	
240 minute winter	S17	232	15.559	1.650	4.6	1.8664	0.0000	SURCHARGED	60 minute winter	3.002	S18	-18.0	0.702	-0.325	0.1691	
240 minute winter	S18	232	15.558	1.697	5.9	1.9195	0.0000	SURCHARGED	60 minute winter	3.003	S19	-25.4	0.893	-0.592	0.9402	
240 minute winter	S19	236	15.558	1.858	7.7	2.1011	0.0000	FLOOD RISK	15 minute winter	3.004	S20	35.1	0.913	0.523	0.9731	
240 minute winter	S20	236	15.558	2.265	8.6	2.5622	0.0000	FLOOD RISK	15 minute winter	3.005	S21	41.1	1.034	0.611	0.3483	
240 minute winter	S21	236	15.558	2.411	10.5	2.7273	0.0000	SURCHARGED	15 minute winter	3.006	SA3	40.8	1.026	0.786	0.5060	
240 minute winter	S22	236	15.563	2.489	51.1	2.8151	0.0000	SURCHARGED	15 minute winter	2.008	SA2	96.8	2.435	2.296	0.3548	
15 minute winter	CP1	14	15.740	0.340	16.3	0.0962	0.0000	SURCHARGED	15 minute summer	4.000	CP2	14.7	1.141	0.346	0.3500	
15 minute winter	CP2	14	15.739	0.398	24.6	5.4460	0.0000	SURCHARGED	15 minute winter	4.001	S10	13.3	1.219	0.162	0.5161	
30 minute winter	CP3	25	15.723	0.233	16.7	4.6262	0.0000	SURCHARGED	15 minute winter	5.001	J1	-15.7	-0.894	-0.235	0.1446	
30 minute winter	CP4	25	15.709	0.157	12.8	3.6574	0.0000	SURCHARGED	15 minute winter	6.001	S11	-13.2	0.878	-0.467	0.1010	
15 minute winter	CP5	15	15.661	0.085	9.4	1.5822	0.0000	OK	15 minute winter	7.001	J2	7.6	0.580	0.093	0.1130	
240 minute winter	CP6	236	15.567	0.146	2.1	3.5370	0.0000	OK	15 minute winter	8.001	CP7	7.3	0.638	0.410	0.1056	
240 minute winter	CP7	236	15.568	0.217	3.6	5.4820	0.0000	SURCHARGED	15 minute winter	8.002	S13	18.7	1.403	0.661	0.0753	
15 minute winter	CP8	12	15.618	0.040	5.0	0.5586	0.0000	OK	15 minute winter	9.001	S7	4.2	1.129	0.148	0.0607	
15 minute winter	CP9	12	15.475	0.040	5.0	0.5640	0.0000	OK	15 minute winter	10.001	S7	4.1	1.125	0.146	0.0626	
15 minute winter	CP10	14	15.740	0.295	10.1	0.0834	0.0000	SURCHARGED	15 minute winter	11.000	CP11	10.0	0.989	0.237	0.4823	
15 minute winter	CP11	14	15.737	0.373	30.6	6.8799	0.0000	SURCHARGED	15 minute winter	11.001	S10	-19.1	1.076	-0.231	0.3021	
15 minute winter	CP12	13	15.724	0.374	18.9	0.1059	0.0000	SURCHARGED	15 minute winter	12.000	CP13	18.8	1.104	0.361	0.4431	
15 minute winter	CP13	13	15.719	0.481	36.5	7.7454	0.0000	SURCHARGED	15 minute summer	12.001	CP14	-20.1	1.119	-0.384	0.1417	
15 minute winter	CP14	13	15.719	0.517	55.6	7.0667	0.0000	SURCHARGED	15 minute winter	12.002	S11	-46.4	1.594	-0.563	0.2640	
15 minute winter	CP15	14	15.606	0.034	3.8	0.4077	0.0000	OK	15 minute winter	13.001	CP17	3.2	0.614	0.114	0.1108	
15 minute winter	CP16	13	15.611	0.166	18.2	0.0469	0.0000	OK	15 minute winter	17.000	CP17	18.7	1.572	0.327	0.4270	
15 minute winter	CP17	13	15.608	0.308	36.3	5.7094	0.0000	SURCHARGED	15 minute winter	13.002	J3	22.8	0.746	0.091	0.2768	
240 minute winter	CP18	236	15.559	0.421	10.0	15.6869	0.0000	SURCHARGED	15 minute winter	14.001	SA3	15.4	1.513	0.187	0.0900	
240 minute winter	CP19	236	15.563	0.425	8.5	6.4983	0.0000	SURCHARGED	120 minute winter	15.001	S22	-13.0	0.781	-0.461	0.1383	

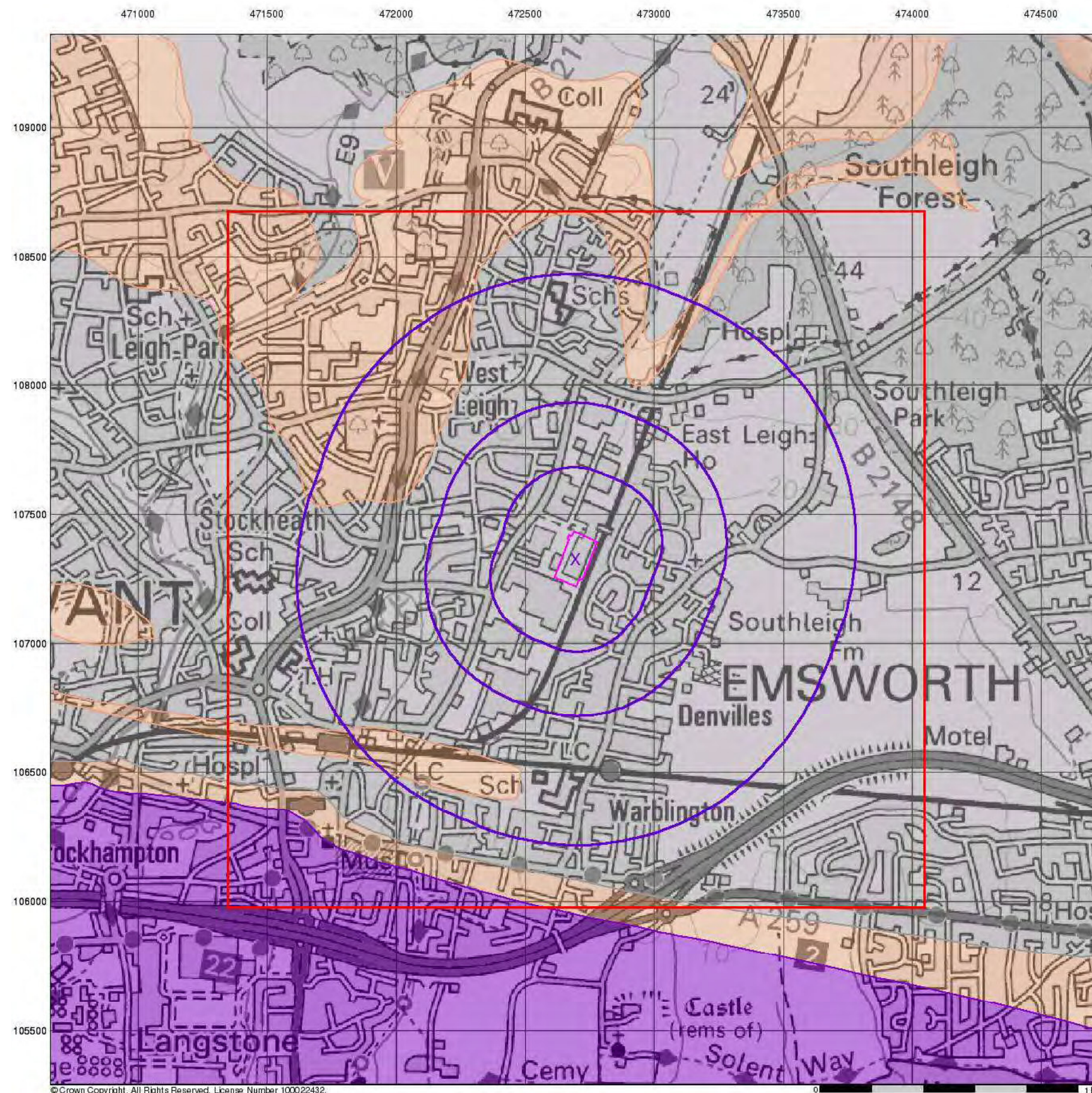
240 minute winter	CP20	236	15.563	0.293	0.6	0.0830	0.0000	SURCHARGED	15 minute winter	15.000	CP19	1.9	0.670	0.106	0.0390
15 minute winter	RE1	16	15.725	0.095	2.5	0.0000	0.0000	OK	15 minute winter	5.000	CP3	2.5	0.854	0.139	0.2016
15 minute winter	RE2	10	15.764	0.039	2.5	0.0000	0.0000	OK	15 minute winter	6.000	CP4	2.5	0.734	0.140	0.1630
15 minute winter	RE3	10	15.766	0.041	2.5	0.0000	0.0000	OK	15 minute winter	7.000	CP5	2.5	0.887	0.139	0.0884
15 minute winter	RE4	10	15.647	0.042	3.1	0.0000	0.0000	OK	15 minute winter	8.000	CP6	3.1	0.736	0.173	0.1307
15 minute winter	RE5	10	15.644	0.039	3.1	0.0000	0.0000	OK	15 minute winter	19.000	CP7	3.1	0.750	0.148	0.1927
15 minute winter	RE6	10	15.764	0.039	2.5	0.0000	0.0000	OK	15 minute winter	9.000	CP8	2.5	0.743	0.140	0.0521
15 minute winter	RE7	10	15.634	0.039	2.5	0.0000	0.0000	OK	15 minute winter	10.000	CP9	2.5	0.743	0.140	0.0564
15 minute winter	RE8	13	15.725	0.030	1.9	0.0000	0.0000	OK	15 minute winter	18.000	CP14	1.9	0.477	0.055	0.1361
15 minute winter	RE9	10	15.729	0.034	1.9	0.0000	0.0000	OK	15 minute winter	13.000	CP15	1.9	0.680	0.106	0.0354
240 minute winter	RE10	236	15.559	0.214	0.7	0.0000	0.0000	OK	15 minute winter	14.000	CP18	3.1	0.698	0.059	0.1065
240 minute winter	RE11	236	15.559	0.224	0.9	0.0000	0.0000	OK	15 minute winter	16.000	CP18	5.0	0.545	0.078	0.1912
180 minute winter	SA1	176	14.852	1.837	33.1	96.6124	0.0000	OK	120 minute winter	Infiltration		4.5			
240 minute winter	SA2	236	15.560	2.548	50.7	2.8820	0.0000	SURCHARGED	15 minute winter	2.009	SA3	96.6	2.430	16.151	0.2673
240 minute winter	SA3	236	15.560	2.549	61.2	2.8829	0.0000	SURCHARGED	15 minute winter	2.010	SA4	151.7	4.096	17.433	0.1308
240 minute winter	SA4	236	15.557	2.547	60.9	185.2294	0.0000	OK	30 minute winter	Infiltration		7.9			
30 minute winter	J1	25	15.719	1.374	31.6	0.0000	0.0000	SURCHARGED	15 minute winter	2.001	S11	33.7	1.100	0.502	0.4254
15 minute winter	J2	13	15.668	1.769	60.6	0.0000	0.0000	SURCHARGED	15 minute summer	2.003	S12	62.2	1.564	0.922	0.1542
15 minute winter	J3	13	15.601	1.905	66.4	0.0000	0.0000	SURCHARGED	15 minute winter	2.005	S13	68.0	1.711	1.015	0.2185

Results for 200 year +40% CC Critical Storm Duration. Lowest mass balance: 98.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link Event (Outflow)	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	12	16.022	0.722	17.5	0.8167	0.0000	SURCHARGED	15 minute summer	1.000	S2	16.5	0.597	0.453	1.1990	
15 minute winter	S2	12	15.998	0.848	48.0	0.9588	0.0000	SURCHARGED	15 minute winter	1.001	S3	41.4	1.057	0.797	1.2939	
15 minute winter	S3	12	15.768	0.943	57.9	1.0665	0.0000	SURCHARGED	15 minute winter	1.002	S4	54.6	1.374	1.044	0.4708	
180 minute winter	S4	176	15.709	1.004	18.1	1.1354	0.0000	SURCHARGED	15 minute winter	1.003	S5	59.1	1.486	2.296	0.9544	
180 minute winter	S5	176	15.708	1.063	20.0	1.2027	0.0000	SURCHARGED	15 minute summer	1.004	S6	64.7	1.627	0.957	0.9452	
180 minute winter	S6	176	15.708	1.463	21.9	1.6545	0.0000	SURCHARGED	15 minute summer	1.005	S7	70.7	1.791	1.381	0.4480	
180 minute winter	S7	176	15.708	1.578	38.7	1.7842	0.0000	SURCHARGED	15 minute winter	1.006	SA1	131.4	4.120	0.831	0.4851	
180 minute winter	S8	176	15.708	0.923	8.0	1.0436	0.0000	SURCHARGED	15 minute winter	20.000	S9	33.9	1.194	0.584	0.8693	
180 minute winter	S9	176	15.708	1.308	14.0	1.4790	0.0000	SURCHARGED	15 minute winter	20.001	S7	58.6	1.742	0.814	0.5189	
30 minute winter	S10	22	15.894	1.435	39.7	1.6234	0.0000	FLOOD RISK	30 minute winter	2.000	J1	36.0	1.382	0.535	0.2708	
30 minute winter	S11	25	15.836	1.669	52.8	1.8876	0.0000	FLOOD RISK	15 minute summer	2.002	J2	60.3	1.516	0.896	0.6381	
240 minute winter	S12	232	15.830	1.995	35.9	2.2562	0.0000	SURCHARGED	15 minute summer	2.004	J3	61.8	1.555	0.916	0.3295	
240 minute winter	S13	232	15.827	2.222	50.5	2.5132	0.0000	FLOOD RISK	15 minute winter	2.006	S14	81.7	2.055	1.216	0.7914	
240 minute winter	S14	228	15.821	2.547	59.1	2.8802	0.0000	FLOOD RISK	30 minute summer	2.007	S22	98.3	2.472	1.263	0.3569	
240 minute winter	S15	228	15.820	0.976	1.4	1.1039	0.0000	FLOOD RISK	15 minute winter	21.000	S14	6.2	1.094	0.218	0.1906	
240 minute winter	S16	232	15.807	1.657	19.0	1.8739	0.0000	SURCHARGED	120 minute summer	3.001	S17	-20.2	-0.544	-0.369	0.8634	
180 minute winter	S17	172	15.808	1.899	9.1	2.1474	0.0000	SURCHARGED	120 minute winter	3.002	S18	-24.2	0.635	-0.439	0.1691	
240 minute winter	S18	212	15.806	1.945	23.7	2.1996	0.0000	SURCHARGED	60 minute winter	3.003	S19	-27.9	0.895	-0.651	0.9402	
240 minute winter	S19	212	15.805	2.105	26.9	2.3808	1.3480	FLOOD	15 minute winter	3.004	S20	40.1	1.008	0.597	0.9731	
240 minute winter	S20	212	15.805	2.512	27.2	2.8411	4.3966	FLOOD	15 minute winter	3.005	S21	46.8	1.176	0.695	0.3483	
240 minute winter	S21	224	15.806	2.659	28.0	3.0072	0.0000	SURCHARGED	15 minute winter	3.006	SA3	46.4	1.167	0.894	0.5060	
240 minute winter	S22	228	15.816	2.742	59.5	3.1012	0.0000	FLOOD RISK	15 minute winter	2.008	SA2	98.8	2.483	2.342	0.3548	
15 minute winter	CP1	14	15.894	0.494	19.0	0.1397	0.0000	SURCHARGED	15 minute winter	4.000	CP2	17.0	1.167	0.401	0.3500	
15 minute winter	CP2	13	15.892	0.551	32.0	6.2212	0.0000	SURCHARGED	15 minute winter	4.001	S10	-13.5	1.284	-0.164	0.5161	
30 minute winter	CP3	26	15.852	0.362	21.9	7.1197	0.0000	SURCHARGED	15 minute winter	5.001	J1	-20.8	-1.184	-0.312	0.1446	
30 minute winter	CP4	26	15.837	0.285	21.1	7.0071	0.0000	SURCHARGED	15 minute winter	6.001	S11	-20.3	-1.206	-0.721	0.1010	
240 minute winter	CP5	228	15.831	0.255	3.1	5.4334	0.0000	SURCHARGED	15 minute winter	7.001	J2	-13.9	-0.899	-0.170	0.1425	
240 minute winter	CP6	228	15.827	0.406	6.2	9.2320	0.0000	FLOOD RISK	15 minute winter	8.001	CP7	-10.0	0.645	-0.565	0.1237	
240 minute winter	CP7	228	15.828	0.477	9.8	9.2519	0.0000	FLOOD RISK	15 minute winter	8.002	S13	21.3	1.470	0.755	0.0753	
180 minute winter	CP8	176	15.708	0.130	2.2	2.5915	0.0000	OK	15 minute winter	9.001	S7	4.9	1.182	0.174	0.0683	
180 minute winter	CP9	176	15.708	0.273	7.8	6.3033	0.0000	FLOOD RISK	180 minute winter	10.001	S7	-7.3	0.827	-0.260	0.3015	
15 minute winter	CP10	13	15.965	0.520	11.7	0.1470	0.0000	SURCHARGED	15 minute winter	11.000	CP11	11.8	1.013	0.278	0.4823	
15 minute winter	CP11	13	15.929	0.565	31.0	8.4126	0.0000	FLOOD RISK	15 minute winter	11.001	S10	-24.8	1.071	-0.301	0.3021	
15 minute winter	CP12	14	15.846	0.496	21.9	0.1403	0.0000	SURCHARGED	15 minute summer	12.000	CP13	20.5	1.169	0.394	0.4431	
30 minute winter	CP13	22	15.843	0.605	35.1	7.7807	0.0000	FLOOD RISK	15 minute summer	12.001	CP14	-25.5	1.165	-0.488	0.1417	
30 minute winter	CP14	22	15.840	0.638	42.0	7.1010	0.0000	FLOOD RISK	15 minute summer	12.002	S11	-52.3	1.605	-0.635	0.2640	
240 minute winter	CP15	232	15.829	0.257	3.0	4.7304	0.0000	FLOOD RISK	15 minute winter	13.001	CP17	7.7	0.649	0.273	0.1667	
240 minute winter	CP16	228	15.829	0.384	4.0	0.1087	0.0000	SURCHARGED	15 minute winter	17.000	CP17	20.7	1.632	0.363	0.4775	
240 minute winter	CP17	228	15.829	0.529	5.2	8.4889	0.0000	FLOOD RISK	15 minute summer	13.002	J3	22.4	0.719	0.089	0.2768	
240 minute winter	CP18	212	15.807	0.669	15.0	16.8961	0.0000	SURCHARGED	120 minute winter	14.001	SA3	-19.7	1.259	-0.239	0.3509	
240 minute winter	CP19	228	15.816	0.678	10.3	6.5700	0.0000	SURCHARGED	120 minute winter	15.001	S22	-17.2	-0.979	-0.612	0.1383	

240 minute winter	CP20	228	15.815	0.545	0.8	0.1544	0.0000	SURCHARGED	180 minute winter	15.000	CP19	-2.3	0.414	-0.129	0.2313
30 minute winter	RE1	24	15.850	0.220	2.6	0.0000	0.0000	SURCHARGED	15 minute winter	5.000	CP3	3.0	0.891	0.167	0.2417
30 minute winter	RE2	26	15.845	0.120	2.3	0.0000	0.0000	OK	15 minute winter	6.000	CP4	2.9	0.767	0.163	0.2285
240 minute winter	RE3	228	15.831	0.106	0.5	0.0000	0.0000	OK	15 minute winter	7.000	CP5	2.9	0.926	0.166	0.1475
240 minute winter	RE4	228	15.827	0.222	0.7	0.0000	0.0000	SURCHARGED	15 minute winter	8.000	CP6	3.6	0.756	0.205	0.1824
240 minute winter	RE5	232	15.827	0.222	0.7	0.0000	0.0000	SURCHARGED	15 minute winter	19.000	CP7	3.6	0.767	0.174	0.1997
15 minute winter	RE6	10	15.767	0.042	2.9	0.0000	0.0000	OK	15 minute winter	9.000	CP8	2.9	0.772	0.163	0.0585
180 minute winter	RE7	176	15.708	0.113	0.7	0.0000	0.0000	OK	15 minute winter	10.000	CP9	2.9	0.774	0.163	0.0633
15 minute winter	RE8	14	15.844	0.149	4.0	0.0000	0.0000	OK	15 minute summer	18.000	CP14	5.9	0.484	0.172	0.1515
240 minute winter	RE9	232	15.828	0.133	0.4	0.0000	0.0000	OK	15 minute winter	13.000	CP15	2.2	0.707	0.123	0.0936
240 minute winter	RE10	232	15.806	0.461	1.2	0.0000	0.0000	SURCHARGED	15 minute winter	14.000	CP18	3.6	0.681	0.070	0.1229
240 minute winter	RE11	228	15.807	0.471	1.2	0.0000	0.0000	FLOOD RISK	15 minute winter	16.000	CP18	5.8	0.555	0.091	0.2077
180 minute winter	SA1	176	15.706	2.691	38.6	97.5781	0.0000	OK	60 minute summer	Infiltration		4.5			
240 minute winter	SA2	224	15.810	2.798	59.0	3.1649	0.0000	SURCHARGED	15 minute winter	2.009	SA3	98.0	2.465	16.384	0.2673
240 minute winter	SA3	228	15.808	2.797	70.5	3.1638	0.0000	SURCHARGED	15 minute winter	2.010	SA4	162.9	4.214	18.713	0.1308
240 minute winter	SA4	224	15.805	2.795	70.1	185.5103	0.0000	OK	30 minute summer	Infiltration		7.9			
30 minute winter	J1	25	15.854	1.509	36.0	0.0000	0.0000	FLOOD RISK	15 minute summer	2.001	S11	33.6	1.080	0.501	0.4254
240 minute winter	J2	228	15.832	1.933	28.7	0.0000	0.0000	SURCHARGED	15 minute summer	2.003	S12	61.1	1.537	0.906	0.1542
240 minute winter	J3	228	15.829	2.133	40.5	0.0000	0.0000	SURCHARGED	15 minute summer	2.005	S13	67.6	1.701	1.009	0.2185

Appendix D



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Bedrock Aquifer Designation

General

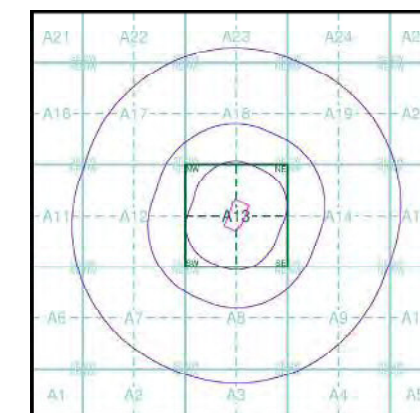
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



Order Details

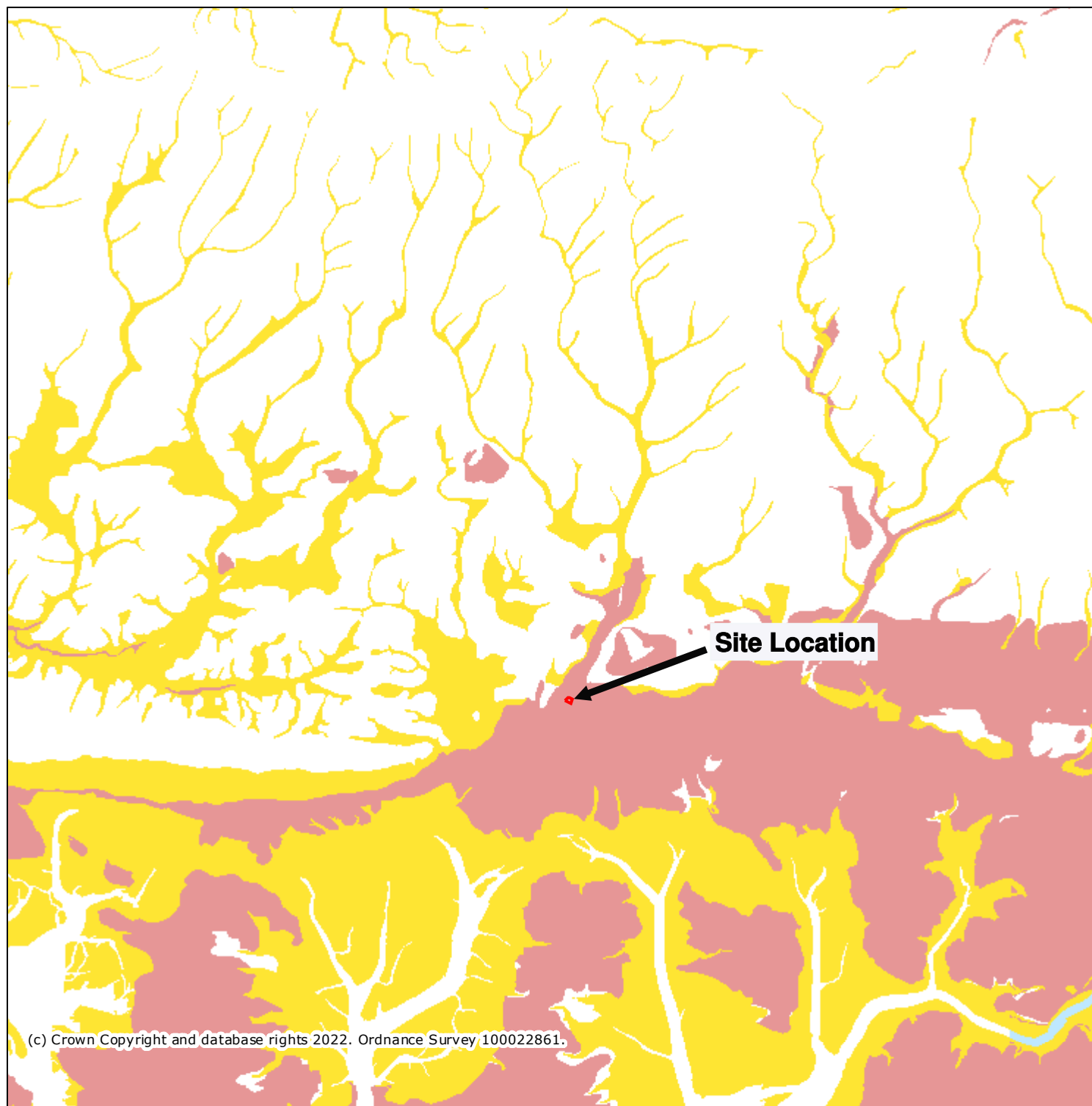
Order Number: 62539150_1_1
 Customer Ref: 13-0646.01
 National Grid Reference: 472700, 107330
 Slice: A
 Site Area (Ha): 1.99
 Search Buffer (m): 1000

Site Details

Stanbridge Road, Havant, PO9 2NL



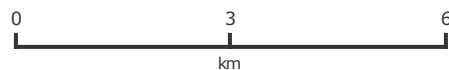
Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



Legend

Aquifer Designation Map (Superficial Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive



Projection = OSGB36

xmin = 445600

ymin = 95310

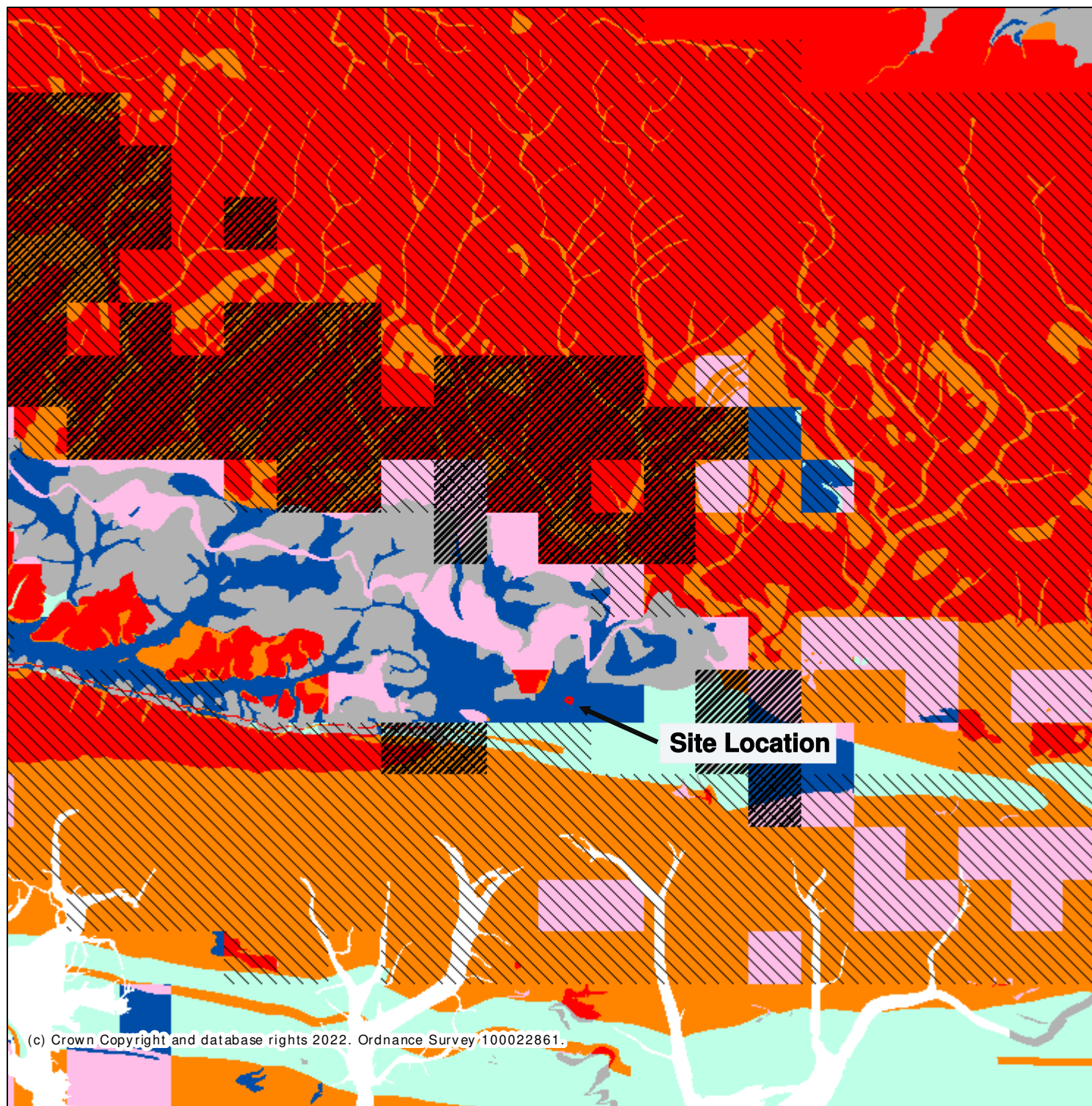
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Map produced by MAGiC on 21 July, 2022.

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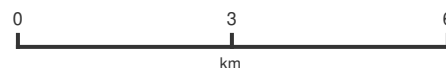
MAGiC roundwater Vulnerability Map



Legend

Groundwater Vulnerability Map (England)

-  Local Information
-  Soluble Rock Risk
-  High
-  Medium - High
-  Medium
-  Medium - Low
-  Low
-  Unproductive



Projection = OSGB36

xmin = 445600

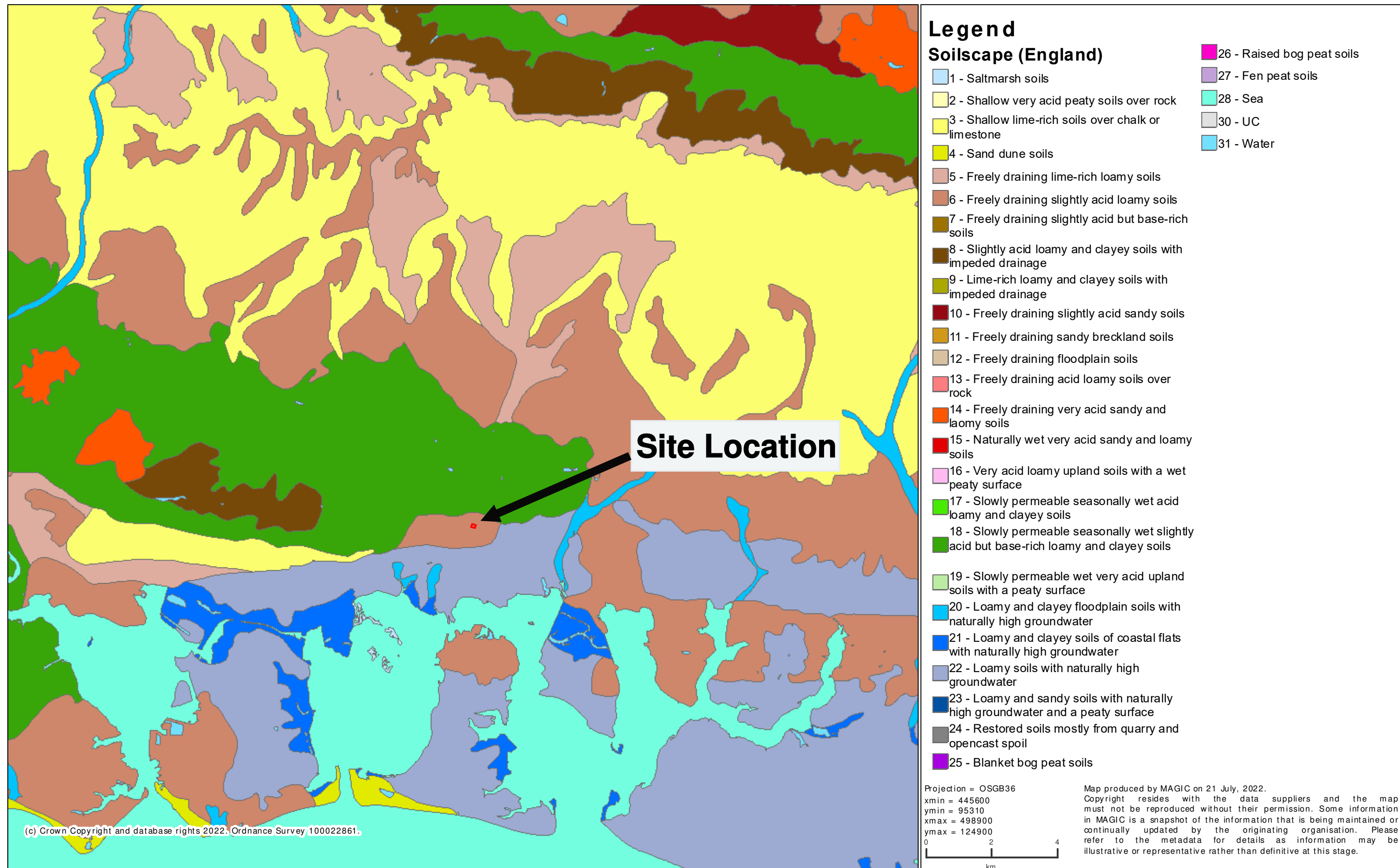
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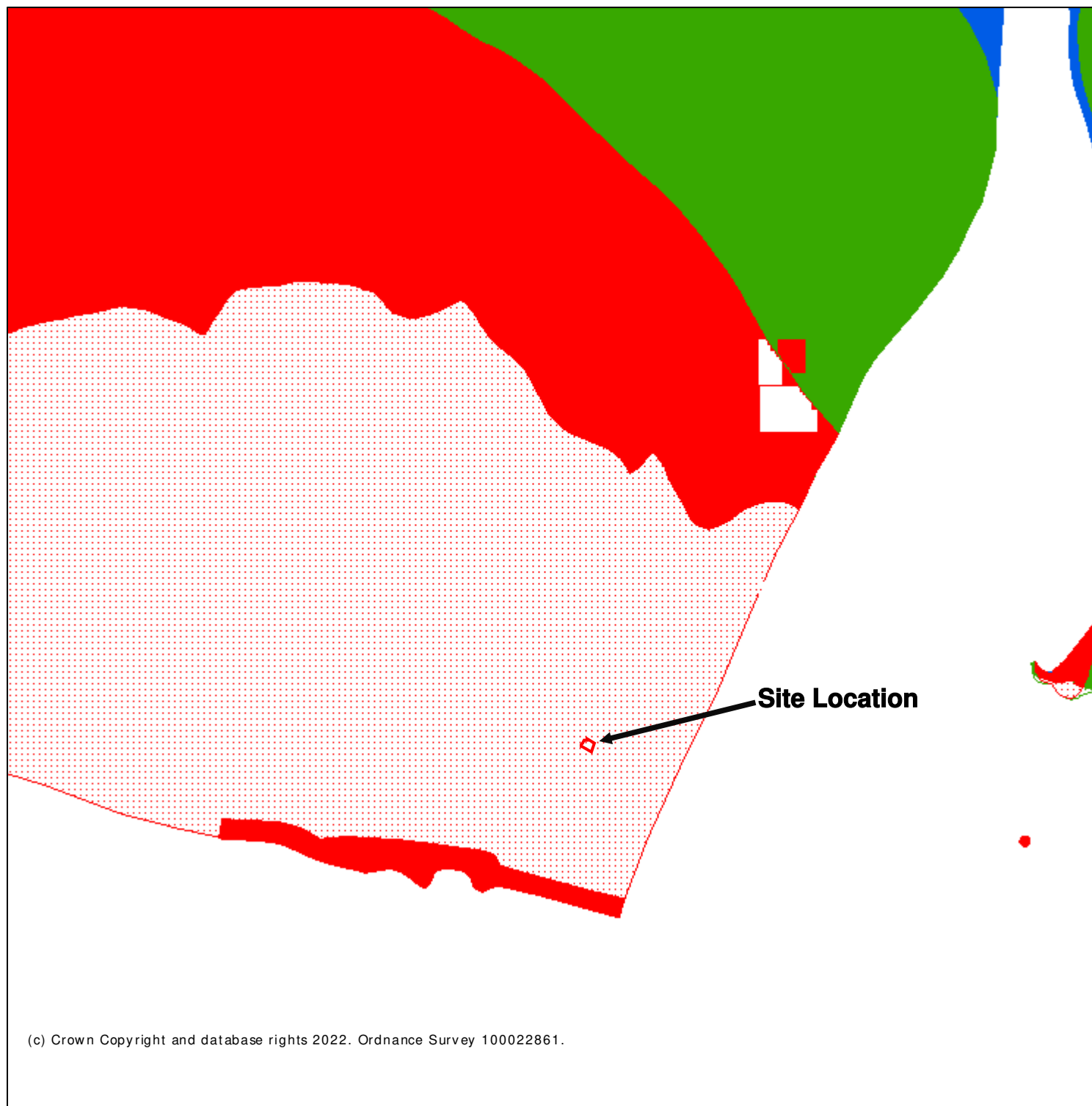
xmax = 498900

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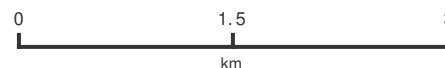




Legend

Source Protection Zones merged (England)

- Zone I - Inner Protection Zone
- Zone I - Subsurface Activity
- Zone II - Outer Protection Zone
- Zone II - Subsurface Activity
- Zone III - Total Catchment
- Zone III - Subsurface Activity
- Zone of Special Interest



Projection = OSGB36

xmin = 458900

ymin = 101800

xmax = 485600

ymax = 116600

Map produced by MAGiC on 21 July, 2022.

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Delta-Simons 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR Tel: +44 (0) 870 0400 012 Fax: +44 (0) 1522 698393 Email: info@deltasimons.com									
Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH1			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 10/12/2014 - 11/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				16.92 0.15 16.77 0.30 16.57 0.50					
MADE GROUND: Hardcore.					D		0.50		
MADE GROUND: Brown sandy gravelly CLAY. Gravel is fine to coarse chert and brick.				(0.90)			1.00 - 1.45	CPT N=36 3,5/5,8,11,12	
Firm brown mottled grey slightly sandy, slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to medium grained flint. [HEAD DEPOSITS]				15.67 1.40	D		1.50		
Medium dense to very dense light brown sandy GRAVEL. Sand is fine to coarse, gravel is sub-angular fine to medium grained with occasional cobbles of chert/ flint. No soil returns from 3.0m to 4.5m bgl. [RIVER TERRACE DEPOSITS]				(3.10)	B		2.00 - 2.45 2.50	CPT N=50/150mm (8,17/70mm/23,27)	
NO RECOVERY (Possible Driving Cobble). [RIVER TERRACE DEPOSITS].				12.57 4.50			3.00 - 3.45 4.00 - 4.45	CPT N=23 6,4/5,5,6,7 CPT N=36 10,7/6,10,8,12	
Firm brown silty gravelly CLAY. Gravel is angular to sub-angular fine to medium grained chert. [LONDON CLAY FORMATION]			(150mm)	(1.00)			5.00 - 5.45	CPT N=20 7,11/8,4,4,4	
Firm and stiff brown slightly silty CLAY with occasional fine silty partings. [LONDON CLAY FORMATION]				11.57 5.50	D		5.50		
Stiff grey silty CLAY with occasional organic laminations. [LONDON CLAY FORMATION]				(1.10)			6.00 - 6.45	CPT N=12 3,3/2,3,3,4	
Very stiff grey silty gravelly CLAY. Gravel is angular to sub-angular, fine to coarse chert, flint and occasional siltstone. [LONDON CLAY FORMATION]				10.47 6.60			7.00		
				(2.10)	D		7.50 - 7.95	U=60/450mm	
				8.37 8.70			9.00 - 9.45	SPT N=29 4,5/6,7,7,9	
				(0.60)			9.50		
				7.77 9.30	D		10.00 - 10.45		
				(1.15)					

REMARKS :

- Engineer verified logged in general accordance to BS 5930:2010.
- Area CAT scanned prior to excavation.
- Water added from 2.00m bgl.
- Groundwater encountered at 8.70m bgl.
- Installed with a HDPE standpipe to 9.50m bgl.

CHISELLING			WATER LEVEL OBSERVATIONS					
Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
1.40	2.80	03:00	1	11-12-14		8.70	6.10	6.00
3.50	4.50	02:30						

BOREHOLE DIAMETER	CASING DIAMETER	DEPTH SEALED
	150mm to 10.45m	

All measurements in metres unless otherwise stated	10m/page Scale: 1:62.50	Coordinates to National Grid Ground Level to Ordnance Datum	Page 1 of 2
Plant Used: Dando 2000	Coordinates / Level (mAOD): E: 472768 N: 107394 Level: 17.07	Logged By: ML	Checked By: AC Approved By: DW

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Project: **Stanbridge Road, Havant** Project No: **13-0646.01** Hole ID: **BH1**

CABLE PERCUSSION BOREHOLE LOG

Date From / To:
10/12/2014 - 11/12/2014

Client:
BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
			10.45	6.62 _ 10.45				SPT N=43 8,8/9,11,11,12	
Borehole complete at 10.45m bgl.									

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 2.00m bgl.
4. Groundwater encountered at 8.70m bgl.
5. Installed with a HDPE standpipe to 9.50m bgl.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
1.40	2.80	03:00	1	11-12-14		8.70	6.10	6.00
3.50	4.50	02:30						

WATER LEVEL OBSERVATIONS

BOREHOLE DIAMETER CASING DIAMETER DEPTH SEALED

150mm to 10.45m

All measurements in metres unless otherwise stated

10m/page Scale: 1:62.50

Coordinates to National Grid
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used: **Dando 2000** Coordinates / Level (mAOD): **E: 472768 N: 107394 Level: 17.07** Logged By: **ML** Checked By: **AC** Approved By: **DW**

Delta-Simons 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR Tel: +44 (0) 870 0400 012 Fax: +44 (0) 1522 698393 Email: info@deltasimons.com									
Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH2			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 08/12/2014 - 09/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				16.62 0.20					
MADE GROUND: Brown sandy gravelly CLAY. Gravel is angular to sub-rounded fine to coarse with occasional brick cobbles. Gravels comprise brick concrete and chert.				16.32 0.50	D		0.50		
MADE GROUND: Firm brown mottled grey, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, gravel is angular to sub-rounded fine to coarse flint and brick.				(0.90)			1.00 - 1.45	CPT N=22 5,4/3,4,7,8	
Dense to very dense light brown slightly sandy GRAVEL. Sand is fine to coarse, gravel is angular to sub-angular chert/ flint. [RIVER TERRACE DEPOSITS]				15.42 1.40	B		1.50		
					B		2.00 - 2.45	CPT N=48 13,11/12,11,13,12	
					B		2.50		
					B		3.00 - 3.45	CPT N=50/230mm (12,13/15,16,16,3/5mm)	
				(4.20)	B		3.50		
					B		4.00 - 4.45	CPT N=50/155mm (12,13/65mm/22,23,5/5mm)	
					B		4.50		
							5.00 - 5.45	CPT N=50/225mm (12,13/60mm/15,17,18)	
					D		5.50		
Firm brown blue slightly silty CLAY with occasional fine silty partings. [LONDON CLAY FORMATION]				11.22 5.60	U		6.00 - 6.45	U=40/450mm	
				(0.70)					
				10.52 6.30					
Firm green grey silty sandy CLAY. [LONDON CLAY FORMATION]							7.50 - 7.95	SPT N=14 2,2/3,3,4,4	
				(2.00)					
					D		8.00		
				8.52 8.30					
Very stiff grey silty gravelly CLAY. Gravel is fine to coarse sub-angular to rounded chert/ flint. [LONDON CLAY FORMATION]							9.00 - 9.45	SPT N=42 3,4/9,10,11,12	
				(1.87)					
							9.90 - 10.35	SPT N=50/270mm	

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Water added from 1.50m bgl. 4. Groundwater encountered at 5.90m bgl. 5. Installed with a HDPE standpipe to 9.00m bgl.	CHISELLING			WATER LEVEL OBSERVATIONS					
	Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
	1.80	2.80	02:30	1	09-12-14		5.90	5.10	5.50
	3.00	4.00	03:00						
	4.00	5.50	03:00						
BOREHOLE DIAMETER			CASING DIAMETER			DEPTH SEALED			
			150mm to 10.17m						

All measurements in metres unless otherwise stated	10m/page Scale: 1:62.50	Coordinates to National Grid Ground Level to Ordnance Datum	Page 1 of 2
Plant Used: Dando 2000	Coordinates / Level (mAOD): E: 472710 N: 107423 Level: 16.82	Logged By: ML	Checked By: AC Approved By: DW

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Project: **Stanbridge Road, Havant** Project No: **13-0646.01** Hole ID: **BH2**

CABLE PERCUSSION BOREHOLE LOG

Date From / To:
08/12/2014 - 09/12/2014

Client:
BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Borehole complete at 10.17m bgl.			10.17	6.65 — 10.17				(9,13/13,14,14,9/45mm)	

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 1.50m bgl.
4. Groundwater encountered at 5.90m bgl.
5. Installed with a HDPE standpipe to 9.00m bgl.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
1.80	2.80	02:30	1	09-12-14		5.90	5.10	5.50
3.00	4.00	03:00						
4.00	5.50	03:00						

WATER LEVEL OBSERVATIONS

BOREHOLE DIAMETER

CASING DIAMETER

DEPTH SEALED

150mm to 10.17m

All measurements in metres unless otherwise stated

10m/page Scale: 1:62.50

Coordinates to National Grid
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used: **Dando 2000** Coordinates / Level (mAOD): **E: 472710 N: 107423 Level: 16.82** Logged By: **ML** Checked By: **AC** Approved By: **DW**

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Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH3			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 16/12/2014 - 17/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				16.12 0.25					
MADE GROUND: Very gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded brick and chert.				(0.55) 15.57 0.80	D		0.50		
Firm becoming stiff light brown, slightly gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded chert/ flint. Becoming coarser with depth. [HEAD DEPOSITS]				(1.80)	D		1.00 - 1.45	CPT N=16 2,3/4,4,3,5	
					D		1.50		
					D		2.00 - 2.45	CPT N=19 6,3/3,7,4,5	
				13.77 2.60	D		2.50		
Very dense light brown sandy GRAVEL with occasional cobbles. Gravel is fine to coarse, angular to sub-angular chert/ flint becoming coarser with depth. [RIVER TERRACE DEPOSITS]				(2.70)	D		3.00 - 3.45	CPT N=50/220mm (13,12/55mm/17,17,16/70mm)	
					D		3.50		
					D		4.00 - 4.45	CPT N=24/70mm (25,26/24/70mm)	
					D		4.50		
					D		5.00 - 5.45	CPT N=17 11,7/4,4,4,5	
Firm grey brown gravelly CLAY. Gravel is fine to coarse angular to sub-angular flint/ chert. [LONDON CLAY FORMATION]			(150mm)	11.07 5.30 10.87 5.50	D		5.50		
					D		6.00 - 6.45	SPT N=12 2,3/3,3,3,3	
Firm becoming stiff (from c.8m) grey silty CLAY. [LONDON CLAY FORMATION]				(3.40)	D		7.00		
					U		7.50 - 7.95	U=32/315mm	
				7.47 8.90			9.00 - 9.45	SPT N=23 3,4/5,6,6,6	
Stiff grey sandy gravelly CLAY. Sand is fine to coarse, gravel is fine to coarse, angular to sub-angular flint/ chert. [LONDON CLAY FORMATION]				(1.55)	D		9.50		
							10.00 - 10.45		

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Water added from 3.00m bgl. 4. Groundwater encountered at 6.90m bgl. 5. Backfilled with arisings.																			
										CHISELLING					WATER LEVEL OBSERVATIONS				
										Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth	
										2.50	3.00	01:45	1	17-12-14		6.90	5.90	6.00	
										3.00	4.00	02:15							
BOREHOLE DIAMETER					CASING DIAMETER		DEPTH SEALED												
					150mm to 10.45m														

All measurements in metres unless otherwise stated		10m/page Scale: 1:62.50	Coordinates to National Grid Ground Level to Ordnance Datum		Page 1 of 2
Plant Used: Dando 2000	Coordinates / Level (mAOD): E: 472642 N: 107311 Level: 16.37		Logged By: ML	Checked By: AC	Approved By: DW

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Project: **Stanbridge Road, Havant** Project No: **13-0646.01** Hole ID: **BH3**

CABLE PERCUSSION BOREHOLE LOG

Date From / To:
16/12/2014 - 17/12/2014

Client:
BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
			10.45	5.92 - 10.45				SPT N=40 5,7/8,9,11,12	
Borehole complete at 10.45m bgl.									

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 3.00m bgl.
4. Groundwater encountered at 6.90m bgl.
5. Backfilled with arisings.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
2.50	3.00	01:45	1	17-12-14		6.90	5.90	6.00
3.00	4.00	02:15						

WATER LEVEL OBSERVATIONS

BOREHOLE DIAMETER

CASING DIAMETER

DEPTH SEALED

150mm to 10.45m

All measurements in metres unless otherwise stated

10m/page Scale: 1:62.50

Coordinates to National Grid
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used: **Dando 2000** Coordinates / Level (mAOD): **E: 472642 N: 107311 Level: 16.37** Logged By: **ML** Checked By: **AC** Approved By: **DW**

Delta-Simons 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR Tel: +44 (0) 870 0400 012 Fax: +44 (0) 1522 698393 Email: info@deltasimons.com									
Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH4			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 12/12/2014 - 15/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				15.74 0.25					
MADE GROUND: Firm brown gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded chert and brick.				15.29 0.70	D		0.50		
Stiff Brown slightly gravelly CLAY. Gravel is fine to medium, angular to sub-angular chert. [HEAD DEPOSITS].				(2.20)	D		1.00 - 1.45	CPT N=25 3,5/5,7,8,5	
							1.50		
							2.00 - 2.45	CPT N=24 5,7/4,6,7,7	
							2.50		
Very dense and dense light brown sandy GRAVEL. Sand is fine to coarse, gravel is fine to medium, angular to sub-angular chert. [RIVER TERRACE DEPOSITS]				(2.30)	D		3.00 - 3.45	CPT N=50/265mm (11,14/11,14,15,10/40mm)	
							3.50		
							4.00 - 4.45	CPT N=48 7,9/12,9,13,14	
							4.50		
Stiff brown silty gravelly CLAY. Gravel is fine to medium angular to sub-angular chert. [LONDON CLAY FORMATION]				(0.60)	D		5.00 - 5.45	CPT N=19 7,6/5,4,5,5	
							5.50		
Stiff grey silty CLAY. [LONDON CLAY FORMATION]				(2.60)	D		6.00 - 6.45	SPT N=17 2,3/4,4,4,5	
							7.00		
							7.50 - 7.95	U=28/450mm	
Stiff to very stiff gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded chert. [LONDON CLAY FORMATION]				(1.55)	D		9.00 - 9.45	SPT N=32 4,5/7,8,8,9	
							9.50		
							9.50 - 9.95	SPT N=44 6,8/10,10,12,12	
			9.95	6.04 9.95					

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Water added from 3.00m bgl. 4. Groundwater encountered at 5.80m bgl. 5. Installed with a HDPE standpipe to 9.00m bgl.	CHISELLING			WATER LEVEL OBSERVATIONS					
	Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
	3.20	4.00	01:45	1	15-12-14		5.80	5.40	5.50
	4.00	4.90	02:15						
BOREHOLE DIAMETER			CASING DIAMETER			DEPTH SEALED			
			150mm to 9.95m						
All measurements in metres unless otherwise stated		10m/page Scale: 1:62.50		Coordinates to National Grid Ground Level to Ordnance Datum				Page 1 of 2	
Plant Used: Dando 2000		Coordinates / Level (mAOD): E: 472661 N: 107247 Level: 15.99		Logged By: ML		Checked By: AC		Approved By: DW	

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Project: **Stanbridge Road, Havant** Project No: **13-0646.01** Hole ID: **BH4**

CABLE PERCUSSION BOREHOLE LOG

Date From / To:
12/12/2014 - 15/12/2014

Client:
BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Borehole complete at 9.95m bgl.									

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 3.00m bgl.
4. Groundwater encountered at 5.80m bgl.
5. Installed with a HDPE standpipe to 9.00m bgl.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
3.20	4.00	01:45	1	15-12-14		5.80	5.40	5.50
4.00	4.90	02:15						

WATER LEVEL OBSERVATIONS

BOREHOLE DIAMETER

CASING DIAMETER

DEPTH SEALED

150mm to 9.95m

All measurements in metres unless otherwise stated

10m/page Scale: 1:62.50

Coordinates to National Grid
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used: **Dando 2000** Coordinates / Level (mAOD): **E: 472661 N: 107247 Level: 15.99** Logged By: **ML** Checked By: **AC** Approved By: **DW**

Delta-Simons 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR Tel: +44 (0) 870 0400 012 Fax: +44 (0) 1522 698393 Email: info@deltasimons.com									
Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH5			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 11/12/2014 - 12/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				15.88 0.30 15.68 0.50	D		0.50		
MADE GROUND: Firm brown gravelly CLAY. Gravel is fine to medium grained brick.				(1.10)			1.00 - 1.45	CPT N=13 3,2/2,3,4,4	
Firm brown gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded chert. [HEAD DEPOSITS]				14.58 1.60	D		1.50		
Medium dense and dense light brown sandy GRAVEL. Gravel is fine to medium angular to sub-angular chert. [RIVER TERRACE DEPOSITS]			(4.60)	B		2.00	2.00 - 2.45	CPT N=42 5,6/8,8,12,14	
				D		3.00	3.00 - 3.45	CPT N=50/285mm (9,11/12,11,15,12/60mm)	
				D		4.00	4.00 - 4.45	CPT N=24 5,5/6,5,6,7	
				D		5.00	5.00 - 5.45	CPT N=28 9,12/8,7,7,6	
Firm brown slightly silty CLAY with occasional chert gravel. [LONDON CLAY FORMATION]				9.98 6.20 (0.70)			6.00 - 6.45	CPT N=10 4,3/2,2,3,3	
Stiff brown slightly silty CLAY with occasional silty partings. [LONDON CLAY FORMATION]				9.28 6.90 (1.20)	D		7.00		
Stiff slightly gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded chert. [LONDON CLAY FORMATION]			(1.85)	U		7.50 - 7.95		U=70/450mm	
				D		9.00 - 9.45	SPT N=27 5,5/5,7,7,8		
			9.95	6.23 9.95			9.50	9.50 - 9.95	SPT N=42 5,7/8,11,11,12

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Water added from 1.50m bgl. 4. Groundwater encountered at 6.90m bgl. 5. Installed with a HDPE standpipe to 9.00m bgl.	CHISELLING			WATER LEVEL OBSERVATIONS					
	Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
	2.20	3.00	01:30	1	12-12-14		6.90	5.20	6.00
	3.00	3.70	01:15						
BOREHOLE DIAMETER			CASING DIAMETER			DEPTH SEALED			
			150mm to 9.95m						

All measurements in metres unless otherwise stated	10m/page Scale: 1:62.50	Coordinates to National Grid Ground Level to Ordnance Datum	Page 1 of 2
Plant Used: Dando 2000	Coordinates / Level (mAOD): E: 427712 N: 107265 Level: 16.18	Logged By: ML	Checked By: AC Approved By: DW

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Project: **Stanbridge Road, Havant** Project No: **13-0646.01** Hole ID: **BH5**

CABLE PERCUSSION BOREHOLE LOG

Date From / To:
11/12/2014 - 12/12/2014

Client:
BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Borehole complete at 9.95m bgl.									

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 1.50m bgl.
4. Groundwater encountered at 6.90m bgl.
5. Installed with a HDPE standpipe to 9.00m bgl.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
2.20	3.00	01:30	1	12-12-14		6.90	5.20	6.00
3.00	3.70	01:15						

WATER LEVEL OBSERVATIONS

BOREHOLE DIAMETER

CASING DIAMETER

DEPTH SEALED

150mm to 9.95m

All measurements in metres unless otherwise stated

10m/page Scale: 1:62.50

Coordinates to National Grid
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used: **Dando 2000** Coordinates / Level (mAOD): **E: 427712 N: 107265 Level: 16.18** Logged By: **ML** Checked By: **AC** Approved By: **DW**

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Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH6			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 18/12/2014 - 22/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				16.49 0.30	B		0.30 - 0.60		
MADE GROUND: Orange brown slightly sandy very gravelly CLAY. Sand is fine to medium, gravel is sub-angular.				(0.60) 15.89 0.90	B		0.90 - 1.30		
MADE GROUND: Dense black silty sandy GRAVEL of tarmacadam/ asphalt.				15.49 1.30 15.29 1.50	B		1.30 - 1.60 1.50 - 1.95	CPT N=24 2,3/4,6,6,8	
MADE GROUND: Gravel sub-base.									
Stiff light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse, gravel is fine to coarse angular to sub-angular flint/ chert. Becoming very gravelly at base. [HEAD DEPOSITS]				(1.50) 13.79 3.00			2.50 - 2.95	CPT N=33 3,5/7,8,8,10	
Dense and very dense light brown sandy, cobbly GRAVEL. Gravel is fine to coarse angular to sub-angular flint/ chert. [RIVER TERRACE DEPOSITS]			(200mm)	(2.50) 11.29 5.50			3.50 - 3.95 4.50 - 4.95	CPT N=58 1,4/9,15,21,13 CPT N=37 2,7/7,8,11,11	
Firm brown gravelly CLAY. [LONDON CLAY FORMATION]				(1.30) 9.99 6.80	B		6.80 - 7.20		
Firm grey CLAY with rare orange mottling and slightly organic partings and rare sub-angular flint gravel. [LONDON CLAY FORMATION]				(1.20) 8.79 8.00	U		7.50 - 7.95	U=40/450mm	
Stiff light and dark grey slightly gravelly CLAY. Slightly organic traces at top of strata. Gravel is fine to medium, sub-angular to subrounded chert. [LONDON CLAY FORMATION]				(1.95)	U		9.00 - 9.45	U=55/450mm	
					D		9.50 - 9.95 9.50 - 9.95	SPT N=24 2,3/4,6,6,8	
				9.95 6.84 9.95					

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Water added from 3.00m - 6.00m bgl. 4. Groundwater encountered at 7.00m bgl. 5. Backfilled with arisings.				CHISELLING			WATER LEVEL OBSERVATIONS					
				Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
				0.90	1.30	02:30	1	19-12-14		7.00		6.00
				3.00	5.00	02:00						
				BOREHOLE DIAMETER		CASING DIAMETER		DEPTH SEALED				
						200mm to 9.95m						

All measurements in metres unless otherwise stated		10m/page Scale: 1:62.50	No Coordinate Data Available Ground Level to Ordnance Datum		Page 1 of 2
Plant Used: Pilson Cut Down	Coordinates / Level (mAOD): Level: 16.79		Logged By: SB	Checked By: AC	Approved By: DW

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Project:	Stanbridge Road, Havant	Project No:	13-0646.01	Hole ID:	BH6
	CABLE PERCUSSION BOREHOLE LOG	Date From / To:	18/12/2014 - 22/12/2014	Client:	BCP (Havant) LLP

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Borehole complete at 9.95m bgl.									

REMARKS :

1. Engineer verified logged in general accordance to BS 5930:2010.
2. Area CAT scanned prior to excavation.
3. Water added from 3.00m - 6.00m bgl.
4. Groundwater encountered at 7.00m bgl.
5. Backfilled with arisings.

CHISELLING

Depth From	Depth To	Time Taken		Date	Time	Water Strike	Standing Level	Casing Depth
0.90	1.30	02:30	1	19-12-14		7.00		6.00
3.00	5.00	02:00						

WATER LEVEL OBSERVATIONS**BOREHOLE DIAMETER****CASING DIAMETER****DEPTH SEALED**

200mm to 9.95m

All measurements in metres
 unless otherwise stated

10m/page Scale: 1:62.50

No Coordinate Data Available
 Ground Level to Ordnance Datum

Page 2 of 2

Plant Used:	Coordinates / Level (mAOD):	Logged By:	Checked By:	Approved By:
Pilcon Cut Down	Level: 16.79	SB	AC	DW

Delta-Simons 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR Tel: +44 (0) 870 0400 012 Fax: +44 (0) 1522 698393 Email: info@deltasimons.com									
Project: Stanbridge Road, Havant				Project No: 13-0646.01		Hole ID: BH7			
CABLE PERCUSSION BOREHOLE LOG				Date From / To: 12/12/2014 - 17/12/2014		Client: BCP (Havant) LLP			

DESCRIPTION OF STRATA	LEGEND	WATER	CASING DEPTH / (Diam. mm)	REDUCED LEVEL/ DEPTH (Thickness)	Sample Details			Test Results	Backfill Details
					TYPE	REF	Depth	SPT N Value/Drive mm	
Concrete.				16.59 0.20					
MADE GROUND: Hardcore GRAVEL sub-base.				16.29 0.50					
MADE GROUND: Fine to coarse brick GRAVEL.				15.99 0.80					
Red brown gravelly CLAY. [HEAD DEPOSITS]				15.69 1.10					
Medium dense and dense clayey sandy GRAVEL. Sand is medium to coarse, gravel is fine to coarse, sub-angular to sub-rounded chert. [RIVER TERRACE DEPOSITS]				(4.20)			1.50 - 1.95	CPT N=11 2,4/3,3,3,2	
							2.50 - 2.95	CPT N=33 3,6/7,8,8,10	
							3.50 - 3.95	CPT N=30 2,4/8,6,7,9	
							4.50 - 4.95	CPT N=30 5,7/8,8,7,7	
			(200mm)	11.49 5.30	D		5.30		
Firm brown sandy gravelly CLAY. Gravel is fine to medium, angular to sub-angular chert. [LONDON CLAY FORMATION]				(0.50) 10.99 5.80	D		5.80		
Firm grey CLAY becoming silty towards base. [LONDON CLAY FORMATION]				(2.00)	U		6.00 - 6.45	U=20/450mm	
					D		6.50		
							7.50 - 7.95	SPT N=13 1,2/2,3,3,5	
				8.99 7.80					
Stiff dark grey silty CLAY. [LONDON CLAY FORMATION]				(2.15)	D		9.50		
							9.50 - 9.95	SPT N=24 3,5/5,5,7,7	
			9.95	6.84 9.95					

REMARKS : 1. Engineer verified logged in general accordance to BS 5930:2010. 2. Area CAT scanned prior to excavation. 3. Groundwater encountered at 5.80m bgl. 4. Installed with a HDPE standpipe to 9.50m bgl.				CHISELLING			WATER LEVEL OBSERVATIONS				
				Depth From	Depth To	Time Taken	Date	Time	Water Strike	Standing Level	Casing Depth
				1.10	3.00	03:30	16-12-14		5.80		
				3.00	4.50	03:30					
4.50	5.30	01:00									
BOREHOLE DIAMETER				CASING DIAMETER		DEPTH SEALED					
				200mm to 9.95m							

All measurements in metres unless otherwise stated		10m/page Scale: 1:62.50	No Coordinate Data Available Ground Level to Ordnance Datum		Page 1 of 2
Plant Used: Pilson Cut Down	Coordinates / Level (mAOD): Level: 16.79		Logged By: SB	Checked By: AC	Approved By: DW

SU 70 NW 7 A

C. 721.068

Boring method		Shell and Auger			Location		SU 721 068		Record of BOREHOLE 1	
Boring diameter (mm)		150 to 10.20m							(sheet 1 of 2)	
Casing diameter (mm)		150 to 10.20m			Orientation				Ground level (m.O.D.) 10.75	
Boring equipment		Pileon Wayfaxer 20							Date survey commenced 16.6.74	
Samples and in situ tests		Casing Depth (m)	Water Depth (m)			Date and Depth (m)	DESCRIPTION OF STRATA		O.D. Level (m.O.D.)	Legend
Depth (m)	Type									
0.10	D					0.10	TARMACADAM	10.65		
0.40	D					0.40	Brown fine to coarse GRAVEL with clay binder	10.35		
0.50	U	NIL								
0.95	D						Firm brown sandy silty CLAY with large FLINTS			
1.50	C19	1.50								
1.50	BD									
2.80	D					2.80	Soft to firm grey-brown sandy CLAY	7.95		
3.05	U	3.00				3.30	Medium dense grey silty fine to medium SAND	7.45		
3.50	S11	3.00				3.70		7.05		
3.50	D		3.60*							
3.70	D									
4.10	U	4.10								
4.30	W									
4.55	D									
5.60	U	5.50					Stiff to very stiff fissured dark brown silty CLAY			
6.05	D									
7.20	U	7.20								
7.65	D									
8.70	U	8.50								
9.15	D		5.60			9.20		1.55		
9.20	C67	9.20	4.30			17/8				
9.20	BD						Very dense grey fine to coarse SAND and GRAVEL			
REMARKS										
For explanation of symbols and abbreviations see Notes, pages (i) and (ii)										
LAB Ref. No.		HAVANT - ATE EXTENSION							Fig. 1	
S/ 10783										

5070 NW/130

FIG. 2.

7239 '0687

BOREHOLE LOG

LOCATION S. 14th. EVANT. HUNTS.

CARRIED OUT FOR Messrs. Lincoln, & Co., Roberts & Assn. of N. Y.

BOREHOLE No. 1.

DIAMETER: 5in.

GROUND LEVEL : ca +12m

DATE: 17th-19th Nov. 1964

DESCRIPTION OF STRATA	Sample	LEGEND	DEPTH	THICK- NESS	STA. NO. AND PENETRATION T.H.S.
GRAY TOPSOIL.			G.L.	300m	
Earthy SILT with angular GRAVEL.	1		1'0"	1'0"	British Geological Survey
MODERATELY COMPACT mixed GRAVEL in creamy sandy SILTY CHALK matrix.	2		9'50"	2'5"	750
	3		6'6"	3'0"	900
COMPACT medium to coarse GRAVEL and yellow brown sand, clayey at the top and base.	4			3'00"	1000
	5			10'0"	1100
	6				1200
	7		4'50"		1300
Yellow fine SAND.	8		15'6"	0'5"	1400
	9		17'0"		1500
	10		51'00"	1'5"	1600
MODERATELY COMPACT Gray SILT with SOFT CLAY pockets.				2'5"	1700
			31'6"		1800
			6'450m		1900
END OF BOREHOLE.					

Note:

GROUND WATER encountered at 7ft. 6in. below G.S.

Final WATER level 10ft. 3in. below G.T. on completion of borehole.

PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

PROJECT NUMBER	13-0646.01
PROJECT TITLE	Standbridge Rd, Havant
BOREHOLE REF	BH5
DATE	22-Dec-14
BOREHOLE DIAMETER (mm)	150
STATIC WATER LEVEL (m bd)	3.39
"L" LENGTH SLOTTED SCREEN (m)	9.00
BASE OF STANDPIPE (m)	10.00
STRATA TYPE	Sand and Gravel
"D" BOREHOLE DIAMETER (m)	1.50E-01
"SCENARIO (a,b,c,d1,d2,e or f - case sensitive)	d2
"F" VALUE	1.35E+01
"A" AREA OF BOREHOLE (m ²)	1.77E-02

[illegible]

BASIC TIME LAG METHOD (after BS5930:1999)

$$K = A / (F \cdot T)$$

T= TIME FOR $H/H_0:0.37$

T= 0.18 (min)

T= 11.09 (sec)

K= 1.18E-04 (m/s)

K= 10.201 (m/d)

GENERAL METHOD (after BS5930:1999)

$$k = \frac{A}{F\sigma_{\hat{1}} - t_{\hat{1}} \div}{}^{\prime \pm 1} e \frac{H_{\hat{1}}}{H_{\hat{1}}}$$

t1= 0.12 (min)

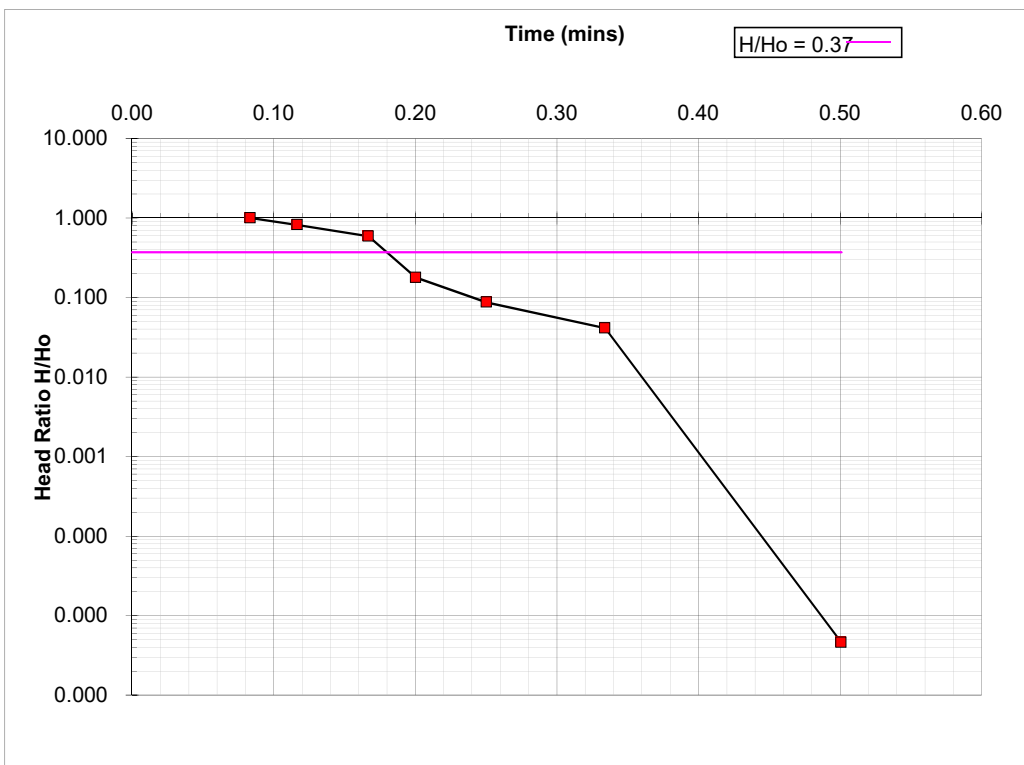
t2=	0.25 (min)
-----	------------

$$H(\text{head})_1 = 1.79 \text{ (m)}$$

$$H(\text{head})_2 = 0.19 \text{ (m)}$$

K= 3.76E-04 (m/s)

K= 32.524 (m/d)



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

PROJECT NUMBER	13-0646.01
PROJECT TITLE	Standbridge Rd, Havant
BOREHOLE REF	BH5
DATE	22-Dec-14
BOREHOLE DIAMETER (mm)	150
STATIC WATER LEVEL (m bd)	3.39
"L" LENGTH SLOTTED SCREEN (m)	9.00
BASE OF STANDPIPE (m)	10.00
STRATA TYPE	Sand and Gravel
"D" BOREHOLE DIAMETER (m)	1.50E-01
"SCENARIO (a,b,c,d1,d2,e or f - case sensitive)	d2
"F" VALUE	1.35E+01
"A" AREA OF BOREHOLE (m ²)	1.77E-02

TIME (mins)	Hi(mbd)	H(head)	H/Ho
0.03	0.150	3.240	1.000
0.08	0.860	2.530	0.781
0.17	1.230	2.160	0.667
0.20	1.440	1.950	0.602
0.25	1.980	1.410	0.435
0.33	2.300	1.090	0.336
0.43	2.800	0.590	0.182
0.53	3.050	0.340	0.105
0.75	3.130	0.260	0.080
0.92	3.210	0.180	0.056
1.15	3.280	0.110	0.034
1.25	3.280	0.110	0.034
1.45	3.290	0.100	0.031
2.10	3.310	0.080	0.0247
2.45	3.310	0.080	0.025
3.15	3.320	0.070	0.022
3.45	3.340	0.050	0.015
4.00	3.350	0.040	0.012
		3.390	1.046
		3.390	1.046

BASIC TIME LAG METHOD (after BS5930:1999)

$$K = A/(F \cdot T)$$

T= TIME FOR H/Ho:0.37

$$T = 0.31 \text{ (min)}$$

$$T = 18.34 \text{ (sec)}$$

$$K = 7.14E-05 \text{ (m/s)}$$

$$K = 6.168 \text{ (m/d)}$$

GENERAL METHOD (after BS5930:1999)

$$k = \frac{A}{F \alpha_i - t_i} \cdot \frac{H_i}{H_i}$$

$$t1 = 0.17 \text{ (min)}$$

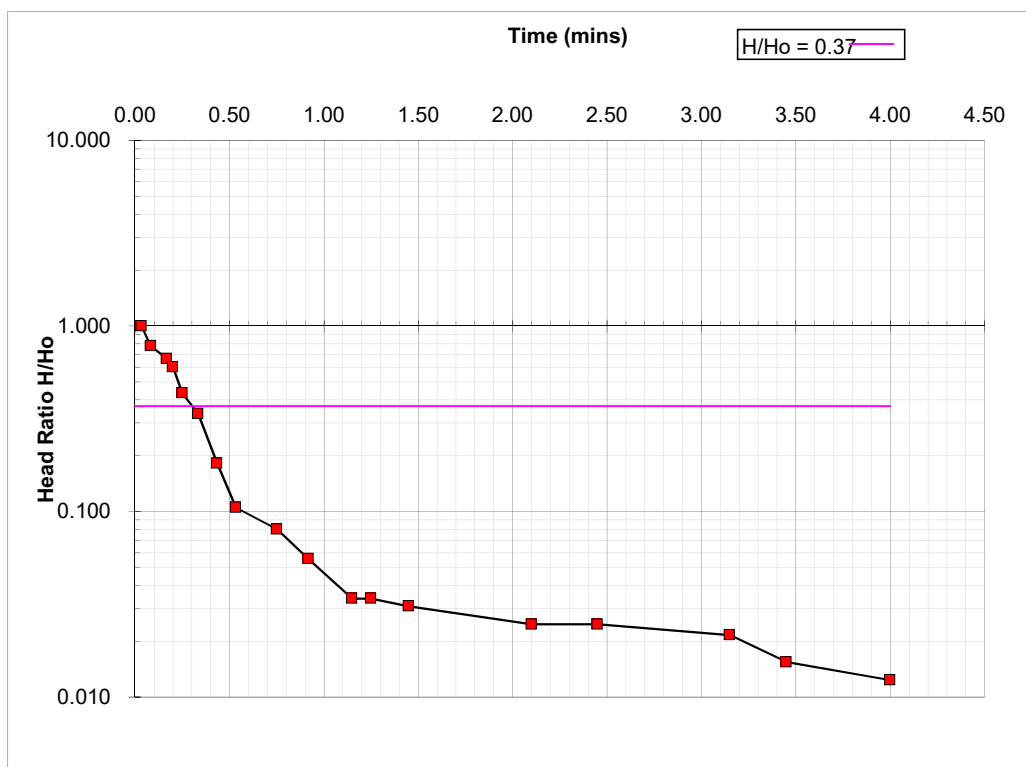
$$t2 = 0.53 \text{ (min)}$$

$$H(\text{head})1 = 2.16 \text{ (m)}$$

$$H(\text{head})2 = 0.34 \text{ (m)}$$

$$K = 1.12E-04 \text{ (m/s)}$$

$$K = 9.682 \text{ (m/d)}$$



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

PROJECT NUMBER	13-0646.01
PROJECT TITLE	Standbridge Rd, Havant
BOREHOLE REF	BH5
DATE	22-Dec-14
BOREHOLE DIAMETER (mm)	150
STATIC WATER LEVEL (m bd)	3.39
"L" LENGTH SLOTTED SCREEN (m)	9.00
BASE OF STANDPIPE (m)	10.00
STRATA TYPE	Sand and Gravel
"D" BOREHOLE DIAMETER (m)	1.50E-01
"SCENARIO (a,b,c,d1,d2,e or f - case sensitive)	d2
"F" VALUE	1.35E+01
"A" AREA OF BOREHOLE (m ²)	1.77E-02

TIME (mins)	Hi(mbd)	H(head)	H/Ho
0.01	0.210	3.180	1.000
0.17	0.930	2.460	0.774
0.25	1.180	2.210	0.695
0.42	1.960	1.430	0.450
0.58	2.460	0.930	0.292
0.75	2.890	0.500	0.157
1.00	3.130	0.260	0.082
1.25	3.170	0.220	0.069
2.00	3.220	0.170	0.053
3.00	3.260	0.130	0.041
4.00	3.300	0.090	0.028
5.00	3.340	0.050	0.016
		3.390	1.066
		3.390	1.0660
		3.390	1.066
		3.390	1.066
		3.390	1.066
		3.390	1.066
		3.390	1.066
		3.390	1.066

BASIC TIME LAG METHOD (after BS5930:1999)

$$K = A/(F \cdot T)$$

T = TIME FOR H/Ho:0.37

$$T = 0.50 \text{ (min)}$$

$$T = 30.13 \text{ (sec)}$$

$$K = 4.35E-05 \text{ (m/s)}$$

$$K = 3.754 \text{ (m/d)}$$

GENERAL METHOD (after BS5930:1999)

$$k = \frac{A}{F \alpha_i - t_i} \cdot \frac{H_i}{H_i}$$

$$t1 = 0.42 \text{ (min)}$$

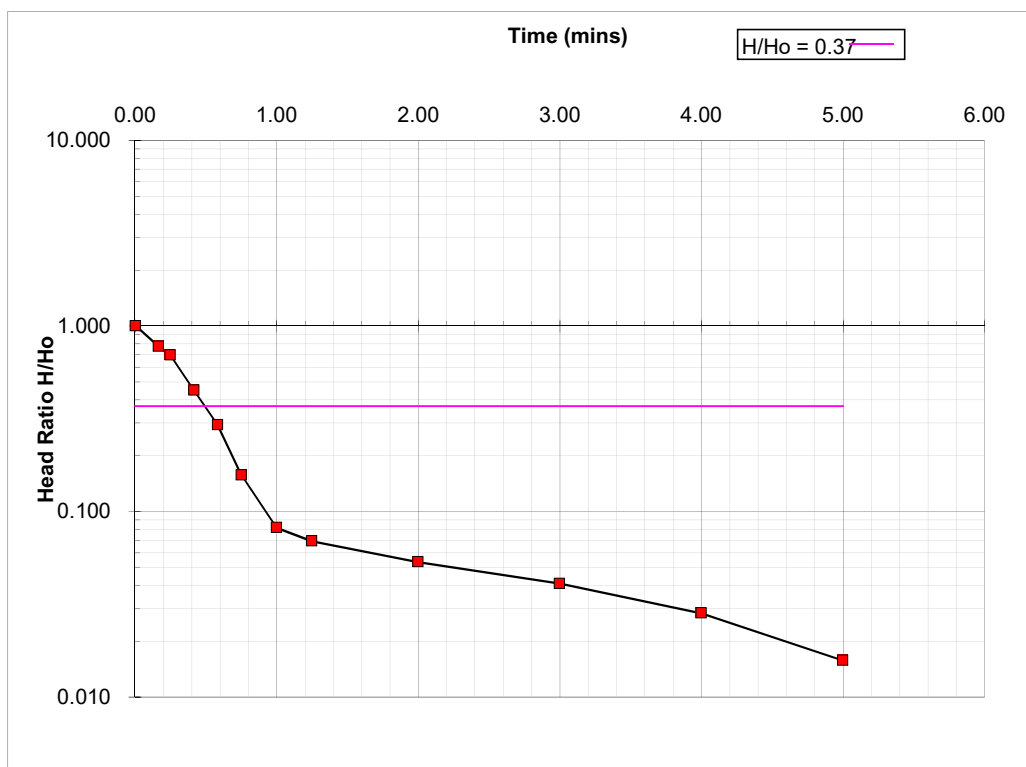
$$t2 = 1.00 \text{ (min)}$$

$$H(\text{head})1 = 1.43 \text{ (m)}$$

$$H(\text{head})2 = 0.26 \text{ (m)}$$

$$K = 6.41E-05 \text{ (m/s)}$$

$$K = 5.541 \text{ (m/d)}$$



107549



O.S. REF.

SU7207SE

Title: 36 Stanbridge Road

Drawn by: banerin

Scale: 1:1250

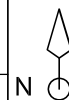
Date: 23/03/2013

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 determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
3205X	13.93	10.98	600	CP	CIRC																		
3350X	14.55	13.37	225	VC	CIRC																		
3450X	14.65	13.41	600	CP	CIRC																		
4300X	14.37	11.26	600	CP	CIRC																		
4301X	14.55	12.6	375	CP	CIRC																		
4302X	14.54	12.74	225	VC	CIRC																		
4303X	14.36	12.92	150	VC	CIRC																		
4350X	14.66	13.61	450	CP	CIRC																		
4351X	14.4	13.13	450	CP	CIRC																		
4353X	14.12	12.82	600	CP	CIRC																		
4400X	14.81	12.83	375	VC	CIRC																		
4401X	14.79	11.49	600	CP	CIRC	*																	
4401Y	14.79	12.79	375	VC	CIRC	*																	
4402X	14.85	12.75	375	CP	CIRC																		
4403X	15.08	13.05	225	VC	CIRC																		
4404X	14.84	13.18	225	VC	CIRC																		
4450X	14.96	13.65	600	CP	CIRC																		
4451X	14.64	13.53	600	CP	CIRC																		
5400X	15.94	14.37	225	VC	CIRC																		
5401X	15.26	13.21	375	VC	CIRC																		
5402X	15.13	11.72	600	CP	CIRC																		
5450Y	15.98		300	VC	CIRC	*																	
5450X	15.98		300	VC	CIRC	*																	
5500X	15.83	13.48	375	CP	CIRC																		
5501X	15.41	12.11	600	CP	CIRC																		
5502X	15.21	13.32	225	VC	CIRC																		
5550X	14.84	12.92	600	CP	CIRC																		
5551X	15.15	13.92	450	CP	CIRC																		
6400X	16.61	14.86	225	VC	CIRC																		
6450X	16.61	15.34	450	CP	CIRC																		
7350X	16.74	15.52	225	CP	CIRC																		
7500X	17.33	15.46	225	VC	CIRC																		
7550X	17.35	15.89	375	CP	CIRC																		
8200X	16.43	14.48	225	VC	CIRC																		
8256X	16.13	14.13	225	VC	CIRC																		
8350X	16.53	14.93	225	VC	CIRC																		

LINE STYLES / COLOURS	MATERIALS	LEGEND - SEWERS
Brown Red Dark Blue Purple Light Blue Yellow Green	AK Asphalt BAC Bonded Asbestos Cement BBC Brick (Common) BRE Brick (Engineering) CC Concrete Box Culvert CI Cast Iron CO Concrete (Pre-Cast) CSB Concrete Segments (boxed) CSU Concrete Segments (unboxed) DI Ductile Iron GRP Glass Reinforced Concrete GRP Glass Reinforced Plastic MNC Masonry in random Courses MARK Masonry in random Courses PE Polyethylene PP High Rate PP Polypropylene PVC Polyvinyl Chloride RPA Reinforced Plastic Manhole SI Spun Iron ST Steel VC Vitreous Clay XXX Other ZZZ Unknown	Manhole (SW) Manhole (FAC) Lamp hole (SW) Lamp hole (FAC) Pumping Station (SW) Pumping Station (FAC) Side entry manhole (SW) Side entry manhole (FAC) Blind shaft (SW) Blind shaft (FAC) Chamber (SW) Chamber (FAC) Waterlight door (SW) Waterlight door (FAC) Flushing ch. (SW) Flushing ch. (FAC) Flushing ch. (SW) Flushing ch. (FAC) Demarcation Chamber Washout (SW) Washout (FAC) Roading Eye (SW) Roading Eye (FAC) Gauging point (SW) Gauging point (FAC) Franchise chamber (SW) Franchise chamber (FAC) Storm Tank (SW) Storm Tank (FAC) Vortex chamber (SW) Vortex chamber (FAC) Match box (SW) Match box (FAC) Direction arrow Outfall Embankment Canopy Soakaway Inlet Subsiding Pond Other (S) Other (FAC) Change in sewer (S) Change in sewer (FAC) Roller valve Flap valve Cascade Anode Valve Closed Valve Air Valve Match box (SW) Match box (FAC) Direction arrow Outfall Embankment Canopy Soakaway Inlet Subsiding Pond Water/water treatment works Marine treatment works Outfall headworks Vent Vent column Tidal storage tank Blind end Head of Public Sewer Micro Pumping Station

Drawn by:	banerin
Title:	36 Stanbridge Road
Date:	23/03/2013



New Lane,
Havant

SUDS Maintenance Plan

Project Ref: EB/13383

First Issue January 2023



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SUSTAINABLE DRAINAGE AND LANDSCAPE MANAGEMENT PLAN FOR New Lane, Havant

An introduction to sustainable drainage systems or SuDS

SuDS are a new environmentally friendly approach to managing rainfall that uses landscape features to deal with surface water. SuDS aim to:

- Control the flow, volume and frequency of water leaving a development area
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

SuDS at New Lane, Havant

The SuDS are designed to prevent flooding and control the flow of surface water using attractive landscape features. It is proposed that drainage strategy incorporates cellular storage soakaways car parking area. This feature is the primary source of surface water storage for the site. Surface water is then allowed to permeate into the ground.

In addition to the cellular soakaways, storage is also provided by the use of porous car parking.

- Surface water drainage system allows direct infiltration into the ground via cellular soakaways serving the proposed development.
- The second drainage system includes permeable paving which allows rain to percolate through the surface into underlying drainage layers.

SuDS Management

The proposed SuDS measures, have been designed with easy maintenance in mind. Maintenance will generally fall into one of the three following categories:

- **Regular day to day care** - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a SuDS feature
- **Occasional tasks** - managing vegetation and removing any silt that builds up in the SuDS features also after flooding events.
- **Remedial work** - repairing damage where necessary

SuDS Maintenance – Summary

		Frequency	Unit Rate	Total
	REGULAR MAINTENANCE			
1.	LITTER MANAGEMENT			
1.1	Pick up all litter in SuDs and Landscape areas and removed from	12 visits monthly		
2	GRASS MAINTENANCE – all cutting to wildlife piles			
2.1	Mow all grass verges, paths and amenity at 35-60mm with 75mm max. Leaving grass in situ	As required or monthly		
4	HARD SERVICES			
4.1	Sweep all paving regularly. Sweep and suction brush. Permeable paving in autumn after leaf fall	1 visit		
	OCCASIONAL TASKS			
6	SILT MANAGEMENT			
6.1	Remove / clear out silt from silt collection traps in linear drainage channels	As required / after flood event.		
7	REMEDIAL WORK			
7.1	Inspect SuDs system regularly to check for damage or failure.	As required / after flood event.		

SuDS Features:

SuDS techniques include attenuation structures which assist in managing discharge of water from the site, in this case infiltration into the ground.

Cellular Tanks / Soakaways are used to manage and control surface runoff. Also, they are used to store surface water under the ground which then allows it to soak into the ground.

Permeable surfaces as permeable paving, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc.

Inspection Chambers and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.

Overflows can be below ground through gratings and chambers or over grass weirs in the open. They must be kept clear at all times to protect areas from flooding.

Flood routes (exceedance routes) allow water volumes exceeding the capacity of the SUDS system to escape from the site without causing damage to property. This route must be clear of obstructions at all times.

Sustainable Drainage Maintenance Specification

1.0 GENERAL REQUIREMENTS

Maintenance activities comprise: • Regular Maintenance • Occasional Task • Remedial Work	Frequency
Generally Litter Collect all litter or other debris and remove from site at each site visit	Monthly

- **Avoid** use of weed killers and pesticides to prevent chemical pollution
- **Avoid** de-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces.
- **Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

Exclusions:

- Maintenance of rainwater harvesting chambers, pumps, etc.

2.0 INLETS, OUTLETS, CONTROLS, AND INSPECTION CHAMBERS

- **Inlets and outlets structures** may be surface structures or conveyance pipes with guards or headwalls. They must be free from obstruction at all times.
- **SuDS flow control structures** can be protected orifices, slots weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection Chambers** and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular Maintenance	Frequency
Inlets, outlets and surface control structures Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage. Trim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris	Monthly Monthly
Inspection chambers and below ground control chambers	

Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage	As necessary
Remedial work	Frequency
Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.	As required
Repair physical damage if necessary.	As required

3.0 OVERFLOWS AND FLOOD ROUTES

- **Overflows** are overland across weirs, through gratings or within chambers and must be kept clear at all times to protect areas from flooding. They allow onward flow when part of the SuDS system is blocked.
- **Flood routes (exceedance routes)** allow water volumes that exceed the capacity of the SuDS system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

OVERFLOWS AND FLOOD ROUTES	
Regular Maintenance	Frequency
Overflows. Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next SUDS feature – inlet to basin or chamber.	Annually
Overflows. Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.	Monthly
Flood Routes. Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.	Monthly
Remedial	Frequency
Overflows. If overflow is not clear then dismantle structure and reassemble to design detail.	As required

4.0 Cellular Storage

Cellular Storage	
Regular Maintenance	Frequency
Inspect inlets, outlets and control structures and remove obstructions and silt as necessary.	Monthly
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional Maintenance	
Remove silt from catchpits and cellular storage	As necessary
Remedial work	Frequency
Repair inlet/outlet if necessary, removal of silt build up	As required
Repair physical damage if necessary.	As required

5.0 INFILTRATION DEVICES - soakaways, infiltration trenches and infiltration basins

- **Infiltration basins, trenches, soakaways** and most of the preceding SuDs features allow water to soak into the ground.

SOAKAWAYS		
MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

6.0 PERMEABLE SURFACES

- **Permeable surfaces** including permeable block paving, porous asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc. Permeable block paving can be cleaned by suction brushing.

PERMEABLE AND POROUS SURFACES	
Regular Maintenance	Frequency
Cleaning Brush regularly and remove sweeping from all hard surface	Monthly
Occasional Tasks	Frequency
Permeable Tasks Brush and vacuum surface once and year to prevent still blockage and enhance design life	Annually
Remedial Work	Frequency
Monitor effectiveness of permeable pavement and when water does not infiltrate immediately advise client of possible need for reinstatement of top layers or specialist cleaning. Recent experience suggest jet washing and suction cleaning will substantially reinstate pavement to 90% efficiently	As required
After Flood Event	Frequency
Brush and vacuum surface to remove silt / debris. If water still does not infiltrate immediately advise client of possible need of reinstatement of top layers or specialist cleaning. Check perforated pipework and outlet sumps.	After the flooding has subsided and is safe to undertake.

7.0 MANHOLES AND INSPECTION CHAMBERS

- **Manholes and Inspection Chambers** and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular Maintenance	Frequency
Manholes and Inspection chambers and below ground control chambers	
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is obstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Annually
Occasional Maintenance	Frequency
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage	As necessary
Remedial Work	Frequency
Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary. Repair physical damage if necessary	As required

8.0 SPILLAGE – EMERGENCY ACTION

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

Contact the Environment Agency immediately.

9.0 QUERIES REGARDING A DESIGN FEATURE.

In the event of a concern or failure of a SuDs design feature contact The Baynham Meikle Partnership.

8 Meadow Road, Edgbaston, Birmingham B17 8BU

Tel: (0121) 434 4100

Email admin@bm-p.co.uk

10.0 RESPONSIBILITIES

The new on-site drainage will not be adopted and it is to remain in private ownership.

All drainage maintenance will be managed by Hellier Langston, details below:

Andy Hellier ah@hlp.co.uk

01329 220 111