

Foul and Surface Water Drainage Report

Land to the Rear of Croft Surgery, Eastergate, West Sussex, PO20 3RP

Planning Ref: BN/38/24/PL

For

Metis Homes

Rev – **P1**

Reference **C3875**

Date **January 2026**

Revision	Date of Issue	Comments	Prepared By	Checked By
P1	27/01/2026	Initial Issue	SFC	CS

Contents

1	INTRODUCTION	3
2	EXECUTIVE SUMMARY:	4
3	SITE GEOLOGY	4
4	EXISTING DRAINAGE	5
5	PROPOSED DRAINAGE STRATEGY	6
6	SUMMARY AND CONCLUSIONS.....	12
7	APPENDICES	13

1 Introduction

1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Land to the Rear of Croft Surgery, Eastergate, West Sussex.

1.1.2 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere in order to clear Conditions 8 and 9. The conditions are given on Decision Notice of 24th December 2024, planning reference: BN/38/24/PL and are summarised as follows:

8. Details of surface water management to be approved by the Local Planning Authority prior to commencement.

9. Details of the ongoing maintenance and management of the SuDS system to be approved by the Local Planning Authority prior to commencement

1.1.3 The existing site comprises a grassed field. The proposed development will consist of the erection of 21 dwellings with associated access and areas. The proposed development is located as OS Grid Reference **SU 94692 05728** and has the post code **PO20 3RP**.

Fig 1. Site Location



2 Executive Summary:

- 2.1.1 Surface water runoff from roofs will be piped to a central geocellular soakaway which will utilise the gravelly stratum identified in the GESL Site investigation.
- 2.1.2 Surface water runoff from the drives and roads will be collected through porous surfaces and sub-bases and discharged to ground via infiltration trenches which are to extend down to the gravelly stratum
- 2.1.3 The foul water will discharge to the local foul water sewer via a direct connection into an existing manhole. This connection is subject to Southern Water's consent under Section 106 of the Water Industry Act 1991

3 Site Geology

3.1 British Geological Survey information

- 3.1.1 The British Geological Survey records indicate that the site is underlain by bedrock of the London Clay formation – Clay, silt and Sand, with superficial River Terrace Deposits, Sand silt and clay.

Fig 2. British Geological Survey

About this layer:

Combination of bedrock and superficial geology



Info



Opacity



Legend

0%  100%

-  Alluvium - Clay, silt, sand and gravel
-  Head - Clay, silt, sand and gravel
-  Head - Gravel, sand, silt and clay
-  Raised Beach Deposits, 1 - Sand an...
-  River Terrace Deposits - Sand, silt an...
-  London Clay Formation - Clay, silt a...
-  Lambeth Group - Clay, silt and sand



3.2 Geological Assessment

- 3.2.1 An intrusive site investigation report was issued by Omnia in March 2023, including boreholes and infiltration testing results. This report was used to prepare the original drainage strategy design, included in the submitted approved document *C2870 SW Drainage Report P3*.
- 3.2.2 A further site investigation letter report was issued by Geo-Environmental (GESL) in September 2025, which included further boreholes and BRE 365 infiltration testing.
- 3.2.3 Omnia also issued a groundwater monitoring report in April 2023.
- 3.2.4 Copies of the above reports and letters are included in Appendix D of this report
- 3.2.5 The Omnia report included two rounds of infiltration testing; the first batch at depth and the second batch at shallower depth. This was because the deep infiltration tests (2.5m) generally failed to complete the required reduction in water level for a test to be valid. A subsequent round of testing (also included in the Omnia report) was limited to a depth of up to around 1.5m and successfully completed some BRE 365 tests in the eastern half and centre of the site. It was therefore decided that the original drainage strategy would utilise this infiltration potential of the shallower strata in the eastern part of the site.
- 3.2.6 In order to double-check the behaviour of proposed soakaways and in an abundance of caution, GESL were commissioned to provide further testing and ground investigation. Their results confirmed the good soakage test results previously obtained around the centre and east of the site, but they attributed this to a gravel stratum they identified at 1.4-1.6m below existing ground level. Strata above and below this gravel seam was shown to have poor infiltration potential, but test pits that were within (or just above) the gravel seam produced good infiltration results up to 3x10⁻⁴m/s near the south east corner, and 1.9x10⁻⁴m/s in the centre.
- 3.2.7 Winter Groundwater monitoring was undertaken by Omnia from December 2022 to March 2023. Monitoring boreholes were between 1.6m and 2.45m in depth below existing ground level. All test boreholes were recorded as dry throughout the monitoring period.

4 Existing Drainage

- 4.1.1 There are currently no drainage networks or structures within the development site.

5 Proposed Drainage Strategy

5.1 SuDS Hierarchy

- 5.1.1 All options for the destination of run-off generated on site have been assessed in line with the SuDS hierarchy as set out in Building Regulations Part H document and DEFRA's Draft National Standards for SuDS.
- 5.1.2 As infiltration has been reliably shown to be feasible, no further options were assessed.

Table 1. SuDS Hierarchy

Discharge Destination	
Discharge to Ground	YES
Discharge to Watercourse	NO
Discharge to Surface Water Sewer	NO
Discharge to Other Sewer	NO

5.2 Proposed Hydraulic Calculation Specifications:

Table 2. Hydraulic Model Variables

Hydraulic Calculations Settings:	
Rainfall Methodology	FEH-22
CV	1
Additional Storage (m ³ / ha)	0.0
Maximum Rainfall (mm/hr)	500
Main Soakaway Design	Base Coefficient (m/hr): 0.00000
	Side Coefficient (m/hr): 0.684
	Factor of Safety: 5
	Porosity: 95%
	Time to Half Empty (mins): 969
Permeable Road design (with infiltration trenches at formation)	Base Coefficient (m/hr): 0.00000
	Trench Side Coefficient (m/hr): 0.076
	Factor of Safety: 5
	Porosity: 30%
	Time to Half Empty (mins): 505

5.3 Surface Water Drainage

- 5.3.1 Based upon the findings of the GESL investigation, which supported the Omnia findings in that the central area has good soakage potential due to the presence of the gravelly stratum, it was decided that all roof drainage is to be collected into a single geocellular soakaway in the location where 2 independently executed successful tests were carried out (Omnia:SA202 and GESL:SA03).
- 5.3.2 The option of distributing roof runoff to 2 or more soakaways (including the option of having soakaways for each plot) was dismissed due to the absence of definitive evidence that the gravelly seam was present at all locations. A single, large-footprint soakaway will allow all runoff to benefit from zones of good soakage within the footprint of the structure. The previous design in the old report utilised 2 separate soakaways, but the evidence supports the single central location and is patchier outside that area. This also simplifies maintenance (emptying of catchpits etc) which is of critical importance for the long life of SuDS infiltration features.
- 5.3.3 The depth of the main soakaway is set so that it rests in the recorded gravelly seam and the drawings instruct the contractors to ensure this is the case.
- 5.3.4 Regarding the disposal of rainwater that falls onto the driveways and roads, permeable surfacing and porous sub-bases will be used to collect runoff and provide water quality improvement. Due to the poor soakage potential at shallow depth, the main access roads will include infiltration trenches cut into the formation so as to convey water into the gravel seam. The porous sub-bases of the driveways will be contiguous with those of the access roads so that runoff can be delivered into the infiltration trenches. Both the trenches and the sub-bases will be used for storage but infiltration will only occur within the infiltration trenches. The route and extent of the trenches means that areas with patchier soakage potential can benefit from the proven presence of the gravelly seam elsewhere.
- 5.3.5 All storage volumes were based on simulations of the critical 1 in 100 year storm, plus an allowance of 45% for the predicted effects of climate change.
- 5.3.6 The following areas are to be drained and are shown to be accommodated in the calculations included in Appendix C

Total drained area	=	4619m ²
Roof Areas	=	2376m ² (Drains to SA1)
Drive and Access Road Areas	=	993m ² (Drains to Road 1 infiltration trenches) 1250m ² (Drains to Road 2 infiltration trenches)

5.4 Water Quality

- 5.4.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.
- 5.4.2 Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals, and various organic and inorganic contaminants) Therefore the first 5-10mm of rainfall should be adequately treated with SuDS.
- 5.4.3 The SuDS Manual (Ciria C753, November 2015) describes risks posed by the surface water runoff to the receiving environment as a function of:
- The pollution hazard at a particular site (i.e., the pollution source)
 - The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
 - The sensitivity of the receiving environment
- 5.4.4 The EA mapping indicates that the site does not lie within a Source Protection Zone.
- 5.4.5 The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

Table 26.1 from SuDS manual. Approaches to Water Quality Risk Management

Table 26.1 Approaches to Water Quality Risk Management			
Design method	Hazard Characterisation	Risk Reduction	
		For Surface Water	For Groundwater
Simple Index Approach	Simple pollution hazard indices based on land use (Table 26.2)	Simple SuDS hazard mitigation indices (Table 26.3)	Simple SuDS hazard mitigation indices (Table 26.4)
Risk Screening	Factors characterising traffic density and extent of infiltration likely to occur (Table 26.5)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (Table 26.5)
Detailed Risk Assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in even mean discharge concentrations and total annual load reductions delivered by the system	

- 5.4.6 As per Table 26.1 Simple Index approach will be used as a design method for this site.
- 5.4.7 Table 26.2 provides hazard classification of different land uses. The land uses for the surface water drainage for this site are.
- Residential Roofs
 - Individual Property driveways and residential car parks
 - Low traffic roads
- 5.4.8 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index $\geq$ pollution hazard index

5.4.9 Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual;

Table 26.2 from SuDS manual. Pollution Hazard Indices for Different Land Use Classifications

Table 26.2 Pollution hazard indices for different land use classifications				
Land Use	Pollution Hazard Level	Total Suspended solids (TSS)	Metals	Hydro-Carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (Typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

5.4.10 From Table 26.2 the following information is tabulated in Table 1

Table 1: Pollution hazard index and destination of runoff for the proposed site

Table 3: Pollution Hazard Index and Destination of runoff for the proposed Site					
Land Use	Destination of Runoff	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roof	Ground Water	Very Low	0.2	0.2	0.05
Individual driveways, residential car parks and low traffic roads	Ground water	Low	0.5	0.4	0.4

5.4.11 The SuDS mitigation index will be obtained from Table 26.4 (for groundwater) of the SuDS manual.

Table 26.4 from SuDS manual. Indicative SuDS Mitigation Indices for discharges to ground waters.

Table 26.4 Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good containment attenuation potential of at least 300mm in depth	0.6	0.5	0.6
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e., graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth.	0.4	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

5.4.12 SuDS mitigation indices are tabulated in Table 5 as follows:

Table 5: SuDS mitigation index

Table 4 Mitigation Indices						
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual driveways, residential car parks and low traffic roads	Ground water	Table 26.4 (for ground waters)	Permeable Paving	0.7	0.6	0.7
			Infiltration Trench	0.4	0.4	0.4
Residential Roofs	Ground water	Table 26.4 (for ground waters)	To soil	0.4	0.3	0.3

5.4.13 The above analysis demonstrates that the SuDS devices within the design will mitigate any pollution present within the surface water system.

5.5 Foul water drainage

- 5.5.1 The foul water will discharge into the local foul water sewer via a new direct connection into an existing private chamber located 65 metres south of the site
- 5.5.2 A CCTV survey should be undertaken to confirm if a connection onsite is possible and if remedial works are required.

5.6 Construction Phase Drainage

- 5.6.1 It is an offence to cause or knowingly permit the entry of any polluting, poisonous or noxious material in the water environment. If the pollution is serious enough to lower the ecological status of the water body as set out in terms by the Water Framework Directive (2000/60/EC) than prosecution may occur.
- 5.6.2 Remediation of any damage caused will not require the polluter to be prosecuted first. If the water pollution is serious enough to be classed an environmental damage, the damage will require to be remediated such that the area is returned to the condition it would have been in if the damage had not occurred.
- 5.6.3 If any pollution has not been reported or the polluter has not taken actions to prevent any further damage; they would then be causing an offence. Third parties (e.g., Private water supply users, landowners, recreation users and the public) who may be affected by possible damage may also report the risk of any environmental damage to the enforcing authority.
- 5.6.4 The principles of SuDS (Sustainable Drainage Systems) shall be applied to all components of design and construction regarding surface water management. Any design or site works that may impact on the site drainage or the water quality shall:
- Soakaway where soils allow
 - Consider and manage erosion
 - Remove pollutants in surface water
 - Retain any silts on site and prevent silts from discharging to watercourses or drains
 - Keep runoff rates at existing greenfield runoff
 - Prevent accidental spillages reaching watercourse
- 5.6.5 As infiltration on site is viable, the temporary drainage for the development will be in the form of land drains which will discharge into the ground.
- 5.6.6 Pollution will be controlled via the use of catchpit manholes and geotextiles.
- 5.6.7 Any potential hazardous substances will be within a controlled compound with a separate drainage system that will contain a penstock valve / containment kit in the event of a spillage.

6 Summary and Conclusions

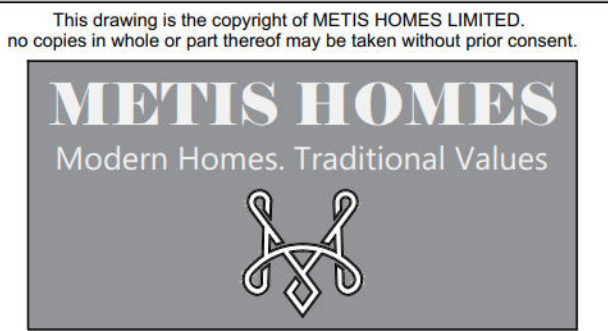
- 6.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for 21 houses.
- 6.1.2 The Surface Water will discharge to ground; roof water being collected into a centrally located geocellular soakaway and runoff from drives and roads being discharged to ground via porous sub-bases and infiltration trenches reaching down to the gravelly seam.
- 6.1.3 The Foul water will discharge into the nearby foul sewers to the south.
- 6.1.4 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water and foul drainage can be achieved for the proposed development.
- 6.1.5 A maintenance schedule has been written up for the drainage network including the SuDS features and can be found within Appendix E

7 Appendices

7.1 Appendix A – Site Plan

Please note: Adjacent building positions and heights have been surveyed where possible but boundary screening leaving potential full lines of site and therefore full survey detail.

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METIS HOMES LIMITED
THE OLD BARN
VICARAGE FARM BUSINESS PARK
WINCHESTER ROAD
FAIR OAK
SO50 7HD
TEL: 01489 896668 / 01962 893535

Job Title:
BARNHAM ROAD
EASTERGATE
PO20 3RP

Description:
SITE PLAN

Scale: 1:250 Date: Nov' 25 Drawing No: BRE-010-T1

7.2 **Appendix B – Drainage Strategy**



POROUS SHARED ACCESS AREAS (PP1)

Permeable paved surface with porous sub-base discharging to ground.

Comprising:

- 80mm Permeable Block Paving
- 50mm Laying Course
- 80mm Running Course AC10 (Core Drilled)
- 350mm voided Sub Base
- Geotextile (Terra T1000)

POROUS SUB-BASE WITH IMPERMEABLE SURFACE (SITE ENTRANCE)

Impermeable Tarmac surface with porous sub-base discharging to ground.

Comprising:

- 30mm Wearing Course
- 60mm Binder Course
- 125mm Base Course
- 350mm voided Sub Base
- Geotextile (Terra T1000)

POROUS PARKING AREAS (PP2)

Permeable paved surface with porous sub-base discharging to trenches in access ways

Comprising:

- 60mm Permeable Block Paving
- 80mm DBM Running course AC10 (Core Drilled)
- 50mm Laying Course
- 250mm voided Sub Base
- Impermeable Membrane

POROUS PARKING AREAS - FORMATION

Formation level of permeable paved parking areas to be laid to a nominal fall to allow water to pass directly from driveways' sub-bases to the access road sub-base.

Sub-bases for parking areas to be contiguous with the sub-base for the main access ways with no barrier between them.

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
GROUNDWATER DEPTH
LOCATION AND DEPTH OF EXISTING UTILITIES

DRAINAGE LEGEND

EXISTING FEATURES

- Ex FWD - Existing foul water sewer/drain and manhole
- Ex SWD - Existing surface water sewer/drain and manhole
- Existing foul/surface water sewer/drain and manhole to be abandoned

PROPOSED FEATURES

- FWD - Foul Drainage
- SWD - Surface Water Drainage
- Pipe crossing (thickening denotes pipe above)
- CD - Channel drain
- Rainwater pipe
- Storm water access chamber (3000)
- Storm water inspection chamber (4500)
- Storm water manhole (10500)
- Storm water catchpit chamber (4500)
- Storm water rodding eye
- Extent of permeable paving with porous sub-base
- Geocellular soakaway - Polypipe Polystorm R-units (or similar approved) wrapped in permeable geotextile. Min Cover 0.6m in landscaped areas only
- Permavoid distribution tank
- Road gully
- Services strip (Delineated with stretcher course of blocks where appropriate)
- Infiltration trench 0.45m width to reach gravel layer approx 1.4m below existing ground level
- Soil stack (type TBC by architect/m&e engineer)
- Foul water access chamber (3000)
- Foul water inspection chamber (4500)
- Finished floor level
- Pipe info - diameter, length, gradient, bedding type

ABBREVIATIONS

- MH - MANHOLE
- IC - INSPECTION CHAMBER
- AC - ACCESS CHAMBER
- CP - CATCHPIT
- BC - BRAKE CHAMBER
- RE - RODDING EYE
- IL - INVERT LEVEL
- SL - SUMP LEVEL
- RA - RESTRICTED ACCESS COVER
- CL - COVER LEVEL
- TL - TOP OF CELLULAR SA
- BL - BASE OF CELLULAR SA
- FL - FORMATION LEVEL

Site Specific Notes

- All storage volumes are designed to the critical 1 in 100 year storm event plus an allowance of 45% for the predicted effects of climate change.
- Soakaways including infiltration trenches designed to 1.89x10⁻⁴m/s recorded infiltration rate. P
- All infiltration structures to be located min 5m from any building and with min 600mm cover to units in landscaped areas (see drawing for variations).
- Geo-cellular structures to be fitted with vent and in full accordance with manufacturer's guidance.

STANDARD DRAINAGE NOTES

- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
- ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
- BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
- ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT. THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
- COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
- ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA.
- ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911-PART 1.
- ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
- ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
- ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
- THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
- STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
- IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
- NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
- ALL EXISTING MANHOLE COVERS, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
- UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT A SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION.
- PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
- MANHOLE AND CHAMBER COVER GRADES:
 - 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
 - 'B125' IN ALL DRIVEWAYS
 - 'C250' IN PRIVATE PARKING AREAS
 - 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	Should not be used for contract or construction purposes
P = PRELIMINARY	Should not be used for contract or construction purposes
T = TENDER	Should not be used for construction purposes
C = CONSTRUCTION	These are the only drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

C3	27.01.26	SA1 volume revised	SFC	CS	CS
C2	23.01.26	Surface water drainage revised to SI	SFC	CS	CS
C1	13.12.25	CONSTRUCTION ISSUE	SFC	CS	CS
P4	12.12.25	Revised to client comments	SFC	CS	CS
P3	18.12.25	Revised to client comments	SFC	CS	CS
P2	26.11.25	Soakaways revised	SFC	CS	CS
P1	14.11.25	FIRST ISSUE	SFC	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP



CLIENT	METIS HOMES				
ARCHITECT					
JOB TITLE	LAND TO REAR OF CROFT SURGERY EASTERGATE				
DRAWING TITLE	PROPOSED DRAINAGE LAYOUT SHEET 1				
DRAWN	SFC	ENGINEER	SFC	CHECKED	CS
DATE	NOV '25	SCALE @ A1	1:200		
JOB No.	C3875	STATUS	C	DRAWING No.	101
				REV.	3

FOR CONSTRUCTION



DRAINAGE LEGEND

EXISTING FEATURES

- Ex FWD Existing foul water sewer/drain and manhole
- Ex SWD Existing surface water sewer/drain and manhole
- Existing foul/surface water sewer/drain and manhole to be abandoned

PROPOSED FEATURES

- FWD Foul Drainage
- SWD Surface Water Drainage
- Pipe crossing (thickening denotes pipe above)
- CD Channel drain
- Rainwater pipe
- Storm water access chamber (3000)
- Storm water inspection chamber (4500)
- Storm water manhole (10500)
- Storm water catchpit chamber (4500)
- Storm water rodding eye
- Extent of permeable paving with porous sub-base
- Geocellular soakaway - Polypipe Polystorm R-units (or similar approved) wrapped in permeable geotextile. Min Cover 0.6m in landscaped areas only
- Permavoid distribution tank
- Road gully
- Services strip (Delineated with stretcher course of blocks where appropriate)
- Infiltration trench 0.45m width to reach gravel layer approx 1.4m below existing ground level
- Soil stack (type TBC by architect/m&e engineer)
- Foul water access chamber (3000)
- Foul water inspection chamber (4500)
- Finished floor level
- Pipe info - diameter, length, gradient, bedding type
- ABBREVIATIONS**
 - MH - MANHOLE
 - IC - INSPECTION CHAMBER
 - AC - ACCESS CHAMBER
 - CP - CATCHPIT
 - BC - BRAKE CHAMBER
 - RE - RODDING EYE
 - IL - INVERT LEVEL
 - SL - SUMP LEVEL
 - RA - RESTRICTED ACCESS COVER
 - CL - COVER LEVEL
 - TL - TOP OF CELLULAR SA
 - BL - BASE OF CELLULAR SA
 - FL - FORMATION LEVEL

FOUL DRAINAGE CHAMBER SCHEDULE							
REF	E	N	CL	IL	DEPTH TO IL	DIA	COVER GRADE
F1	494651.503	105798.470	15.525	14.625	0.900	450mm	B125
F2	494649.318	105792.673	15.525	14.625	0.900	450mm	B125
F3	494648.905	105785.808	15.525	14.625	0.900	450mm	B125
F4	494652.711	105791.384	15.522	14.529	0.993	450mm	C250
F6	494651.632	105772.154	15.400	14.281	1.119	450mm	D400
F7	494662.713	105773.458	15.525	14.625	0.900	450mm	A15
F8	494668.683	105770.409	15.525	14.625	0.900	450mm	A15
F10	494683.229	105764.739	15.525	14.549	0.976	450mm	A15
F11	494689.519	105763.073	15.525	14.625	0.900	450mm	A15
F12	494705.954	105758.032	15.525	14.625	0.900	450mm	A15
F13	494712.466	105755.539	15.525	14.625	0.900	450mm	A15
F14	494727.484	105750.829	15.525	14.600	0.925	450mm	A15
F15	494725.334	105732.509	15.475	14.575	0.900	450mm	A15
F16	494727.380	105737.894	15.475	14.503	0.972	450mm	A15
F17	494721.158	105745.735	15.400	14.380	1.020	450mm	D400
F18	494702.252	105748.386	15.475	14.455	1.020	450mm	A15
F19	494679.087	105761.721	15.400	13.767	1.633	450mm	D400
F20	494666.005	105762.472	15.375	14.525	0.850	450mm	A15
F21	494658.220	105737.514	15.375	14.525	0.850	450mm	A15
F23	494661.347	105728.973	15.375	14.625	0.750	450mm	A15
F24	494662.800	105730.658	15.375	14.450	0.925	450mm	A15
F25	494659.301	105721.888	15.375	14.625	0.750	450mm	A15
F26	494657.881	105717.826	15.375	14.571	0.804	450mm	A15
F27	494650.890	105702.416	15.375	14.475	0.900	450mm	A15
F28	494651.308	105704.687	15.375	14.475	0.900	450mm	A15
F29	494654.824	105712.770	15.375	14.250	1.125	450mm	A15
F30	494697.907	105731.417	15.280	13.552	1.728	450mm	D400
F31	494671.421	105719.942	15.280	13.472	1.808	450mm	D400
F32	494673.332	105712.600	15.225	14.475	0.750	450mm	A15
F33	494677.569	105711.142	15.225	14.350	0.875	450mm	A15
F34	494682.101	105709.269	15.225	14.475	0.750	450mm	A15
F35	494686.279	105707.681	15.240	14.350	0.890	450mm	A15
F36	494691.787	105710.902	15.148	13.323	1.825	450mm	D400
F37	494703.075	105695.104	14.910	13.194	1.716	450mm	D400
F38	494702.349	105677.610	14.750	13.077	1.673	450mm	D400
F39	494688.533	105641.979	14.550	12.822	1.728	450mm	D400
F40	494677.987	105623.835	14.330	12.682	1.648	450mm	D400
F41	494699.463	105740.741	15.475	14.575	0.900	450mm	A15
Temp1	494706.686	105696.189	15.010	13.900	1.110	450mm	C250
Temp2	494683.989	105684.613	15.100	14.200	0.900	450mm	C250

SURFACE WATER DRAINAGE CHAMBER SCHEDULE							
REF	E	N	CL	IL	DEPTH TO IL	DIA	COVER GRADE
2	494652.983	105802.081	15.525	15.001	0.524	450	C250
4	494650.374	105774.395	15.400	14.000	1.4	450	D400
6	494657.532	105775.081	15.450	14.840	0.61	450	B125
8	494665.593	105771.603	15.450	14.830	0.62	450	A15
11	494670.438	105775.475	15.525	14.890	0.635	450	B125
12	494677.183	105769.346	15.500	14.809	0.691	450	B125
13	494675.504	105764.845	15.400	13.820	1.58	450RA	D400
15	494688.520	105767.106	15.525	14.899	0.626	450	A15
18	494701.213	105767.949	15.525	14.890	0.635	450	B125
19	494698.958	105761.821	15.500	14.809	0.691	450	B125
21	494729.924	105746.816	15.450	14.835	0.615	450	A15
24	494723.215	105760.820	15.525	14.890	0.635	450	B125
25	494719.332	105750.694	15.450	14.943	0.507	450	B125
26	494716.557	105749.244	15.400	14.200	1.2	450	D400
28	494710.305	105759.554	15.525	14.894	0.631	450	A15
29	494698.825	105756.540	15.400	13.592	1.808	600	D400
31	494727.896	105738.966	15.475	14.805	0.67	450	A15
32	494702.101	105746.839	15.475	14.200	1.275	450RA	A15
33	494694.411	105749.761	15.475	13.542	1.933	900CP RA	C250
35	494694.523	105728.309	15.475	14.576	0.899	450	A15
37	494672.102	105760.411	15.375	14.701	0.674	450	A15
38	494673.294	105756.869	15.375	14.655	0.72	450	A15
40	494649.212	105740.535	15.375	14.873	0.502	450	A15
42	494684.883	105734.735	15.375	14.615	0.76	450	B125
43	494686.989	105740.276	15.375	14.383	0.992	450	A15
44	494680.189	105735.261	15.400	14.207	1.193	450CP	B125
47	494649.805	105696.413	15.225	14.736	0.489	450	A15
48	494656.725	105714.237	15.375	14.445	0.93	450	B125
51	494687.654	105707.945	15.220	14.581	0.639	450	B125
52	494672.425	105713.842	15.225	14.376	0.849	450	A15
53	494669.811	105719.892	15.240	14.190	1.05	450	D400
54	494683.822	105725.946	15.400	13.999	1.401	450CP	B125

POROUS SHARED ACCESS AREAS (PP1)
Permeable paved surface with porous sub-base discharging to ground.

Comprising:

- 80mm Permeable Block Paving
- 50mm Laying Course
- 80mm Running Course AC10 (Core Drilled)
- 350mm voided Sub Base
- Geotextile (Terram T1000)

POROUS SUB-BASE WITH IMPERMEABLE SURFACE (SITE ENTRANCE)
Impermeable Tarmac surface with porous sub-base discharging to ground.

Comprising:

- 30mm Wearing Course
- 60mm Binder Course
- 125mm Base Course
- 350mm voided Sub Base
- Geotextile (Terram T1000)

POROUS PARKING AREAS (PP2)
Permeable paved surface with porous sub-base discharging to trenches in access ways

Comprising:

- 80mm Permeable Block Paving
- 80mm DBM Running course AC10 (Core Drilled)
- 50mm Laying Course
- 250mm voided Sub Base
- Impermeable Membrane

POROUS PARKING AREAS - FORMATION
Formation level of permeable paved parking areas to be laid to a nominal fall to allow water to pass directly from driveways' sub-bases to the access road sub-base.
Sub-bases for parking areas to be contiguous with the sub-base for the main access ways with no barrier between them.

CONNECTION TO FOUL SEWER SUBJECT TO S106 CONSENT
CONNECTION LEVEL TO BE CONFIRMED
AND REPORTED TO ENGINEER PRIOR TO START OF ANY WORKS AS THERE IS NO SLACK AVAILABLE.

Ex F1
CL 14.580
IL 12.625
From Developer-TBC

F40 IC (RA)
CL 14.330
IL 12.682

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
GROUNDWATER DEPTH
LOCATION AND DEPTH OF EXISTING UTILITIES

STANDARD DRAINAGE NOTES

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- COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
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- ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
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C2	23.01.26	Surface water drainage revised to SI	SFC	CS	CS
C1	13.12.25	CONSTRUCTION ISSUE	SFC	CS	CS
P5	12.12.25	Revised to client comments	SFC	CS	CS
P4	18.12.25	Revised to client comments	SFC	CS	CS
P3	28.11.25	Chamber schedule added	SFC	CS	CS
P2	26.11.25	Soakaways revised	SFC	CS	CS
P1	14.11.25	FIRST ISSUE	SFC	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP

cgs
civils
Consulting Civil Engineers

CLIENT	METIS HOMES				
ARCHITECT					
JOB TITLE	LAND TO REAR OF CROFT SURGERY EASTERGATE				
DRAWING TITLE	PROPOSED DRAINAGE LAYOUT SHEET 2				
DRAWN	SFC	ENGINEER	SFC	CHECKED	CS
DATE	NOV '25		SCALE @ A1		1:200
JOB No.	C3875	STATUS	C	DRAWING No.	102
REV.					2

FOR CONSTRUCTION



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Impermeable drained areas



Existing impermeable drained areas
0m²



Proposed impermeable drained areas
4619m²



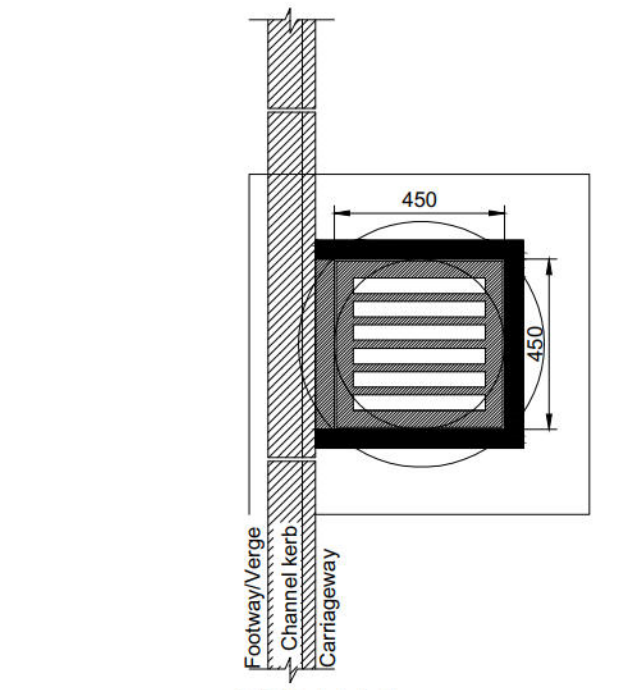
BLUE ARROWS SHOW ROUTE OF EXCEEDANCE FLOWS FROM PROJECTED POINTS OF EMERGENCE TOWARDS DIRECTION OF FALL.

ALL STRUCTURES DESIGNED TO ACCOMMODATE BELOW GROUND THE CRITICAL 1 IN 100 YEAR STORM EVENT PLUS 45% EXCEEDANCE WOULD ONLY OCCUR IN STORMS OF GREATER INTENSITY THAN THIS.

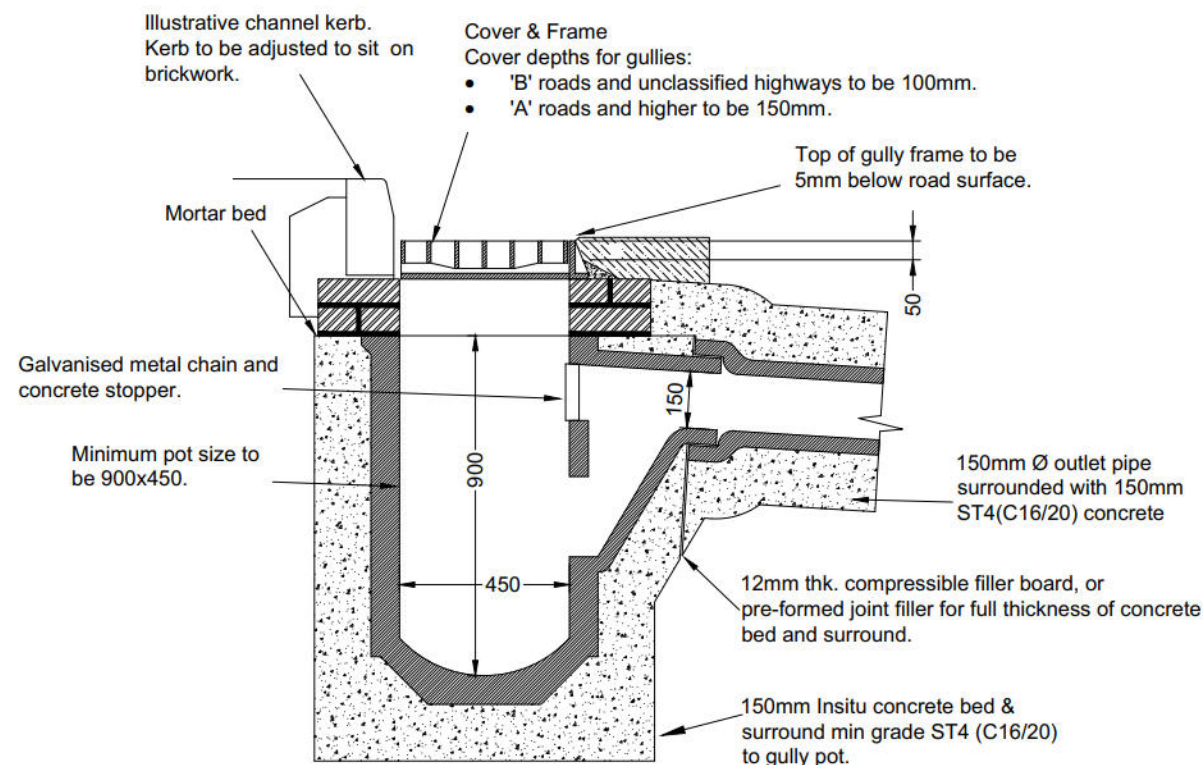
DUE TO THE ROUTES OF EXCEEDANCE SHOWN, A SAFETY FACTOR OF 5.0 HAS BEEN SELECTED FOR SOAKAWAY DESIGN IN ACCORDANCE WITH CIRIA196 TABLE4.6.

FOR PLANNING

P1	27.01.26	FIRST ISSUE	SFC	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
 Consulting Civil Engineers					
CLIENT		METIS HOMES			
ARCHITECT					
JOB TITLE		LAND TO REAR OF CROFT SURGERY EASTERGATE			
DRAWING TITLE		IMPERMEABLE AREAS AND EXCEEDANCE ROUTES			
DRAWN	ENGINEER	SFC	CHECKED	CS	CS
DATE	JAN '26	SCALE @ A1 1:500			
JOB No.	C3875	STATUS	P	DRAWING No.	103
		REV.	1		

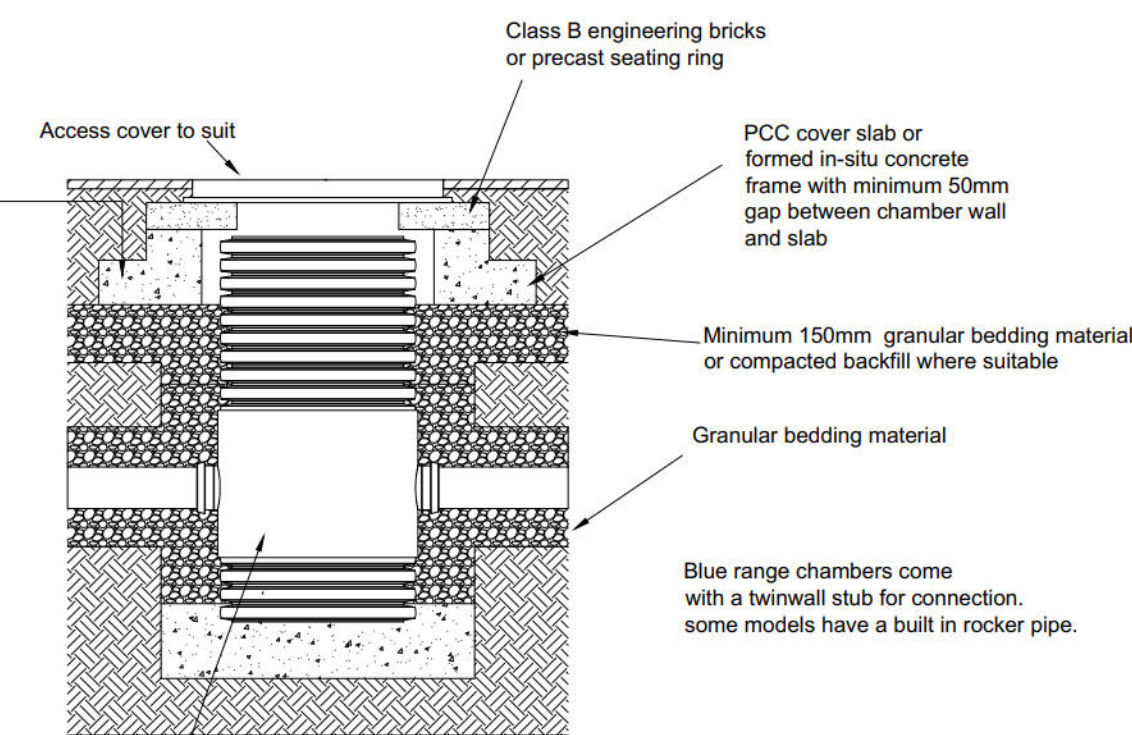


GULLY A
TYPE: PRECAST CONCRETE
PLAN

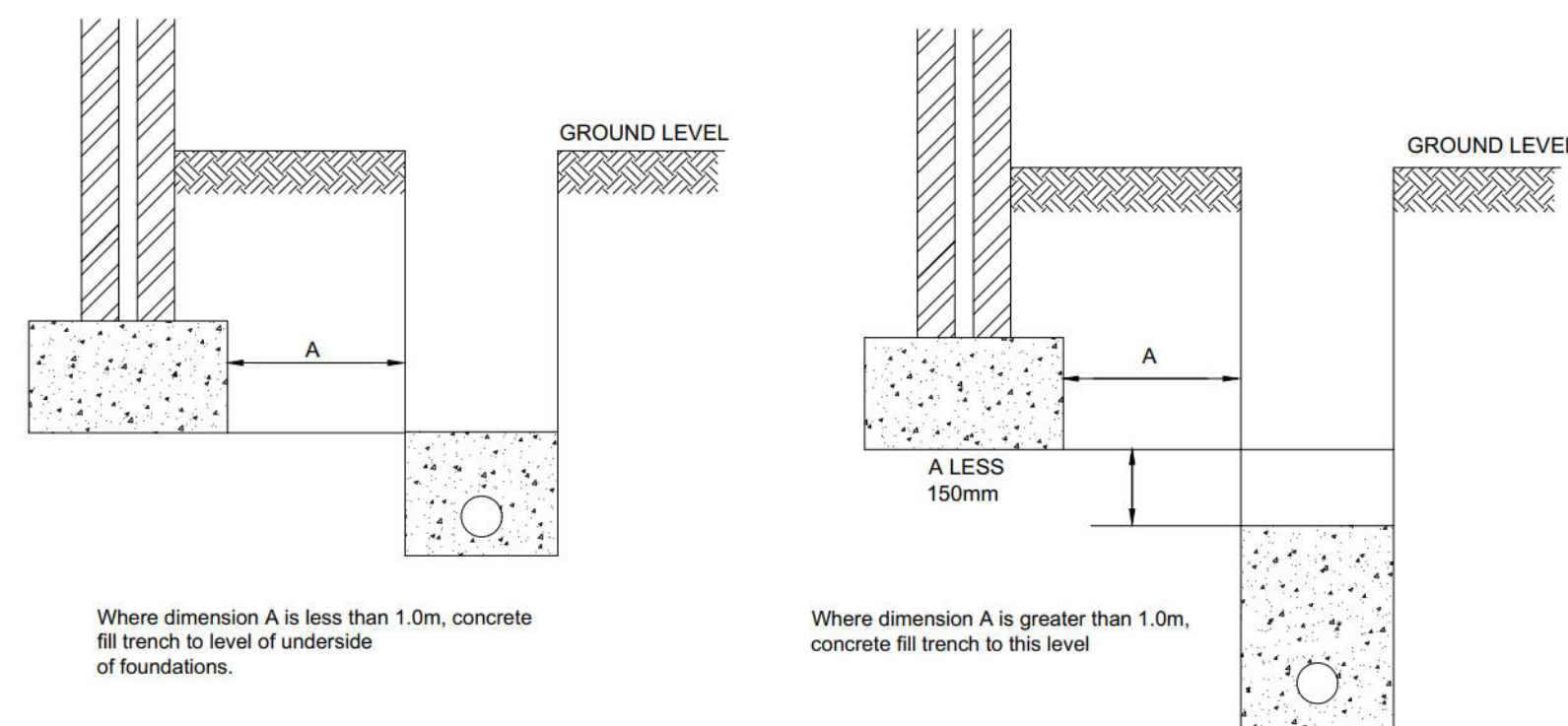


GULLY A
TYPE: PRECAST CONCRETE
SECTION

150mm x 150mm concrete surround required for support of cover and frame. Where the inspection chamber is being installed on a driveway subject to light vehicular traffic, or where B125 covers are being used, the concrete support should be 300mm wide x 225mm deep

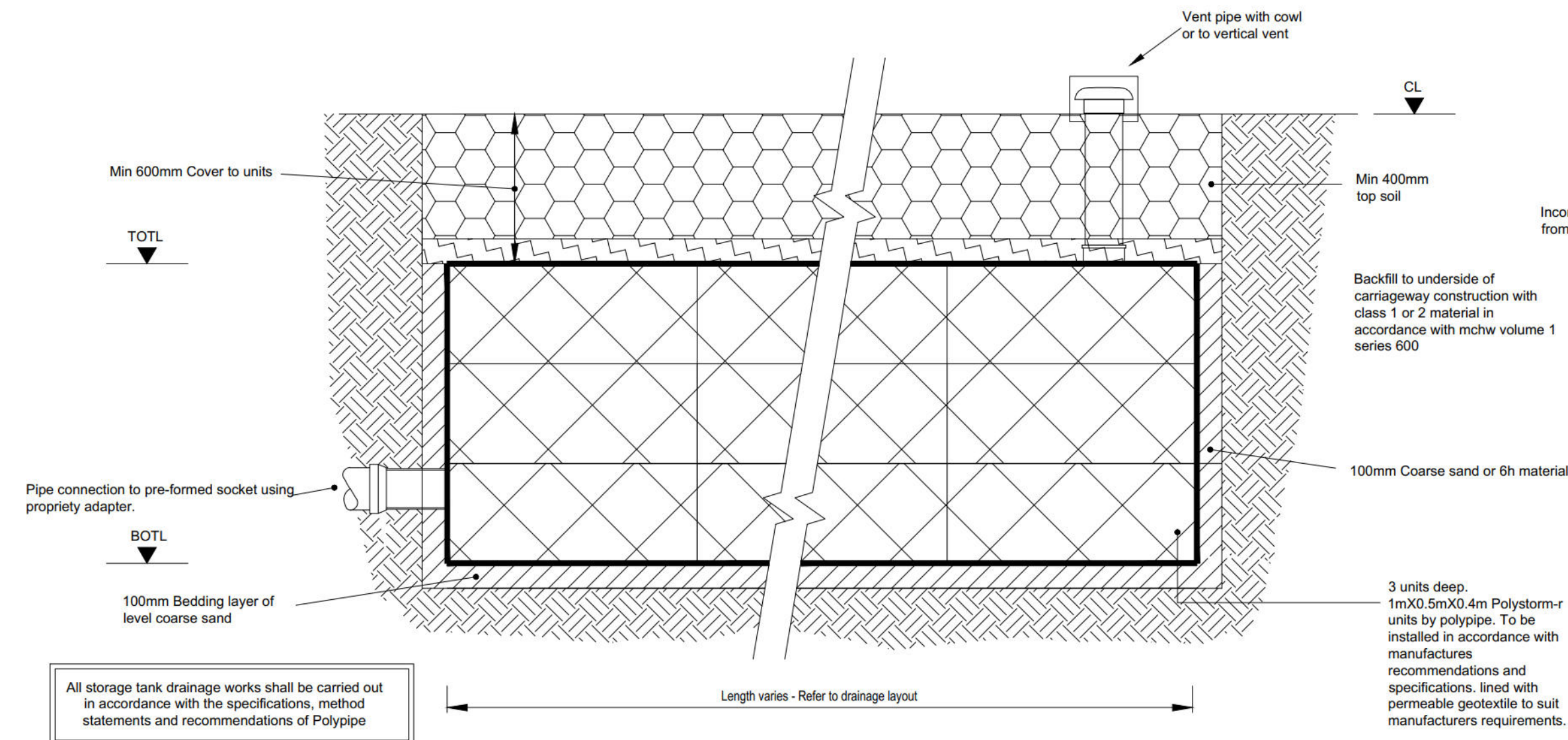


450mmØ/600mmØ Turtle Enviro
Silt Trap Detail

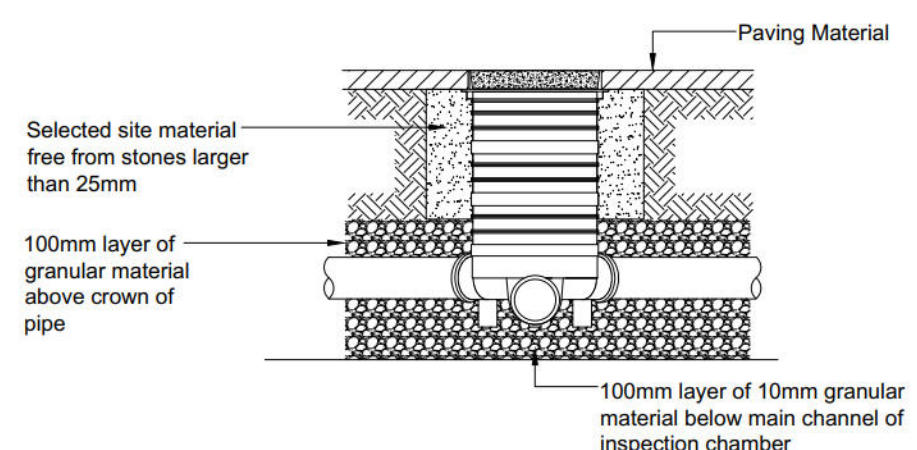


Pipes near buildings

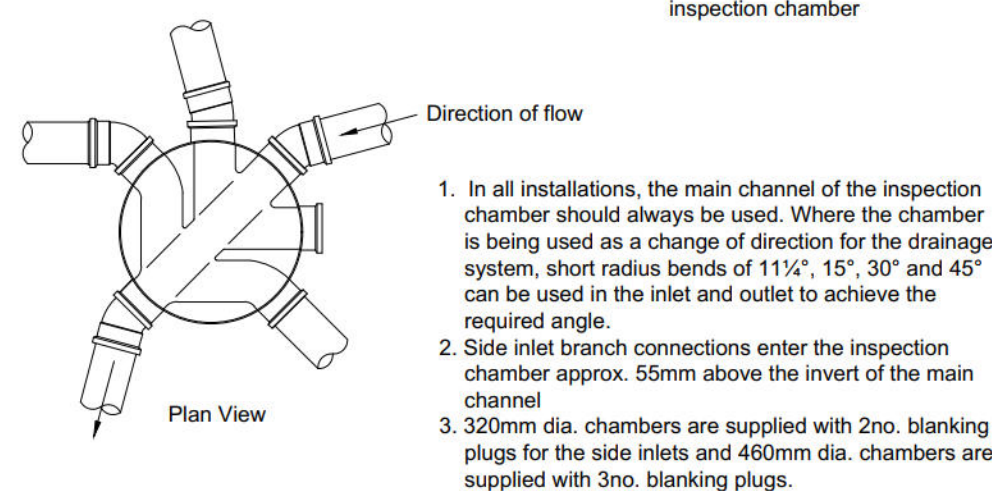
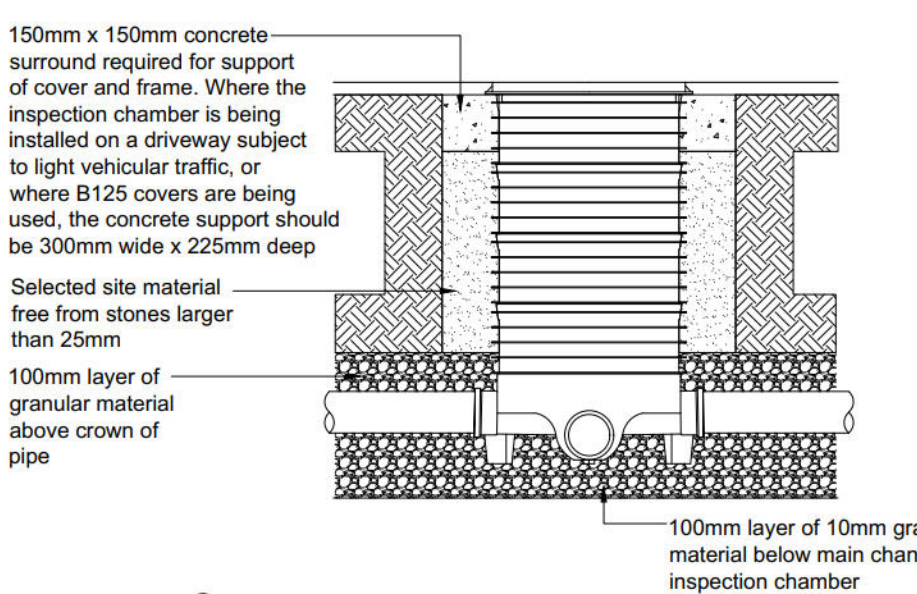
Pipes near buildings



Soakaway using polystorm-r geomodular units
for non-trafficked areas

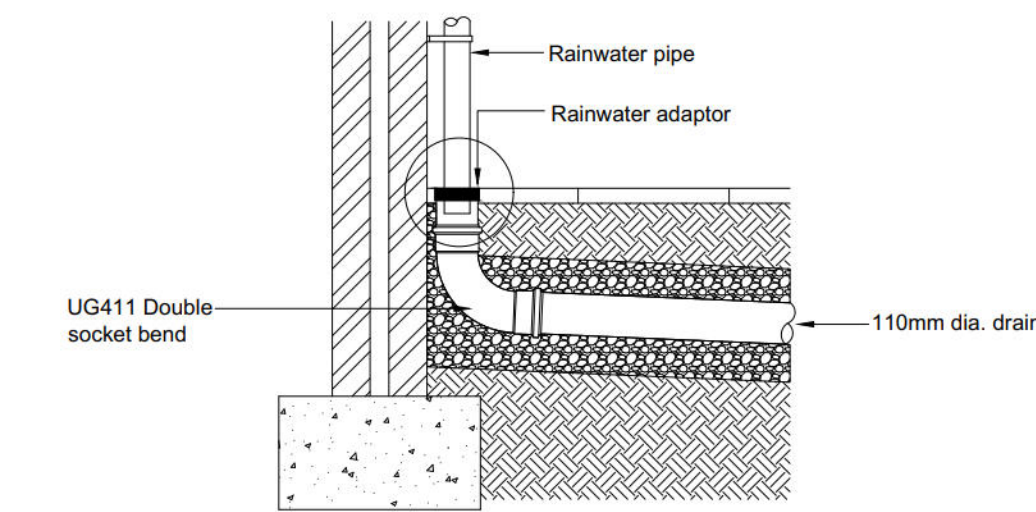


300mmØ SHALLOW
INSPECTION CHAMBER DETAIL

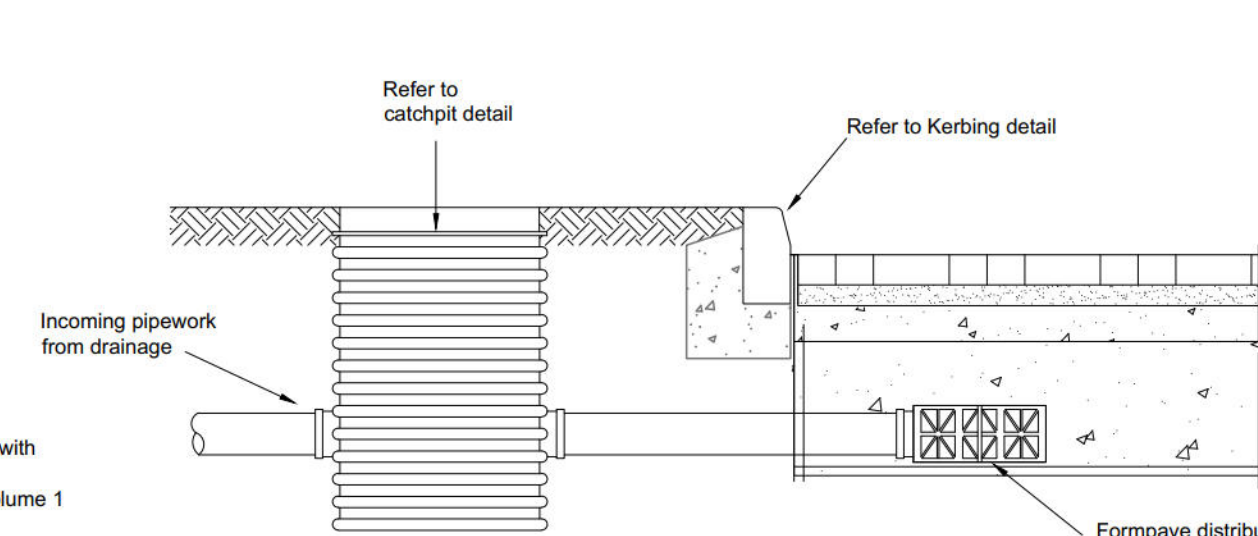


460mmØ INSPECTION
CHAMBER DETAIL

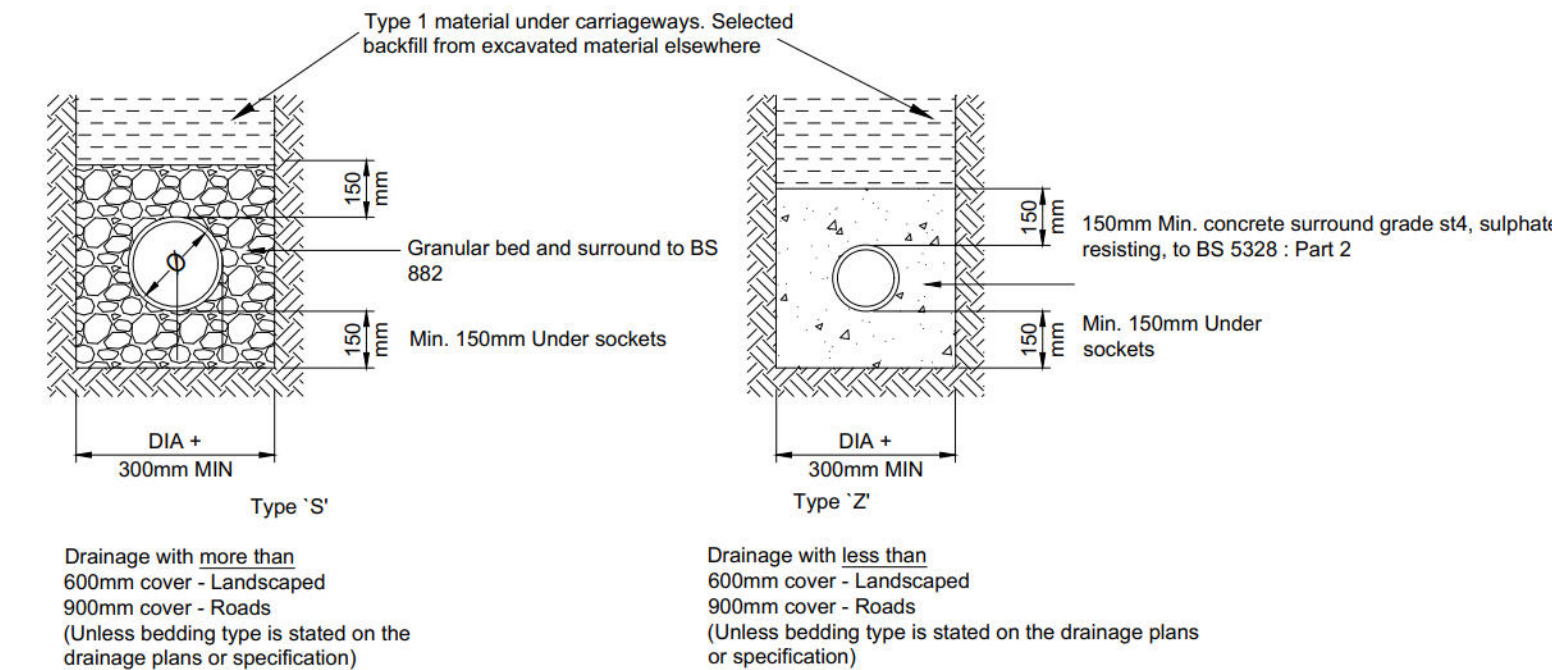
Soil pipe / wc connection



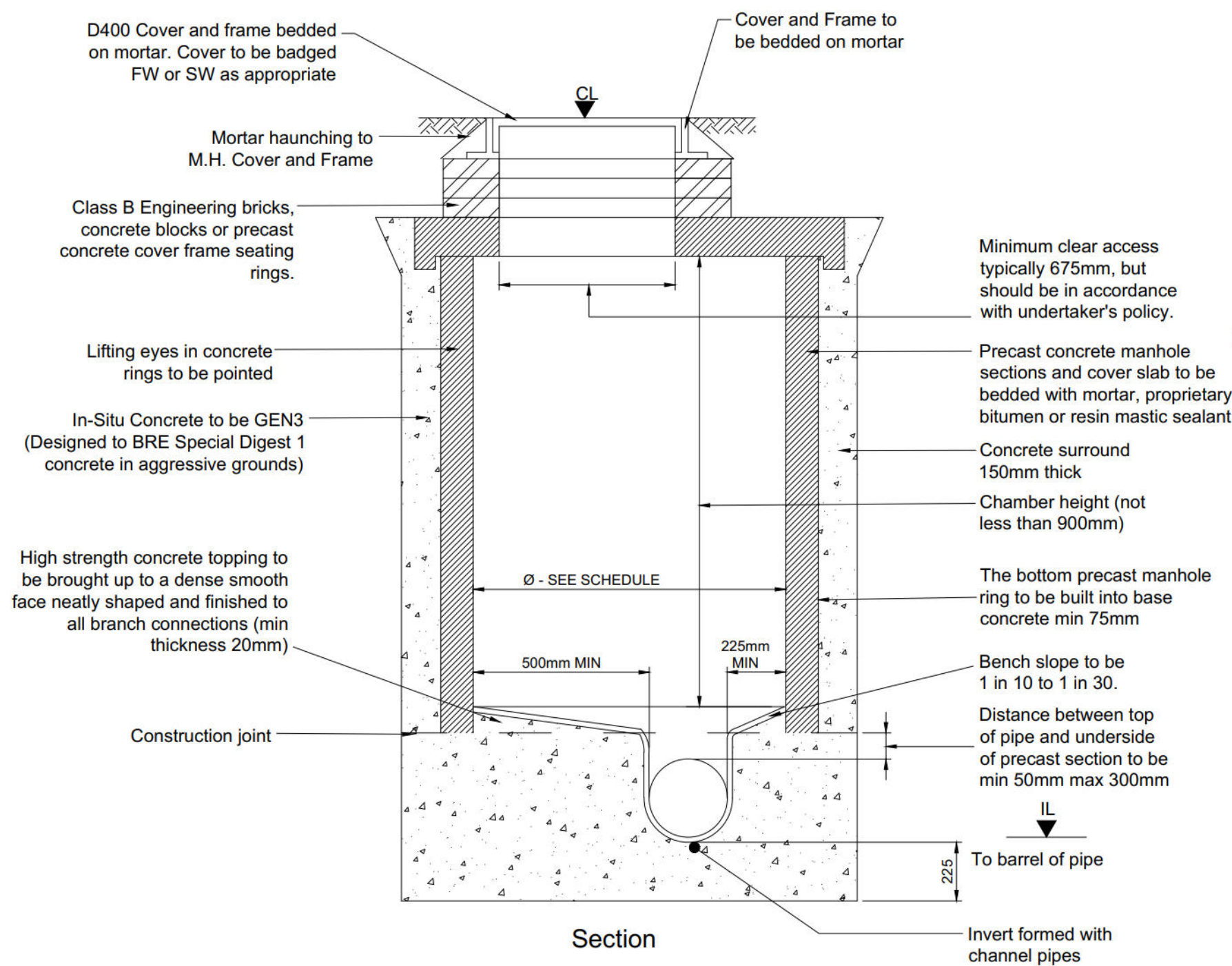
Rainwater pipe connection



Formpave Diffuser tank construction



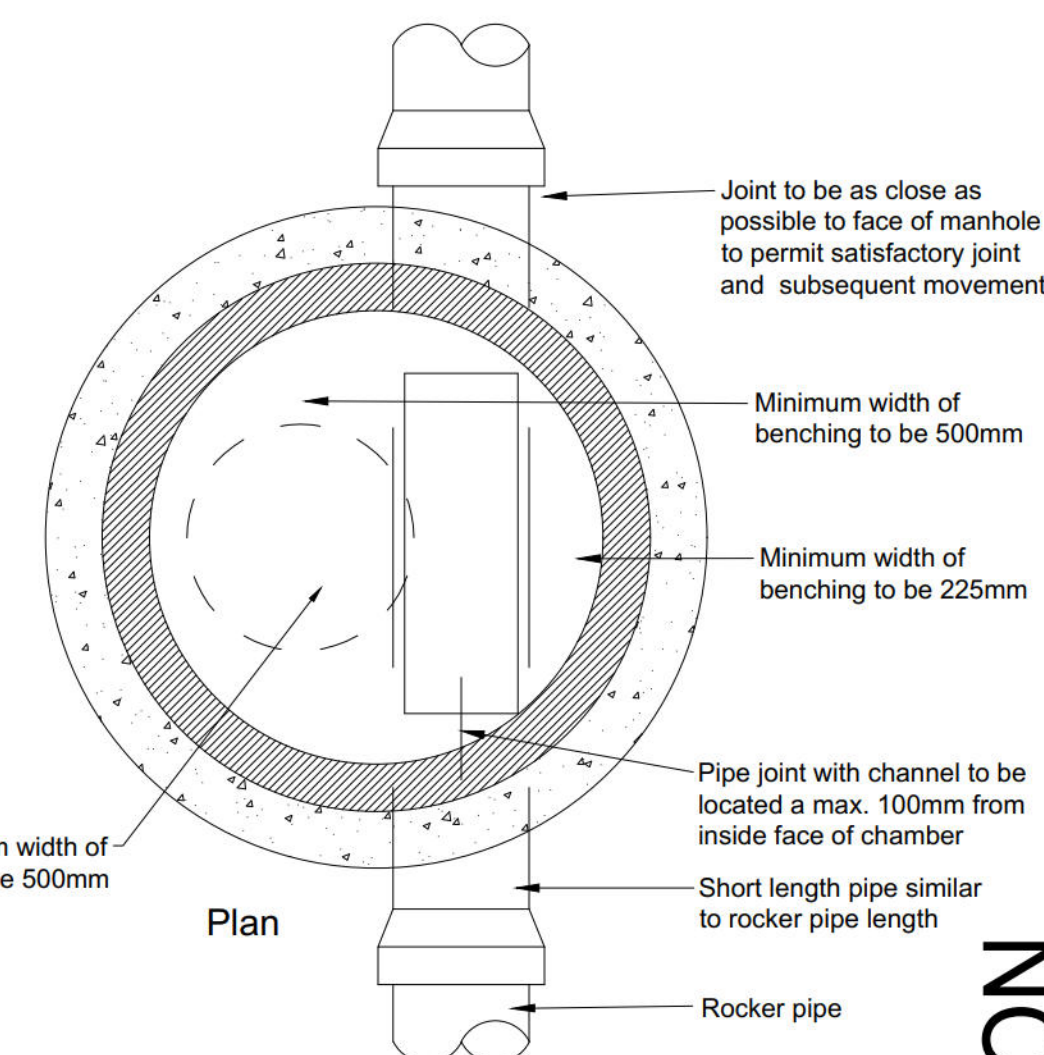
Pipe bedding details in private
Areas



Typical Manhole Detail - Type B
Maximum depth from cover level to soffit of pipe 3.0m

NOMINAL DIAMETER (mm) DN	EFFECTIVE ROCKER PIPE LENGTH (m)
150 - 600	0.6
675 - 750	1.0
OVER 750	1.25

DIAMETER OF LARGEST PIPE IN MANHOLE (mm) DN	INTERNAL DIAMETER OF MANHOLE (mm)
< 375	1200 (1050 WHERE SOFFIT IS 1.35-1.5m)
375 - 450	1350
500 - 700	1500
750 - 900	1800
> 900	CONSULT UNDERTAKER



Plan

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 - COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
 - ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA
 - ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911:PART 1.
 - ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
 - ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
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 - STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
 - IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
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 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
 - UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION
 - PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
 - MANHOLE AND CHAMBER COVER GRADES:
 - 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
 - 'B125' IN ALL DRIVEWAYS
 - 'C250' IN PRIVATE PARKING AREAS
 - 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

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C2	23.01.26	Surface water drainage revised to SI	SFC	CS	CS
C1	13.12.25	CONSTRUCTION ISSUE	SFC	CS	CS
P2	28.11.25	Cellular soakaway detail added	SFC	CS	CS
P1	14.11.25	FIRST ISSUE	SFC	CS	CS

REV	DATE	DESCRIPTION	BY	CHK	APP
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CLIENT
METIS HOMES

ARCHITECT

JOB TITLE
LAND TO REAR OF CROFT SURGERY
EASTERGATE

DRAWING TITLE
DRAINAGE
CONSTRUCTION DETAILS

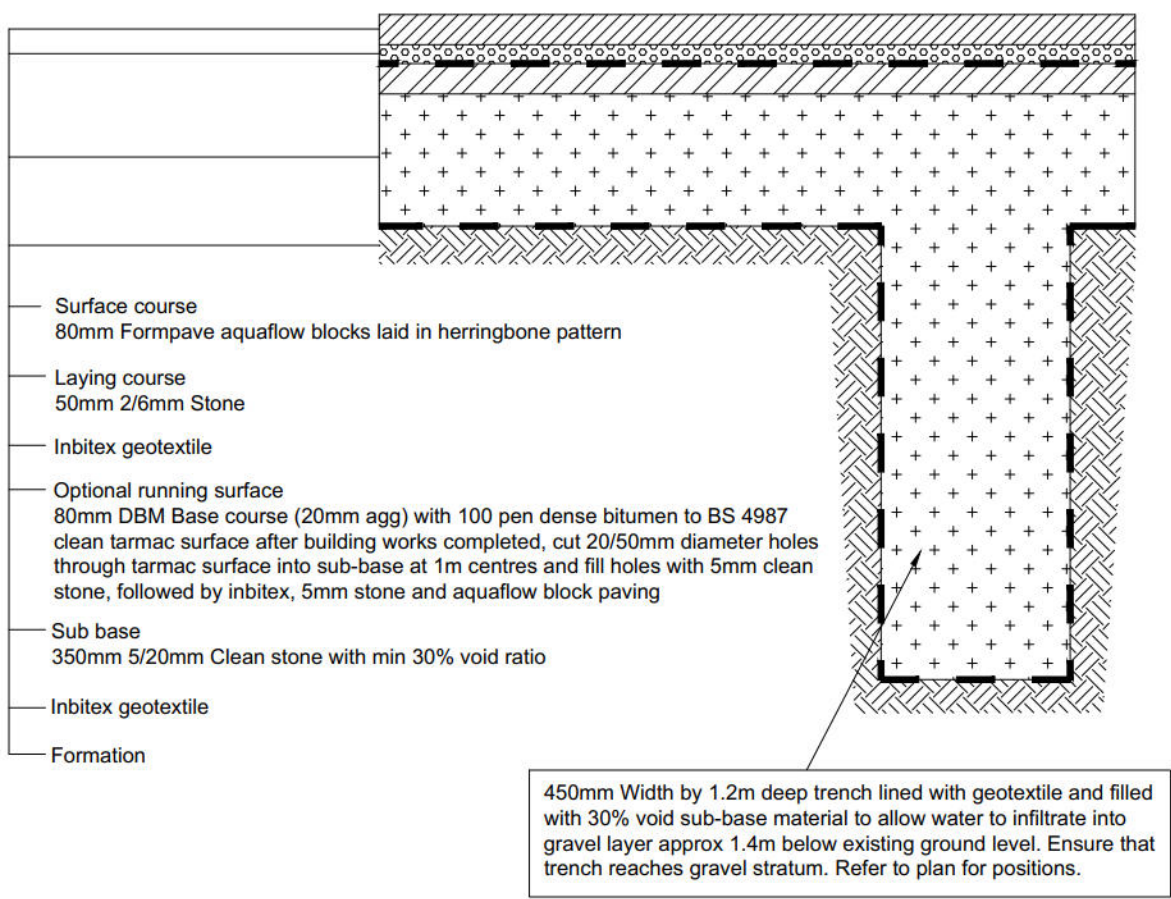
DRAWN	ENGINEER	CHECKED	APPROVED
SFC	SFC	CS	CS

DATE
NOV '25

SCALE @ A1
1:200

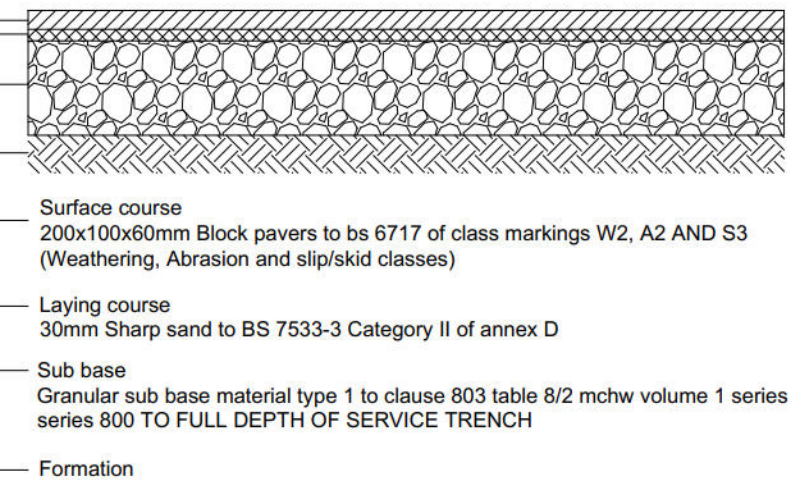
JOB No.	STATUS	DRAWING No.	REV.
C3875	C	301	2

FOR CONSTRUCTION



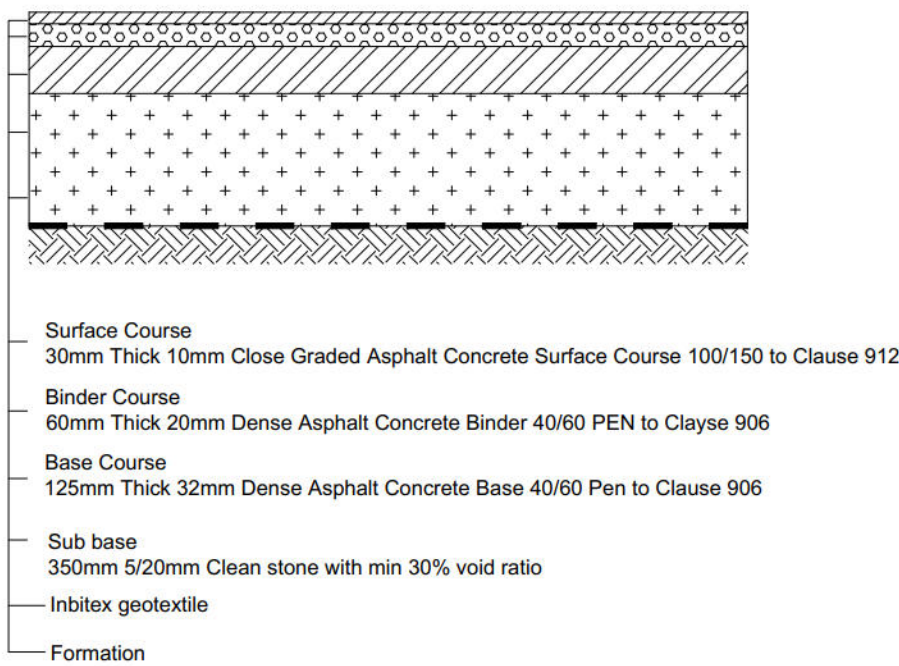
Formpave Permeable Block Paving Access Way Construction

To be read in accordance with Formpave details and specification

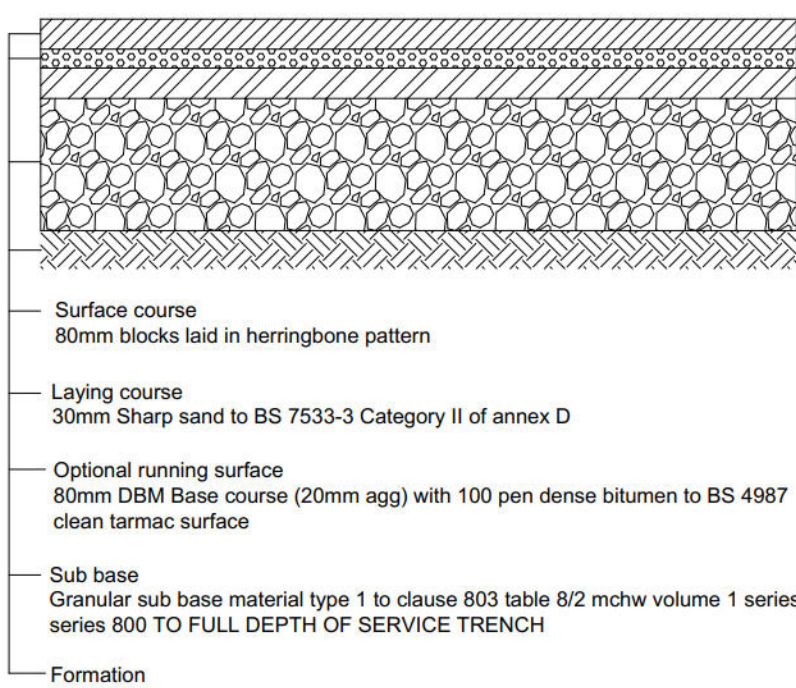


To be read in accordance with NHBC standards chapter 10.2

Impermeable Block Paved Driveway Construction (For use where service strip passes through driveway areas)

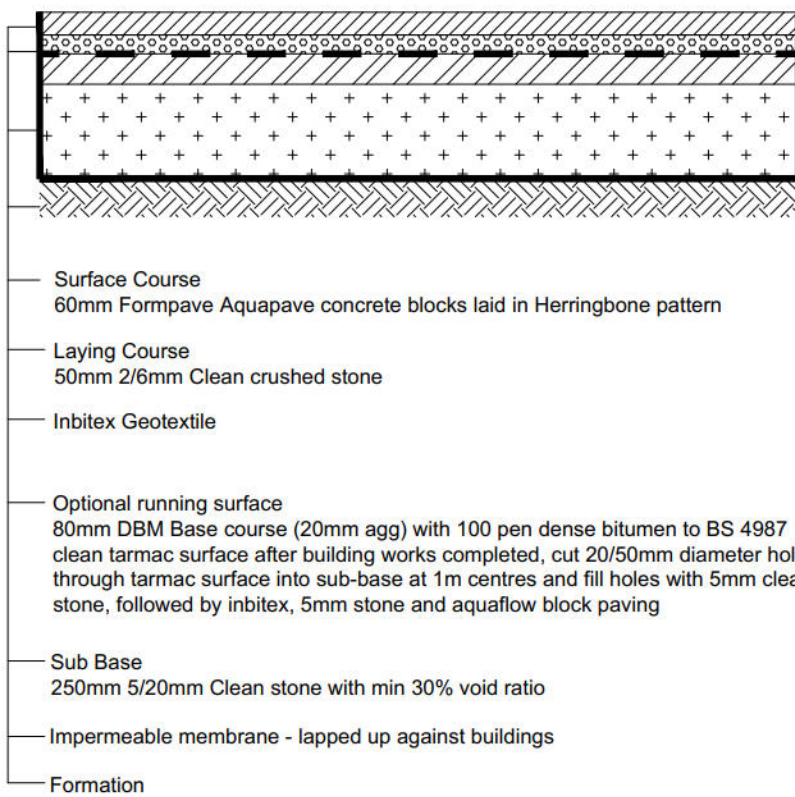


Access Way Porous sub-base with impermeable wearing course



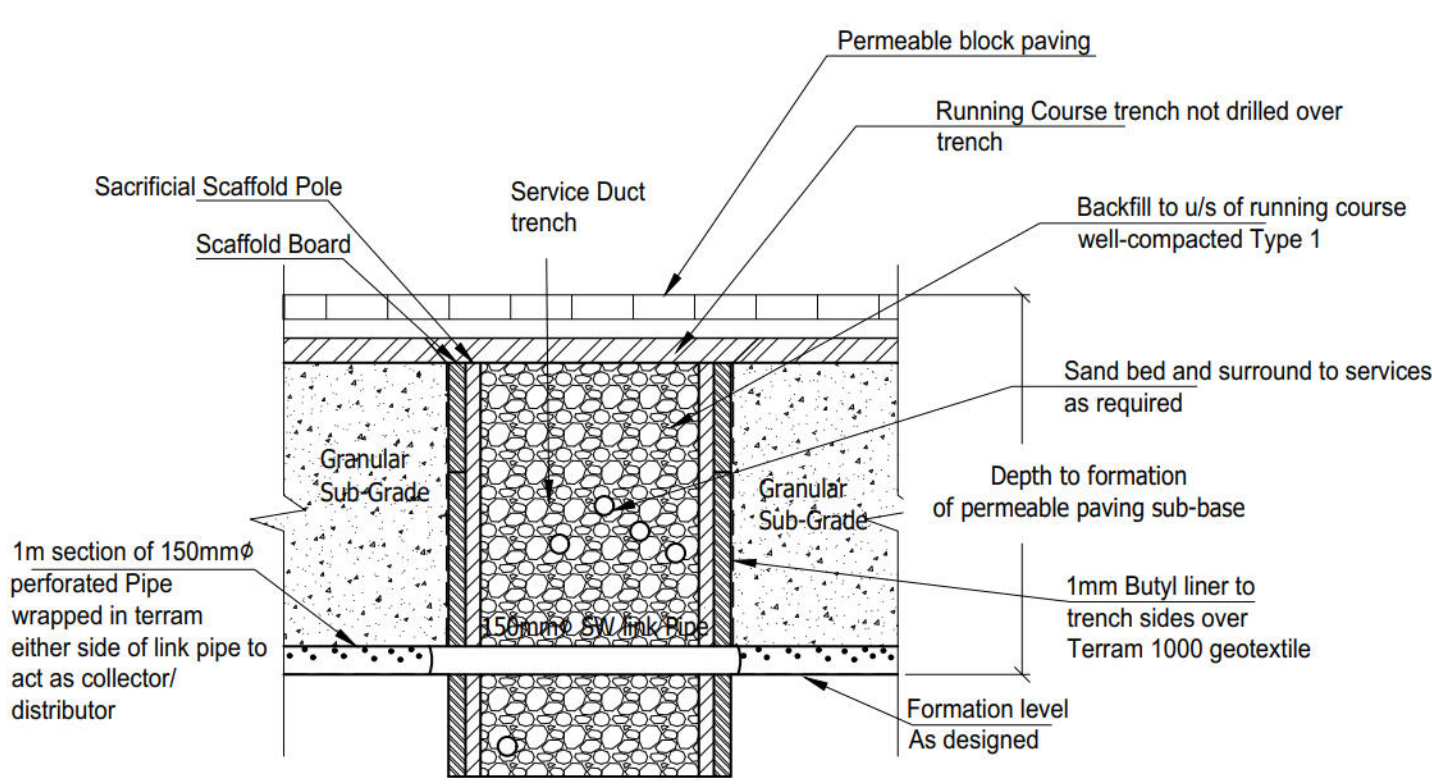
To be read in accordance with Formpave details and specification

Impermeable Block Paving Access Road Construction (For use where service strip passes through access way areas)

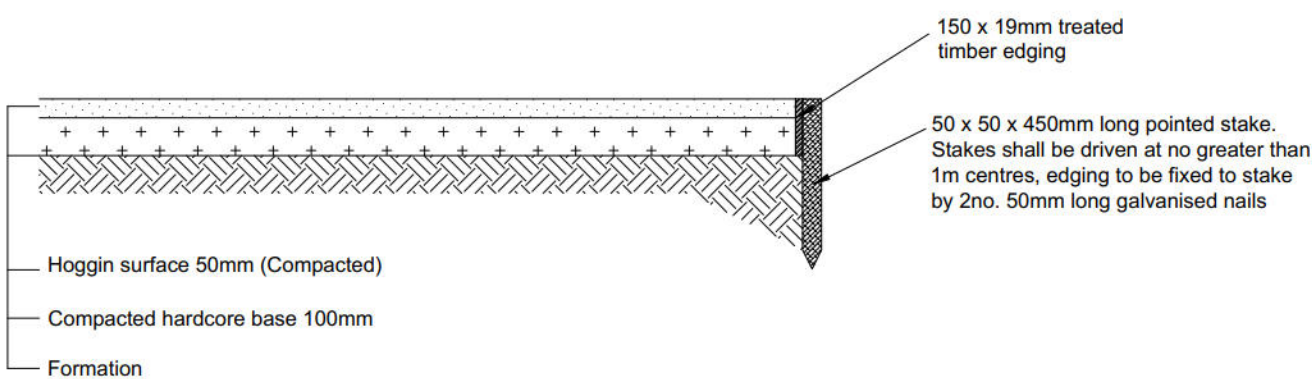
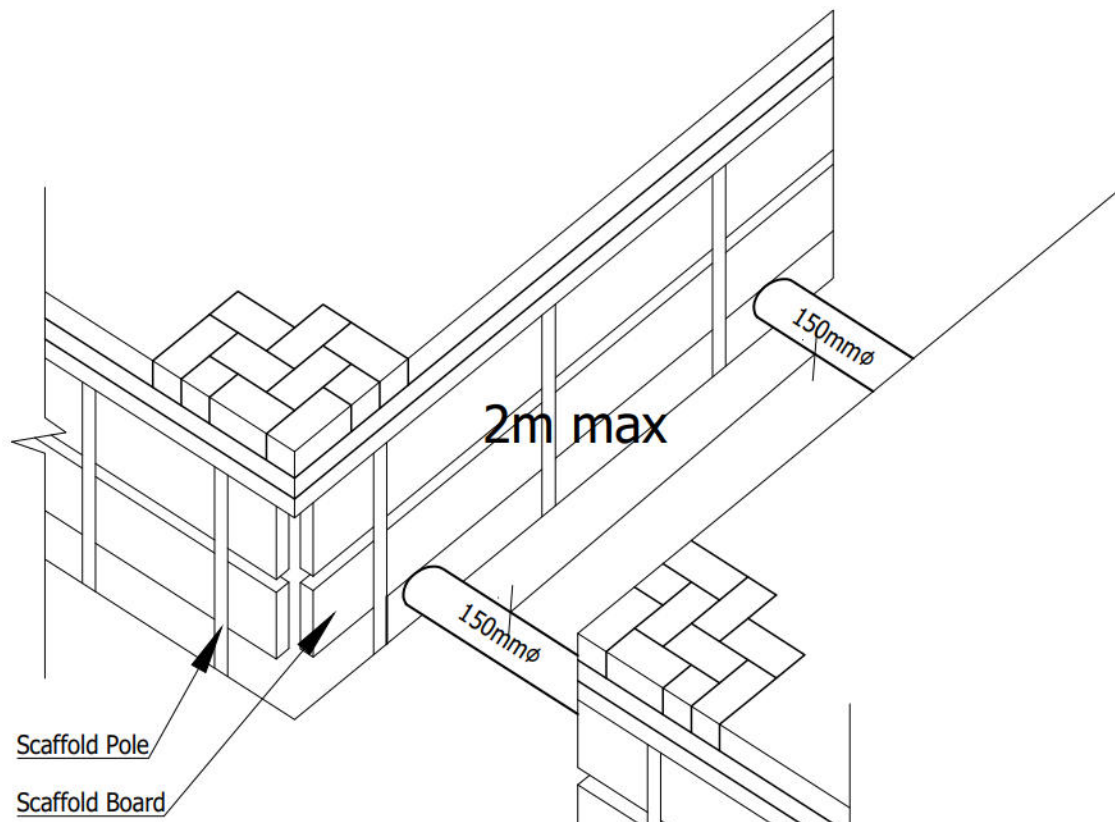


Formpave permeable block paving private driveway construction

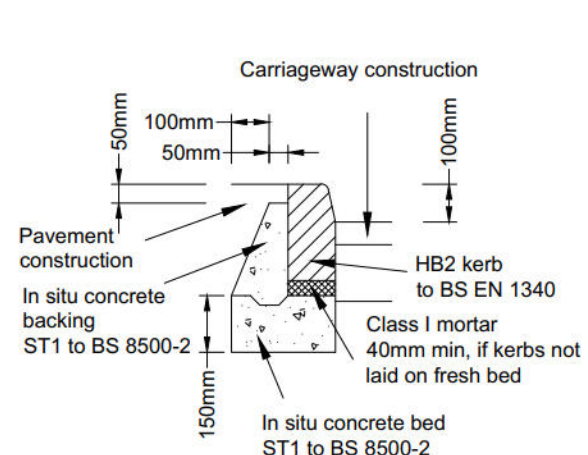
To be read in accordance with Formpave details and specification



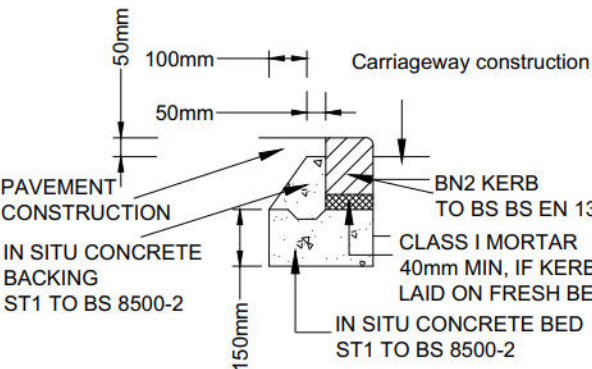
SERVICES CROSSING THROUGH POROUS SUB-BASE



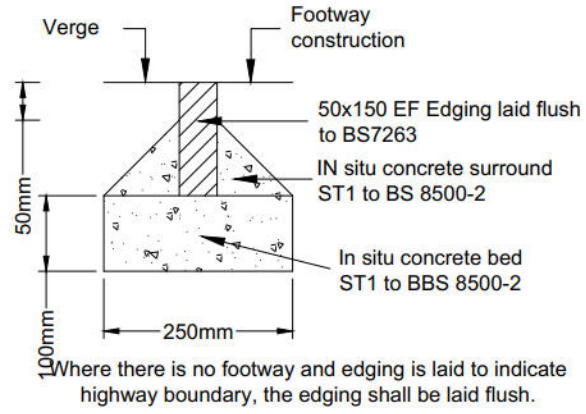
Hoggin footway construction



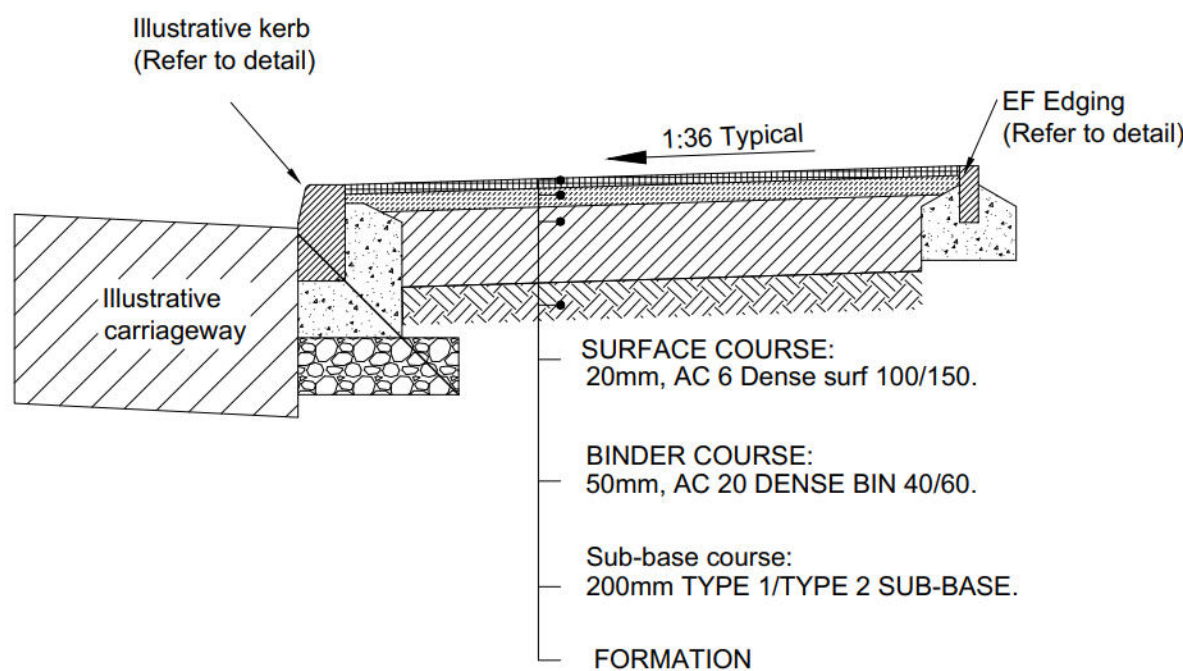
HB2 Kerb



BN KERB



EF Edging Footway edge detail



Type 1 Flexible footway construction (Adjacent Carriageway) (Scale 1:20)

STANDARD DRAINAGE NOTES

- DO NOT SCALE FROM THIS DRAWING, REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
- ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
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C2	23.01.26	Surface water drainage revised to SI	SFC	CS	CS
C1	13.12.25	CONSTRUCTION ISSUE	SFC	CS	CS
P4	12.12.25	Hoggin path detail added	SFC	CS	CS
P3	18.12.25	Revised to client comments	SFC	CS	CS
P2	28.11.25	Permeable driveway detail revised	SFC	CS	CS
P1	14.11.25	FIRST ISSUE	SFC	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP



CLIENT		METIS HOMES			
ARCHITECT					
JOB TITLE					
LAND TO REAR OF CROFT SURGERY EASTERGATE					
DRAWING TITLE					
EXTERNAL WORKS CONSTRUCTION DETAILS					
DRAWN		ENGINEER		CHECKED	APPROVED
SFC		SFC		CS	CS
DATE		SCALE @ A1			
NOV '25		1:200			
JOB No.		STATUS		DRAWING No.	
C3875		C		401	
				REV.	
				2	

FOR CONSTRUCTION

7.3 **Appendix C – Surface Water Calculations**

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S33	0.000	5.00	15.475	900	2.405	5.674	2.233
SA1			15.400	600	-2.725	-4.626	2.239
1	0.007	5.00	15.525	100	-51.808	62.693	0.350
2			15.525	450	-38.849	57.853	0.524
3	0.015	5.00	15.525	100	-58.252	44.444	0.700
4			15.400	450	-41.419	30.097	1.450
5	0.006	5.00	15.525	100	-27.705	48.229	0.450
7	0.012	5.00	15.525	100	-19.424	45.679	0.450
6			15.450	450	-34.293	30.905	0.610
8			15.450	450	-26.265	27.484	0.620
9	0.006	5.00	15.525	100	-10.968	42.211	0.450
10	0.006	5.00	15.525	100	-6.344	40.421	0.450
11			15.525	450	-12.488	31.332	0.685
12			15.500	450	-14.673	25.251	0.691
14	0.012	5.00	15.525	100	1.621	36.130	0.450
15			15.525	450	-3.414	22.876	0.626
16	0.006	5.00	15.525	100	11.122	34.610	0.450
17	0.006	5.00	15.525	100	15.540	32.789	0.450
18			15.525	450	9.317	23.779	0.685
19			15.525	450	7.132	17.698	0.716
13			15.400	450	-16.383	20.786	1.580
20	0.006	5.00	15.525	100	44.804	20.453	0.450
21			15.450	450	38.106	2.686	0.615
22	0.006	5.00	15.525	100	32.548	27.389	0.450
23	0.006	5.00	15.525	100	37.361	25.726	0.450
24			15.525	450	31.265	16.748	0.685
25			15.450	450	27.417	6.724	0.802
26			15.400	450	24.614	5.156	1.200
27	0.012	5.00	15.525	100	23.426	29.004	0.450
28			15.525	450	18.343	15.418	0.631
29			15.400	450	5.041	12.361	1.808
36	0.008	5.00	15.375	100	-36.507	22.868	0.450
37			15.375	450	-19.779	16.402	0.674
38			15.375	450	-18.587	12.687	0.720
57	0.016	5.00	15.600	100	-37.378	9.198	0.675
39	0.006	5.00	15.700	100	-45.585	-11.236	0.721
40	0.014	5.00	15.700	450	-42.546	-3.333	0.827
42			15.375	450	-26.807	-9.209	0.810
41	0.006	5.00	15.525	100	-30.860	-19.747	0.450
43			15.375	450	-24.781	-3.637	1.042
31			15.400	450	-11.557	-8.703	1.507
dummy			15.400	550	0.481	-1.286	2.247

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
48	0.032	5.00	15.375	450	-34.961	-29.579	0.930
53			15.240	450	-21.915	-24.061	1.050
54			15.400	450	-8.021	-17.935	1.401
52	0.020	5.00	15.500	450	-19.313	-30.067	1.124
32	0.017	5.00	15.475	450	10.274	2.964	1.275
35	0.017	5.00	15.475	450	2.666	-15.555	0.899

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	13.833	0.600	15.175	15.001	0.174	79.5	100	5.27	55.3
1.001	2	4	27.875	0.600	15.001	14.000	1.001	27.8	100	5.58	54.0
3.000	3	4	22.118	0.600	14.825	14.451	0.374	59.1	100	5.37	54.9
2.000	5	6	18.534	0.600	15.075	14.840	0.235	78.9	100	5.36	55.0
2.001	6	4	7.172	0.600	14.840	14.494	0.346	20.7	100	5.43	54.7
4.000	7	8	19.439	0.600	15.075	14.830	0.245	79.3	100	5.37	54.9
4.001	8	13	11.938	0.600	14.830	13.820	1.010	11.8	100	5.46	54.5
5.000	9	11	10.985	0.600	15.075	14.890	0.185	59.4	100	5.18	55.7
6.000	10	11	10.971	0.600	15.075	14.890	0.185	59.3	100	5.18	55.7
5.001	11	12	6.462	0.600	14.840	14.809	0.031	208.4	100	5.39	54.8
5.002	12	13	4.781	0.600	14.809	13.820	0.989	4.8	100	5.41	54.7
11.000	14	15	14.178	0.600	15.075	14.899	0.176	80.6	100	5.28	55.3
11.001	15	29	13.493	0.600	14.899	13.592	1.307	10.3	100	5.37	54.9
12.000	16	18	10.980	0.600	15.075	14.890	0.185	59.4	100	5.18	55.7
13.000	17	18	10.950	0.600	15.075	14.890	0.185	59.2	100	5.18	55.7
12.001	18	19	6.462	0.600	14.840	14.809	0.031	208.4	100	5.39	54.8
12.002	19	29	5.732	0.600	14.809	13.592	1.217	4.7	100	5.41	54.7
7.000	20	21	18.988	0.600	15.075	14.835	0.240	79.1	100	5.37	54.9
9.000	22	24	10.718	0.600	15.075	14.890	0.185	57.9	100	5.18	55.7
8.000	23	24	10.852	0.600	15.075	14.890	0.185	58.7	100	5.18	55.7
8.001	24	25	10.737	0.600	14.840	14.648	0.192	55.9	100	5.35	55.0
7.001	21	25	11.426	0.600	14.835	14.648	0.187	61.1	100	5.56	54.1
7.002	25	26	3.212	0.600	14.648	14.200	0.448	7.2	100	5.58	54.1
7.003	26	29	20.857	0.600	14.200	13.717	0.483	43.2	100	5.87	52.9
1.003	13	29	22.960	0.600	13.820	13.592	0.228	100.7	225	6.52	97.6
1.004	29	S33	7.188	0.600	13.592	13.542	0.050	143.8	225	6.63	50.1
15.000	36	37	17.934	0.600	14.925	14.701	0.224	80.1	100	5.35	55.0
15.001	37	38	3.902	0.600	14.701	14.655	0.046	84.8	100	5.43	54.7
1.002	4	13	26.711	0.600	13.950	13.820	0.130	205.5	150	6.22	51.6
10.000	27	28	14.506	0.600	15.075	14.894	0.181	80.1	100	5.28	55.3
10.001	28	26	12.026	0.600	14.894	14.200	0.694	17.3	100	5.39	54.8
15.002	38	43	17.460	0.600	14.655	14.383	0.272	64.2	100	5.73	53.5
18.000	57	43	17.984	0.600	14.925	14.383	0.542	33.2	100	5.22	55.5
15.003	43	31	14.161	0.600	14.333	14.193	0.140	101.2	150	5.96	52.5
15.004	31	SA1	9.728	0.600	14.193	13.461	0.732	13.3	150	6.02	52.3
16.000	39	40	8.467	0.600	14.979	14.873	0.106	79.9	100	5.16	55.7
16.001	40	42	16.800	0.600	14.873	14.615	0.258	65.1	100	5.46	54.5
16.002	42	43	5.929	0.600	14.565	14.333	0.232	25.6	150	5.51	54.3
17.000	41	42	11.291	0.600	15.075	14.615	0.460	24.5	100	5.12	55.9
1.006	SA1	dummy	2.988	0.600	13.161	13.153	0.008	373.5	450	6.87	49.9
19.000	48	53	14.165	0.600	14.445	14.190	0.255	55.5	150	5.17	55.7

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
19.001	53	54	15.185	0.600	14.190	13.999	0.191	79.5	150	5.40	54.8
20.000	52	53	6.545	0.600	14.376	14.190	0.186	35.2	100	5.08	56.1
19.002	54	SA1	14.324	0.600	13.999	13.475	0.524	27.3	150	5.52	54.3
14.000	32	S33	8.323	0.600	14.200	13.542	0.658	12.6	100	5.06	56.1
1.005	S33	SA1	11.507	0.600	13.542	13.475	0.067	171.7	225	6.82	49.5
21.000	35	SA1	12.186	0.600	14.576	13.475	1.101	11.1	100	5.09	56.0

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	1440	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node SA1 Online Weir Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.590
Replaces Downstream Link	x	Design Flow (l/s)	20.0		
Invert Level (m)	15.300	Width (m)	0.011		

Node SA1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	13.161	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.68400	Time to half empty (mins)	930	Inf Depth (m)	
Safety Factor	5.0	Pit Width (m)	8.000	Number Required	1
Porosity	0.95	Pit Length (m)	22.000		

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	S33	675	14.501	0.959	11.7	0.6100	0.0000	SURCHARGED
720 minute summer	SA1	675	14.501	1.340	23.2	201.1028	0.0000	SURCHARGED
15 minute summer	1	10	15.254	0.079	6.0	0.0006	0.0000	OK
15 minute summer	2	11	15.053	0.052	5.9	0.0082	0.0000	OK
15 minute summer	3	12	15.409	0.584	12.9	0.0047	0.0000	FLOOD RISK
15 minute summer	4	13	14.685	0.735	21.6	0.1168	0.0000	SURCHARGED
15 minute summer	5	10	15.145	0.070	5.2	0.0006	0.0000	OK
15 minute summer	7	12	15.445	0.370	10.3	0.0030	0.0000	FLOOD RISK
15 minute summer	6	10	14.885	0.045	5.1	0.0072	0.0000	OK
15 minute summer	8	12	14.885	0.055	8.9	0.0088	0.0000	OK
15 minute summer	9	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	10	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	11	11	15.101	0.261	9.5	0.0415	0.0000	SURCHARGED
15 minute summer	12	12	14.852	0.043	9.0	0.0068	0.0000	OK
15 minute summer	14	11	15.417	0.342	10.3	0.0027	0.0000	FLOOD RISK
15 minute summer	15	12	14.951	0.052	9.2	0.0083	0.0000	OK
15 minute summer	16	11	15.164	0.089	5.2	0.0007	0.0000	OK
15 minute summer	17	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	18	11	15.101	0.261	9.5	0.0415	0.0000	SURCHARGED
15 minute summer	19	12	14.850	0.041	9.0	0.0065	0.0000	OK
720 minute summer	13	675	14.501	0.681	5.2	0.1083	0.0000	SURCHARGED
30 minute summer	20	22	15.217	0.142	4.7	0.0011	0.0000	SURCHARGED
15 minute summer	21	14	15.195	0.360	5.2	0.0573	0.0000	FLOOD RISK
15 minute summer	22	13	15.277	0.202	5.2	0.0016	0.0000	FLOOD RISK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute summer	S33	1.005	SA1	11.6	0.686	0.293	0.4576	0.0
720 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	
720 minute summer	SA1	Infiltration		2.7				
15 minute summer	1	1.000	2	5.9	1.101	0.871	0.0733	
15 minute summer	2	1.001	4	5.8	0.974	0.505	0.1661	
15 minute summer	3	3.000	4	10.6	1.360	1.350	0.1731	
15 minute summer	4	1.002	13	18.3	1.041	1.487	0.4702	
15 minute summer	5	2.000	6	5.1	1.098	0.750	0.0865	
15 minute summer	7	4.000	8	8.9	1.296	1.311	0.1194	
15 minute summer	6	2.001	4	5.3	1.520	0.393	0.0384	
15 minute summer	8	4.001	13	8.8	1.275	0.497	0.0733	
15 minute summer	9	5.000	11	4.7	0.853	0.603	0.0832	
15 minute summer	10	6.000	11	4.7	0.853	0.602	0.0830	
15 minute summer	11	5.001	12	9.0	1.420	2.167	0.0355	
15 minute summer	12	5.002	13	9.0	1.406	0.322	0.0263	
15 minute summer	14	11.000	15	9.2	1.368	1.366	0.0848	
15 minute summer	15	11.001	29	9.2	1.373	0.482	0.0807	
15 minute summer	16	12.000	18	4.7	0.853	0.602	0.0832	
15 minute summer	17	13.000	18	4.7	0.853	0.602	0.0829	
15 minute summer	18	12.001	19	9.0	1.425	2.158	0.0350	
15 minute summer	19	12.002	29	8.9	1.415	0.317	0.0311	
720 minute summer	13	1.003	29	5.1	0.480	0.099	0.9131	
30 minute summer	20	7.000	21	4.7	0.936	0.693	0.1486	
15 minute summer	21	7.001	25	4.4	0.871	0.568	0.0894	
15 minute summer	22	9.000	24	4.7	0.983	0.588	0.0839	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	23	13	15.277	0.202	5.2	0.0016	0.0000	FLOOD RISK
15 minute summer	24	13	15.255	0.415	9.4	0.0661	0.0000	FLOOD RISK
15 minute summer	25	14	15.183	0.535	11.9	0.0850	0.0000	FLOOD RISK
15 minute summer	26	14	15.129	0.929	14.9	0.1478	0.0000	FLOOD RISK
15 minute summer	27	12	15.507	0.432	10.3	0.0035	0.0000	FLOOD RISK
15 minute summer	28	13	15.276	0.382	8.7	0.0607	0.0000	FLOOD RISK
720 minute summer	29	675	14.501	0.909	10.4	0.1446	0.0000	SURCHARGED
15 minute summer	36	12	15.110	0.185	6.9	0.0015	0.0000	FLOOD RISK
15 minute summer	37	13	14.980	0.279	6.2	0.0443	0.0000	SURCHARGED
15 minute summer	38	13	14.950	0.295	5.6	0.0470	0.0000	SURCHARGED
15 minute summer	57	12	15.560	0.635	13.7	0.0051	0.0000	FLOOD RISK
15 minute summer	39	12	15.696	0.717	5.2	0.0057	0.0000	FLOOD RISK
15 minute summer	40	12	15.666	0.793	13.9	0.1261	0.0000	FLOOD RISK
15 minute summer	42	12	14.911	0.346	16.4	0.0550	0.0000	SURCHARGED
15 minute summer	41	10	15.120	0.045	5.2	0.0004	0.0000	OK
15 minute summer	43	13	14.847	0.514	30.3	0.0818	0.0000	SURCHARGED
720 minute summer	31	675	14.501	0.308	5.0	0.0490	0.0000	SURCHARGED
15 minute summer	dummy	1	13.153	0.000	0.0	0.0000	0.0000	OK
15 minute summer	48	12	15.328	0.883	27.5	0.1404	0.0000	FLOOD RISK
15 minute summer	53	12	15.053	0.863	37.5	0.1372	0.0000	FLOOD RISK
720 minute summer	54	675	14.501	0.502	5.0	0.0798	0.0000	SURCHARGED
15 minute summer	52	12	15.483	1.107	17.2	0.1760	0.0000	FLOOD RISK
720 minute summer	32	675	14.501	0.301	1.7	0.0479	0.0000	SURCHARGED
15 minute summer	35	10	14.648	0.072	14.6	0.0115	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	23	8.000	24	4.7	0.980	0.591	0.0849	
15 minute summer	24	8.001	25	7.5	1.286	0.929	0.0840	
15 minute summer	25	7.002	26	8.9	1.299	0.391	0.0251	
15 minute summer	26	7.003	29	13.6	1.741	1.475	0.1632	
15 minute summer	27	10.000	28	8.7	1.113	1.289	0.1135	
15 minute summer	28	10.001	26	6.7	1.178	0.459	0.0941	
720 minute summer	29	1.004	S33	10.0	0.662	0.232	0.2859	
15 minute summer	36	15.000	37	6.2	0.917	0.917	0.1403	
15 minute summer	37	15.001	38	5.6	0.909	0.856	0.0305	
15 minute summer	38	15.002	43	5.3	0.682	0.704	0.1366	
15 minute summer	57	18.000	43	11.2	1.430	1.060	0.1407	
15 minute summer	39	16.000	40	4.3	0.553	0.640	0.0662	
15 minute summer	40	16.001	42	11.8	1.512	1.577	0.1314	
15 minute summer	42	16.002	43	15.4	0.874	0.435	0.1044	
15 minute summer	41	17.000	42	5.2	1.330	0.420	0.0637	
15 minute summer	43	15.003	31	29.9	1.847	1.692	0.2071	
720 minute summer	31	15.004	SA1	5.0	1.298	0.102	0.1713	
15 minute summer	48	19.000	53	23.9	1.359	1.001	0.2494	
15 minute summer	53	19.001	54	35.4	2.014	1.778	0.2673	
720 minute summer	54	19.002	SA1	5.0	1.012	0.146	0.2522	
15 minute summer	52	20.000	53	13.6	1.736	1.326	0.0512	
720 minute summer	32	14.000	S33	1.7	0.325	0.099	0.0651	
15 minute summer	35	21.000	SA1	14.5	2.484	0.790	0.0711	

Results for 100 year +45% CC 15 minute summer. 1455 minute analysis at 1 minute timestep. Mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S33	12	14.032	0.490	76.2	0.3115	0.0000	SURCHARGED
15 minute summer	SA1	24	13.684	0.523	152.2	87.6487	0.0000	SURCHARGED
15 minute summer	1	10	15.254	0.079	6.0	0.0006	0.0000	OK
15 minute summer	2	11	15.053	0.052	5.9	0.0082	0.0000	OK
15 minute summer	3	12	15.409	0.584	12.9	0.0047	0.0000	FLOOD RISK
15 minute summer	4	13	14.685	0.735	21.6	0.1168	0.0000	SURCHARGED
15 minute summer	5	10	15.145	0.070	5.2	0.0006	0.0000	OK
15 minute summer	7	12	15.445	0.370	10.3	0.0030	0.0000	FLOOD RISK
15 minute summer	6	10	14.885	0.045	5.1	0.0072	0.0000	OK
15 minute summer	8	12	14.885	0.055	8.9	0.0088	0.0000	OK
15 minute summer	9	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	10	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	11	11	15.101	0.261	9.5	0.0415	0.0000	SURCHARGED
15 minute summer	12	12	14.852	0.043	9.0	0.0068	0.0000	OK
15 minute summer	14	11	15.417	0.342	10.3	0.0027	0.0000	FLOOD RISK
15 minute summer	15	12	14.951	0.052	9.2	0.0083	0.0000	OK
15 minute summer	16	11	15.164	0.089	5.2	0.0007	0.0000	OK
15 minute summer	17	11	15.163	0.088	5.2	0.0007	0.0000	OK
15 minute summer	18	11	15.101	0.261	9.5	0.0415	0.0000	SURCHARGED
15 minute summer	19	12	14.850	0.041	9.0	0.0065	0.0000	OK
15 minute summer	13	13	14.356	0.536	36.1	0.0852	0.0000	SURCHARGED
15 minute summer	20	14	15.211	0.136	5.2	0.0011	0.0000	SURCHARGED
15 minute summer	21	14	15.195	0.360	5.2	0.0573	0.0000	FLOOD RISK
15 minute summer	22	13	15.277	0.202	5.2	0.0016	0.0000	FLOOD RISK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S33	1.005	SA1	76.1	1.913	1.924	0.4525	
15 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
15 minute summer	SA1	Infiltration		1.2				
15 minute summer	1	1.000	2	5.9	1.101	0.871	0.0733	
15 minute summer	2	1.001	4	5.8	0.974	0.505	0.1661	
15 minute summer	3	3.000	4	10.6	1.360	1.350	0.1731	
15 minute summer	4	1.002	13	18.3	1.041	1.487	0.4702	
15 minute summer	5	2.000	6	5.1	1.098	0.750	0.0865	
15 minute summer	7	4.000	8	8.9	1.296	1.311	0.1194	
15 minute summer	6	2.001	4	5.3	1.520	0.393	0.0384	
15 minute summer	8	4.001	13	8.8	1.275	0.497	0.0733	
15 minute summer	9	5.000	11	4.7	0.853	0.603	0.0832	
15 minute summer	10	6.000	11	4.7	0.853	0.602	0.0830	
15 minute summer	11	5.001	12	9.0	1.420	2.167	0.0355	
15 minute summer	12	5.002	13	9.0	1.406	0.322	0.0263	
15 minute summer	14	11.000	15	9.2	1.368	1.366	0.0848	
15 minute summer	15	11.001	29	9.2	1.373	0.482	0.0807	
15 minute summer	16	12.000	18	4.7	0.853	0.602	0.0832	
15 minute summer	17	13.000	18	4.7	0.853	0.602	0.0829	
15 minute summer	18	12.001	19	9.0	1.425	2.158	0.0350	
15 minute summer	19	12.002	29	8.9	1.415	0.317	0.0311	
15 minute summer	13	1.003	29	36.0	0.906	0.696	0.9131	
15 minute summer	20	7.000	21	5.2	0.962	0.772	0.1486	
15 minute summer	21	7.001	25	4.4	0.871	0.568	0.0894	
15 minute summer	22	9.000	24	4.7	0.983	0.588	0.0839	

Results for 100 year +45% CC 15 minute summer. 1455 minute analysis at 1 minute timestep. Mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	23	13	15.277	0.202	5.2	0.0016	0.0000	FLOOD RISK
15 minute summer	24	13	15.255	0.415	9.4	0.0661	0.0000	FLOOD RISK
15 minute summer	25	14	15.183	0.535	11.9	0.0850	0.0000	FLOOD RISK
15 minute summer	26	14	15.129	0.929	14.9	0.1478	0.0000	FLOOD RISK
15 minute summer	27	12	15.507	0.432	10.3	0.0035	0.0000	FLOOD RISK
15 minute summer	28	13	15.276	0.382	8.7	0.0607	0.0000	FLOOD RISK
15 minute summer	29	13	14.219	0.627	64.8	0.0997	0.0000	SURCHARGED
15 minute summer	36	12	15.110	0.185	6.9	0.0015	0.0000	FLOOD RISK
15 minute summer	37	13	14.980	0.279	6.2	0.0443	0.0000	SURCHARGED
15 minute summer	38	13	14.950	0.295	5.6	0.0470	0.0000	SURCHARGED
15 minute summer	57	12	15.560	0.635	13.7	0.0051	0.0000	FLOOD RISK
15 minute summer	39	12	15.696	0.717	5.2	0.0057	0.0000	FLOOD RISK
15 minute summer	40	12	15.666	0.793	13.9	0.1261	0.0000	FLOOD RISK
15 minute summer	42	12	14.911	0.346	16.4	0.0550	0.0000	SURCHARGED
15 minute summer	41	10	15.120	0.045	5.2	0.0004	0.0000	OK
15 minute summer	43	13	14.847	0.514	30.3	0.0818	0.0000	SURCHARGED
15 minute summer	31	13	14.287	0.094	29.9	0.0150	0.0000	OK
15 minute summer	dummy	1	13.153	0.000	0.0	0.0000	0.0000	OK
15 minute summer	48	12	15.328	0.883	27.5	0.1404	0.0000	FLOOD RISK
15 minute summer	53	12	15.053	0.863	37.5	0.1372	0.0000	FLOOD RISK
15 minute summer	54	12	14.300	0.301	35.4	0.0478	0.0000	SURCHARGED
15 minute summer	52	12	15.483	1.107	17.2	0.1760	0.0000	FLOOD RISK
15 minute summer	32	11	14.474	0.274	14.6	0.0436	0.0000	SURCHARGED
15 minute summer	35	10	14.648	0.072	14.6	0.0115	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	23	8.000	24	4.7	0.980	0.591	0.0849	
15 minute summer	24	8.001	25	7.5	1.286	0.929	0.0840	
15 minute summer	25	7.002	26	8.9	1.299	0.391	0.0251	
15 minute summer	26	7.003	29	13.6	1.741	1.475	0.1632	
15 minute summer	27	10.000	28	8.7	1.113	1.289	0.1135	
15 minute summer	28	10.001	26	6.7	1.178	0.459	0.0941	
15 minute summer	29	1.004	S33	65.3	1.643	1.510	0.2859	
15 minute summer	36	15.000	37	6.2	0.917	0.917	0.1403	
15 minute summer	37	15.001	38	5.6	0.909	0.856	0.0305	
15 minute summer	38	15.002	43	5.3	0.682	0.704	0.1366	
15 minute summer	57	18.000	43	11.2	1.430	1.060	0.1407	
15 minute summer	39	16.000	40	4.3	0.553	0.640	0.0662	
15 minute summer	40	16.001	42	11.8	1.512	1.577	0.1314	
15 minute summer	42	16.002	43	15.4	0.874	0.435	0.1044	
15 minute summer	41	17.000	42	5.2	1.330	0.420	0.0637	
15 minute summer	43	15.003	31	29.9	1.847	1.692	0.2071	
15 minute summer	31	15.004	SA1	29.9	2.735	0.610	0.1268	
15 minute summer	48	19.000	53	23.9	1.359	1.001	0.2494	
15 minute summer	53	19.001	54	35.4	2.014	1.778	0.2673	
15 minute summer	54	19.002	SA1	35.0	2.068	1.024	0.2521	
15 minute summer	52	20.000	53	13.6	1.736	1.326	0.0512	
15 minute summer	32	14.000	S33	13.3	1.705	0.774	0.0651	
15 minute summer	35	21.000	SA1	14.5	2.484	0.790	0.0711	

Results for 100 year +45% CC 30 minute summer. 1470 minute analysis at 1 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S33	20	14.017	0.475	74.4	0.3019	0.0000	SURCHARGED
30 minute summer	SA1	38	13.852	0.691	147.7	115.7787	0.0000	SURCHARGED
30 minute summer	1	18	15.249	0.074	5.5	0.0006	0.0000	OK
30 minute summer	2	18	15.050	0.049	5.5	0.0077	0.0000	OK
30 minute summer	3	19	15.309	0.484	11.9	0.0039	0.0000	FLOOD RISK
30 minute summer	4	20	14.638	0.688	20.5	0.1094	0.0000	SURCHARGED
30 minute summer	5	18	15.141	0.066	4.7	0.0005	0.0000	OK
30 minute summer	7	19	15.405	0.330	9.5	0.0026	0.0000	FLOOD RISK
30 minute summer	6	18	14.883	0.043	4.7	0.0069	0.0000	OK
30 minute summer	8	20	14.882	0.052	8.5	0.0082	0.0000	OK
30 minute summer	9	19	15.142	0.067	4.7	0.0005	0.0000	OK
30 minute summer	10	19	15.142	0.067	4.7	0.0005	0.0000	OK
30 minute summer	11	19	15.089	0.249	9.2	0.0396	0.0000	SURCHARGED
30 minute summer	12	20	14.849	0.040	8.7	0.0064	0.0000	OK
30 minute summer	14	19	15.375	0.300	9.5	0.0024	0.0000	FLOOD RISK
30 minute summer	15	19	14.948	0.049	8.8	0.0078	0.0000	OK
30 minute summer	16	19	15.142	0.067	4.7	0.0005	0.0000	OK
30 minute summer	17	19	15.142	0.067	4.7	0.0005	0.0000	OK
30 minute summer	18	19	15.089	0.249	9.2	0.0396	0.0000	SURCHARGED
30 minute summer	19	20	14.848	0.039	8.7	0.0062	0.0000	OK
30 minute summer	13	20	14.319	0.499	34.8	0.0794	0.0000	SURCHARGED
30 minute summer	20	22	15.217	0.142	4.7	0.0011	0.0000	SURCHARGED
30 minute summer	21	22	15.194	0.359	4.7	0.0571	0.0000	FLOOD RISK
30 minute summer	22	21	15.274	0.199	4.7	0.0016	0.0000	FLOOD RISK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	S33	1.005	SA1	74.3	1.870	1.880	0.4576	
30 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
30 minute summer	SA1	Infiltration		1.6				
30 minute summer	1	1.000	2	5.5	1.090	0.811	0.0693	
30 minute summer	2	1.001	4	5.5	0.974	0.476	0.1618	
30 minute summer	3	3.000	4	10.3	1.317	1.307	0.1731	
30 minute summer	4	1.002	13	17.9	1.018	1.455	0.4702	
30 minute summer	5	2.000	6	4.7	1.077	0.690	0.0811	
30 minute summer	7	4.000	8	8.5	1.256	1.247	0.1158	
30 minute summer	6	2.001	4	4.7	1.496	0.351	0.0385	
30 minute summer	8	4.001	13	8.3	1.237	0.470	0.0711	
30 minute summer	9	5.000	11	4.6	0.876	0.586	0.0735	
30 minute summer	10	6.000	11	4.6	0.876	0.586	0.0734	
30 minute summer	11	5.001	12	8.7	1.388	2.101	0.0349	
30 minute summer	12	5.002	13	8.7	1.380	0.312	0.0258	
30 minute summer	14	11.000	15	8.8	1.314	1.301	0.0825	
30 minute summer	15	11.001	29	8.7	1.305	0.459	0.0785	
30 minute summer	16	12.000	18	4.6	0.875	0.586	0.0736	
30 minute summer	17	13.000	18	4.6	0.875	0.585	0.0733	
30 minute summer	18	12.001	19	8.7	1.393	2.097	0.0344	
30 minute summer	19	12.002	29	8.7	1.388	0.308	0.0306	
30 minute summer	13	1.003	29	34.7	0.871	0.669	0.9131	
30 minute summer	20	7.000	21	4.7	0.936	0.693	0.1486	
30 minute summer	21	7.001	25	3.8	0.853	0.496	0.0894	
30 minute summer	22	9.000	24	4.7	0.988	0.587	0.0839	

Results for 100 year +45% CC 30 minute summer. 1470 minute analysis at 1 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	23	21	15.274	0.199	4.7	0.0016	0.0000	FLOOD RISK
30 minute summer	24	21	15.253	0.413	9.3	0.0656	0.0000	FLOOD RISK
30 minute summer	25	22	15.178	0.530	11.6	0.0843	0.0000	FLOOD RISK
30 minute summer	26	22	15.118	0.918	14.9	0.1460	0.0000	FLOOD RISK
30 minute summer	27	20	15.465	0.390	9.5	0.0031	0.0000	FLOOD RISK
30 minute summer	28	21	15.259	0.365	8.2	0.0581	0.0000	FLOOD RISK
30 minute summer	29	20	14.193	0.600	63.3	0.0955	0.0000	SURCHARGED
30 minute summer	36	20	15.068	0.143	6.3	0.0011	0.0000	SURCHARGED
30 minute summer	37	21	14.951	0.250	6.2	0.0397	0.0000	SURCHARGED
30 minute summer	38	21	14.923	0.268	5.2	0.0426	0.0000	SURCHARGED
30 minute summer	57	19	15.468	0.543	12.6	0.0043	0.0000	FLOOD RISK
30 minute summer	39	20	15.646	0.667	4.7	0.0053	0.0000	FLOOD RISK
30 minute summer	40	20	15.612	0.739	13.3	0.1174	0.0000	FLOOD RISK
30 minute summer	42	20	14.890	0.325	15.8	0.0517	0.0000	SURCHARGED
30 minute summer	41	18	15.118	0.043	4.7	0.0003	0.0000	OK
30 minute summer	43	20	14.826	0.493	29.4	0.0784	0.0000	SURCHARGED
30 minute summer	31	20	14.286	0.093	29.2	0.0147	0.0000	OK
30 minute summer	dummy	1	13.153	0.000	0.0	0.0000	0.0000	OK
30 minute summer	48	19	15.211	0.766	25.3	0.1218	0.0000	FLOOD RISK
30 minute summer	53	20	14.947	0.757	36.2	0.1204	0.0000	FLOOD RISK
30 minute summer	54	20	14.262	0.263	34.3	0.0418	0.0000	SURCHARGED
30 minute summer	52	19	15.343	0.967	15.8	0.1538	0.0000	FLOOD RISK
30 minute summer	32	19	14.419	0.219	13.4	0.0348	0.0000	SURCHARGED
30 minute summer	35	18	14.644	0.068	13.4	0.0108	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	23	8.000	24	4.7	0.984	0.590	0.0849	
30 minute summer	24	8.001	25	7.7	1.262	0.953	0.0840	
30 minute summer	25	7.002	26	8.7	1.233	0.379	0.0251	
30 minute summer	26	7.003	29	13.1	1.676	1.419	0.1632	
30 minute summer	27	10.000	28	8.2	1.146	1.217	0.1135	
30 minute summer	28	10.001	26	6.9	1.050	0.471	0.0941	
30 minute summer	29	1.004	S33	63.1	1.588	1.460	0.2859	
30 minute summer	36	15.000	37	6.2	0.902	0.915	0.1403	
30 minute summer	37	15.001	38	5.2	0.908	0.796	0.0305	
30 minute summer	38	15.002	43	5.1	0.695	0.675	0.1366	
30 minute summer	57	18.000	43	10.8	1.376	1.020	0.1407	
30 minute summer	39	16.000	40	4.1	0.525	0.607	0.0662	
30 minute summer	40	16.001	42	11.6	1.479	1.542	0.1314	
30 minute summer	42	16.002	43	15.0	0.855	0.426	0.1044	
30 minute summer	41	17.000	42	4.7	1.371	0.383	0.0623	
30 minute summer	43	15.003	31	29.2	1.838	1.655	0.2054	
30 minute summer	31	15.004	SA1	29.2	2.720	0.594	0.1327	
30 minute summer	48	19.000	53	23.2	1.316	0.969	0.2494	
30 minute summer	53	19.001	54	34.3	1.947	1.719	0.2673	
30 minute summer	54	19.002	SA1	33.9	2.051	0.992	0.2522	
30 minute summer	52	20.000	53	13.2	1.687	1.288	0.0512	
30 minute summer	32	14.000	S33	12.9	1.648	0.751	0.0651	
30 minute summer	35	21.000	SA1	13.4	2.455	0.730	0.0681	

Results for 100 year +45% CC 60 minute summer. 1500 minute analysis at 1 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S33	66	14.035	0.493	63.1	0.3133	0.0000	SURCHARGED
60 minute summer	SA1	66	14.035	0.874	126.6	146.3479	0.0000	SURCHARGED
60 minute summer	1	33	15.236	0.061	4.2	0.0005	0.0000	OK
60 minute summer	2	33	15.043	0.042	4.2	0.0067	0.0000	OK
60 minute summer	3	34	15.013	0.188	9.1	0.0015	0.0000	SURCHARGED
60 minute summer	4	35	14.366	0.416	16.2	0.0662	0.0000	SURCHARGED
60 minute summer	5	33	15.131	0.056	3.6	0.0004	0.0000	OK
60 minute summer	7	34	15.237	0.162	7.3	0.0013	0.0000	FLOOD RISK
60 minute summer	6	33	14.877	0.037	3.6	0.0059	0.0000	OK
60 minute summer	8	34	14.873	0.043	6.9	0.0069	0.0000	OK
60 minute summer	9	33	15.123	0.048	3.6	0.0004	0.0000	OK
60 minute summer	10	33	15.123	0.047	3.6	0.0004	0.0000	OK
60 minute summer	11	34	15.008	0.168	7.2	0.0266	0.0000	SURCHARGED
60 minute summer	12	34	14.843	0.034	7.0	0.0054	0.0000	OK
60 minute summer	14	34	15.228	0.153	7.3	0.0012	0.0000	FLOOD RISK
60 minute summer	15	34	14.941	0.042	7.0	0.0067	0.0000	OK
60 minute summer	16	33	15.123	0.048	3.6	0.0004	0.0000	OK
60 minute summer	17	33	15.122	0.047	3.6	0.0004	0.0000	OK
60 minute summer	18	34	15.008	0.168	7.2	0.0267	0.0000	SURCHARGED
60 minute summer	19	34	14.843	0.034	7.0	0.0054	0.0000	OK
60 minute summer	13	35	14.133	0.313	28.9	0.0497	0.0000	SURCHARGED
60 minute summer	20	32	15.128	0.053	3.6	0.0004	0.0000	OK
60 minute summer	21	37	15.071	0.236	3.6	0.0375	0.0000	SURCHARGED
60 minute summer	22	37	15.139	0.064	3.6	0.0005	0.0000	OK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S33	1.005	SA1	63.1	1.589	1.597	0.4576	
60 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
60 minute summer	SA1	Infiltration		2.0				
60 minute summer	1	1.000	2	4.2	1.032	0.619	0.0563	
60 minute summer	2	1.001	4	4.2	0.978	0.364	0.1523	
60 minute summer	3	3.000	4	8.6	1.111	1.086	0.1693	
60 minute summer	4	1.002	13	15.3	0.871	1.244	0.4702	
60 minute summer	5	2.000	6	3.6	1.012	0.529	0.0661	
60 minute summer	7	4.000	8	6.9	1.181	1.012	0.1076	
60 minute summer	6	2.001	4	3.6	1.398	0.269	0.0185	
60 minute summer	8	4.001	13	6.9	1.066	0.387	0.0661	
60 minute summer	9	5.000	11	3.6	0.871	0.458	0.0631	
60 minute summer	10	6.000	11	3.6	0.871	0.457	0.0630	
60 minute summer	11	5.001	12	7.0	1.156	1.681	0.0329	
60 minute summer	12	5.002	13	7.0	1.156	0.251	0.0243	
60 minute summer	14	11.000	15	7.0	1.193	1.038	0.0777	
60 minute summer	15	11.001	29	7.0	1.095	0.368	0.0739	
60 minute summer	16	12.000	18	3.6	0.871	0.458	0.0631	
60 minute summer	17	13.000	18	3.6	0.872	0.457	0.0629	
60 minute summer	18	12.001	19	7.0	1.158	1.681	0.0328	
60 minute summer	19	12.002	29	7.0	1.158	0.248	0.0291	
60 minute summer	13	1.003	29	28.9	0.726	0.558	0.9131	
60 minute summer	20	7.000	21	3.6	0.899	0.536	0.1118	
60 minute summer	21	7.001	25	3.3	0.844	0.426	0.0894	
60 minute summer	22	9.000	24	3.6	0.943	0.452	0.0704	

Results for 100 year +45% CC 60 minute summer. 1500 minute analysis at 1 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	23	37	15.139	0.064	3.6	0.0005	0.0000	OK
60 minute summer	24	37	15.126	0.286	7.2	0.0455	0.0000	SURCHARGED
60 minute summer	25	37	15.050	0.402	9.7	0.0640	0.0000	SURCHARGED
60 minute summer	26	37	14.986	0.786	13.6	0.1250	0.0000	SURCHARGED
60 minute summer	27	35	15.241	0.166	7.3	0.0013	0.0000	FLOOD RISK
60 minute summer	28	37	15.093	0.199	7.2	0.0316	0.0000	SURCHARGED
60 minute summer	29	35	14.044	0.452	54.2	0.0719	0.0000	SURCHARGED
60 minute summer	36	33	14.988	0.063	4.8	0.0005	0.0000	OK
60 minute summer	37	36	14.816	0.115	4.8	0.0183	0.0000	SURCHARGED
60 minute summer	38	36	14.793	0.138	4.7	0.0220	0.0000	SURCHARGED
60 minute summer	57	34	15.149	0.224	9.7	0.0018	0.0000	SURCHARGED
60 minute summer	39	35	15.338	0.359	3.6	0.0029	0.0000	SURCHARGED
60 minute summer	40	35	15.312	0.439	11.1	0.0698	0.0000	SURCHARGED
60 minute summer	42	35	14.760	0.195	13.5	0.0310	0.0000	SURCHARGED
60 minute summer	41	33	15.112	0.037	3.6	0.0003	0.0000	OK
60 minute summer	43	35	14.710	0.377	25.6	0.0600	0.0000	SURCHARGED
60 minute summer	31	32	14.273	0.080	25.5	0.0127	0.0000	OK
60 minute summer	dummy	1	13.153	0.000	0.0	0.0000	0.0000	OK
60 minute summer	48	34	14.835	0.390	19.4	0.0620	0.0000	SURCHARGED
60 minute summer	53	34	14.646	0.456	29.5	0.0725	0.0000	SURCHARGED
60 minute summer	54	34	14.115	0.116	29.2	0.0184	0.0000	OK
60 minute summer	52	34	14.940	0.564	12.1	0.0896	0.0000	SURCHARGED
60 minute summer	32	33	14.266	0.066	10.3	0.0104	0.0000	OK
60 minute summer	35	32	14.632	0.056	10.3	0.0090	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	23	8.000	24	3.6	0.939	0.455	0.0714	
60 minute summer	24	8.001	25	6.5	1.237	0.805	0.0840	
60 minute summer	25	7.002	26	8.2	1.185	0.358	0.0251	
60 minute summer	26	7.003	29	12.2	1.560	1.321	0.1632	
60 minute summer	27	10.000	28	7.2	1.148	1.069	0.1135	
60 minute summer	28	10.001	26	6.3	0.979	0.433	0.0941	
60 minute summer	29	1.004	S33	54.2	1.364	1.253	0.2859	
60 minute summer	36	15.000	37	4.8	0.861	0.712	0.1118	
60 minute summer	37	15.001	38	4.7	0.895	0.713	0.0305	
60 minute summer	38	15.002	43	4.4	0.720	0.579	0.1366	
60 minute summer	57	18.000	43	8.9	1.183	0.839	0.1407	
60 minute summer	39	16.000	40	3.5	0.448	0.513	0.0662	
60 minute summer	40	16.001	42	10.1	1.293	1.348	0.1314	
60 minute summer	42	16.002	43	13.3	0.826	0.375	0.1044	
60 minute summer	41	17.000	42	3.6	1.302	0.293	0.0591	
60 minute summer	43	15.003	31	25.5	1.674	1.442	0.1925	
60 minute summer	31	15.004	SA1	25.4	2.601	0.518	0.1308	
60 minute summer	48	19.000	53	18.4	1.048	0.772	0.2494	
60 minute summer	53	19.001	54	29.2	1.704	1.465	0.2445	
60 minute summer	54	19.002	SA1	29.4	2.046	0.859	0.2295	
60 minute summer	52	20.000	53	11.2	1.427	1.090	0.0512	
60 minute summer	32	14.000	S33	10.2	1.415	0.597	0.0552	
60 minute summer	35	21.000	SA1	10.3	2.323	0.561	0.0729	

Results for 100 year +45% CC 120 minute summer. 1560 minute analysis at 2 minute timestep. Mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	S33	126	14.176	0.634	44.3	0.4030	0.0000	SURCHARGED
120 minute summer	SA1	126	14.176	1.015	88.9	169.9541	0.0000	SURCHARGED
120 minute summer	1	64	15.222	0.047	2.7	0.0004	0.0000	OK
120 minute summer	2	64	15.034	0.033	2.7	0.0053	0.0000	OK
120 minute summer	3	64	14.891	0.066	5.8	0.0005	0.0000	OK
120 minute summer	4	128	14.175	0.225	10.8	0.0358	0.0000	SURCHARGED
120 minute summer	5	64	15.118	0.043	2.3	0.0003	0.0000	OK
120 minute summer	7	64	15.142	0.067	4.6	0.0005	0.0000	OK
120 minute summer	6	64	14.869	0.029	2.3	0.0046	0.0000	OK
120 minute summer	8	64	14.865	0.035	4.6	0.0055	0.0000	OK
120 minute summer	9	64	15.113	0.038	2.3	0.0003	0.0000	OK
120 minute summer	10	64	15.113	0.038	2.3	0.0003	0.0000	OK
120 minute summer	11	64	14.922	0.082	4.6	0.0131	0.0000	OK
120 minute summer	12	64	14.837	0.028	4.6	0.0044	0.0000	OK
120 minute summer	14	64	15.143	0.068	4.6	0.0005	0.0000	OK
120 minute summer	15	64	14.933	0.034	4.6	0.0053	0.0000	OK
120 minute summer	16	64	15.113	0.038	2.3	0.0003	0.0000	OK
120 minute summer	17	64	15.113	0.038	2.3	0.0003	0.0000	OK
120 minute summer	18	64	14.922	0.082	4.6	0.0131	0.0000	OK
120 minute summer	19	64	14.836	0.027	4.6	0.0043	0.0000	OK
120 minute summer	13	126	14.175	0.355	20.0	0.0565	0.0000	SURCHARGED
120 minute summer	20	64	15.116	0.041	2.3	0.0003	0.0000	OK
120 minute summer	21	62	14.873	0.038	2.3	0.0060	0.0000	OK
120 minute summer	22	64	15.113	0.038	2.3	0.0003	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	S33	1.005	SA1	43.7	1.151	1.105	0.4576	
120 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
120 minute summer	SA1	Infiltration		2.3				
120 minute summer	1	1.000	2	2.7	0.925	0.398	0.0405	
120 minute summer	2	1.001	4	2.7	1.000	0.234	0.1172	
120 minute summer	3	3.000	4	5.8	1.080	0.736	0.1188	
120 minute summer	4	1.002	13	10.8	0.817	0.875	0.4702	
120 minute summer	5	2.000	6	2.3	0.906	0.338	0.0473	
120 minute summer	7	4.000	8	4.6	1.146	0.678	0.0779	
120 minute summer	6	2.001	4	2.3	1.242	0.172	0.0133	
120 minute summer	8	4.001	13	4.6	0.850	0.259	0.0606	
120 minute summer	9	5.000	11	2.3	0.853	0.292	0.0296	
120 minute summer	10	6.000	11	2.3	0.854	0.292	0.0296	
120 minute summer	11	5.001	12	4.6	1.044	1.108	0.0279	
120 minute summer	12	5.002	13	4.6	0.905	0.165	0.0227	
120 minute summer	14	11.000	15	4.6	1.156	0.683	0.0563	
120 minute summer	15	11.001	29	4.6	0.765	0.242	0.0684	
120 minute summer	16	12.000	18	2.3	0.854	0.292	0.0296	
120 minute summer	17	13.000	18	2.3	0.854	0.292	0.0295	
120 minute summer	18	12.001	19	4.6	1.046	1.108	0.0279	
120 minute summer	19	12.002	29	4.6	0.803	0.163	0.0274	
120 minute summer	13	1.003	29	20.0	0.643	0.385	0.9131	
120 minute summer	20	7.000	21	2.3	0.803	0.338	0.0544	
120 minute summer	21	7.001	25	2.3	0.826	0.298	0.0411	
120 minute summer	22	9.000	24	2.3	0.861	0.289	0.0286	

Results for 100 year +45% CC 120 minute summer. 1560 minute analysis at 2 minute timestep. Mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	23	64	15.113	0.038	2.3	0.0003	0.0000	OK
120 minute summer	24	62	14.899	0.059	4.6	0.0093	0.0000	OK
120 minute summer	25	66	14.705	0.057	6.9	0.0091	0.0000	OK
120 minute summer	26	66	14.615	0.415	11.3	0.0660	0.0000	SURCHARGED
120 minute summer	27	64	15.141	0.066	4.6	0.0005	0.0000	OK
120 minute summer	28	64	14.933	0.039	4.6	0.0061	0.0000	OK
120 minute summer	29	126	14.176	0.584	39.2	0.0928	0.0000	SURCHARGED
120 minute summer	36	64	14.973	0.048	3.1	0.0004	0.0000	OK
120 minute summer	37	64	14.754	0.053	3.1	0.0084	0.0000	OK
120 minute summer	38	64	14.700	0.045	3.1	0.0071	0.0000	OK
120 minute summer	57	64	14.980	0.055	6.2	0.0004	0.0000	OK
120 minute summer	39	64	15.019	0.040	2.3	0.0003	0.0000	OK
120 minute summer	40	64	14.966	0.093	7.7	0.0148	0.0000	OK
120 minute summer	42	64	14.619	0.054	9.9	0.0087	0.0000	OK
120 minute summer	41	64	15.105	0.030	2.3	0.0002	0.0000	OK
120 minute summer	43	64	14.517	0.184	19.2	0.0293	0.0000	SURCHARGED
120 minute summer	31	64	14.257	0.064	18.9	0.0103	0.0000	OK
120 minute summer	dummy	2	13.153	0.000	0.0	0.0000	0.0000	OK
120 minute summer	48	64	14.521	0.076	12.3	0.0121	0.0000	OK
120 minute summer	53	64	14.330	0.140	20.0	0.0222	0.0000	OK
120 minute summer	54	126	14.176	0.177	20.0	0.0281	0.0000	SURCHARGED
120 minute summer	52	64	14.452	0.076	7.7	0.0121	0.0000	OK
120 minute summer	32	64	14.243	0.043	6.6	0.0069	0.0000	OK
120 minute summer	35	64	14.618	0.042	6.6	0.0066	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	23	8.000	24	2.3	0.857	0.291	0.0291	
120 minute summer	24	8.001	25	4.6	1.207	0.570	0.0479	
120 minute summer	25	7.002	26	6.7	1.157	0.294	0.0200	
120 minute summer	26	7.003	29	10.3	1.320	1.118	0.1632	
120 minute summer	27	10.000	28	4.6	1.105	0.681	0.0603	
120 minute summer	28	10.001	26	4.6	0.772	0.314	0.0638	
120 minute summer	29	1.004	S33	37.7	0.948	0.871	0.2859	
120 minute summer	36	15.000	37	3.1	0.787	0.459	0.0708	
120 minute summer	37	15.001	38	3.1	0.822	0.472	0.0147	
120 minute summer	38	15.002	43	3.1	0.716	0.410	0.0978	
120 minute summer	57	18.000	43	6.2	1.184	0.588	0.1102	
120 minute summer	39	16.000	40	2.3	0.437	0.340	0.0446	
120 minute summer	40	16.001	42	7.6	1.052	1.019	0.1251	
120 minute summer	42	16.002	43	9.9	0.807	0.281	0.0693	
120 minute summer	41	17.000	42	2.3	1.179	0.187	0.0220	
120 minute summer	43	15.003	31	18.9	1.442	1.068	0.1759	
120 minute summer	31	15.004	SA1	18.8	2.270	0.383	0.1208	
120 minute summer	48	19.000	53	12.3	0.924	0.515	0.1846	
120 minute summer	53	19.001	54	20.0	1.437	1.003	0.2069	
120 minute summer	54	19.002	SA1	19.9	1.809	0.581	0.2522	
120 minute summer	52	20.000	53	7.7	1.013	0.751	0.0466	
120 minute summer	32	14.000	S33	6.6	1.026	0.385	0.0460	
120 minute summer	35	21.000	SA1	6.6	1.875	0.360	0.0664	

Results for 100 year +45% CC 180 minute summer. 1620 minute analysis at 4 minute timestep. Mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	S33	188	14.258	0.716	33.7	0.4551	0.0000	SURCHARGED
180 minute summer	SA1	188	14.258	1.097	67.1	183.6671	0.0000	SURCHARGED
180 minute summer	1	96	15.215	0.040	2.0	0.0003	0.0000	OK
180 minute summer	2	96	15.029	0.028	2.0	0.0045	0.0000	OK
180 minute summer	3	96	14.879	0.054	4.3	0.0004	0.0000	OK
180 minute summer	4	184	14.257	0.307	8.0	0.0489	0.0000	SURCHARGED
180 minute summer	5	96	15.111	0.036	1.7	0.0003	0.0000	OK
180 minute summer	7	96	15.130	0.055	3.4	0.0004	0.0000	OK
180 minute summer	6	96	14.865	0.025	1.7	0.0040	0.0000	OK
180 minute summer	8	96	14.860	0.030	3.4	0.0047	0.0000	OK
180 minute summer	9	96	15.107	0.032	1.7	0.0003	0.0000	OK
180 minute summer	10	96	15.107	0.032	1.7	0.0003	0.0000	OK
180 minute summer	11	96	14.908	0.068	3.4	0.0107	0.0000	OK
180 minute summer	12	96	14.833	0.024	3.4	0.0038	0.0000	OK
180 minute summer	14	96	15.131	0.056	3.4	0.0004	0.0000	OK
180 minute summer	15	96	14.928	0.029	3.4	0.0046	0.0000	OK
180 minute summer	16	96	15.107	0.032	1.7	0.0003	0.0000	OK
180 minute summer	17	96	15.107	0.032	1.7	0.0003	0.0000	OK
180 minute summer	18	96	14.908	0.068	3.4	0.0107	0.0000	OK
180 minute summer	19	96	14.832	0.023	3.4	0.0037	0.0000	OK
180 minute summer	13	188	14.257	0.437	14.8	0.0695	0.0000	SURCHARGED
180 minute summer	20	96	15.110	0.035	1.7	0.0003	0.0000	OK
180 minute summer	21	96	14.868	0.033	1.7	0.0052	0.0000	OK
180 minute summer	22	96	15.107	0.032	1.7	0.0003	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute summer	S33	1.005	SA1	33.3	1.028	0.841	0.4576	
180 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
180 minute summer	SA1	Infiltration		2.5				
180 minute summer	1	1.000	2	2.0	0.854	0.295	0.0325	
180 minute summer	2	1.001	4	2.0	1.002	0.173	0.1203	
180 minute summer	3	3.000	4	4.3	1.012	0.546	0.0940	
180 minute summer	4	1.002	13	8.0	0.762	0.649	0.4702	
180 minute summer	5	2.000	6	1.7	0.837	0.250	0.0379	
180 minute summer	7	4.000	8	3.4	1.073	0.501	0.0621	
180 minute summer	6	2.001	4	1.7	1.143	0.127	0.0107	
180 minute summer	8	4.001	13	3.4	0.763	0.192	0.0573	
180 minute summer	9	5.000	11	1.7	0.787	0.216	0.0237	
180 minute summer	10	6.000	11	1.7	0.787	0.216	0.0237	
180 minute summer	11	5.001	12	3.4	0.979	0.819	0.0227	
180 minute summer	12	5.002	13	3.4	0.814	0.122	0.0217	
180 minute summer	14	11.000	15	3.4	1.082	0.505	0.0450	
180 minute summer	15	11.001	29	3.4	0.587	0.179	0.0653	
180 minute summer	16	12.000	18	1.7	0.787	0.216	0.0237	
180 minute summer	17	13.000	18	1.7	0.788	0.216	0.0236	
180 minute summer	18	12.001	19	3.4	0.980	0.819	0.0227	
180 minute summer	19	12.002	29	3.4	0.613	0.121	0.0264	
180 minute summer	13	1.003	29	14.8	0.624	0.286	0.9131	
180 minute summer	20	7.000	21	1.7	0.732	0.250	0.0441	
180 minute summer	21	7.001	25	1.7	0.774	0.219	0.0251	
180 minute summer	22	9.000	24	1.7	0.794	0.214	0.0230	

Results for 100 year +45% CC 180 minute summer. 1620 minute analysis at 4 minute timestep. Mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	23	96	15.107	0.032	1.7	0.0003	0.0000	OK
180 minute summer	24	96	14.889	0.049	3.4	0.0078	0.0000	OK
180 minute summer	25	96	14.680	0.032	5.1	0.0051	0.0000	OK
180 minute summer	26	96	14.278	0.078	8.5	0.0124	0.0000	OK
180 minute summer	27	96	15.130	0.055	3.4	0.0004	0.0000	OK
180 minute summer	28	96	14.927	0.033	3.4	0.0052	0.0000	OK
180 minute summer	29	188	14.257	0.665	30.0	0.1058	0.0000	SURCHARGED
180 minute summer	36	96	14.965	0.040	2.3	0.0003	0.0000	OK
180 minute summer	37	96	14.745	0.044	2.3	0.0070	0.0000	OK
180 minute summer	38	96	14.693	0.038	2.3	0.0060	0.0000	OK
180 minute summer	57	96	14.971	0.046	4.5	0.0004	0.0000	OK
180 minute summer	39	96	15.013	0.034	1.7	0.0003	0.0000	OK
180 minute summer	40	96	14.941	0.068	5.7	0.0108	0.0000	OK
180 minute summer	42	96	14.612	0.047	7.4	0.0074	0.0000	OK
180 minute summer	41	96	15.101	0.026	1.7	0.0002	0.0000	OK
180 minute summer	43	96	14.445	0.112	14.2	0.0178	0.0000	OK
180 minute summer	31	188	14.258	0.065	14.2	0.0103	0.0000	OK
180 minute summer	dummy	4	13.153	0.000	0.0	0.0000	0.0000	OK
180 minute summer	48	96	14.509	0.064	9.1	0.0102	0.0000	OK
180 minute summer	53	96	14.295	0.105	14.8	0.0167	0.0000	OK
180 minute summer	54	188	14.257	0.258	14.8	0.0411	0.0000	SURCHARGED
180 minute summer	52	92	14.430	0.054	5.7	0.0086	0.0000	OK
180 minute summer	32	188	14.257	0.057	4.8	0.0091	0.0000	OK
180 minute summer	35	96	14.611	0.035	4.8	0.0056	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute summer	23	8.000	24	1.7	0.790	0.215	0.0233	
180 minute summer	24	8.001	25	3.4	1.134	0.419	0.0324	
180 minute summer	25	7.002	26	5.1	1.157	0.224	0.0140	
180 minute summer	26	7.003	29	8.4	1.296	0.911	0.1497	
180 minute summer	27	10.000	28	3.4	1.031	0.503	0.0480	
180 minute summer	28	10.001	26	3.4	0.768	0.232	0.0527	
180 minute summer	29	1.004	S33	28.9	0.862	0.668	0.2859	
180 minute summer	36	15.000	37	2.3	0.732	0.340	0.0564	
180 minute summer	37	15.001	38	2.3	0.763	0.350	0.0118	
180 minute summer	38	15.002	43	2.3	0.711	0.304	0.0680	
180 minute summer	57	18.000	43	4.5	1.148	0.426	0.0770	
180 minute summer	39	16.000	40	1.7	0.424	0.251	0.0340	
180 minute summer	40	16.001	42	5.7	1.030	0.760	0.0930	
180 minute summer	42	16.002	43	7.4	0.787	0.209	0.0556	
180 minute summer	41	17.000	42	1.7	1.084	0.138	0.0177	
180 minute summer	43	15.003	31	14.2	1.409	0.805	0.1414	
180 minute summer	31	15.004	SA1	14.2	1.965	0.289	0.1209	
180 minute summer	48	19.000	53	9.1	0.891	0.381	0.1443	
180 minute summer	53	19.001	54	14.8	1.396	0.742	0.1917	
180 minute summer	54	19.002	SA1	14.8	1.630	0.433	0.2522	
180 minute summer	52	20.000	53	5.7	0.855	0.556	0.0397	
180 minute summer	32	14.000	S33	4.8	0.782	0.280	0.0519	
180 minute summer	35	21.000	SA1	4.8	1.642	0.262	0.0626	

Results for 100 year +45% CC 240 minute summer. 1680 minute analysis at 4 minute timestep. Mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	S33	244	14.294	0.752	27.5	0.4782	0.0000	SURCHARGED
240 minute summer	SA1	244	14.294	1.133	54.9	189.7098	0.0000	SURCHARGED
240 minute summer	1	124	15.211	0.036	1.7	0.0003	0.0000	OK
240 minute summer	2	124	15.027	0.026	1.7	0.0041	0.0000	OK
240 minute summer	3	124	14.873	0.048	3.6	0.0004	0.0000	OK
240 minute summer	4	244	14.294	0.344	6.6	0.0547	0.0000	SURCHARGED
240 minute summer	5	124	15.108	0.033	1.4	0.0003	0.0000	OK
240 minute summer	7	124	15.125	0.050	2.9	0.0004	0.0000	OK
240 minute summer	6	124	14.862	0.022	1.4	0.0036	0.0000	OK
240 minute summer	8	124	14.857	0.027	2.9	0.0043	0.0000	OK
240 minute summer	9	124	15.104	0.029	1.4	0.0002	0.0000	OK
240 minute summer	10	124	15.104	0.029	1.4	0.0002	0.0000	OK
240 minute summer	11	124	14.900	0.060	2.8	0.0095	0.0000	OK
240 minute summer	12	124	14.830	0.021	2.8	0.0034	0.0000	OK
240 minute summer	14	124	15.126	0.051	2.9	0.0004	0.0000	OK
240 minute summer	15	124	14.925	0.026	2.9	0.0042	0.0000	OK
240 minute summer	16	124	15.104	0.029	1.4	0.0002	0.0000	OK
240 minute summer	17	124	15.104	0.029	1.4	0.0002	0.0000	OK
240 minute summer	18	124	14.900	0.060	2.8	0.0095	0.0000	OK
240 minute summer	19	124	14.830	0.021	2.8	0.0034	0.0000	OK
240 minute summer	13	244	14.294	0.474	12.2	0.0754	0.0000	SURCHARGED
240 minute summer	20	124	15.106	0.031	1.4	0.0003	0.0000	OK
240 minute summer	21	124	14.864	0.029	1.4	0.0046	0.0000	OK
240 minute summer	22	124	15.104	0.029	1.4	0.0002	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	S33	1.005	SA1	27.0	0.949	0.684	0.4576	
240 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
240 minute summer	SA1	Infiltration		2.6				
240 minute summer	1	1.000	2	1.7	0.817	0.249	0.0288	
240 minute summer	2	1.001	4	1.7	0.994	0.146	0.1214	
240 minute summer	3	3.000	4	3.6	0.967	0.453	0.0816	
240 minute summer	4	1.002	13	6.6	0.722	0.533	0.4702	
240 minute summer	5	2.000	6	1.4	0.793	0.204	0.0327	
240 minute summer	7	4.000	8	2.9	1.030	0.425	0.0550	
240 minute summer	6	2.001	4	1.4	1.080	0.103	0.0092	
240 minute summer	8	4.001	13	2.9	0.726	0.162	0.0557	
240 minute summer	9	5.000	11	1.4	0.745	0.177	0.0205	
240 minute summer	10	6.000	11	1.4	0.745	0.177	0.0205	
240 minute summer	11	5.001	12	2.8	0.927	0.667	0.0198	
240 minute summer	12	5.002	13	2.8	0.755	0.099	0.0214	
240 minute summer	14	11.000	15	2.9	1.039	0.428	0.0399	
240 minute summer	15	11.001	29	2.9	0.630	0.151	0.0639	
240 minute summer	16	12.000	18	1.4	0.745	0.177	0.0205	
240 minute summer	17	13.000	18	1.4	0.746	0.177	0.0204	
240 minute summer	18	12.001	19	2.8	0.929	0.667	0.0197	
240 minute summer	19	12.002	29	2.8	0.561	0.098	0.0259	
240 minute summer	13	1.003	29	12.1	0.600	0.234	0.9131	
240 minute summer	20	7.000	21	1.4	0.695	0.205	0.0380	
240 minute summer	21	7.001	25	1.4	0.731	0.178	0.0216	
240 minute summer	22	9.000	24	1.4	0.751	0.175	0.0198	

Results for 100 year +45% CC 240 minute summer. 1680 minute analysis at 4 minute timestep. Mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	23	124	15.104	0.029	1.4	0.0002	0.0000	OK
240 minute summer	24	124	14.884	0.044	2.8	0.0070	0.0000	OK
240 minute summer	25	124	14.677	0.029	4.2	0.0046	0.0000	OK
240 minute summer	26	244	14.295	0.095	7.0	0.0151	0.0000	OK
240 minute summer	27	124	15.125	0.050	2.9	0.0004	0.0000	OK
240 minute summer	28	124	14.924	0.030	2.9	0.0048	0.0000	OK
240 minute summer	29	244	14.294	0.702	24.8	0.1116	0.0000	SURCHARGED
240 minute summer	36	124	14.961	0.036	1.9	0.0003	0.0000	OK
240 minute summer	37	124	14.740	0.039	1.9	0.0062	0.0000	OK
240 minute summer	38	124	14.689	0.034	1.9	0.0054	0.0000	OK
240 minute summer	57	124	14.967	0.042	3.8	0.0003	0.0000	OK
240 minute summer	39	124	15.010	0.031	1.4	0.0002	0.0000	OK
240 minute summer	40	124	14.932	0.059	4.7	0.0094	0.0000	OK
240 minute summer	42	124	14.607	0.042	6.1	0.0067	0.0000	OK
240 minute summer	41	124	15.098	0.023	1.4	0.0002	0.0000	OK
240 minute summer	43	124	14.431	0.098	11.7	0.0155	0.0000	OK
240 minute summer	31	244	14.294	0.101	11.6	0.0160	0.0000	OK
240 minute summer	dummy	4	13.153	0.000	0.0	0.0000	0.0000	OK
240 minute summer	48	124	14.503	0.058	7.6	0.0092	0.0000	OK
240 minute summer	53	244	14.294	0.104	12.4	0.0165	0.0000	OK
240 minute summer	54	244	14.294	0.295	12.3	0.0469	0.0000	SURCHARGED
240 minute summer	52	124	14.425	0.049	4.8	0.0078	0.0000	OK
240 minute summer	32	244	14.294	0.094	4.0	0.0149	0.0000	OK
240 minute summer	35	124	14.608	0.032	4.0	0.0051	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	23	8.000	24	1.4	0.748	0.176	0.0202	
240 minute summer	24	8.001	25	2.8	1.076	0.342	0.0278	
240 minute summer	25	7.002	26	4.1	1.146	0.181	0.0128	
240 minute summer	26	7.003	29	7.0	1.247	0.756	0.1617	
240 minute summer	27	10.000	28	2.9	0.990	0.427	0.0426	
240 minute summer	28	10.001	26	2.9	0.782	0.196	0.0478	
240 minute summer	29	1.004	S33	23.5	0.812	0.543	0.2859	
240 minute summer	36	15.000	37	1.9	0.698	0.280	0.0487	
240 minute summer	37	15.001	38	1.9	0.725	0.287	0.0101	
240 minute summer	38	15.002	43	1.9	0.704	0.248	0.0525	
240 minute summer	57	18.000	43	3.8	1.154	0.359	0.0607	
240 minute summer	39	16.000	40	1.4	0.408	0.206	0.0291	
240 minute summer	40	16.001	42	4.7	0.988	0.621	0.0793	
240 minute summer	42	16.002	43	6.0	0.753	0.171	0.0479	
240 minute summer	41	17.000	42	1.4	1.025	0.113	0.0154	
240 minute summer	43	15.003	31	11.6	1.353	0.660	0.1221	
240 minute summer	31	15.004	SA1	11.6	1.814	0.237	0.1468	
240 minute summer	48	19.000	53	7.6	0.856	0.317	0.1255	
240 minute summer	53	19.001	54	12.3	1.342	0.617	0.2321	
240 minute summer	54	19.002	SA1	12.3	1.495	0.359	0.2522	
240 minute summer	52	20.000	53	4.8	0.806	0.467	0.0373	
240 minute summer	32	14.000	S33	4.0	0.667	0.233	0.0643	
240 minute summer	35	21.000	SA1	4.0	1.529	0.218	0.0607	

Results for 100 year +45% CC 360 minute summer. 1800 minute analysis at 8 minute timestep. Mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	S33	360	14.331	0.789	20.8	0.5016	0.0000	SURCHARGED
360 minute summer	SA1	360	14.330	1.169	41.3	195.8635	0.0000	SURCHARGED
360 minute summer	1	184	15.205	0.030	1.2	0.0002	0.0000	OK
360 minute summer	2	184	15.023	0.022	1.2	0.0035	0.0000	OK
360 minute summer	3	184	14.866	0.041	2.7	0.0003	0.0000	OK
360 minute summer	4	360	14.331	0.381	4.9	0.0606	0.0000	SURCHARGED
360 minute summer	5	184	15.104	0.029	1.1	0.0002	0.0000	OK
360 minute summer	7	184	15.117	0.042	2.1	0.0003	0.0000	OK
360 minute summer	6	184	14.860	0.020	1.1	0.0031	0.0000	OK
360 minute summer	8	184	14.853	0.023	2.1	0.0037	0.0000	OK
360 minute summer	9	184	15.101	0.026	1.1	0.0002	0.0000	OK
360 minute summer	10	184	15.101	0.026	1.1	0.0002	0.0000	OK
360 minute summer	11	184	14.892	0.052	2.2	0.0083	0.0000	OK
360 minute summer	12	184	14.828	0.019	2.2	0.0030	0.0000	OK
360 minute summer	14	184	15.117	0.042	2.1	0.0003	0.0000	OK
360 minute summer	15	184	14.921	0.022	2.1	0.0036	0.0000	OK
360 minute summer	16	184	15.101	0.026	1.1	0.0002	0.0000	OK
360 minute summer	17	184	15.101	0.026	1.1	0.0002	0.0000	OK
360 minute summer	18	184	14.892	0.052	2.2	0.0083	0.0000	OK
360 minute summer	19	184	14.828	0.019	2.2	0.0030	0.0000	OK
360 minute summer	13	360	14.331	0.511	9.2	0.0812	0.0000	SURCHARGED
360 minute summer	20	184	15.103	0.028	1.1	0.0002	0.0000	OK
360 minute summer	21	184	14.861	0.026	1.1	0.0041	0.0000	OK
360 minute summer	22	184	15.101	0.026	1.1	0.0002	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	S33	1.005	SA1	20.5	0.843	0.518	0.4576	
360 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
360 minute summer	SA1	Infiltration		2.7				
360 minute summer	1	1.000	2	1.2	0.740	0.176	0.0225	
360 minute summer	2	1.001	4	1.2	0.943	0.103	0.1200	
360 minute summer	3	3.000	4	2.7	0.899	0.340	0.0659	
360 minute summer	4	1.002	13	4.9	0.666	0.399	0.4702	
360 minute summer	5	2.000	6	1.1	0.742	0.160	0.0274	
360 minute summer	7	4.000	8	2.1	0.948	0.307	0.0434	
360 minute summer	6	2.001	4	1.1	1.007	0.081	0.0077	
360 minute summer	8	4.001	13	2.1	0.640	0.117	0.0542	
360 minute summer	9	5.000	11	1.1	0.696	0.139	0.0172	
360 minute summer	10	6.000	11	1.1	0.696	0.139	0.0172	
360 minute summer	11	5.001	12	2.2	0.866	0.522	0.0167	
360 minute summer	12	5.002	13	2.2	0.712	0.078	0.0209	
360 minute summer	14	11.000	15	2.1	0.956	0.310	0.0315	
360 minute summer	15	11.001	29	2.1	0.378	0.110	0.0616	
360 minute summer	16	12.000	18	1.1	0.696	0.139	0.0172	
360 minute summer	17	13.000	18	1.1	0.697	0.138	0.0171	
360 minute summer	18	12.001	19	2.2	0.868	0.522	0.0167	
360 minute summer	19	12.002	29	2.2	0.406	0.077	0.0253	
360 minute summer	13	1.003	29	9.1	0.556	0.175	0.9131	
360 minute summer	20	7.000	21	1.1	0.651	0.160	0.0318	
360 minute summer	21	7.001	25	1.1	0.682	0.139	0.0181	
360 minute summer	22	9.000	24	1.1	0.702	0.137	0.0167	

Results for 100 year +45% CC 360 minute summer. 1800 minute analysis at 8 minute timestep. Mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	23	184	15.101	0.026	1.1	0.0002	0.0000	OK
360 minute summer	24	184	14.878	0.038	2.2	0.0061	0.0000	OK
360 minute summer	25	184	14.674	0.026	3.2	0.0041	0.0000	OK
360 minute summer	26	360	14.332	0.132	5.3	0.0211	0.0000	SURCHARGED
360 minute summer	27	184	15.116	0.041	2.1	0.0003	0.0000	OK
360 minute summer	28	184	14.920	0.026	2.1	0.0041	0.0000	OK
360 minute summer	29	360	14.331	0.739	18.6	0.1175	0.0000	SURCHARGED
360 minute summer	36	184	14.956	0.031	1.4	0.0002	0.0000	OK
360 minute summer	37	184	14.734	0.033	1.4	0.0053	0.0000	OK
360 minute summer	38	184	14.684	0.029	1.4	0.0046	0.0000	OK
360 minute summer	57	184	14.961	0.036	2.8	0.0003	0.0000	OK
360 minute summer	39	184	15.006	0.027	1.1	0.0002	0.0000	OK
360 minute summer	40	184	14.923	0.050	3.6	0.0079	0.0000	OK
360 minute summer	42	184	14.602	0.037	4.7	0.0058	0.0000	OK
360 minute summer	41	184	15.096	0.021	1.1	0.0002	0.0000	OK
360 minute summer	43	184	14.415	0.082	8.8	0.0130	0.0000	OK
360 minute summer	31	360	14.331	0.138	8.8	0.0219	0.0000	OK
360 minute summer	dummy	8	13.153	0.000	0.0	0.0000	0.0000	OK
360 minute summer	48	184	14.495	0.050	5.7	0.0079	0.0000	OK
360 minute summer	53	360	14.331	0.141	9.2	0.0224	0.0000	OK
360 minute summer	54	360	14.331	0.332	9.1	0.0528	0.0000	SURCHARGED
360 minute summer	52	184	14.416	0.040	3.5	0.0064	0.0000	OK
360 minute summer	32	360	14.331	0.131	3.0	0.0208	0.0000	SURCHARGED
360 minute summer	35	184	14.603	0.027	3.0	0.0044	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	23	8.000	24	1.1	0.699	0.138	0.0169	
360 minute summer	24	8.001	25	2.2	1.009	0.268	0.0232	
360 minute summer	25	7.002	26	3.2	1.111	0.142	0.0130	
360 minute summer	26	7.003	29	5.3	1.146	0.572	0.1632	
360 minute summer	27	10.000	28	2.1	0.910	0.309	0.0336	
360 minute summer	28	10.001	26	2.1	0.713	0.142	0.0491	
360 minute summer	29	1.004	S33	17.8	0.755	0.411	0.2859	
360 minute summer	36	15.000	37	1.4	0.645	0.206	0.0387	
360 minute summer	37	15.001	38	1.4	0.669	0.210	0.0081	
360 minute summer	38	15.002	43	1.4	0.705	0.181	0.0351	
360 minute summer	57	18.000	43	2.8	1.120	0.264	0.0448	
360 minute summer	39	16.000	40	1.1	0.393	0.161	0.0238	
360 minute summer	40	16.001	42	3.6	0.928	0.474	0.0644	
360 minute summer	42	16.002	43	4.6	0.717	0.131	0.0391	
360 minute summer	41	17.000	42	1.1	0.956	0.089	0.0129	
360 minute summer	43	15.003	31	8.8	1.264	0.496	0.1299	
360 minute summer	31	15.004	SA1	8.7	1.648	0.178	0.1679	
360 minute summer	48	19.000	53	5.7	0.803	0.238	0.1283	
360 minute summer	53	19.001	54	9.1	1.249	0.458	0.2642	
360 minute summer	54	19.002	SA1	9.1	1.302	0.267	0.2522	
360 minute summer	52	20.000	53	3.5	0.731	0.341	0.0309	
360 minute summer	32	14.000	S33	3.0	0.518	0.175	0.0651	
360 minute summer	35	21.000	SA1	3.0	1.362	0.163	0.0583	

Results for 100 year +45% CC 480 minute summer. 1920 minute analysis at 8 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	S33	480	14.358	0.816	15.7	0.5187	0.0000	SURCHARGED
480 minute summer	SA1	480	14.357	1.196	31.5	200.3743	0.0000	SURCHARGED
480 minute summer	1	248	15.202	0.027	1.0	0.0002	0.0000	OK
480 minute summer	2	248	15.021	0.020	1.0	0.0032	0.0000	OK
480 minute summer	3	248	14.861	0.036	2.1	0.0003	0.0000	OK
480 minute summer	4	480	14.358	0.408	3.9	0.0648	0.0000	SURCHARGED
480 minute summer	5	248	15.100	0.025	0.8	0.0002	0.0000	OK
480 minute summer	7	248	15.111	0.036	1.6	0.0003	0.0000	OK
480 minute summer	6	248	14.857	0.017	0.8	0.0027	0.0000	OK
480 minute summer	8	248	14.850	0.020	1.6	0.0032	0.0000	OK
480 minute summer	9	248	15.097	0.022	0.8	0.0002	0.0000	OK
480 minute summer	10	248	15.097	0.022	0.8	0.0002	0.0000	OK
480 minute summer	11	248	14.885	0.045	1.6	0.0071	0.0000	OK
480 minute summer	12	248	14.825	0.016	1.6	0.0026	0.0000	OK
480 minute summer	14	248	15.111	0.036	1.6	0.0003	0.0000	OK
480 minute summer	15	248	14.919	0.020	1.6	0.0031	0.0000	OK
480 minute summer	16	248	15.097	0.022	0.8	0.0002	0.0000	OK
480 minute summer	17	248	15.097	0.022	0.8	0.0002	0.0000	OK
480 minute summer	18	248	14.885	0.045	1.6	0.0071	0.0000	OK
480 minute summer	19	248	14.825	0.016	1.6	0.0026	0.0000	OK
480 minute summer	13	480	14.358	0.538	7.1	0.0855	0.0000	SURCHARGED
480 minute summer	20	248	15.099	0.024	0.8	0.0002	0.0000	OK
480 minute summer	21	248	14.857	0.022	0.8	0.0035	0.0000	OK
480 minute summer	22	248	15.097	0.022	0.8	0.0002	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute summer	S33	1.005	SA1	15.5	0.790	0.392	0.4576	
480 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
480 minute summer	SA1	Infiltration		2.7				
480 minute summer	1	1.000	2	1.0	0.703	0.147	0.0198	
480 minute summer	2	1.001	4	1.0	0.897	0.087	0.1200	
480 minute summer	3	3.000	4	2.1	0.843	0.267	0.0551	
480 minute summer	4	1.002	13	3.9	0.623	0.317	0.4702	
480 minute summer	5	2.000	6	0.8	0.679	0.117	0.0220	
480 minute summer	7	4.000	8	1.6	0.882	0.236	0.0359	
480 minute summer	6	2.001	4	0.8	0.923	0.060	0.0062	
480 minute summer	8	4.001	13	1.6	0.586	0.090	0.0530	
480 minute summer	9	5.000	11	0.8	0.638	0.102	0.0138	
480 minute summer	10	6.000	11	0.8	0.639	0.102	0.0137	
480 minute summer	11	5.001	12	1.6	0.794	0.385	0.0136	
480 minute summer	12	5.002	13	1.6	0.629	0.058	0.0205	
480 minute summer	14	11.000	15	1.6	0.890	0.237	0.0260	
480 minute summer	15	11.001	29	1.6	0.298	0.084	0.0601	
480 minute summer	16	12.000	18	0.8	0.638	0.102	0.0138	
480 minute summer	17	13.000	18	0.8	0.639	0.102	0.0137	
480 minute summer	18	12.001	19	1.6	0.795	0.385	0.0136	
480 minute summer	19	12.002	29	1.6	0.309	0.057	0.0248	
480 minute summer	13	1.003	29	6.9	0.523	0.134	0.9131	
480 minute summer	20	7.000	21	0.8	0.595	0.118	0.0255	
480 minute summer	21	7.001	25	0.8	0.628	0.103	0.0146	
480 minute summer	22	9.000	24	0.8	0.644	0.100	0.0133	

Results for 100 year +45% CC 480 minute summer. 1920 minute analysis at 8 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	23	248	15.097	0.022	0.8	0.0002	0.0000	OK
480 minute summer	24	248	14.873	0.033	1.6	0.0052	0.0000	OK
480 minute summer	25	248	14.670	0.022	2.4	0.0035	0.0000	OK
480 minute summer	26	480	14.359	0.159	4.0	0.0252	0.0000	SURCHARGED
480 minute summer	27	248	15.111	0.036	1.6	0.0003	0.0000	OK
480 minute summer	28	248	14.916	0.022	1.6	0.0036	0.0000	OK
480 minute summer	29	480	14.358	0.766	14.0	0.1217	0.0000	SURCHARGED
480 minute summer	36	248	14.952	0.027	1.1	0.0002	0.0000	OK
480 minute summer	37	248	14.730	0.029	1.1	0.0047	0.0000	OK
480 minute summer	38	248	14.681	0.026	1.1	0.0042	0.0000	OK
480 minute summer	57	248	14.957	0.032	2.2	0.0003	0.0000	OK
480 minute summer	39	248	15.002	0.023	0.8	0.0002	0.0000	OK
480 minute summer	40	248	14.915	0.042	2.7	0.0068	0.0000	OK
480 minute summer	42	248	14.597	0.032	3.5	0.0051	0.0000	OK
480 minute summer	41	248	15.093	0.018	0.8	0.0001	0.0000	OK
480 minute summer	43	248	14.404	0.071	6.8	0.0112	0.0000	OK
480 minute summer	31	480	14.358	0.165	6.8	0.0262	0.0000	SURCHARGED
480 minute summer	dummy	8	13.153	0.000	0.0	0.0000	0.0000	OK
480 minute summer	48	248	14.489	0.044	4.4	0.0069	0.0000	OK
480 minute summer	53	480	14.358	0.168	7.1	0.0267	0.0000	SURCHARGED
480 minute summer	54	480	14.358	0.359	7.1	0.0570	0.0000	SURCHARGED
480 minute summer	52	248	14.411	0.035	2.7	0.0056	0.0000	OK
480 minute summer	32	480	14.358	0.158	2.3	0.0251	0.0000	SURCHARGED
480 minute summer	35	248	14.600	0.024	2.3	0.0038	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute summer	23	8.000	24	0.8	0.641	0.101	0.0135	
480 minute summer	24	8.001	25	1.6	0.928	0.197	0.0187	
480 minute summer	25	7.002	26	2.4	1.023	0.105	0.0133	
480 minute summer	26	7.003	29	4.0	1.075	0.433	0.1632	
480 minute summer	27	10.000	28	1.6	0.846	0.237	0.0277	
480 minute summer	28	10.001	26	1.6	0.677	0.109	0.0495	
480 minute summer	29	1.004	S33	13.4	0.711	0.310	0.2859	
480 minute summer	36	15.000	37	1.1	0.605	0.163	0.0326	
480 minute summer	37	15.001	38	1.1	0.623	0.168	0.0069	
480 minute summer	38	15.002	43	1.1	0.682	0.146	0.0282	
480 minute summer	57	18.000	43	2.2	1.050	0.208	0.0377	
480 minute summer	39	16.000	40	0.8	0.358	0.118	0.0192	
480 minute summer	40	16.001	42	2.7	0.866	0.360	0.0524	
480 minute summer	42	16.002	43	3.5	0.658	0.099	0.0323	
480 minute summer	41	17.000	42	0.8	0.873	0.065	0.0103	
480 minute summer	43	15.003	31	6.8	1.185	0.385	0.1381	
480 minute summer	31	15.004	SA1	6.8	1.433	0.139	0.1713	
480 minute summer	48	19.000	53	4.4	0.752	0.184	0.1312	
480 minute summer	53	19.001	54	7.1	1.171	0.356	0.2673	
480 minute summer	54	19.002	SA1	7.1	1.213	0.208	0.2522	
480 minute summer	52	20.000	53	2.7	0.677	0.264	0.0281	
480 minute summer	32	14.000	S33	2.3	0.410	0.134	0.0651	
480 minute summer	35	21.000	SA1	2.3	1.200	0.125	0.0565	

Results for 100 year +45% CC 600 minute summer. 2040 minute analysis at 15 minute timestep. Mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	S33	600	14.469	0.927	13.2	0.5897	0.0000	SURCHARGED
600 minute summer	SA1	600	14.469	1.308	26.1	201.0938	0.0000	SURCHARGED
600 minute summer	1	315	15.200	0.025	0.8	0.0002	0.0000	OK
600 minute summer	2	315	15.019	0.018	0.8	0.0029	0.0000	OK
600 minute summer	3	315	14.857	0.032	1.7	0.0003	0.0000	OK
600 minute summer	4	600	14.469	0.519	3.2	0.0826	0.0000	SURCHARGED
600 minute summer	5	315	15.098	0.023	0.7	0.0002	0.0000	OK
600 minute summer	7	315	15.107	0.032	1.3	0.0003	0.0000	OK
600 minute summer	6	315	14.856	0.016	0.7	0.0025	0.0000	OK
600 minute summer	8	315	14.848	0.018	1.3	0.0029	0.0000	OK
600 minute summer	9	315	15.096	0.021	0.7	0.0002	0.0000	OK
600 minute summer	10	315	15.096	0.021	0.7	0.0002	0.0000	OK
600 minute summer	11	315	14.882	0.042	1.4	0.0066	0.0000	OK
600 minute summer	12	315	14.824	0.015	1.4	0.0024	0.0000	OK
600 minute summer	14	315	15.108	0.033	1.3	0.0003	0.0000	OK
600 minute summer	15	315	14.917	0.018	1.3	0.0028	0.0000	OK
600 minute summer	16	315	15.096	0.021	0.7	0.0002	0.0000	OK
600 minute summer	17	315	15.095	0.020	0.7	0.0002	0.0000	OK
600 minute summer	18	315	14.882	0.042	1.4	0.0066	0.0000	OK
600 minute summer	19	315	14.824	0.015	1.4	0.0024	0.0000	OK
600 minute summer	13	600	14.469	0.649	5.9	0.1032	0.0000	SURCHARGED
600 minute summer	20	315	15.097	0.022	0.7	0.0002	0.0000	OK
600 minute summer	21	315	14.856	0.021	0.7	0.0033	0.0000	OK
600 minute summer	22	315	15.095	0.020	0.7	0.0002	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute summer	S33	1.005	SA1	13.0	0.718	0.329	0.4576	
600 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
600 minute summer	SA1	Infiltration		2.7				
600 minute summer	1	1.000	2	0.8	0.659	0.118	0.0169	
600 minute summer	2	1.001	4	0.8	0.840	0.069	0.1186	
600 minute summer	3	3.000	4	1.7	0.795	0.216	0.0473	
600 minute summer	4	1.002	13	3.2	0.587	0.260	0.4702	
600 minute summer	5	2.000	6	0.7	0.654	0.103	0.0200	
600 minute summer	7	4.000	8	1.3	0.832	0.191	0.0309	
600 minute summer	6	2.001	4	0.7	0.888	0.052	0.0057	
600 minute summer	8	4.001	13	1.3	0.542	0.073	0.0526	
600 minute summer	9	5.000	11	0.7	0.614	0.089	0.0125	
600 minute summer	10	6.000	11	0.7	0.614	0.089	0.0125	
600 minute summer	11	5.001	12	1.4	0.763	0.337	0.0124	
600 minute summer	12	5.002	13	1.4	0.617	0.050	0.0205	
600 minute summer	14	11.000	15	1.3	0.839	0.193	0.0224	
600 minute summer	15	11.001	29	1.3	0.273	0.068	0.0591	
600 minute summer	16	12.000	18	0.7	0.614	0.089	0.0125	
600 minute summer	17	13.000	18	0.7	0.615	0.089	0.0125	
600 minute summer	18	12.001	19	1.4	0.765	0.337	0.0124	
600 minute summer	19	12.002	29	1.4	0.278	0.050	0.0246	
600 minute summer	13	1.003	29	5.8	0.494	0.111	0.9131	
600 minute summer	20	7.000	21	0.7	0.574	0.103	0.0232	
600 minute summer	21	7.001	25	0.7	0.604	0.090	0.0132	
600 minute summer	22	9.000	24	0.7	0.619	0.088	0.0121	

Results for 100 year +45% CC 600 minute summer. 2040 minute analysis at 15 minute timestep. Mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	23	315	15.095	0.020	0.7	0.0002	0.0000	OK
600 minute summer	24	315	14.870	0.030	1.4	0.0048	0.0000	OK
600 minute summer	25	315	14.669	0.021	2.1	0.0033	0.0000	OK
600 minute summer	26	600	14.470	0.270	3.4	0.0430	0.0000	SURCHARGED
600 minute summer	27	315	15.107	0.032	1.3	0.0003	0.0000	OK
600 minute summer	28	315	14.914	0.020	1.3	0.0032	0.0000	OK
600 minute summer	29	600	14.469	0.877	11.8	0.1395	0.0000	SURCHARGED
600 minute summer	36	315	14.950	0.025	0.9	0.0002	0.0000	OK
600 minute summer	37	315	14.727	0.026	0.9	0.0042	0.0000	OK
600 minute summer	38	315	14.679	0.024	0.9	0.0038	0.0000	OK
600 minute summer	57	315	14.953	0.028	1.8	0.0002	0.0000	OK
600 minute summer	39	315	15.001	0.022	0.7	0.0002	0.0000	OK
600 minute summer	40	315	14.911	0.038	2.2	0.0060	0.0000	OK
600 minute summer	42	315	14.594	0.029	2.9	0.0046	0.0000	OK
600 minute summer	41	315	15.091	0.016	0.7	0.0001	0.0000	OK
600 minute summer	43	600	14.469	0.136	5.6	0.0217	0.0000	OK
600 minute summer	31	600	14.469	0.276	5.6	0.0439	0.0000	SURCHARGED
600 minute summer	dummy	15	13.153	0.000	0.0	0.0000	0.0000	OK
600 minute summer	48	315	14.484	0.039	3.5	0.0062	0.0000	OK
600 minute summer	53	600	14.469	0.279	5.7	0.0444	0.0000	SURCHARGED
600 minute summer	54	600	14.469	0.470	5.7	0.0748	0.0000	SURCHARGED
600 minute summer	52	600	14.469	0.093	2.2	0.0148	0.0000	OK
600 minute summer	32	600	14.469	0.269	1.9	0.0428	0.0000	SURCHARGED
600 minute summer	35	315	14.598	0.022	1.9	0.0035	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute summer	23	8.000	24	0.7	0.617	0.088	0.0123	
600 minute summer	24	8.001	25	1.4	0.895	0.173	0.0169	
600 minute summer	25	7.002	26	2.1	1.004	0.092	0.0133	
600 minute summer	26	7.003	29	3.4	0.995	0.368	0.1632	
600 minute summer	27	10.000	28	1.3	0.799	0.192	0.0239	
600 minute summer	28	10.001	26	1.3	0.629	0.089	0.0495	
600 minute summer	29	1.004	S33	11.3	0.692	0.261	0.2859	
600 minute summer	36	15.000	37	0.9	0.573	0.133	0.0282	
600 minute summer	37	15.001	38	0.9	0.590	0.137	0.0060	
600 minute summer	38	15.002	43	0.9	0.644	0.119	0.0653	
600 minute summer	57	18.000	43	1.8	0.994	0.171	0.0680	
600 minute summer	39	16.000	40	0.7	0.358	0.103	0.0168	
600 minute summer	40	16.001	42	2.2	0.821	0.293	0.0450	
600 minute summer	42	16.002	43	2.9	0.629	0.082	0.0513	
600 minute summer	41	17.000	42	0.7	0.840	0.057	0.0094	
600 minute summer	43	15.003	31	5.6	1.126	0.317	0.2437	
600 minute summer	31	15.004	SA1	5.6	1.376	0.114	0.1713	
600 minute summer	48	19.000	53	3.5	0.705	0.146	0.1378	
600 minute summer	53	19.001	54	5.7	1.105	0.286	0.2673	
600 minute summer	54	19.002	SA1	5.7	1.071	0.167	0.2522	
600 minute summer	52	20.000	53	2.2	0.641	0.215	0.0505	
600 minute summer	32	14.000	S33	1.9	0.363	0.111	0.0651	
600 minute summer	35	21.000	SA1	1.9	1.114	0.104	0.0553	

Results for 100 year +45% CC 720 minute summer. 2160 minute analysis at 15 minute timestep. Mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	S33	675	14.501	0.959	11.7	0.6100	0.0000	SURCHARGED
720 minute summer	SA1	675	14.501	1.340	23.2	201.1028	0.0000	SURCHARGED
720 minute summer	1	375	15.198	0.023	0.7	0.0002	0.0000	OK
720 minute summer	2	375	15.018	0.017	0.7	0.0027	0.0000	OK
720 minute summer	3	375	14.855	0.030	1.5	0.0002	0.0000	OK
720 minute summer	4	675	14.501	0.551	2.8	0.0877	0.0000	SURCHARGED
720 minute summer	5	375	15.096	0.021	0.6	0.0002	0.0000	OK
720 minute summer	7	375	15.106	0.031	1.2	0.0002	0.0000	OK
720 minute summer	6	375	14.855	0.015	0.6	0.0023	0.0000	OK
720 minute summer	8	375	14.848	0.018	1.2	0.0028	0.0000	OK
720 minute summer	9	375	15.094	0.019	0.6	0.0002	0.0000	OK
720 minute summer	10	375	15.094	0.019	0.6	0.0002	0.0000	OK
720 minute summer	11	375	14.879	0.039	1.2	0.0061	0.0000	OK
720 minute summer	12	375	14.823	0.014	1.2	0.0023	0.0000	OK
720 minute summer	14	375	15.106	0.031	1.2	0.0003	0.0000	OK
720 minute summer	15	375	14.916	0.017	1.2	0.0027	0.0000	OK
720 minute summer	16	375	15.094	0.019	0.6	0.0002	0.0000	OK
720 minute summer	17	375	15.094	0.019	0.6	0.0002	0.0000	OK
720 minute summer	18	375	14.879	0.039	1.2	0.0061	0.0000	OK
720 minute summer	19	375	14.823	0.014	1.2	0.0022	0.0000	OK
720 minute summer	13	675	14.501	0.681	5.2	0.1083	0.0000	SURCHARGED
720 minute summer	20	375	15.095	0.020	0.6	0.0002	0.0000	OK
720 minute summer	21	375	14.854	0.019	0.6	0.0030	0.0000	OK
720 minute summer	22	375	15.094	0.019	0.6	0.0002	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute summer	S33	1.005	SA1	11.6	0.686	0.293	0.4576	
720 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
720 minute summer	SA1	Infiltration		2.7				
720 minute summer	1	1.000	2	0.7	0.635	0.103	0.0154	
720 minute summer	2	1.001	4	0.7	0.807	0.061	0.1186	
720 minute summer	3	3.000	4	1.5	0.768	0.190	0.0469	
720 minute summer	4	1.002	13	2.8	0.565	0.227	0.4702	
720 minute summer	5	2.000	6	0.6	0.626	0.088	0.0179	
720 minute summer	7	4.000	8	1.2	0.814	0.177	0.0292	
720 minute summer	6	2.001	4	0.6	0.849	0.045	0.0051	
720 minute summer	8	4.001	13	1.2	0.539	0.068	0.0523	
720 minute summer	9	5.000	11	0.6	0.587	0.076	0.0112	
720 minute summer	10	6.000	11	0.6	0.587	0.076	0.0112	
720 minute summer	11	5.001	12	1.2	0.729	0.289	0.0112	
720 minute summer	12	5.002	13	1.2	0.581	0.043	0.0203	
720 minute summer	14	11.000	15	1.2	0.821	0.178	0.0212	
720 minute summer	15	11.001	29	1.2	0.274	0.063	0.0588	
720 minute summer	16	12.000	18	0.6	0.587	0.076	0.0112	
720 minute summer	17	13.000	18	0.6	0.588	0.076	0.0112	
720 minute summer	18	12.001	19	1.2	0.730	0.289	0.0112	
720 minute summer	19	12.002	29	1.2	0.275	0.043	0.0243	
720 minute summer	13	1.003	29	5.1	0.480	0.099	0.9131	
720 minute summer	20	7.000	21	0.6	0.549	0.088	0.0208	
720 minute summer	21	7.001	25	0.6	0.578	0.077	0.0119	
720 minute summer	22	9.000	24	0.6	0.592	0.075	0.0109	

Results for 100 year +45% CC 720 minute summer. 2160 minute analysis at 15 minute timestep. Mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	23	375	15.094	0.019	0.6	0.0002	0.0000	OK
720 minute summer	24	375	14.868	0.028	1.2	0.0044	0.0000	OK
720 minute summer	25	375	14.667	0.019	1.8	0.0030	0.0000	OK
720 minute summer	26	675	14.502	0.302	3.0	0.0481	0.0000	SURCHARGED
720 minute summer	27	375	15.106	0.031	1.2	0.0002	0.0000	OK
720 minute summer	28	375	14.913	0.019	1.2	0.0031	0.0000	OK
720 minute summer	29	675	14.501	0.909	10.4	0.1446	0.0000	SURCHARGED
720 minute summer	36	375	14.948	0.023	0.8	0.0002	0.0000	OK
720 minute summer	37	375	14.726	0.025	0.8	0.0039	0.0000	OK
720 minute summer	38	375	14.677	0.022	0.8	0.0035	0.0000	OK
720 minute summer	57	375	14.952	0.027	1.6	0.0002	0.0000	OK
720 minute summer	39	375	14.999	0.020	0.6	0.0002	0.0000	OK
720 minute summer	40	375	14.909	0.036	2.0	0.0057	0.0000	OK
720 minute summer	42	375	14.593	0.028	2.6	0.0044	0.0000	OK
720 minute summer	41	375	15.090	0.015	0.6	0.0001	0.0000	OK
720 minute summer	43	675	14.501	0.168	5.0	0.0268	0.0000	SURCHARGED
720 minute summer	31	675	14.501	0.308	5.0	0.0490	0.0000	SURCHARGED
720 minute summer	dummy	15	13.153	0.000	0.0	0.0000	0.0000	OK
720 minute summer	48	675	14.501	0.056	3.1	0.0090	0.0000	OK
720 minute summer	53	675	14.501	0.311	5.0	0.0495	0.0000	SURCHARGED
720 minute summer	54	675	14.501	0.502	5.0	0.0798	0.0000	SURCHARGED
720 minute summer	52	675	14.501	0.125	1.9	0.0199	0.0000	SURCHARGED
720 minute summer	32	675	14.501	0.301	1.7	0.0479	0.0000	SURCHARGED
720 minute summer	35	375	14.597	0.021	1.7	0.0033	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute summer	23	8.000	24	0.6	0.590	0.076	0.0110	
720 minute summer	24	8.001	25	1.2	0.857	0.148	0.0152	
720 minute summer	25	7.002	26	1.8	0.949	0.079	0.0133	
720 minute summer	26	7.003	29	3.0	0.985	0.325	0.1632	
720 minute summer	27	10.000	28	1.2	0.781	0.178	0.0226	
720 minute summer	28	10.001	26	1.2	0.628	0.082	0.0495	
720 minute summer	29	1.004	S33	10.0	0.662	0.232	0.2859	
720 minute summer	36	15.000	37	0.8	0.555	0.118	0.0259	
720 minute summer	37	15.001	38	0.8	0.572	0.122	0.0055	
720 minute summer	38	15.002	43	0.8	0.623	0.106	0.0709	
720 minute summer	57	18.000	43	1.6	0.961	0.152	0.0738	
720 minute summer	39	16.000	40	0.6	0.334	0.089	0.0155	
720 minute summer	40	16.001	42	2.0	0.800	0.267	0.0420	
720 minute summer	42	16.002	43	2.6	0.612	0.074	0.0537	
720 minute summer	41	17.000	42	0.6	0.804	0.049	0.0084	
720 minute summer	43	15.003	31	5.0	1.092	0.283	0.2493	
720 minute summer	31	15.004	SA1	5.0	1.298	0.102	0.1713	
720 minute summer	48	19.000	53	3.1	0.688	0.130	0.1675	
720 minute summer	53	19.001	54	5.0	1.067	0.251	0.2673	
720 minute summer	54	19.002	SA1	5.0	1.012	0.146	0.2522	
720 minute summer	52	20.000	53	1.9	0.612	0.185	0.0512	
720 minute summer	32	14.000	S33	1.7	0.325	0.099	0.0651	
720 minute summer	35	21.000	SA1	1.7	1.063	0.093	0.0548	

Results for 100 year +45% CC 960 minute summer. 2400 minute analysis at 15 minute timestep. Mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	S33	780	14.353	0.811	9.1	0.5160	0.0000	SURCHARGED
960 minute summer	SA1	780	14.353	1.192	18.3	199.6613	0.0000	SURCHARGED
960 minute summer	1	510	15.194	0.019	0.5	0.0002	0.0000	OK
960 minute summer	2	480	15.015	0.014	0.5	0.0023	0.0000	OK
960 minute summer	3	495	14.852	0.027	1.2	0.0002	0.0000	OK
960 minute summer	4	780	14.353	0.403	2.2	0.0642	0.0000	SURCHARGED
960 minute summer	5	495	15.095	0.020	0.5	0.0002	0.0000	OK
960 minute summer	7	495	15.102	0.027	0.9	0.0002	0.0000	OK
960 minute summer	6	495	14.853	0.013	0.5	0.0021	0.0000	OK
960 minute summer	8	495	14.845	0.015	0.9	0.0024	0.0000	OK
960 minute summer	9	495	15.092	0.017	0.5	0.0001	0.0000	OK
960 minute summer	10	495	15.092	0.017	0.5	0.0001	0.0000	OK
960 minute summer	11	495	14.875	0.035	1.0	0.0056	0.0000	OK
960 minute summer	12	495	14.822	0.013	1.0	0.0021	0.0000	OK
960 minute summer	14	495	15.102	0.027	0.9	0.0002	0.0000	OK
960 minute summer	15	495	14.914	0.015	0.9	0.0024	0.0000	OK
960 minute summer	16	495	15.092	0.017	0.5	0.0001	0.0000	OK
960 minute summer	17	495	15.092	0.017	0.5	0.0001	0.0000	OK
960 minute summer	18	495	14.875	0.035	1.0	0.0056	0.0000	OK
960 minute summer	19	495	14.822	0.013	1.0	0.0021	0.0000	OK
960 minute summer	13	780	14.353	0.533	4.1	0.0848	0.0000	SURCHARGED
960 minute summer	20	495	15.094	0.019	0.5	0.0001	0.0000	OK
960 minute summer	21	495	14.852	0.017	0.5	0.0028	0.0000	OK
960 minute summer	22	495	15.092	0.017	0.5	0.0001	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	S33	1.005	SA1	9.1	0.631	0.229	0.4576	
960 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
960 minute summer	SA1	Infiltration		2.7				
960 minute summer	1	1.000	2	0.5	0.577	0.074	0.0121	
960 minute summer	2	1.001	4	0.5	0.731	0.043	0.1173	
960 minute summer	3	3.000	4	1.2	0.722	0.152	0.0368	
960 minute summer	4	1.002	13	2.2	0.524	0.179	0.4702	
960 minute summer	5	2.000	6	0.5	0.594	0.073	0.0158	
960 minute summer	7	4.000	8	0.9	0.750	0.133	0.0238	
960 minute summer	6	2.001	4	0.5	0.805	0.037	0.0045	
960 minute summer	8	4.001	13	0.9	0.474	0.051	0.0512	
960 minute summer	9	5.000	11	0.5	0.557	0.064	0.0099	
960 minute summer	10	6.000	11	0.5	0.557	0.064	0.0098	
960 minute summer	11	5.001	12	1.0	0.690	0.241	0.0099	
960 minute summer	12	5.002	13	1.0	0.555	0.036	0.0201	
960 minute summer	14	11.000	15	0.9	0.757	0.134	0.0172	
960 minute summer	15	11.001	29	0.9	0.260	0.047	0.0577	
960 minute summer	16	12.000	18	0.5	0.557	0.064	0.0099	
960 minute summer	17	13.000	18	0.5	0.557	0.063	0.0098	
960 minute summer	18	12.001	19	1.0	0.691	0.241	0.0099	
960 minute summer	19	12.002	29	1.0	0.274	0.035	0.0241	
960 minute summer	13	1.003	29	3.8	0.480	0.073	0.9131	
960 minute summer	20	7.000	21	0.5	0.521	0.074	0.0182	
960 minute summer	21	7.001	25	0.5	0.548	0.065	0.0104	
960 minute summer	22	9.000	24	0.5	0.562	0.063	0.0095	

Results for 100 year +45% CC 960 minute summer. 2400 minute analysis at 15 minute timestep. Mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	23	495	15.092	0.017	0.5	0.0001	0.0000	OK
960 minute summer	24	495	14.865	0.025	1.0	0.0040	0.0000	OK
960 minute summer	25	495	14.665	0.017	1.5	0.0028	0.0000	OK
960 minute summer	26	780	14.354	0.154	2.4	0.0245	0.0000	SURCHARGED
960 minute summer	27	495	15.102	0.027	0.9	0.0002	0.0000	OK
960 minute summer	28	495	14.911	0.017	0.9	0.0027	0.0000	OK
960 minute summer	29	780	14.353	0.761	8.0	0.1211	0.0000	SURCHARGED
960 minute summer	36	495	14.945	0.020	0.6	0.0002	0.0000	OK
960 minute summer	37	495	14.722	0.021	0.6	0.0034	0.0000	OK
960 minute summer	38	495	14.674	0.019	0.6	0.0031	0.0000	OK
960 minute summer	57	495	14.948	0.023	1.2	0.0002	0.0000	OK
960 minute summer	39	495	14.997	0.018	0.5	0.0001	0.0000	OK
960 minute summer	40	495	14.905	0.032	1.6	0.0051	0.0000	OK
960 minute summer	42	495	14.590	0.025	2.1	0.0040	0.0000	OK
960 minute summer	41	495	15.089	0.014	0.5	0.0001	0.0000	OK
960 minute summer	43	495	14.385	0.052	3.9	0.0083	0.0000	OK
960 minute summer	31	780	14.353	0.160	3.9	0.0255	0.0000	SURCHARGED
960 minute summer	dummy	15	13.153	0.000	0.0	0.0000	0.0000	OK
960 minute summer	48	495	14.478	0.033	2.5	0.0052	0.0000	OK
960 minute summer	53	780	14.353	0.163	4.1	0.0260	0.0000	SURCHARGED
960 minute summer	54	780	14.353	0.354	4.1	0.0563	0.0000	SURCHARGED
960 minute summer	52	495	14.403	0.027	1.6	0.0043	0.0000	OK
960 minute summer	32	780	14.353	0.153	1.3	0.0244	0.0000	SURCHARGED
960 minute summer	35	495	14.594	0.018	1.3	0.0029	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	23	8.000	24	0.5	0.559	0.063	0.0097	
960 minute summer	24	8.001	25	1.0	0.813	0.123	0.0133	
960 minute summer	25	7.002	26	1.5	0.922	0.066	0.0133	
960 minute summer	26	7.003	29	2.4	0.912	0.260	0.1632	
960 minute summer	27	10.000	28	0.9	0.720	0.133	0.0184	
960 minute summer	28	10.001	26	0.9	0.564	0.061	0.0495	
960 minute summer	29	1.004	S33	7.8	0.634	0.181	0.2859	
960 minute summer	36	15.000	37	0.6	0.512	0.089	0.0210	
960 minute summer	37	15.001	38	0.6	0.528	0.091	0.0044	
960 minute summer	38	15.002	43	0.6	0.573	0.079	0.0183	
960 minute summer	57	18.000	43	1.2	0.886	0.114	0.0244	
960 minute summer	39	16.000	40	0.5	0.324	0.074	0.0133	
960 minute summer	40	16.001	42	1.6	0.753	0.213	0.0357	
960 minute summer	42	16.002	43	2.1	0.587	0.059	0.0218	
960 minute summer	41	17.000	42	0.5	0.761	0.041	0.0074	
960 minute summer	43	15.003	31	3.9	1.020	0.221	0.1348	
960 minute summer	31	15.004	SA1	3.9	1.202	0.079	0.1713	
960 minute summer	48	19.000	53	2.5	0.641	0.105	0.1305	
960 minute summer	53	19.001	54	4.1	1.010	0.206	0.2673	
960 minute summer	54	19.002	SA1	4.1	0.996	0.120	0.2522	
960 minute summer	52	20.000	53	1.6	0.586	0.156	0.0280	
960 minute summer	32	14.000	S33	1.3	0.319	0.076	0.0651	
960 minute summer	35	21.000	SA1	1.3	1.006	0.071	0.0535	

Results for 100 year +45% CC 1440 minute summer. 2880 minute analysis at 30 minute timestep. Mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	S33	1050	14.318	0.776	6.4	0.4938	0.0000	SURCHARGED
1440 minute summer	SA1	1050	14.318	1.157	12.6	193.8350	0.0000	SURCHARGED
1440 minute summer	1	750	15.192	0.017	0.4	0.0001	0.0000	OK
1440 minute summer	2	750	15.014	0.013	0.4	0.0020	0.0000	OK
1440 minute summer	3	750	14.847	0.022	0.8	0.0002	0.0000	OK
1440 minute summer	4	1050	14.319	0.369	1.5	0.0586	0.0000	SURCHARGED
1440 minute summer	5	720	15.090	0.015	0.3	0.0001	0.0000	OK
1440 minute summer	7	750	15.099	0.024	0.7	0.0002	0.0000	OK
1440 minute summer	6	720	14.851	0.011	0.3	0.0017	0.0000	OK
1440 minute summer	8	750	14.844	0.014	0.7	0.0022	0.0000	OK
1440 minute summer	9	720	15.089	0.014	0.3	0.0001	0.0000	OK
1440 minute summer	10	720	15.089	0.014	0.3	0.0001	0.0000	OK
1440 minute summer	11	720	14.867	0.027	0.6	0.0044	0.0000	OK
1440 minute summer	12	720	14.819	0.010	0.6	0.0016	0.0000	OK
1440 minute summer	14	750	15.099	0.024	0.7	0.0002	0.0000	OK
1440 minute summer	15	750	14.912	0.013	0.7	0.0021	0.0000	OK
1440 minute summer	16	720	15.089	0.014	0.3	0.0001	0.0000	OK
1440 minute summer	17	720	15.089	0.014	0.3	0.0001	0.0000	OK
1440 minute summer	18	720	14.867	0.027	0.6	0.0044	0.0000	OK
1440 minute summer	19	720	14.819	0.010	0.6	0.0016	0.0000	OK
1440 minute summer	13	1050	14.319	0.499	2.8	0.0793	0.0000	SURCHARGED
1440 minute summer	20	720	15.090	0.015	0.3	0.0001	0.0000	OK
1440 minute summer	21	720	14.849	0.014	0.3	0.0022	0.0000	OK
1440 minute summer	22	720	15.088	0.013	0.3	0.0001	0.0000	OK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	S33	1.005	SA1	6.3	0.600	0.159	0.4576	
1440 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
1440 minute summer	SA1	Infiltration		2.6				
1440 minute summer	1	1.000	2	0.4	0.539	0.059	0.0103	
1440 minute summer	2	1.001	4	0.4	0.684	0.035	0.1157	
1440 minute summer	3	3.000	4	0.8	0.643	0.102	0.0275	
1440 minute summer	4	1.002	13	1.5	0.471	0.122	0.4702	
1440 minute summer	5	2.000	6	0.3	0.511	0.044	0.0110	
1440 minute summer	7	4.000	8	0.7	0.697	0.103	0.0199	
1440 minute summer	6	2.001	4	0.3	0.691	0.022	0.0031	
1440 minute summer	8	4.001	13	0.7	0.470	0.039	0.0505	
1440 minute summer	9	5.000	11	0.3	0.480	0.038	0.0069	
1440 minute summer	10	6.000	11	0.3	0.480	0.038	0.0069	
1440 minute summer	11	5.001	12	0.6	0.589	0.144	0.0070	
1440 minute summer	12	5.002	13	0.6	0.483	0.022	0.0197	
1440 minute summer	14	11.000	15	0.7	0.703	0.104	0.0144	
1440 minute summer	15	11.001	29	0.7	0.235	0.037	0.0569	
1440 minute summer	16	12.000	18	0.3	0.480	0.038	0.0069	
1440 minute summer	17	13.000	18	0.3	0.480	0.038	0.0068	
1440 minute summer	18	12.001	19	0.6	0.591	0.144	0.0070	
1440 minute summer	19	12.002	29	0.6	0.253	0.021	0.0236	
1440 minute summer	13	1.003	29	2.8	0.405	0.054	0.9131	
1440 minute summer	20	7.000	21	0.3	0.449	0.044	0.0127	
1440 minute summer	21	7.001	25	0.3	0.472	0.039	0.0073	
1440 minute summer	22	9.000	24	0.3	0.484	0.038	0.0066	

Results for 100 year +45% CC 1440 minute summer. 2880 minute analysis at 30 minute timestep. Mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	23	720	15.088	0.013	0.3	0.0001	0.0000	OK
1440 minute summer	24	720	14.860	0.020	0.6	0.0031	0.0000	OK
1440 minute summer	25	720	14.662	0.014	0.9	0.0022	0.0000	OK
1440 minute summer	26	1050	14.320	0.120	1.6	0.0190	0.0000	SURCHARGED
1440 minute summer	27	750	15.098	0.023	0.7	0.0002	0.0000	OK
1440 minute summer	28	750	14.909	0.015	0.7	0.0024	0.0000	OK
1440 minute summer	29	1050	14.319	0.727	5.7	0.1155	0.0000	SURCHARGED
1440 minute summer	36	720	14.942	0.017	0.4	0.0001	0.0000	OK
1440 minute summer	37	720	14.718	0.017	0.4	0.0028	0.0000	OK
1440 minute summer	38	720	14.671	0.016	0.4	0.0025	0.0000	OK
1440 minute summer	57	750	14.945	0.020	0.9	0.0002	0.0000	OK
1440 minute summer	39	720	14.993	0.014	0.3	0.0001	0.0000	OK
1440 minute summer	40	750	14.899	0.026	1.1	0.0042	0.0000	OK
1440 minute summer	42	750	14.585	0.020	1.4	0.0033	0.0000	OK
1440 minute summer	41	720	15.086	0.011	0.3	0.0001	0.0000	OK
1440 minute summer	43	750	14.376	0.043	2.7	0.0069	0.0000	OK
1440 minute summer	31	1050	14.318	0.125	2.7	0.0199	0.0000	OK
1440 minute summer	dummy	30	13.153	0.000	0.0	0.0000	0.0000	OK
1440 minute summer	48	750	14.472	0.027	1.7	0.0043	0.0000	OK
1440 minute summer	53	1050	14.319	0.129	2.8	0.0204	0.0000	OK
1440 minute summer	54	1050	14.318	0.319	2.8	0.0508	0.0000	SURCHARGED
1440 minute summer	52	750	14.398	0.022	1.1	0.0035	0.0000	OK
1440 minute summer	32	1050	14.318	0.118	0.9	0.0188	0.0000	SURCHARGED
1440 minute summer	35	750	14.591	0.015	0.9	0.0024	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	23	8.000	24	0.3	0.482	0.038	0.0068	
1440 minute summer	24	8.001	25	0.6	0.702	0.074	0.0093	
1440 minute summer	25	7.002	26	0.9	0.808	0.039	0.0130	
1440 minute summer	26	7.003	29	1.6	0.840	0.173	0.1632	
1440 minute summer	27	10.000	28	0.7	0.669	0.104	0.0154	
1440 minute summer	28	10.001	26	0.7	0.565	0.048	0.0489	
1440 minute summer	29	1.004	S33	5.5	0.587	0.126	0.2859	
1440 minute summer	36	15.000	37	0.4	0.456	0.059	0.0157	
1440 minute summer	37	15.001	38	0.4	0.471	0.061	0.0033	
1440 minute summer	38	15.002	43	0.4	0.509	0.053	0.0137	
1440 minute summer	57	18.000	43	0.9	0.816	0.085	0.0198	
1440 minute summer	39	16.000	40	0.3	0.289	0.044	0.0098	
1440 minute summer	40	16.001	42	1.1	0.679	0.147	0.0272	
1440 minute summer	42	16.002	43	1.4	0.514	0.040	0.0167	
1440 minute summer	41	17.000	42	0.3	0.653	0.024	0.0052	
1440 minute summer	43	15.003	31	2.7	0.919	0.153	0.1204	
1440 minute summer	31	15.004	SA1	2.7	1.090	0.055	0.1622	
1440 minute summer	48	19.000	53	1.7	0.591	0.071	0.1184	
1440 minute summer	53	19.001	54	2.8	0.908	0.140	0.2557	
1440 minute summer	54	19.002	SA1	2.8	0.851	0.082	0.2522	
1440 minute summer	52	20.000	53	1.1	0.526	0.107	0.0273	
1440 minute summer	32	14.000	S33	0.9	0.256	0.052	0.0651	
1440 minute summer	35	21.000	SA1	0.9	0.865	0.049	0.0522	

Results for 100 year +45% CC 2160 minute summer. 3600 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	S33	1440	14.266	0.724	4.4	0.4602	0.0000	SURCHARGED
2160 minute summer	SA1	1440	14.266	1.105	8.8	184.9877	0.0000	SURCHARGED
2160 minute summer	1	1140	15.190	0.015	0.3	0.0001	0.0000	OK
2160 minute summer	2	1140	15.012	0.011	0.3	0.0018	0.0000	OK
2160 minute summer	3	1140	14.844	0.019	0.6	0.0002	0.0000	OK
2160 minute summer	4	1440	14.266	0.316	1.1	0.0502	0.0000	SURCHARGED
2160 minute summer	5	1080	15.088	0.013	0.2	0.0001	0.0000	OK
2160 minute summer	7	1140	15.095	0.020	0.5	0.0002	0.0000	OK
2160 minute summer	6	1080	14.849	0.009	0.2	0.0014	0.0000	OK
2160 minute summer	8	1140	14.842	0.012	0.5	0.0018	0.0000	OK
2160 minute summer	9	1080	15.086	0.011	0.2	0.0001	0.0000	OK
2160 minute summer	10	1080	15.086	0.011	0.2	0.0001	0.0000	OK
2160 minute summer	11	1080	14.863	0.023	0.4	0.0036	0.0000	OK
2160 minute summer	12	1080	14.817	0.008	0.4	0.0013	0.0000	OK
2160 minute summer	14	1140	15.095	0.020	0.5	0.0002	0.0000	OK
2160 minute summer	15	1140	14.910	0.011	0.5	0.0018	0.0000	OK
2160 minute summer	16	1080	15.086	0.011	0.2	0.0001	0.0000	OK
2160 minute summer	17	1080	15.086	0.011	0.2	0.0001	0.0000	OK
2160 minute summer	18	1080	14.863	0.023	0.4	0.0036	0.0000	OK
2160 minute summer	19	1080	14.817	0.008	0.4	0.0013	0.0000	OK
2160 minute summer	13	1440	14.266	0.446	2.0	0.0709	0.0000	SURCHARGED
2160 minute summer	20	1080	15.087	0.012	0.2	0.0001	0.0000	OK
2160 minute summer	21	1080	14.846	0.011	0.2	0.0018	0.0000	OK
2160 minute summer	22	1080	15.086	0.011	0.2	0.0001	0.0000	OK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute summer	S33	1.005	SA1	4.4	0.524	0.111	0.4576	
2160 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
2160 minute summer	SA1	Infiltration		2.5				
2160 minute summer	1	1.000	2	0.3	0.495	0.044	0.0084	
2160 minute summer	2	1.001	4	0.3	0.627	0.026	0.1141	
2160 minute summer	3	3.000	4	0.6	0.591	0.076	0.0225	
2160 minute summer	4	1.002	13	1.1	0.432	0.089	0.4702	
2160 minute summer	5	2.000	6	0.2	0.453	0.029	0.0083	
2160 minute summer	7	4.000	8	0.5	0.632	0.074	0.0157	
2160 minute summer	6	2.001	4	0.2	0.614	0.015	0.0023	
2160 minute summer	8	4.001	13	0.5	0.424	0.028	0.0497	
2160 minute summer	9	5.000	11	0.2	0.425	0.025	0.0052	
2160 minute summer	10	6.000	11	0.2	0.425	0.025	0.0052	
2160 minute summer	11	5.001	12	0.4	0.520	0.096	0.0053	
2160 minute summer	12	5.002	13	0.4	0.425	0.014	0.0195	
2160 minute summer	14	11.000	15	0.5	0.638	0.074	0.0114	
2160 minute summer	15	11.001	29	0.5	0.235	0.026	0.0560	
2160 minute summer	16	12.000	18	0.2	0.425	0.025	0.0052	
2160 minute summer	17	13.000	18	0.2	0.425	0.025	0.0052	
2160 minute summer	18	12.001	19	0.4	0.521	0.096	0.0053	
2160 minute summer	19	12.002	29	0.4	0.231	0.014	0.0233	
2160 minute summer	13	1.003	29	2.0	0.365	0.038	0.9131	
2160 minute summer	20	7.000	21	0.2	0.397	0.029	0.0096	
2160 minute summer	21	7.001	25	0.2	0.418	0.026	0.0055	
2160 minute summer	22	9.000	24	0.2	0.428	0.025	0.0050	

Results for 100 year +45% CC 2160 minute summer. 3600 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	23	1080	15.086	0.011	0.2	0.0001	0.0000	OK
2160 minute summer	24	1080	14.856	0.016	0.4	0.0026	0.0000	OK
2160 minute summer	25	1080	14.659	0.011	0.6	0.0018	0.0000	OK
2160 minute summer	26	1440	14.267	0.067	1.1	0.0106	0.0000	OK
2160 minute summer	27	1140	15.095	0.020	0.5	0.0002	0.0000	OK
2160 minute summer	28	1140	14.907	0.013	0.5	0.0020	0.0000	OK
2160 minute summer	29	1440	14.266	0.674	4.0	0.1071	0.0000	SURCHARGED
2160 minute summer	36	1140	14.939	0.014	0.3	0.0001	0.0000	OK
2160 minute summer	37	1140	14.716	0.015	0.3	0.0024	0.0000	OK
2160 minute summer	38	1140	14.669	0.014	0.3	0.0022	0.0000	OK
2160 minute summer	57	1140	14.941	0.016	0.6	0.0001	0.0000	OK
2160 minute summer	39	1080	14.991	0.012	0.2	0.0001	0.0000	OK
2160 minute summer	40	1140	14.894	0.021	0.7	0.0033	0.0000	OK
2160 minute summer	42	1140	14.582	0.017	0.9	0.0026	0.0000	OK
2160 minute summer	41	1080	15.084	0.009	0.2	0.0001	0.0000	OK
2160 minute summer	43	1140	14.368	0.035	1.8	0.0056	0.0000	OK
2160 minute summer	31	1440	14.266	0.073	1.8	0.0115	0.0000	OK
2160 minute summer	dummy	60	13.153	0.000	0.0	0.0000	0.0000	OK
2160 minute summer	48	1140	14.468	0.023	1.2	0.0036	0.0000	OK
2160 minute summer	53	1440	14.266	0.076	2.0	0.0120	0.0000	OK
2160 minute summer	54	1440	14.266	0.267	2.0	0.0424	0.0000	SURCHARGED
2160 minute summer	52	1140	14.395	0.019	0.8	0.0030	0.0000	OK
2160 minute summer	32	1440	14.266	0.066	0.6	0.0105	0.0000	OK
2160 minute summer	35	1140	14.588	0.012	0.6	0.0020	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute summer	23	8.000	24	0.2	0.426	0.025	0.0051	
2160 minute summer	24	8.001	25	0.4	0.623	0.049	0.0070	
2160 minute summer	25	7.002	26	0.6	0.695	0.026	0.0094	
2160 minute summer	26	7.003	29	1.1	0.763	0.119	0.1393	
2160 minute summer	27	10.000	28	0.5	0.607	0.074	0.0121	
2160 minute summer	28	10.001	26	0.5	0.522	0.034	0.0344	
2160 minute summer	29	1.004	S33	3.8	0.511	0.089	0.2859	
2160 minute summer	36	15.000	37	0.3	0.420	0.044	0.0128	
2160 minute summer	37	15.001	38	0.3	0.434	0.046	0.0027	
2160 minute summer	38	15.002	43	0.3	0.468	0.040	0.0112	
2160 minute summer	57	18.000	43	0.6	0.724	0.057	0.0149	
2160 minute summer	39	16.000	40	0.2	0.258	0.030	0.0072	
2160 minute summer	40	16.001	42	0.7	0.597	0.093	0.0197	
2160 minute summer	42	16.002	43	0.9	0.445	0.025	0.0124	
2160 minute summer	41	17.000	42	0.2	0.579	0.016	0.0039	
2160 minute summer	43	15.003	31	1.8	0.817	0.102	0.0689	
2160 minute summer	31	15.004	SA1	1.8	0.985	0.037	0.1267	
2160 minute summer	48	19.000	53	1.2	0.518	0.050	0.0677	
2160 minute summer	53	19.001	54	2.0	0.825	0.100	0.2013	
2160 minute summer	54	19.002	SA1	2.0	0.765	0.059	0.2522	
2160 minute summer	52	20.000	53	0.8	0.483	0.078	0.0221	
2160 minute summer	32	14.000	S33	0.6	0.306	0.035	0.0553	
2160 minute summer	35	21.000	SA1	0.6	0.762	0.033	0.0511	

Results for 100 year +45% CC 2880 minute summer. 4320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	S33	1860	14.238	0.696	3.9	0.4424	0.0000	SURCHARGED
2880 minute summer	SA1	1860	14.237	1.076	7.4	180.2788	0.0000	SURCHARGED
2880 minute summer	1	1560	15.187	0.012	0.2	0.0001	0.0000	OK
2880 minute summer	2	1440	15.010	0.009	0.2	0.0015	0.0000	OK
2880 minute summer	3	1500	14.842	0.017	0.5	0.0001	0.0000	OK
2880 minute summer	4	1860	14.238	0.288	0.9	0.0457	0.0000	SURCHARGED
2880 minute summer	5	1440	15.088	0.013	0.2	0.0001	0.0000	OK
2880 minute summer	7	1500	15.093	0.018	0.4	0.0001	0.0000	OK
2880 minute summer	6	1440	14.849	0.009	0.2	0.0014	0.0000	OK
2880 minute summer	8	1500	14.840	0.010	0.4	0.0017	0.0000	OK
2880 minute summer	9	1440	15.086	0.011	0.2	0.0001	0.0000	OK
2880 minute summer	10	1440	15.086	0.011	0.2	0.0001	0.0000	OK
2880 minute summer	11	1440	14.863	0.023	0.4	0.0036	0.0000	OK
2880 minute summer	12	1440	14.817	0.008	0.4	0.0013	0.0000	OK
2880 minute summer	14	1500	15.093	0.018	0.4	0.0001	0.0000	OK
2880 minute summer	15	1500	14.909	0.010	0.4	0.0016	0.0000	OK
2880 minute summer	16	1440	15.086	0.011	0.2	0.0001	0.0000	OK
2880 minute summer	17	1440	15.086	0.011	0.2	0.0001	0.0000	OK
2880 minute summer	18	1440	14.863	0.023	0.4	0.0036	0.0000	OK
2880 minute summer	19	1440	14.817	0.008	0.4	0.0013	0.0000	OK
2880 minute summer	13	1860	14.238	0.418	1.7	0.0664	0.0000	SURCHARGED
2880 minute summer	20	1440	15.087	0.012	0.2	0.0001	0.0000	OK
2880 minute summer	21	1440	14.846	0.011	0.2	0.0018	0.0000	OK
2880 minute summer	22	1440	15.086	0.011	0.2	0.0001	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	S33	1.005	SA1	3.8	0.509	0.097	0.4576	
2880 minute summer	SA1	1.006	dummy	0.0	0.000	0.000	0.0000	0.0
2880 minute summer	SA1	Infiltration		2.5				
2880 minute summer	1	1.000	2	0.2	0.440	0.029	0.0064	
2880 minute summer	2	1.001	4	0.2	0.555	0.017	0.1122	
2880 minute summer	3	3.000	4	0.5	0.560	0.063	0.0197	
2880 minute summer	4	1.002	13	0.9	0.404	0.073	0.4702	
2880 minute summer	5	2.000	6	0.2	0.453	0.029	0.0083	
2880 minute summer	7	4.000	8	0.4	0.591	0.059	0.0134	
2880 minute summer	6	2.001	4	0.2	0.614	0.015	0.0023	
2880 minute summer	8	4.001	13	0.4	0.393	0.023	0.0493	
2880 minute summer	9	5.000	11	0.2	0.425	0.025	0.0052	
2880 minute summer	10	6.000	11	0.2	0.425	0.025	0.0052	
2880 minute summer	11	5.001	12	0.4	0.520	0.096	0.0053	
2880 minute summer	12	5.002	13	0.4	0.440	0.014	0.0195	
2880 minute summer	14	11.000	15	0.4	0.597	0.059	0.0097	
2880 minute summer	15	11.001	29	0.4	0.248	0.021	0.0556	
2880 minute summer	16	12.000	18	0.2	0.425	0.025	0.0052	
2880 minute summer	17	13.000	18	0.2	0.425	0.025	0.0052	
2880 minute summer	18	12.001	19	0.4	0.521	0.096	0.0053	
2880 minute summer	19	12.002	29	0.4	0.231	0.014	0.0233	
2880 minute summer	13	1.003	29	1.7	0.360	0.033	0.9131	
2880 minute summer	20	7.000	21	0.2	0.397	0.029	0.0096	
2880 minute summer	21	7.001	25	0.2	0.418	0.026	0.0055	
2880 minute summer	22	9.000	24	0.2	0.428	0.025	0.0050	

Results for 100 year +45% CC 2880 minute summer. 4320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	23	1440	15.086	0.011	0.2	0.0001	0.0000	OK
2880 minute summer	24	1440	14.856	0.016	0.4	0.0026	0.0000	OK
2880 minute summer	25	1440	14.659	0.011	0.6	0.0018	0.0000	OK
2880 minute summer	26	1860	14.239	0.039	1.0	0.0061	0.0000	OK
2880 minute summer	27	1500	15.093	0.018	0.4	0.0001	0.0000	OK
2880 minute summer	28	1500	14.905	0.011	0.4	0.0018	0.0000	OK
2880 minute summer	29	1860	14.238	0.646	3.5	0.1027	0.0000	SURCHARGED
2880 minute summer	36	1380	14.937	0.012	0.2	0.0001	0.0000	OK
2880 minute summer	37	1380	14.713	0.012	0.2	0.0020	0.0000	OK
2880 minute summer	38	1380	14.666	0.011	0.2	0.0018	0.0000	OK
2880 minute summer	57	1500	14.940	0.015	0.5	0.0001	0.0000	OK
2880 minute summer	39	1440	14.991	0.012	0.2	0.0001	0.0000	OK
2880 minute summer	40	1440	14.892	0.019	0.6	0.0031	0.0000	OK
2880 minute summer	42	1440	14.581	0.016	0.8	0.0025	0.0000	OK
2880 minute summer	41	1440	15.084	0.009	0.2	0.0001	0.0000	OK
2880 minute summer	43	1500	14.365	0.032	1.5	0.0051	0.0000	OK
2880 minute summer	31	1860	14.237	0.044	1.5	0.0071	0.0000	OK
2880 minute summer	dummy	60	13.153	0.000	0.0	0.0000	0.0000	OK
2880 minute summer	48	1500	14.466	0.021	1.0	0.0033	0.0000	OK
2880 minute summer	53	1860	14.238	0.048	1.6	0.0076	0.0000	OK
2880 minute summer	54	1860	14.238	0.239	1.6	0.0379	0.0000	SURCHARGED
2880 minute summer	52	1500	14.392	0.016	0.6	0.0026	0.0000	OK
2880 minute summer	32	1860	14.238	0.038	0.5	0.0060	0.0000	OK
2880 minute summer	35	1500	14.587	0.011	0.5	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	23	8.000	24	0.2	0.426	0.025	0.0051	
2880 minute summer	24	8.001	25	0.4	0.623	0.049	0.0070	
2880 minute summer	25	7.002	26	0.6	0.731	0.026	0.0049	
2880 minute summer	26	7.003	29	1.0	0.741	0.108	0.1106	
2880 minute summer	27	10.000	28	0.4	0.567	0.059	0.0104	
2880 minute summer	28	10.001	26	0.4	0.464	0.027	0.0178	
2880 minute summer	29	1.004	S33	3.4	0.486	0.078	0.2859	
2880 minute summer	36	15.000	37	0.2	0.373	0.030	0.0096	
2880 minute summer	37	15.001	38	0.2	0.385	0.030	0.0020	
2880 minute summer	38	15.002	43	0.2	0.414	0.026	0.0084	
2880 minute summer	57	18.000	43	0.5	0.687	0.047	0.0131	
2880 minute summer	39	16.000	40	0.2	0.258	0.030	0.0067	
2880 minute summer	40	16.001	42	0.6	0.570	0.080	0.0177	
2880 minute summer	42	16.002	43	0.8	0.459	0.023	0.0111	
2880 minute summer	41	17.000	42	0.2	0.579	0.016	0.0039	
2880 minute summer	43	15.003	31	1.5	0.775	0.085	0.0389	
2880 minute summer	31	15.004	SA1	1.5	0.984	0.031	0.1068	
2880 minute summer	48	19.000	53	1.0	0.500	0.042	0.0386	
2880 minute summer	53	19.001	54	1.6	0.774	0.080	0.1701	
2880 minute summer	54	19.002	SA1	1.6	0.797	0.047	0.2522	
2880 minute summer	52	20.000	53	0.6	0.433	0.059	0.0133	
2880 minute summer	32	14.000	S33	0.5	0.403	0.029	0.0438	
2880 minute summer	35	21.000	SA1	0.5	0.762	0.027	0.0507	

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	2.000
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Drive	0.099	14.750	600	0.000	10.000	1.760

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	1200	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Drive Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.190	Slope (1:X)	150.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	1.5	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	139.000		

Node Drive Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	12.990	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.07600	Time to half empty (mins)	265	Inf Depth (m)	1.200
Safety Factor	5.0	Pit Width (m)	0.450	Number Required	1
Porosity	0.30	Pit Length (m)	75.000		

Node Drive Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.290	Slope (1:X)	999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	4.000	Inf Depth (m)	
Porosity	0.30	Length (m)	88.000		

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.45%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	Drive	480	14.721	1.731	13.6	85.1795	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)					
480 minute summer	Drive	Infiltration	0.8					

Results for 100 year +45% CC 15 minute summer. 1215 minute analysis at 1 minute timestep. Mass balance: 99.45%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Drive	20	14.471	1.481	85.0	35.9560	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
15 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 30 minute summer. 1230 minute analysis at 1 minute timestep. Mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	Drive	35	14.539	1.549	78.2	48.0432	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
30 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 60 minute summer. 1260 minute analysis at 1 minute timestep. Mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	Drive	64	14.608	1.618	59.9	61.1792	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
60 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 120 minute summer. 1320 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	Drive	124	14.658	1.668	38.2	71.5643	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
120 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 180 minute summer. 1380 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	Drive	184	14.684	1.694	28.1	77.0803	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
180 minute summer	Drive	Infiltration	0.8					

Results for 100 year +45% CC 240 minute summer. 1440 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	Drive	244	14.700	1.710	23.5	80.4648	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
240 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 360 minute summer. 1560 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	Drive	360	14.714	1.724	17.5	83.7755	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
360 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 480 minute summer. 1680 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	Drive	480	14.721	1.731	13.6	85.1795	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
480 minute summer	Drive	Infiltration	0.8					

Results for 100 year +45% CC 600 minute summer. 1800 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	Drive	600	14.719	1.729	10.9	84.7414	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
600 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 720 minute summer. 1920 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	Drive	720	14.714	1.724	9.6	83.7216	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
720 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 960 minute summer. 2160 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	Drive	870	14.704	1.714	7.7	81.3832	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
960 minute summer	Drive	Infiltration	0.8

Results for 100 year +45% CC 1440 minute summer. 2640 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Drive	1080	14.681	1.691	5.4	76.4456	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
1440 minute summer	Drive	Infiltration	0.8					

Results for 100 year +45% CC 2160 minute summer. 3360 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	Drive	1500	14.652	1.662	3.8	70.3312	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
2160 minute summer	Drive	Infiltration	0.8					

Results for 100 year +45% CC 2880 minute summer. 4080 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	Drive	1920	14.617	1.627	3.1	62.9973	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
2880 minute summer	Drive	Infiltration	0.8					

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	2.000
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Drive	0.125	15.400	600	0.000	10.000	1.780

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	1200	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Drive Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.840	Slope (1:X)	999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	1.5	Width (m)	4.900	Inf Depth (m)	
Porosity	0.30	Length (m)	90.000		

Node Drive Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	13.620	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.07600	Time to half empty (mins)	265	Inf Depth (m)	1.200
Safety Factor	5.0	Pit Width (m)	0.450	Number Required	1
Porosity	0.30	Pit Length (m)	88.000		

Node Drive Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.960	Slope (1:X)	999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	137.000		

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	Drive	600	15.251	1.631	13.8	108.6920	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
600 minute summer		Drive	Infiltration	0.9				

Results for 100 year +45% CC 15 minute summer. 1215 minute analysis at 1 minute timestep. Mass balance: 99.45%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Drive	20	15.062	1.442	107.3	45.9591	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
15 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 30 minute summer. 1230 minute analysis at 1 minute timestep. Mass balance: 99.64%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	Drive	35	15.109	1.489	98.7	60.7758	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
30 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 60 minute summer. 1260 minute analysis at 1 minute timestep. Mass balance: 97.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	Drive	64	15.163	1.543	75.6	79.2613	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
60 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 120 minute summer. 1320 minute analysis at 2 minute timestep. Mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	Drive	124	15.198	1.578	48.2	90.8267	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
120 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 180 minute summer. 1380 minute analysis at 4 minute timestep. Mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	Drive	184	15.218	1.598	35.5	97.6660	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
180 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 240 minute summer. 1440 minute analysis at 4 minute timestep. Mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	Drive	244	15.232	1.612	29.7	102.2502	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)
240 minute summer	Drive	Infiltration	0.9

Results for 100 year +45% CC 360 minute summer. 1560 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	Drive	368	15.245	1.625	22.2	106.8031	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
360 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 480 minute summer. 1680 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	Drive	480	15.250	1.630	17.1	108.4938	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
480 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 600 minute summer. 1800 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	Drive	600	15.251	1.631	13.8	108.6920	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
600 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 720 minute summer. 1920 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	Drive	720	15.249	1.629	12.1	108.2970	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
720 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 960 minute summer. 2160 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	Drive	930	15.240	1.620	9.7	105.1117	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
960 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 1440 minute summer. 2640 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Drive	1140	15.222	1.602	6.8	98.8811	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
1440 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 2160 minute summer. 3360 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	Drive	1560	15.197	1.577	4.7	90.4463	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
2160 minute summer	Drive	Infiltration	0.9					

Results for 100 year +45% CC 2880 minute summer. 4080 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	Drive	1920	15.177	1.557	3.9	83.7242	0.0000	OK
Link Event	US Node	Link	Outflow (l/s)					
2880 minute summer	Drive	Infiltration	0.9					

7.4 **Appendix D – Site Investigation Reports**



Omnia
3 – 6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

Web: www.omnia-consulting.co.uk

12th April 2023

ref: A11949/230404/L1

Stuart Mackley
Elberry Properties Ltd
12 Northgate
Chichester
West Sussex
PO19 1BA

By Email: [REDACTED]

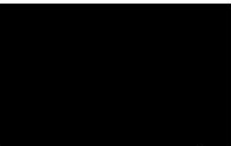
Dear Stuart,

RE: Land behind The Croft, Barnham Road, Eastergate, PO20 3RP – Geo-Environmental Services – Groundwater Monitoring

Omnia were commissioned by Elberry Properties Ltd to undertake winter groundwater monitoring within three (3no.) installed wells via spot monitoring across the site of The Croft, Eastergate. The following letter report presents the information obtained from the winter groundwater monitoring works.

If you have any questions, please do not hesitate to contact us.

Yours Sincerely,
Omnia Consulting



Tommy Holloway
Geo Environmental Consultant

A handwritten signature in black ink that reads "O. Maxwell".

Olivia Maxwell
Senior Geo Environmental Consultant

Attachments:

- Attachment 1: Limitations
- Attachment 2: Drawings
- Attachment 3: Exploratory Hole Logs
- Attachment 4: Photographs

Quality Assurance

Project Number: A11949					
April 2023					
 Geotechnical	Winter Groundwater Monitoring Report				
	Prepared by:	T. Holloway	Date:	04/04/2023	Signature:
	Reviewed by:	H. Spurling	Date:	06/04/2023	Signature:
Authorised by:	O. Maxwell	Date:	11/04/2023	Signature:	

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Ecology



Acoustics



Geotechnical



Geo-environmental



Air Quality

Site Address	Land behind The Croft, Barnham Road, Eastergate, PO20 3RP
National Grid Reference	494677, 105746
Site Area	1.07 ha

1 Background

Omnia have been commissioned by Elberry Properties Ltd to undertake a Winter Groundwater Monitoring Investigation at the site Land behind The Croft, Barnham Road, Eastergate, PO20 3RP to assist the client with their due diligence assessment of the site. The proposed development is for fourteen (14no.) bungalows spaced around a central green and circular access road within the boundary of the approximately square shaped site.

It is understood that no planning application has been submitted at this time.

A Site Location Plan is presented as Figure 1.0 and a Proposed Development Plan presented as Figure 2.0 within Attachment 2.

The site is currently comprised of open green space which covers an area of 1.07 ha and has remained undisturbed, between 1910-2001 an orchard within sections of the north and south of the site was identified on historical mapping. The site is approximately square in shape; the north, northwest, west and southwest of the site is bordered by residential properties. The south of the site is bordered by the Dhand construction site with open fields to the east.

A Phase I-II Geo-Environmental Site Assessment was produced by Omnia for Elberry Properties Ltd in December 2022 (Omnia ref: A11949/1.2) for the site, which included soakaway testing undertaken in February 2023. Three (3no.) monitoring wells were installed as part of the investigation and were utilised for this monitoring (WS102, WS104 and WS105), as detailed in Figure 3.0, with logs provided in Attachment 3.

The results of Omnia's winter groundwater monitoring visits are presented within this factual report.

2 Geology & Hydrogeology

The British Geological Survey (BGS) map for the site, Chichester and Bognor, Sheet 317/332, Solid and Drift at a scale of 1:50,000, dated 1996 indicates that the site is underlain by the geological sequence summarised in Table 2.1:

Table 2.1 - Geological Succession

Geological Unit	Formation Name	Description	Aquifer Classification
Superficial	Head Deposits along the western boundary of the site	Gravel, Sand, Silt & Clay	Secondary A
	River Terrace Deposits across the remainder of the site	Sand, Silt & Clay	Secondary A
Bedrock	London Clay Formation	Clay, Silt & Sand	Unproductive Strata

Intrusive site investigation undertaken by Omnia in October 2022 identified Topsoil within all five (5no.) intrusive locations and was found to lie directly above natural superficial deposits. Topsoil generally comprised of brown slightly sandy slightly gravelly CLAY with frequent rootlets. No Made Ground was identified on site.

Topsoil was directly underlain by natural superficial deposits attributed to the locally mapped River Terrace Deposits which were encountered site-wide within all intrusive locations from 0.25-1.90m bgl, the extent of this unit was not proven during this site investigation. River Terrace Deposits found on site generally comprised firm orangish brown slightly gravelly sandy CLAY.

No groundwater strikes were encountered during works.

2.1 Groundwater Conditions

Results of the groundwater monitoring undertaken between 06/12/2022 to 31/03/2023 for all available monitoring wells has been summarised and included in Table 2.2 below.

During the additional Phase II soakaway testing which was undertaken on the 22/02/2023, one (1no.) additional monitoring well was installed within TP201 which was spot monitored from 22/02/2023-31/03/2023.

Table 2.2 – Groundwater monitoring results

Location	Date	Depth to Groundwater (m bgl)*
WS102	06/12/2022	Dry
	22/12/2022	Dry
	23/01/2023	Dry
	22/02/2023	Dry
	03/03/2023	Dry
	31/03/2023	Dry
WS104	06/12/2022	Dry
	22/12/2022	Dry
	23/01/2023	Dry
	22/02/2023	Dry
	03/03/2023	Dry
	31/03/2023	Dry
WS105	06/12/2022	Dry
	22/12/2022	Dry
	23/01/2023	Dry
	22/02/2023	Dry
	03/03/2023	Dry
	31/03/2023	Dry
TP201	22/02/2023	Dry
	31/03/2023	Dry

*please note the deepest monitoring well is TP201 at 2.45m bgl, all other monitoring wells were shallower than 2.00m bgl with WS102 being the shallowest at 1.60m bgl.

3 Groundwater Monitoring Results

Between the 6th of December 2022 and the 31st of March 2023 six (6no.) monthly groundwater monitoring visits were completed by Omnia at all installed wells. Locations of the groundwater monitoring installations have been denoted on Figure 3.0 appended to this report.

A review of groundwater levels across the four (4no.) locations shows groundwater is deeper than all of the install depths due to all locations being dry during every visit. Therefore, depth to groundwater within WS102 is >1.90m bgl, WS104 is >1.80m bgl, WS105 is >1.60m bgl and TP201 is >2.45mbgl.

Discussion

From a review of the data presented above, groundwater was not present within any of the four (4no.) boreholes across the site during with winter monitoring period between 6th of December 2022 and 31st of March 2023.

End of Report

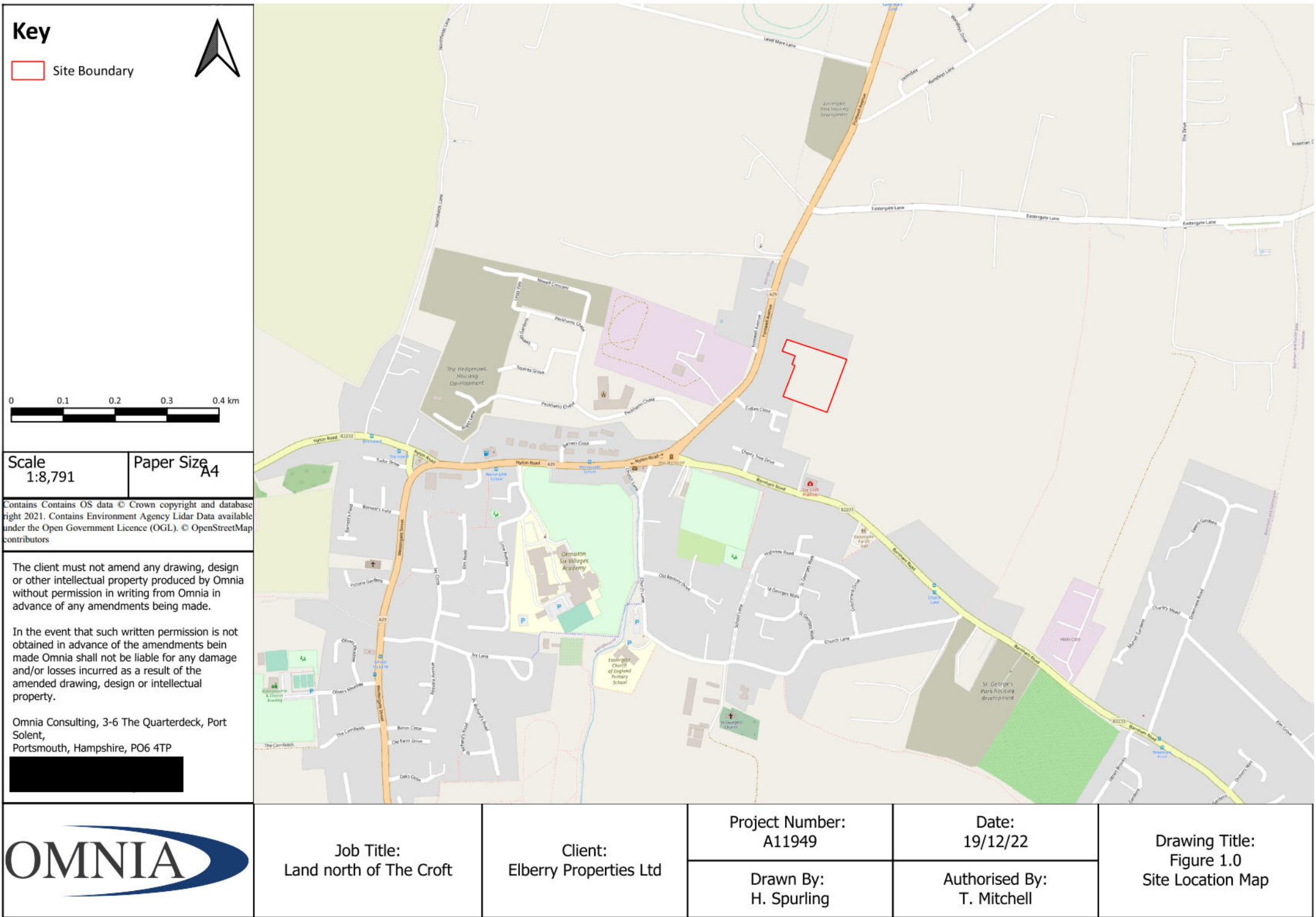
Attachment 1

Limitations

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between OEC and the Client as indicated in Section 1.0.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

Attachment 2

Drawings





Scale
1:650

Paper Size
A4

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Omnia Consulting, 3-6 The Quarterdeck, Port Solent, Portsmouth, Hampshire, PO6 4TP

OMNIA



Job Title:
Land north of The Croft

Client:
Elberry Properties Ltd

Project Number:
A11949

Drawn By:
L. Burnett

Date:
30/01/2023

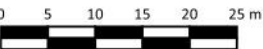
Authorised By:
O. Maxwell

Drawing Title:
Figure 2.0
Proposed Development Plan

Key



-  Window Sample Location
-  Trial Pit Monitoring Location
-  Site Boundary



Scale
1:800

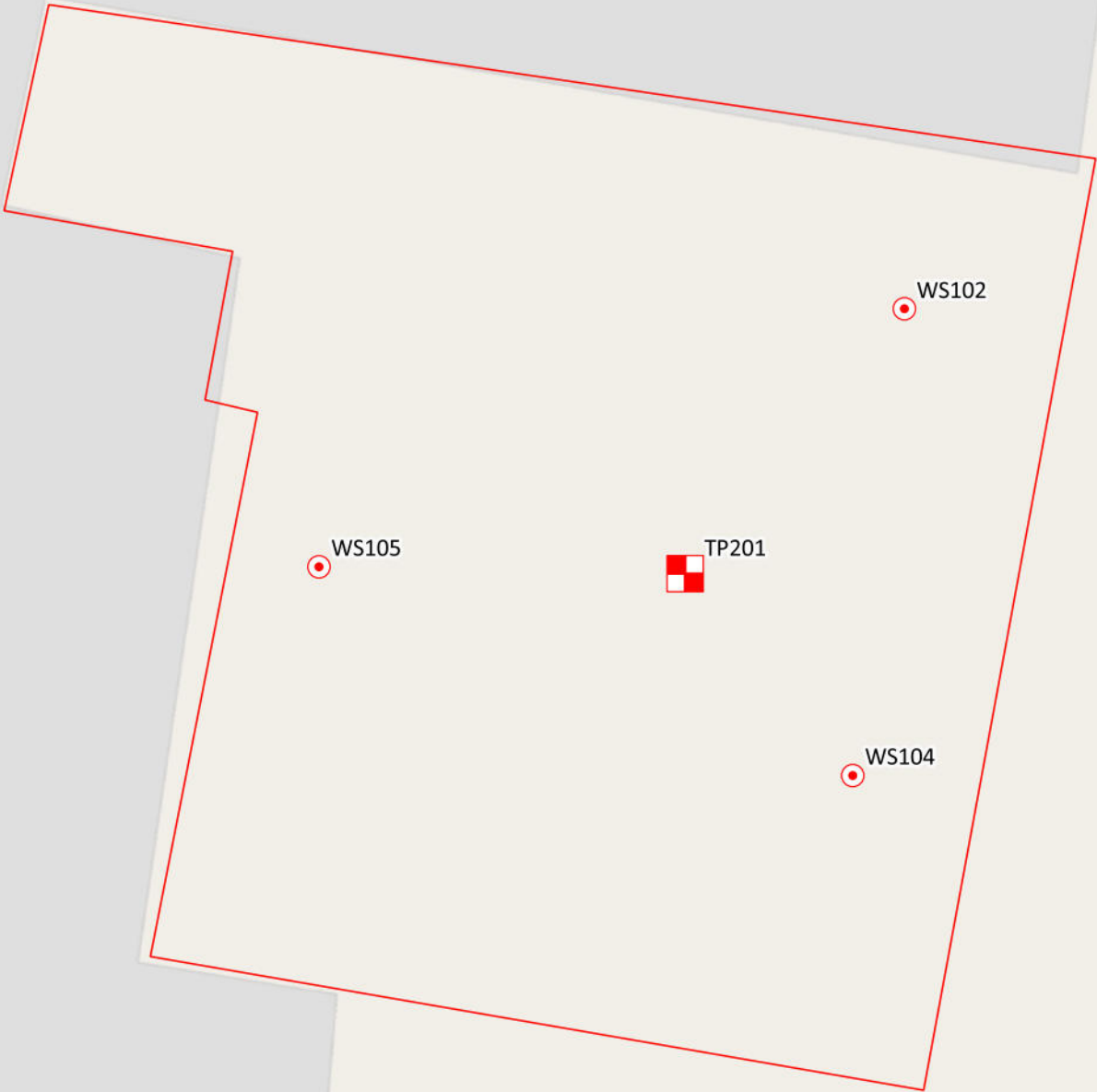
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Job Title:
Land North of The Croft

Client:
Elberry Properties Ltd

Project Number:
A11949

Drawn By:
T.Holloway

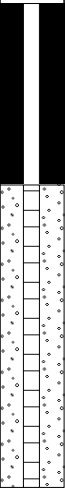
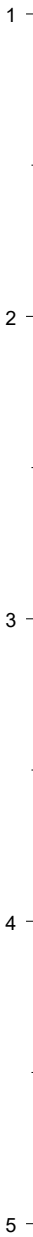
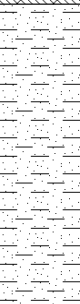
Date:
04/04/2023

Authorised By:
O.Maxwell

Drawing Title:
Figure 3.0
Winter Monitoring
Location Map

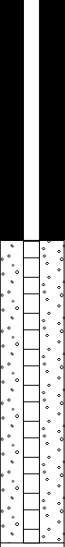
Attachment 3
Exploratory Hole Logs

		3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP		Borehole Log				Borehole No. WS102 Sheet 1 of 1	
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494716.07 - 105766.59		Hole Type WS	
Location: Barnham Road, Eastergate, PO20 3RP				Level:		Scale 1:25		Logged By JR	
Client: Elberry Properties Ltd				Dates: 28/10/2022 - 28/10/2022					

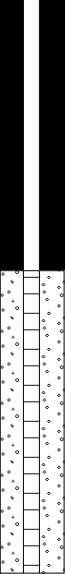
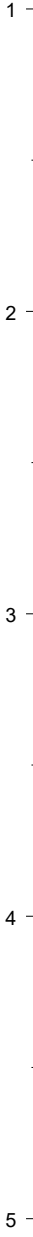
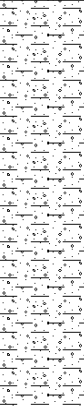
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES		0.30		Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]		
		0.30 - 0.60	ES						Soft to firm orangeish brown slightly sandy CLAY. Sand is fine to medium. [RIVER TERRACE DEPOSITS]
		0.60 - 1.00	ES						
		1.00		N=24 (6,6/6,7,5,6)					
		1.20 - 1.30	D		1.30				
		1.50 - 1.60	D		1.60				
		1.60		50 (9,12/50 for 105mm)			Firm orangeish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium angular to subrounded flint. [RIVER TERRACE DEPOSITS]		
End of borehole at 1.60 m									

Remarks
 1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.



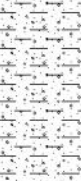
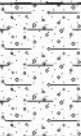
		3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP		Borehole Log				Borehole No. WS104 Sheet 1 of 1	
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494700.92 - 105714.81		Hole Type WS	
Location: Barnham Road, Eastergate, PO20 3RP				Level:		Scale 1:25			
Client: Elberry Properties Ltd				Dates: 28/10/2022 - 28/10/2022		Logged By JR			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.25	ES		0.25		Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]		
		0.25 - 0.60	ES				Soft to firm orangeish brown slightly gravelly sandy CLAY. Gravel is fine to coarse angular to subangular flint. Sand is fine to medium. [RIVER TERRACE DEPOSITS]		
		0.60 - 1.00	ES						
		1.00		N=16 (4,4/3,4,5,4)					
		1.20 - 1.30	D						
		1.60		50 (25 for 75mm/50 for 100mm)	1.60				
	1.70 - 1.80	D		1.80		Stiff light brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse angular to subangular flint. [RIVER TERRACE DEPOSITS]			
End of borehole at 1.80 m									
Remarks 1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.									

		3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP		Borehole Log				Borehole No. WS105 Sheet 1 of 1	
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494644.72 - 105749.07		Hole Type WS	
Location: Barnham Road, Eastergate, PO20 3RP				Level:		Scale 1:25		Logged By JR	
Client: Elberry Properties Ltd				Dates: 28/10/2022 - 28/10/2022					

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES		0.30		Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine to medium angular to subangular flint. [TOPSOIL]		
		0.30 - 0.60	ES						Firm orangeish brown slightly gravelly sandy CLAY. Gravel is fine to medium angular to subangular flint. Sand is fine to medium. [RIVER TERRACE DEPOSITS]
		0.60 - 1.20	ES						
		1.00		N=25 (3,5/6,7,6,6)					
		1.30 - 1.40	D						
		1.80 - 1.90	D		1.65				
		1.90		N=50 (12,10/50 for 290mm)	1.90		Firm to stiff orangeish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse angular to subangular flint. [RIVER TERRACE DEPOSITS] End of borehole at 1.90 m		

Remarks
 1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.



		3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP		Borehole Log				Borehole No. TP201 Sheet 1 of 1	
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494686.00 - 105741.00		Hole Type WS	
Location: Barnham Road, Eastergate, PO20 3RP				Level:		Scale 1:50			
Client: Elberry Properties Ltd				Dates: 22/02/2023 - 22/02/2023		Logged By LB			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint. [TOPSOIL].	1
					1.55			Firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse subangular to rounded flint. RIVER TERRACE DEPOSITS].	2
					2.45			Light brown and cream slightly sandy very clayey fine to coarse angular to subrounded GRAVEL of flint with low cobble content. Cobbles are angular to subrounded flint. [RIVER TERRACE DEPOSITS]	3
							End of borehole at 2.45 m		4
									5
									6
									7
									8
									9
									10

Remarks
Cleared by CAT scanner prior to excavation. No groundwater encountered.



Attachment 4

Photographs

Photograph 1 Overview of the site





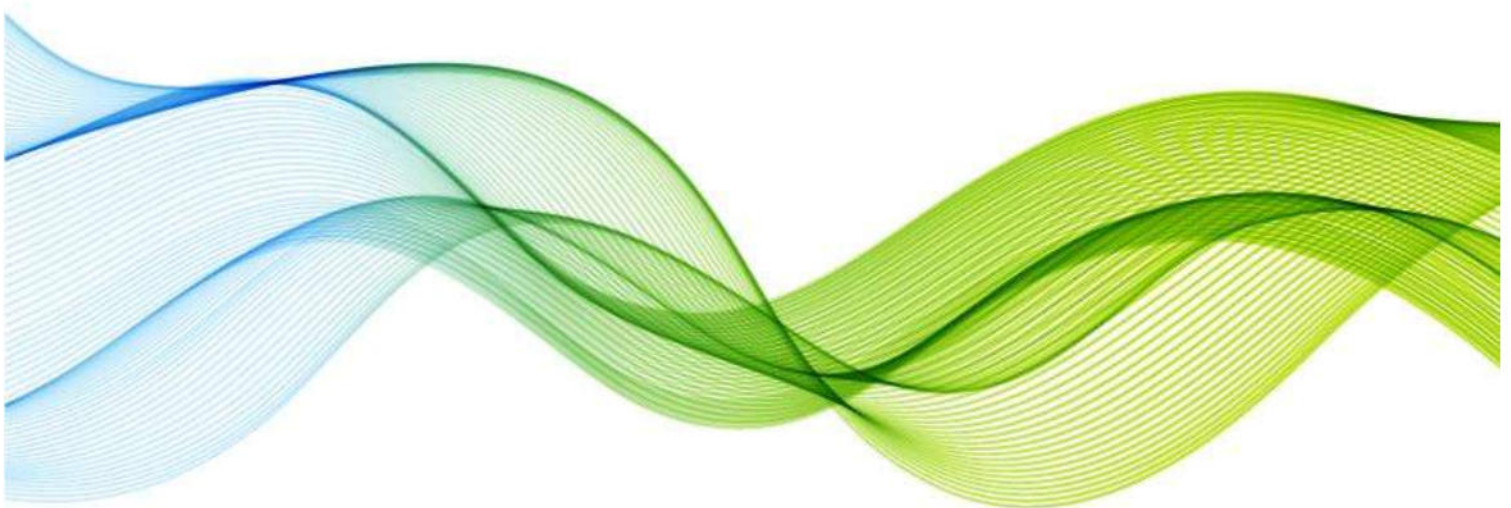
**Phase I - II
Geo-Environmental Site Assessment**

Land north of The Croft, Barnham Road Eastergate, PO20 3RP

*Prepared for:
Elberry Properties Ltd
12 Northgate
Chichester
West Sussex
PO19 1BA*

December 2022

Omnia ref: A11949/1.2



ISO Accredited Certification (UKAS)



QUALITY ASSURANCE

Project Number: A11949					
December 2022					
 Geo-Environmental	Phase I-II Geo-Environmental Assessment (Ref: A11949/1.1)				
	Prepared by:	J. Redstone	Date:	13/12/22	Signature:
	Checked by:	H. Spurling	Date:	15/12/22	Signature:
	Authorised by:	T. Mitchell	Date:	21/12/22	Signature:
 Geotechnical	Geotechnical Assessment (Ref: A11949/1.1)				
	Prepared by:	J. Redstone	Date:	16/12/22	Signature:
	Checked by:	H. Spurling	Date:	19/12/22	Signature:
	Authorised by:	H. Thomas	Date:	21/12/22	Signature:
	Phase I-II Report Update - To include results of soil infiltration testing (A11949/1.2)				
	Prepared by:	L. Burnett	Date:	27/02/23	Signature:
	Authorised by:	A. King	Date:	01/03/23	Signature:

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PO6 4TP



Ecology



Acoustics



Geotechnical



Geo-environmental



Air Quality

Executive Summary	
Site Address	Land north of The Croft, Barnham Road, Eastergate, PO20 3RP
National Grid Reference	494677 105746
Site Area	1.07 ha
Current Site Use	This site is assumed to only be used by nearby residence, this is assumed due to the fact that a few of the residential gardens have gated access from the gardens to the site area. There is also a trodden path that appears to have been used to walk around that site.
Site History	The northern part of the site has a history of being part of an orchard between the years 1910-2001. Between 1937-1961 a strip cutting through the centre of the site from north to south was also used as part of an orchard. Other than being used for an orchard this site has been mostly undisturbed.
Geology & Hydrogeology	BGS maps show that the site is underlain by superficial head deposits (Gravel, Sand, Silt and Clay) along the western boundary and superficial river terrace deposits (Sand, Silt and Clay) across the rest of the site. The bedrock geology of the whole site is the London Clay Formation (Clay, Silt and Sand).
Hydrology & Flooding	The site is underlain by a Secondary A superficial aquifer which has a medium vulnerability, the site is also underlain by a bedrock aquifer this however is unproductive. There is a very low chance of river or costal flooding on site. The Groundsure Report indicates a moderate risk of groundwater flooding with one area in the east and one area in the northwest of the site having a moderate-high risk of groundwater flooding.
Landfill Sites & Ground Gases	There are no records of historical land uses on site which would cause ground gases with the closest groundworks being 140m north where an old gravel pit was excavated in 1896. This pit is presumed infilled due to it no longer being evident on historical mapping from 1937 onward. Groundsure reporting does not show any records of mining or landfill on-site.
Radon	The site lies within an area where between 1% and 3% of the properties are above the Action Level. At these levels BRE publication BR211 indicates that no special radon protective measures are required in the construction of new extensions or dwellings.
Revised Conceptual Site Model	
Following completion of the Tier 1 risk assessment, no active pollution pathways have been identified based on a residential end use with homegrown produce.	
Soil Infiltration Testing	
Soils of the shallower fine-grained River Terrace Deposits have soil infiltration rates ranging from 1.89×10^{-4} (SA202 Test 3) to 3.53×10^{-4} m/s (SA203 Test 1), which indicates medium permeability with good drainage conditions.	
Soils of the deeper coarse-grained River Terrace Deposits provided soil infiltration rates of between 9.85×10^{-6} m/s (SA101 Test 1) to 3.26×10^{-5} m/s (SA201 Test 1). Within this strata, three (3no.) failed tests (SA101 Test 2, SA102 Test 1 and SA103 Test 1) were observed during the initial phase of soakaway works, where the maximum duration of testing was 5 hours 50 minutes.	
Given the calculated infiltration rates within the River Terrace Deposits by in-situ testing, it is considered that the site may prove suitable for conventional soakaway design. It is recommended that the calculated infiltration rates are provided to a suitability qualified drainage engineer. The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365-Soakaway Design.	
Concrete Classification	
The River Terrace Deposits on site are classified as DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 for greenfield locations.	
Geotechnical Assessment	
Traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 100-200kN/m ² within the fine-grained River Terrace Deposits.	

Across the majority of the site traditional strip foundations within the fine-grained River Terrace Deposits of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 400-800kN/m²; and traditional strip foundations within the north-western corner of the site at 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 800kN/m².

A minimum foundation depth of 0.75m bgl is anticipated for a Low Change Volume soil within the River Terrace Deposits outside of the zone of tree influence, in accordance with NHBC. Where foundations are likely to be within the influence of trees foundation depths will require locally deepening. The extent to which they should be deepened should be in accordance with NHBC guidance, Chapter 4.2 – Building Near Trees (Tables 4 and 5).

Should loadings exceed those set out above then alternative founding solutions will need to be explored.

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.

Conclusions and Recommendations

Environmental

If during the development stage any evidence of contamination is identified, works should be halted, and contact made with a suitably qualified Environmental Consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the regulator to achieve sign off of the works.

Geotechnical

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.

It is recommended that the calculated infiltration rates are provided to a suitably qualified drainage engineer. The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365-Soakaway Design.

TABLE OF CONTENTS

Quality Assurance	ii
1 INTRODUCTION	7
1.1 Background	7
1.1.1 February 2023 Update to Phase I-II Report	7
1.2 Proposed Development	7
1.3 Objectives	7
1.4 Sources of Information	8
1.5 Limitations	8
1.6 Confidentiality	8
2 SITE SETTING	9
2.1 Site Details	9
2.2 Current Site Use	9
2.2.1 Site Description	9
2.2.2 Hazardous Materials Storage	9
2.2.3 Potential Asbestos Containing Material (PACM)	9
2.2.4 Waste Storage	9
2.2.5 Tree Species	10
2.2.6 Potential Invasive Species	10
2.3 Surrounding Area	10
3 SITE HISTORY	11
3.1 Site History	11
3.2 Historical Tank Database	13
3.3 Historical Energy Features Database	13
3.4 Historic Garages and Petrol Stations	13
3.5 Historic Industrial Land Uses	13
3.6 Planning History	13
3.7 Unexploded Ordnance Risk Assessment	15
4 ENVIRONMENTAL SETTING	16
4.1 Geology and Hydrogeology	16
4.1.1 Faults & Linear Features	16
4.1.2 Groundwater Flooding	16
4.2 Hydrology and Flooding	17
4.3 Geotechnical Data	17
4.4 Mining and Ground Workings	17
4.5 Radon Risk Potential	18
4.6 Current Industrial Land Uses	18
4.7 Sensitive Land Uses	18
4.7.1 Sites of Special Scientific Interest (SSSI) Impact Risk Zones	18
4.7.2 Nitrate Vulnerable Zone (NVZ)	18
4.8 Site Sensitivity Assessment	19
5 CONSULTATIONS	20
5.1 Contaminated Land Officer	20
5.2 Landfill and Waste Treatment Sites	20
5.3 Potentially Infilled Land	20
5.4 Regulatory Database	20
6 CONCEPTUAL SITE MODEL (CSM)	22

6.1	Initial CSM	22
6.1.1	On-site Potential Sources	22
6.1.2	Off-site Potential Sources	22
6.1.3	Potential Pathways	22
6.1.4	Potential Receptors	22
7	SITE INVESTIGATION	27
7.1	General	27
7.2	Laboratory Analysis	28
8	GROUND AND GROUNDWATER CONDITIONS	29
8.1	Summary of Ground Conditions	29
8.1.1	Topsoil	29
8.1.2	Superficial Deposits	29
8.1.3	Groundwater Conditions	30
8.2	Laboratory Classification Analysis	30
8.2.1	Soil Plasticity	30
8.2.2	Particle Size Distribution Analysis	31
8.2.3	Moisture Content	31
8.2.4	pH and Sulphate	32
8.3	In-Situ Testing	32
8.3.1	Standard Penetration Tests (SPT)	32
8.3.2	Soil Infiltration Testing – Falling Head Permeability Test	32
9	TIER 1 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT	35
9.1	Human Health Risk Assessment	35
9.2	Controlled Waters Assessment	36
10	REVISED CONCEPTUAL SITE MODEL	37
11	GEOTECHNICAL ASSESSMENT	38
11.1	Proposed Development	38
11.2	Site Preparation	38
11.3	Ground Profile	38
11.4	Shallow Foundations	38
11.4.1	In Situ-Testing	39
11.4.2	Shear Strength	39
11.4.3	Bearing Capacities	40
11.5	Groundwater Levels	41
11.6	Building Near Trees	41
11.6.1	NHBC Minimum Depth to Foundations	41
11.6.2	Lateral pressure and heave	42
11.7	Ground Floor Slabs	42
11.8	Concrete Durability	43
11.9	Discussion	43
12	CONCLUSIONS AND RECOMMENDATIONS	44
	APPENDIX I - LIMITATIONS	46
	APPENDIX II – GLOSSARY	48
	APPENDIX III - DRAWINGS	51
	APPENDIX IV - PHOTOGRAPHS	52
	APPENDIX V - HISTORICAL MAPS	58
	APPENDIX VI - EXPLORATORY HOLE LOGS	59
	APPENDIX VII - CHEMICAL ANALYSIS CERTIFICATES	60
	APPENDIX VIII - ORIGIN OF GAC VALUES	61

APPENDIX IX - GEOTECHNICAL ANALYSIS CERTIFICATES	62
APPENDIX X – SOIL INFILTRATION CERTIFICATES.....	63

Tables

Table 2-1 Site Details	9
Table 2-2 Land Use	10
Table 3-1 Historical Land Use	11
Table 4-1 Geology	16
Table 4-2 Geotechnical Data	17
Table 5-1 -Summary of Groundsure Data	20
Table 6-1 Initial Conceptual Site Model	23
Table 7-1 Site Investigation Summary	27
Table 8-1. Summary of Soil Plasticity	30
Table 8-2. Summary of Particle Size Distribution	31
Table 8-3. Summary of Moisture Content	31
Table 8-4. Summary of pH and Sulphate Data	32
Table 8-5 Summary of Soil Infiltration Testing – 8 th February 2023	33
Table 8-6 Summary of Soil Infiltration Testing – 22nd February 2023	33
Table 9-1. Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use with Home Grown Produce	35
Table 11-1 Summary of site ground conditions	38
<i>Table 11-2 Minimum depth of foundations (after NHBC 2021)</i>	42
Table 11-3 New tree planting (after NHBC 2021)	42

1 INTRODUCTION

1.1 Background

Omnia have been commissioned by Elberry Properties Ltd to undertake a Phase I – II Geo-Environmental Assessment at the site of Land north of The Croft, Barnham Road, Eastergate, PO20 3RP. A site location plan is presented as Figure 1.0 within Appendix III.

The investigation has been undertaken in line with Omnia cost proposal reference A11949/221004/L1. This report represents the initial phase of instructed works comprising a Phase I and II report and associated risk assessment. A second phase of works comprising percolation testing will be completed in Quarter 1 2023 alongside reporting of winter groundwater monitoring, which is currently ongoing.

1.1.1 February 2023 Update to Phase I-II Report

Omnia revisited the site in February 2023 to undertake two (2no.) phases of soil infiltration testing in order to assist with drainage design. The first visit on 8th February comprised a single day of soakaway testing over one (1no.) day in three (3no.) locations (SA101-SA103). This was completed in general accordance with BRE DG365 guidance.

The second visit was undertaken on 22nd February 2023. Three (3no.) gravel cell soakaways were constructed (SA201-SA203) within the proposed roadway. The test locations were monitored over one (1no.) day in full accordance with BRE DG365 guidance, where three (3no.) repeat tests were achieved in each.

An updated intrusive location plan is included as Figure 3.0 within Appendix III.

1.2 Proposed Development

It is understood that Elberry Properties Ltd (the Client) are proposing to develop the current open ground to the rear of The Croft, Barnham Road to a residential end use. The draft scheme comprises fourteen (14no.) dwellings with private gardens and associated access roads, spaced around a central green.

The outline proposed site layout is presented as Figure 2.0 (Appendix III).

1.3 Objectives

The objectives of the Phase I-II Geo-Environmental Site Assessment are to:

- Undertake a site walkover and inspection, including interviews with site representatives if available;
- Review historical plans, site investigations, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available in order to complete a Desk Study in line with the Environment Agency (EA) document *Land Contamination Risk Management (LCRM)*;
- Undertake an assessment of the near surface through intrusive site investigation;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to

off-site receptors; and,

- Provide a factual and interpretative report relating to the site and provide recommendations on any potential development issues with consideration of residential and environmental receptors.

1.4 Sources of Information

Background information was sought from the following sources:

- Groundsure Environmental Database Search (GS-9189257);
- Historical Ordnance Survey Mapping (1876 –2022);
- The British Geological Survey (BGS) map for the site (Chichester and Bognor, Sheet 317/332, Solid and Drift Edition at a scale of 1: 50,000, 1996);
- Environment Agency flood designations, aquifer designations and groundwater source protection zones (<https://magic.defra.gov.uk/MagicMap.aspx>) [Accessed: 2022/12/13];
- Zetica UXO Risk Maps (<https://zeticauxo.com/downloads-and-resources/risk-maps>); [Accessed: 2022/12/13]
- British Standard BS10175:2011+A2:2017 – Investigation of Potentially Contaminated Sites – Code of Practice;
- British Standard BS5930:2015+A1:2020 – *Code of Practice for Ground Investigations*;
- British Standard BS1377-9:1990 Incorporating Amendment No. 1 – *Methods of Test for Soils for Civil Engineering Purposes – Part 9: In-situ Tests*;
- BRE DG365 (2016). *Soakaway Design*;
- NHBC Standards (2019). Chapter 4.2 – *Building Near Trees* (2020); and,

1.5 Limitations

The limitations of this report are presented in Appendix I.

1.6 Confidentiality

Omnia has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Omnia; a charge may be levied against such approval.

2 SITE SETTING

2.1 Site Details

Table 2-1 Site Details

Site Address	Land north of The Croft, Barnham Road, Eastergate, PO20 3RP
National Grid Reference	494677 105746
Site Area	1.07 ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan is presented as Figure 1.0 (Appendix III).

2.2 Current Site Use

2.2.1 Site Description

The area of investigation was located approximately 150m North of The Croft Surgery, Eastergate and was approximately square in shape, covering an area of 1.07ha. The site comprised of an open field with a footpath around the centre of the site, it is not a public footpath, however access is public from select back gardens on the eastern boundary.

At the time of the walkover the site was accessed via a track off Barnham Road (B2233) to the south, through an active construction site associated with Dhand Construction. The track which was in visibly good condition was situated approximately 33m east of Cherry Tree Drive. At the time of the site walkover Cherry Tree Drive was being used for parking by Dhand Construction.

The north, northwest, west and southwest of the site was bordered by residential properties with associated gardens. Some of these residential properties had access to the site via back gates off their gardens. To the south of the site was the active Dhand construction site and to the east were open fields with deciduous trees and long grass. Due to the access certain residential properties had to the site from the west, the site is not considered secure.

An annotated site location plan showing observations from the walk-over survey is presented as Figure 2.1 (Appendix III). Relevant photographs from the site walk-over survey are located in Appendix IV.

2.2.2 Hazardous Materials Storage

No hazardous materials were noted to be stored on site.

2.2.3 Potential Asbestos Containing Material (PACM)

There were no buildings or structures located on site.

2.2.4 Waste Storage

There was no evidence of general waste storage or fly-tipped waste noted on site.

2.2.5 Tree Species

At the time of the site walkover the site had been cleared of any vegetation leaving only mature deciduous trees located all around the boundaries of the site, predominantly in the north, northeast, east and southeast around the site boundary. There was a cluster of mature deciduous trees located in the southwest corner of the site. These were noted as deciduous trees that were all over approximately 6.00m tall.

2.2.6 Potential Invasive Species

During the site walkover no obvious signs of potential invasive species were identified. However, it should be noted that the site walkover was conducted during winter months and the site had been cleared of all vegetation, it is recommended that a further inspection is undertaken during the growing season.

2.3 Surrounding Area

The surrounding land uses are summarised in Table 2-2 below:

Table 2-2 Land Use

Direction	Land Use
North	Residential buildings with associated gardens and Fontwell Clinic.
East	Fields with long grass and deciduous trees, residential to the southeast.
South	Active construction site with residential, The Croft Surgery and Barnham Road beyond.
West	Residential buildings with associated gardens, with Fontwell Avenue and NA Jorden Agricultural Contractor beyond.

3 SITE HISTORY

3.1 Site History

A review of historical land use pertinent to the site and within a 250m radius is summarised in Table 3-1.

Table 3-1 Historical Land Use

Map Edition	Historical Land Use	
	On Site	Off Site
1876 (1:2,500) (1:10,560)	Site appears to be within two open fields, with a boundary running east to west 25m from the northern boundary of the site.	Road running north to south 37m from western boundary and an adjoining road running east to west 160m from southern boundary. Well indicated to be approximately 126m northwest and 159m south of the site. Residential housing approximately 99m north of the subject site. Residential housing approximately 186m south of the subject site.
1896- 1897 (1:10,560) (1:2,500)	No significant change	Old Gravel Pit approximately 148m north. Additional well 118m north.
1910-1912 (1:10,560) (1:2,500)	The northern extent of the site is configured as an orchard.	Buildings from 17m east to north of the site. Orchards adjoining onsite orchard span from 0m - 309m north off site. Orchard 200m south. Nursery 18m east, 45m and 127m north of the site.
1937 (1:2,500)	Orchard running north to south in the centre of the site.	Orchards directly east of the site. Orchard continues from 0m south of the centre of the site. Four (4no.) buildings from 23m north. Residential buildings 40m to the west of the site. Larger possibly industrial buildings 94m to the south of the site. Nurseries from 98m south of the site. Old Gravel Pit 148m north no longer shown on maps.

Map Edition	Historical Land Use	
	On Site	Off Site
		Residential development can be seen within 250m southwest, south and southeast of the site.
1938-1940 (1:10,560)	No significant change	Nursery 18m east, 45m and 127m north of the site no longer mapped as nurseries, now mapped as buildings. Nursery 18m east, 45m and 127m north of the site no longer mapped as nurseries, now mapped as buildings.
1950 (1:10,560)	Mapping is partial and only provides coverage from approximately 500m east.	Mapping is partial and only provides coverage from approximately 500m east.
1961 (1:10,560)	Orchard running north to south in the centre of the site, no longer present.	No significant change
1966-1969 (1:10,560)	Partial mapping from 266m east not visible. No significant change	Partial mapping from 266m east not visible. No significant change
1974 (1:2,500)	Non Coniferous trees shown on the south of the site, the northern 22m of the site is still part of an orchard.	Nurseries located from 84m east of site. Folly Fruit Farm located 96m north of the site. Cherry Tree Drive Estate located 128m southwest of site.
1979-1980 (1:2,500) (1:10,000)	No significant change	Additional residential developed in the south of the site from 90m. Car Breakers Yard located 133m west of the study site. Electrical Substation 239m southwest.
1984 (1:2,500)	No significant change	Builders Yard 141m northwest.
1990-1993 (1:10,000)	Partial mapping from 252m east visible.	Partial mapping from 252m east visible.
1994 (1:2,500)	No significant change	Greenfields Farm 181m northwest. Car Breakers Yard located 133m west no longer mapped.
2001 (1:10,000)	North of site no longer shown to be an orchard.	No significant change
2003 (1:1,250)	No significant change	No significant change
2010 (1:10,000)	No significant change	No significant change
2022 (1:10,000)	No significant change	No significant change

A selection of historical maps are presented in Appendix V.

3.2 Historical Tank Database

The Groundsure Report has identified no records of historical tanks within 250m of the study site.

3.3 Historical Energy Features Database

The Groundsure Report identified three (3no.) Historical energy features within a 250m radius of the subject site, which were also identified on historical mapping.

- 239m southwest – Electricity Substation (1973-1984)
- 240m south – Electricity Substation (1979-1994)
- 241m south – Electricity Substation (1973)

Due to the distance and direction from the site and the low mobility of PCBs, the identified electricity sub stations are not considered to have the potential to impact the subject site and have therefore not been considered further.

3.4 Historic Garages and Petrol Stations

The Groundsure Report did not identify any historical petrol stations within a 250m radius of the site. Two (2no.) record of a historical garage has been identified within 250m, relating to one (1no.) Car Breakers Yard 137m west which was also identified on historical maps dating 1979-1984. Due to the distance from the subject site, direction and that metals are immobile and bind with soils it is considered that the car breakers yard does not pose a significant risk to human health and has not been considered further.

3.5 Historic Industrial Land Uses

The Groundsure Report identified five (5no.) records of historical industrial land uses within 250m of the study site.

The identified land uses are:

- 41m southwest – Nursery (1969)
- 85m southeast – Nursery (1977)
- 90m southwest – Nursery (1940)
- 140m north – Old Gravel Pit (1896)
- 156m north – Unspecified Pit (1910)

The above industrial land uses were also identified on historical maps.

3.6 Planning History

A review of the online planning portal of Arun District Council identified in excess of fifty (50no.) planning applications attributed to the site postcode.

Numerous applications relate to the erection of illuminated signs, flagpoles, etc, but the most pertinent planning applications associated with the development of the site are summarised in the sections below.

Planning Reference	EG/75/12/
Date	10/12/2010
Proposal	Renewal of unimplemented outline planning permission EG/67/09/ for new medical centre incorporating pharmacy retail unit (A1 Shops) and other ancillary uses together with access off of Barnham Road and associated car parking.
Decision	Approved
Notes	There are 21 documents which include multiple maps, REP letters, Consultations, System Correspondence and a decision notice.

Planning Reference	BN/84/22/DOC
Date	13/06/2022
Proposal	Approval of details reserved by condition imposed under BN/62/21/PL relating to condition 10-decentralised and renewable or low carbon energy source
Decision	Approved
Notes	Applicant - Dhand Construction

Planning Reference	BN/83/22/DOC
Date	13/06/2022
Proposal	Approval of details reserved by condition imposed under BN/62/21/PL relating to conditions 6-method statement prepared by Arboricultural expert, pre commencement site meeting between Planning Authority Tree Officer and Arboricultural expert representing site owner(s) & 11-mitigation and management method statement for retained hedgerows.
Decision	Approved
Notes	Applicant - Dhand Construction

Planning Reference	BN/82/22/DOC
Date	23/09/2022
Proposal	Approval of details reserved by condition imposed under BN/62/21/PL relating to conditions 7-foul drainage scheme, 8-surface water drainage scheme and 9-maintenance and management of surface water drainage system.
Decision	Refused
Notes	Condition 9 imposed and was refused. Condition 9 relates to maintenance of drainage systems.

Planning Reference	BN/95/22/HH
Date	01/10/2022
Proposal	Single storey rear extension and replacement garage including workshop link.
Decision	Approved
Notes	There are 20 documents which include multiple maps, Consultations, System Correspondence and a decision notice.

Planning Reference	BN/82/22/DOC
Date	13/06/2022
Proposal	Approval of details reserved by condition imposed under BN/62/21/PL relating to conditions 7-foul drainage scheme, 8-surface water drainage scheme and 9-maintenance and management of surface water drainage system.
Decision	Approved
Notes	Applicant - Dhand Construction

3.7 Unexploded Ordnance Risk Assessment

A review of publicly available information (provided by Zetica UXO) shows the site as having a 'low risk' associated with bombing density and bomb risk.

The site is consequently considered **Low Risk** with regards to unexploded ordnance.

4 ENVIRONMENTAL SETTING

4.1 Geology and Hydrogeology

British Geological Survey

Map (Sheet 317/332, Chichester and Bognor, Solid and Drift Edition at a scale of 1:50,000, 1996) indicates that the site is underlain by the following geological sequence:

Table 4-1 Geology

Geological Unit	Formation Name	Description	Aquifer Classification
Superficial	Head Deposits along the western boundary of the site	Gravel, Sand, Silt & Clay	Secondary A
	River Terrace Deposits across the remainder of the site	Sand, Silt & Clay	Secondary A
Bedrock	London Clay Formation	Clay, Silt & Sand	Unproductive Strata

The Groundsure report records no data for Artificial and Made Ground on the proposed site. However, Made Ground was identified within 250m of the site. The Groundsure Report shows worked ground (undivided) 150m north of the site which is related to a gravel pit dated 1896-1937 which was identified on historical mapping.

Review of the environmental database indicates that the site is not located within a groundwater Source Protection Zone, however, 30m northwest is a Source Protection Zone 2c which relates to a confined aquifer associated with the deeper chalk bedrock underlying to the London Clay Formation, as shown on BGS mapping.

There are no active or historical water abstractions located within 250m of the site. The closest active groundwater abstraction is located 701m southwest. There are no active or historical potable water abstractions located within 250m of the site.

Groundwater vulnerability data indicates that the site is underlain by a Secondary A Superficial Aquifer with medium vulnerability. The underlying bedrock aquifer is unproductive.

Based on local topography and the location of surface watercourses it is considered that shallow groundwater, if present, will follow local topography and flow in a southern direction.

4.1.1 Faults & Linear Features

The Groundsure Report shows there are no faults or linear features on site or within 250m of the site boundary.

4.1.2 Groundwater Flooding

The Groundsure report indicates that the site is majority moderate, however the north-western corner is of high risk of groundwater flooding, with land within 50m west of the site having a high risk. The land off to the east however is low with patches of moderate-high risk.

4.2 Hydrology and Flooding

The Groundsure report within 250m of the subject site identifies one (1no.) inland watercourse, 216m to the southwest of the site, unaffected by tidal action. This watercourse contains water year-round in normal circumstances. No surface water features were identified by the Groundsure report within 250m, however the subject site does lie within a surface water catchment zone associated with the River Lidsey Rife.

The River Lidsey Rife has been graded as fail for chemical rating and moderate rating for ecological, and an overall rating as moderate by the Environmental Agency.

No surface water abstraction licences were identified on-site or within a 250m radius, the closest surface water abstraction is 1392m south.

The Groundsure Report identified the site to be within an area of both low risk of river and coastal flooding and negligible risk of surface water flooding, however the south-eastern corner has a risk of 1 in 1000 return period with depths between 0.10-0.30m.

The site is not located in either a Flood Zone 2 & 3.

4.3 Geotechnical Data

Geotechnical Data presented within the Groundsure Report identifies the following potential ground hazards which are summarised in Table 4-2 below:

Table 4-2 Geotechnical Data

Hazard	Designation
Shrink-Swell Clay	The western boundary of the site has a very low risk, and the rest of the site is low risk.
Landslides	Very low across the whole site.
Ground Dissolution	Negligible across the whole site.
Compressible Ground	Negligible across the whole site.
Collapsible Deposits	The western boundary of the site has a very low risk, the rest of the site is low risk.
Running Sand	The western boundary of the site has a very low risk, the rest of the site is low risk.

4.4 Mining and Ground Workings

The site is not located within an area that is affected by coal mining and therefore no Coal Authority mining report was obtained for the purposes of this report. The Groundsure report also identified two (2no.) record of BritPits within 500m of the site, one of which is within 250m of the test site listed below.

- 169m north – Northfields Farm Gravel Pit which has been recorded as a BritPit of which its status is ceased – *This was identified on historical maps and dated 1896-1937 and identified with the surface ground workings section above.*

There are no active records of mining within 500m of the site however two (2no.) records exist for historic surface ground workings within 250m of the study site. Records relating to an Old Gravel Pit (1896-1937) north of the site, as identified on historical maps.

4.5 Radon Risk Potential

The site lies within an area where between 1% and 3% of the properties are above the Action Level. At these levels BRE publication BR211 indicates that no special radon protective measures are required in the construction of new extensions or dwellings.

4.6 Current Industrial Land Uses

The Groundsure Report identified eight (8 no.) current industrial land uses within a 250m radius of the subject site.

- 201m west – scrap metal merchants

In summary, the key current industrial site uses in the vicinity of the site comprise multiple electricity substations (178m-242m located north, south and southwest), a pumping station 185m west. S P R Centre 195m north which after further review is an animal feed company, Mooring facilities 214m south and a Telephone Exchange 219m south.

As set out in Section 3.3, due to the distance and direction from the site and the low mobility of PCBs, the identified electricity sub stations are not considered to have the potential to impact the subject site and have therefore not been considered further.

In addition, the pumping station, SPR Centre, Mooring facilities and telephone exchange are not considered to have the potential to impact the subject site and therefore have not been considered further.

4.7 Sensitive Land Uses

The Groundsure Report identifies that the site is located within a currently defined Nitrate Vulnerable Zone (NVZ) associated with the surface water of the Aldingbourne Rife NVZ, and also located within a SSSI Impact Risk Zone.

- SSSI Impact Risk Zone (On-site);
- Aldingbourne Rife NVZ (two records) (On-site – 168m north)- Surface water

4.7.1 Sites of Special Scientific Interest (SSSI) Impact Risk Zones

The Groundsure Report identified that the site is located within an SSSI Impact Risk Zone, however no SSSI site were identified within 2000m of the site, it is therefore related to the Aldingbourne Rife NVZ.

4.7.2 Nitrate Vulnerable Zone (NVZ)

The site lies within the Aldingbourne Rife Eutrophic Nitrate Vulnerable Zone and due to site lying within a SSSI Impact Risk Zone, the nutrient contents of all discharges, including those to the main sewer, need to be considered in combination for impacts on the surrounding area.

It is considered likely that a nitrate balance report will be required as part of the planning application to assess the potential risk posed from the proposed development on nitrates entering surrounding waters.

4.8 Site Sensitivity Assessment

Based on the information presented in the sections above, the site is considered as being located within a Low-Moderate sensitivity setting due to the following reasons:

- Secondary A Aquifer within the superficial deposits
- Underlying Unproductive within bedrock
- Cohesive bedrock
- Site located within a SSSI Impact Risk Zone
- Site is within a Nitrate Vulnerable Zone (NVZ);
- Site not located within river and coastal Flood Zone 2 and 3
- Negligible risk of surface water flooding across the majority of the site

5 CONSULTATIONS

5.1 Contaminated Land Officer

Contact was made with Arun District Council via email in December 2022 regarding whether the council were aware of any environmental issues pertaining to the site.

At the time of writing a response has yet to be received and should any environmentally pertinent information be received then it will be issued as an addendum to this report.

5.2 Landfill and Waste Treatment Sites

The Groundsure Report identified no records of historic landfill sites or historic waste treatment sites within 250m of the subject site.

The Groundsure Report identified three (3no.) records of active licensed waste sites, which relate to two (2no.) records within 250m of the site boundary as listed below:

- 173m west (1 record) – S R C Recycling Ltd – Metal recycling site (licenced from 1994)
- 230m northeast (2 records) – Sussex Recovery – Metal recycling site (licenced from 1994)

The metal recycling site located 173m west was also identified within section 4.6.

5.3 Potentially Infilled Land

The Groundsure report identified no areas of infilled land within 250m of the site. However, a review of Section 4.4 indicates historical ground workings that have the potential to have been infilled.

The Groundsure report also identified two (2no.) record of BritPits within 500m of the site, one of which is within 250m of the test site listed below.

- 169m north – Northfields Farm Gravel Pit which has been recorded as a BritPit of which its status is ceased – *This was identified on historical maps and dated 1896-1937 and identified with the surface ground workings section above.*

There are no active records of mining within 500m of the site however two (2no.) records exist for historic surface ground workings within 250m of the study site. Records relating to an Old Gravel Pit (1896-1937) north of the site, as identified on historical maps.

5.4 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table (Table 5-1) only includes records not otherwise detailed in the report. Where more than two entries have been identified, the Table summarises the closest two entries to the site.

Table 5-1 Summary of Groundsure Data

	0-249m	250-500m	Details
Sites Determined as Contaminated Land	0	0	N/A
Control of Major Accident Hazards	0	0	N/A

	0-249m	250-500m	Details
(COMAH)			
Regulated Explosive Sites	0	0	N/A
Hazardous substance storage/usage	0	0	N/A
Historical licensed Industrial Activities (IPC)	0	0	N/A
Licensed Industrial Activities (Part A(1))	0	0	N/A
Licensed Pollutant Release (Part A(2)/B)	0	0	N/A
Radioactive Substance Authorisations	0	0	N/A
Licensed discharges to controlled waters	0	6	Closest being 313m north – Sewage discharges final/treated effluent into unnamed land 345m southwest – Trade Discharges into Lidsey Rife
Pollutant release to surface water (Red List)	0	0	N/A
Pollutant Release to public sewer	0	0	N/A
List 1 Dangerous Substances	0	0	N/A
List 2 Dangerous Substances	0	0	N/A
Pollution Incidents (EA/NRW)	1	0	131m Northwest Dated: 22/04/2002 Noise Air Impact: Minor No impact to water or land
Pollution Inventory Substances	0	0	N/A
Pollution Inventory Waste Transfers	0	0	N/A
Pollution Inventory Radioactive Waste	0	0	N/A

6 CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), Omnia Environmental Consulting have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area. A residential end use has been adopted given the proposed site development.

6.1.1 On-site Potential Sources

- Historical Orchard (1910-2001)

6.1.2 Off-site Potential Sources

- Historical Orchards from 0m east and north (1937-2001)
- Historical Nurseries from 18-45m east (1910-1938)
- Folly Fruit Farm 96m north (1974-2010)
- Historical Nursery 127m northwest (1910-1938)
- Builders Yard 141m northwest (1984-2001)
- Gravel Pit 148m north (1896-1937)
- Unspecified Pit 156m north (1910)

6.1.3 Potential Pathways

- Inhalation and ingestion of impacted soils and dusts;
- Dermal contact with impacted soils;
- Inhalation of vapours;
- Vertical and lateral migration; and,
- Migration of gas into confined spaces.

6.1.4 Potential Receptors

- Future Site Users.
- Controlled Waters
 - Groundwater in underlying Principal/Secondary Aquifer
 - Surface Water in the River Lidsey Rife

Construction workers are not considered to be a plausible receptor due to management of their exposure through the use of suitable PPE and hygienic working practices as required under HSE/CDM regulations. Furthermore, the length of any exposure is considered to be very short in comparison to the criteria for which the adopted end use has been derived.

An Initial Conceptual Site Model has been prepared for the site and is presented overleaf within Table 6-1.

Table 6-1 Initial Conceptual Site Model

Source	Contaminant	Potential Migration Pathway	Potential Receptors	Likelihood of Occurrence	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
On-Site Potential Sources							
Historical Orchards (1910-2001)	Metals (As, Pb)	Ingestion of soils	Future Site Users	Low	Moderate	Low/Moderate	Potentially Active – Further Investigation Required
		Dermal Contact	Future Site Users	Low	Moderate	Low/Moderate	
		Vertical and Lateral Migration	Controlled Waters	Low	Minor	Low	
	Polycyclic Aromatic Hydrocarbons (PAH)	Ingestion of soils	Future Site Users	Low	Moderate	Low/Moderate	
		Dermal Contact;	Future Site Users	Low	Moderate	Low/Moderate	
		Inhalation of Vapour	Future Site Users	Very Low	Moderate	Low	
		Vertical and Lateral Migration	Controlled Waters	Low	Minor	Low	
	Herbicides and Pesticides	Ingestion of soils	Future Site Users	Low	Minor	Low	Inactive – Given the limited size of the orchard and associated age dating to 1910 it is considered that any herbicide or pesticide usage would have been limited. This alongside the diffuse nature of herbicide and pesticide application leads to an assessment that
		Dermal Contact	Future Site Users	Low	Moderate	Low/Moderate	

Source	Contaminant	Potential Migration Pathway	Potential Receptors	Likelihood of Occurrence	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
							this source is not sufficient to represent an ongoing risk to identified receptors.
Off-Site Potential Sources							
Historical Orchards from 0m east and north (1937-2001)	Herbicides and Pesticides	Lateral Migration (Groundwater flow)	Future Site Users	Low	Moderate	Low/Moderate	Inactive – Given the limited size of the orchard and associated age dating to 1937 it is considered that any herbicide or pesticide usage would have been limited. This alongside the diffuse nature of herbicide and pesticide application leads to an assessment that this source is not sufficient to represent an ongoing risk to identified receptors.
	Metals (As, Pb)	Lateral Migration (Airborne dust)	Future Site Users	Low	Moderate	Low/Moderate	Potentially Active – Further Investigation Required
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migration (Groundwater flow)	Future Site Users	Low	Minor	Low	
Historical Nurseries from 18-45m east (1910-1938)	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration (Airborne dust)	Future Site Users	Low	Moderate	Low/Moderate	Potentially Active – Further Investigation Required
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migration (Groundwater flow)	Future Site Users	Low	Minor	Low	
Folly Fruit Farm 96m north (1974-2010)	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration (Airborne dust)	Future Site Users	Very Low	Low	Low	Potentially Active – Further Investigation Required

Source	Contaminant	Potential Migration Pathway	Potential Receptors	Likelihood of Occurrence	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migration (Groundwater flow)	Future Site Users	Very Low	Minor	Very Low	
Historical Nursery 127m northwest (1910-1938)	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration (Airborne dust)	Future Site Users	Very Low	Low	Low	Inactive – Due to the distance of the source, direction and age of the source, it is not considered to pose a significant risk to human health.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migration (Groundwater flow)	Future Site Users	Very Low	Minor	Very Low	
Builders Yard 141m northwest (1984-2001)	Polycyclic Aromatic Hydrocarbons (PAH)	Vertical and Lateral Migration	Future Site Users	Low	Minor	Low	Potentially Active – Further Investigation Required
	Total Petroleum Hydrocarbons (TPH)	Vertical and Lateral Migration	Controlled waters	Low	Minor	Low	
	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration (Airborne dust)	Future Site Users	Very Low	Low	Low	
Gravel Pit 148m north (1896-1937)	Ground Gas (CH ₄ & CO ₂)	Later Migration (Confined spaces)	Future Site Users	Low	Severe	Moderate	Inactive – Due to the age of the source 84 years, distance, relatively small size and direction from the subject site. It is likely that ground gas generation will have ceased. Review of BGS mapping suggests that both the superficial and bedrock deposits are cohesive and therefore this source is not considered to have the potential to pose a significant risk to human health.

Source	Contaminant	Potential Migration Pathway	Potential Receptors	Likelihood of Occurrence	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
Unspecified Pit 156m north (1910)	Ground Gas (CH ₄ & CO ₂)	Later Migration (Confined spaces)	Future Site Users	Low	Severe	Moderate	Inactive – Due to the age of the source >100 years, distance and direction from the subject site. It is likely that ground gas generation will have ceased and therefore this source is not considered to have the potential to pose a significant risk to human health.

7 SITE INVESTIGATION

7.1 General

A ground investigation was designed based on the clients requirements, the fee proposal (ref A11949/221004/L1) and the proposed site development as shown in Figure 2.0 (Appendix III).

Following completion of the desk study and a review of the available data, ground investigation works were required on site to investigate the potential for impacted materials to be present on-site from identified on-site and nearby off-site potential sources.

Exploratory fieldwork was conducted over one (1no.) working day, commencing on 28th October 2022 and comprised the following:

Table 7-1 Site Investigation Summary

Potential Source/Rationale	Location Hole	Type	Maximum Depth (m bgl)	Borehole Response Zone (m bgl)
To provide information on the superficial and bedrock deposits across the site. To collect environmental and geotechnical samples for laboratory analysis. To assess potential contamination from the historical orchard covering this section of the site.	WS101	Tracked Window Sampling Rig	1.40	N/A
To provide information on the superficial and bedrock deposits across the site. To collect environmental and geotechnical samples for laboratory analysis. To assess potential contamination from the historical orchard covering this section of the site. To install a groundwater monitoring well for winter monitoring.	WS102		1.60	0.60-1.60
To provide information on the superficial and bedrock deposits across the site. To collect environmental and geotechnical samples for laboratory analysis.	WS103		1.90	N/A
To provide information on the superficial and bedrock deposits across the site. To collect environmental and geotechnical samples for laboratory analysis. To install a groundwater monitoring well for winter monitoring.	WS104		1.80	0.80-1.80

Potential Source/Rationale	Location Hole	Type	Maximum Depth (m bgl)	Borehole Response Zone (m bgl)
To provide information on the superficial and bedrock deposits across the site. To collect environmental and geotechnical samples for laboratory analysis. To install a groundwater monitoring well for winter monitoring.	WS105		1.90	0.90-1.90
To facilitate follow on soil infiltration testing in general accordance with BRE DG365.	SA101	Machine Excavated Trial Pit	2.80	N/A
	SA102		2.80	
	SA103		2.60	
To construct soakaway cells for follow on soil infiltration testing in full accordance with BRE DG365.	SA201		2.40	
	SA202		1.40	
	SA203		1.20	

Termination depths of window sample holes were all <5.0m due to SPT refusals with N>50.

The exploratory hole locations are illustrated on Figure 3.0 (Appendix III). The ground conditions encountered are indicated on the exploratory hole logs, which are provided in Appendix VI.

7.2 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis including:

- CLEA Metals;
- Asbestos fibres in soil;
- Speciated Polycyclic Aromatic Hydrocarbons (PAHs);
- Banded Total Petroleum Hydrocarbons (TPHs);
- Total Cyanide;
- pH; and,
- Phenols.

Element Materials Technology of Deeside undertook the analytical work in accordance with UKAS accreditation where applicable and the laboratory analysis certificates are presented as Appendix VII and discussed in Section 9.

Selected soil samples were submitted to I2 Analytical for a range of geotechnical testing, in accordance with UKAS methodology where applicable, comprising:

- Plasticity Index;
- Moisture Content; and,
- Particle Size Distribution.

The geotechnical analysis certificates are presented in Appendix IX.

8 GROUND AND GROUNDWATER CONDITIONS

8.1 Summary of Ground Conditions

British Geological Survey (BGS) map for the site (Chichester and Bognor, Sheet 317/332, Solid and Drift Edition at a scale of 1:50,000 dated 1996) indicates that the superficial geology on-site was anticipated to comprises Head Deposits along the western boundary of the site, and River Terrace Deposits across the remainder of the site. Bedrock deposits are recorded as the London Clay Formation underlying the entire site.

The geology was generally consistent with that identified in the BGS Mapping however, no Head Deposits were encountered during the investigation. Detailed descriptions of encountered geology is discussed below.

8.1.1 Topsoil

October 2022 – Phase II phase of works

Topsoil was identified in all five (5no.) borehole locations (WS101-105) to a maximum depth of 0.32m bgl.

Topsoil generally comprised brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand was fine to medium. Gravel was angular to subangular fine to medium flint.

February 2023 – Soakaway Testing phase of works

During the return works in February 2023, Topsoil was also encountered within all six (6no.) trial pits (SA101-103, SA201-203) to depths between 0.25 and 0.30m bgl. The topsoil was found to be consistent with that recovered during the previous phase of works, with soils typically being recovered as a slightly sandy slightly gravelly CLAY.

8.1.2 Superficial Deposits

8.1.2.1 River Terrace Deposits

October 2022 – Phase II phase of works

River Terrace Deposits were found at all locations beneath the Topsoil to a maximum drilled depth of 1.90m bgl.

The River Terrace Deposits typically comprised firm orangish brown slightly gravelly sandy CLAY. Sand was fine to medium. Gravel was angular to subangular fine to coarse flint.

Please note, the base of the River Terrace Deposits was not encountered during this phase of works, with investigation depth limited by the nature of the underlying deposits.

February 2023 – Soakaway Testing phase of works

During the return works in February 2023, the River Terrace Deposits were encountered within all six (6no.) trial pits (SA101-103, SA201-203) beneath the Topsoil to the base of the trial pit.

Shallow River Terrace Deposits were typically recovered as soft to firm orangish brown slightly sandy slightly gravelly CLAY. Sand was fine to coarse. Gravel was angular to subrounded flint. The depth of this strata ended between 1.20m (SA203) and 2.00m bgl (SA102).

Beneath the fine-grained shallow River Terrace Deposits, the deeper superficial soils were recovered as light brown and cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional subangular to subrounded flint cobbles.

The base of the River Terrace Deposits was not encountered during this phase of works, with investigation depth limited by the nature of the underlying deposits. The maximum excavated depth was 2.80m bgl (SA101 and SA102).

8.1.3 Groundwater Conditions

No groundwater strikes were encountered during the initial phase of works in October works, nor during the December return monitoring visit. Groundwater was not encountered during the February 2023 return works.

8.2 Laboratory Classification Analysis

Soil classification testing, including Atterberg Limits, Moisture Content, Particle Size Distribution and pH and Sulphate results are summarised in Table 8-1 – Table 8-4 with analysis certificates presented in Appendix VIII.

8.2.1 Soil Plasticity

Four (4no.) samples taken from cohesive deposits across the site were submitted to the laboratory for laboratory plasticity analysis. The results of this analysis have been summarised in Table 8-1 below.

Table 8-1. Summary of Soil Plasticity

Location	Depth (m bgl)	Geology	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index	Plasticity	Volume Change Potential
WS101	1.30-1.40	Brown slightly gravelly sandy CLAY	17	38	20	18	74	13.32	Medium	Low
WS102	1.50-1.60	Brown slightly sandy clayey GRAVEL	6.9	72	31	41	24	9.84	Very high	Low
WS103	1.70-1.80	Brown slightly gravelly sandy CLAY	18	38	19	19	84	15.96	Medium	Low

Location	Depth (m bgl)	Geology	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index	Plasticity	Volume Change Potential
WS104	1.70-1.80	Light brown sandy very gravelly CLAY	9.1	24	16	8	48	3.84	Low	Low

The results presented in Table 8-1 indicate that the Plasticity of the River Terrace Deposits ranges from Low to Very High. The Volume Change Potential (VCP) of the River Terrace Deposits were Low.

8.2.2 Particle Size Distribution Analysis

Two (2no.) soil samples were submitted to the laboratory for Particle Size Distribution (PSD) analysis, with the results presented below in Table 8-2. The results are generally consistent with the on-site observations and descriptions.

Table 8-2. Summary of Particle Size Distribution

Location	Depth (m bgl)	Granulometric Composition (%)					Grading Analysis	
		Laboratory Description	Fines (<0.063mm)	Sand	Gravel	Cobbles	Uniformity	Curvature
WS102	1.50-1.60	Brown slightly sandy clayey GRAVEL	20	4	76	0	>300	N/A
WS104	1.70-1.80	Light brown sandy very gravelly CLAY	43	18	39	0	>27	N/A

8.2.3 Moisture Content

Four (4no.) samples taken from deposits across the site were submitted to the laboratory for moisture content analysis. The results of this analysis have been summarised in Table 8-3 below.

Table 8-3. Summary of Moisture Content

Location	Depth (m bgl)	Natural Moisture Content (%)	Lab Description
WS101	1.30-1.40	17	Brown slightly gravelly sandy CLAY
WS102	1.50-1.60	6.9	Brown slightly sandy clayey GRAVEL
WS103	1.70-1.80	18	Brown slightly gravelly sandy CLAY
WS104	1.70-1.80	9.1	Light brown sandy very gravelly CLAY

8.2.4 pH and Sulphate

Chemical analysis for pH and soluble sulphate content are summarised in Table 8-4 below with analysis certificates presented as Appendix VII.

Table 8-4. Summary of pH and Sulphate Data

Location	Strata	Depth (m bgl)	SO ₄ in 2:1 water / soil (mg/l)	pH Value
WS101	Topsoil	0.0 - 0.3	11.6	6.61
WS102	River Terrace Deposits	0.3 - 0.6	6.6	6.47
WS103	River Terrace Deposits	0.6 - 1.1	5.2	7.05
WS104	River Terrace Deposits	0.25 - 0.6	4.3	6.84
WS105	Topsoil	0.0 – 0.3	8.0	6.78

Topsoil

Due to the limited thickness of the encountered Topsoil, it has been assumed that near surface soils to a depth of approximately 0.30m bgl will be subject to stripping and as such the Topsoil has not been classified.

River Terrace Deposits

Due to the size of the dataset (<5 samples), characteristic pH and SO₄ values were calculated using the highest sulphate result and the lowest pH value as stated in the BRE Special Digest (2005) producing a site characteristic value for sulphate of 6.6 mg/l and a pH value of 6.47.

This therefore classifies the River Terrace Deposits on site as DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 for greenfield locations.

8.3 In-Situ Testing

8.3.1 Standard Penetration Tests (SPT)

Standard Penetration Tests (SPT) were carried out in all windowless sampling boreholes in accordance with techniques outlined in BS1377, to assess the strength/density of the underlying strata. The 'N' value (number of blows per 300mm penetration) was recorded for each test. The results of these in-situ tests, including full blow counts, are presented on the borehole logs within Appendix VI.

8.3.2 Soil Infiltration Testing – Falling Head Permeability Test

8th February 2023

In-situ soil infiltration testing was undertaken in general accordance with BRE DG365 – *Soakaway Design* within the near surface at locations SA101-103 over the course of one (1no.) full day on 8th February 2023. Trial pits were excavated to a maximum depth of 2.80m bgl (SA101 and SA102) and targeted soils comprising a clayey or very clayey GRAVEL. Test pit fill depths ranged between 1.90m (SA101) and 1.96m (SA102) bgl.

Soil Infiltration test certificates are presented as Appendix X and summarised in Table 8-5 overleaf.

Table 8-5 Summary of Soil Infiltration Testing – 8th February 2023

Location	Pit Dimensions (L x W x D)	Depth to fill (m bgl)	Strata Type	Duration of test (hrs:mm:ss)	Soil Infiltrations Rate (m/s)
SA101	1.70x0.48x2.51	1.91	Clayey GRAVEL	04:00:00	9.85x10 ⁻⁶
	1.70x0.48x2.50	1.90		01:02:00	FAILED
SA102	1.95x0.50x2.75	1.96	Clayey GRAVEL	05:50:00	FAILED
SA103	2.00x0.50x2.56	1.94	Clayey GRAVEL	05:09:00	FAILED

Testing was undertaken at SA101-SA103 over a maximum duration of 5 hours 50 minutes. During this period, the required 25% and 75% effective storage depth intercepts were not reached within SA102 or SA103 such that the tests were considered to be unsuccessful, and therefore soil infiltration rates could not be calculated.

However for SA101 during Test 1 the required 25% and 75% effective storage depth intercepts were reached such that the test was considered to be successful, providing a soil infiltration rate of 9.85 x 10⁻⁶ m/s. This indicates low to medium permeability soil with good drainage conditions, consistent with a clayey GRAVEL soil type. However, the required 25% and 75% effective storage depth intercepts were not reached during Test 2 for SA101, and so the test was considered to be unsuccessful. However, due to time constraints on site, with soakaway testing being completed over the course of a single day Test 2 at location SA101 was only left to run for 1 hour 2 minutes.

22nd February 2023

Further infiltration works were undertaken on 22nd February 2023. This phase of works comprised the construction of gravel-filled soakaway test locations (SA201-SA203) and was undertaken in full accordance with BRE DG365 – *Soakaway Design*.

Following a review of infiltration test information provided to Omnia by the client and pertaining to the construction site located adjacent to the south of the subject site and liaison with the Client, an additional three (3no.) test locations (SA201, SA202 and SA203) were advanced either within or within close proximity to the footprint of the proposed access road where it is understood that soakaway cells are proposed for construction. Two (2no.) test locations (SA202 & SA203) targeted shallower deposits comprising a variably gravelly, sandy and silty CLAY whilst the third location (SA201) targeted the deeper clayey sandy GRAVEL deposits previously tested.

In-situ soil infiltration testing was undertaken within the near surface at locations SA201-203 over one (1no.) full day on 22nd February. Trial pits were excavated to a maximum depth of 2.40m bgl (SA201) and the fill depths ranged between 0.28m (SA203) and 1.65m (SA201) bgl.

Soil Infiltration test certificates are presented as Appendix X and summarised in Table 8-6 below.

Table 8-6 Summary of Soil Infiltration Testing – 22nd February 2023

Location	Pit Dimensions (L x W x D)	Depth to fill (m bgl)	Strata Type	Duration of test (hrs:mm:ss)	Soil Infiltrations Rate (m/s)
SA201	2.20x0.50x2.40	1.71	Clayey sandy GRAVEL	01:19:00	3.11 x 10 ⁻⁵
		1.65		01:11:00	3.26 x 10 ⁻⁵
		1.71		01:29:00	2.68 x 10 ⁻⁵
SA202	2.30x0.40x1.40	0.43	Slightly gravelly silty CLAY	00:19:00	2.05 x 10 ⁻⁴
		0.39		00:19:00	2.07 x 10 ⁻⁴
		0.51		00:18:00	1.89 x 10 ⁻⁴

Location	Pit Dimensions (L x W x D)	Depth to fill (m bgl)	Strata Type	Duration of test (hrs:mm:ss)	Soil Infiltrations Rate (m/s)
SA203	2.05x0.50x1.20	0.28	Slightly sandy slightly gravelly CLAY	00:10:00	3.53×10^{-4}
		0.28		00:11:00	3.33×10^{-4}
		0.33		00:12:00	3.01×10^{-4}

Testing was undertaken at SA201-SA203 over a maximum duration of 1 hour 29 minutes. During these periods, the required 25% and 75% effective storage depth intercepts were reached within all locations (SA201-203) for all three (3no.) repeat tests. As such, all of the tests are considered to have been successful and undertaken in full accordance with BRE DG365.

Within SA101 and SA201 the calculated soil infiltration rates ranged from 9.85×10^{-6} to 3.26×10^{-5} m/s indicating medium permeability with good drainage conditions within the deeper clayey sandy GRAVEL deposits.

Within locations SA202 and SA202 the calculated soil infiltration rates ranged from 1.89×10^{-4} to 3.53×10^{-4} m/s indicating medium permeability with good drainage conditions within the shallow variably sandy, silty and gravelly CLAY deposits. The soil infiltration rates indicate that the site may prove suitable for conventional soakaway design.

It is therefore recommended that the calculated infiltration rates are provided to a suitability qualified drainage engineer. The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365-Soakaway Design.

9 TIER 1 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

Omnia has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils pose an unacceptable level of risk to the identified receptors.

9.1 Human Health Risk Assessment

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published by the EA (Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV)) and where absent, Generic Assessment Criteria (GACs) published by LQM/CIEH Suitable for Use Levels (S4UL) 2015. Based on the proposed development comprising residential dwellings with associated gardens, Omnia has adopted screening values for a residential end use with home grown produce. The origin of the GAC values are presented within Appendix VIII.

The results of this comparison have been summarised within Table 9-1.

Table 9-1. Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use with Home Grown Produce

Determinant	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Inorganics							
Metals							
Arsenic	mg/kg	37	5	12.4	N/A	1	No Further Action
Beryllium	mg/kg	1.7	5	1.2	N/A	1	No Further Action
Boron	mg/kg	290	5	1.0	N/A	1	No Further Action
Cadmium	mg/kg	11	5	0.4	N/A	2	No Further Action
Chromium (III)	mg/kg	910	5	49	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	5	<0.3	N/A	2	No Further Action
Copper	mg/kg	2,400	5	19	N/A	2	No Further Action
Lead	mg/kg	200	5	42	N/A	1	No Further Action
Mercury	mg/kg	40	5	0.1	N/A	1	No Further Action
Nickel	mg/kg	180	5	25.3	N/A	1,2	No Further Action
Selenium	mg/kg	250	5	2	N/A	1,2	No Further Action
Vanadium	mg/kg	410	5	47	N/A	2	No Further Action
Zinc	mg/kg	3,700	5	87	N/A	2	No Further Action
General Inorganics							
Asbestos	%	0.001 Chrysotile	5	NAD	N/A	5	No Further Action
Total Cyanide *	mg/kg	50	5	<0.5	N/A	1	No Further Action
Organics							
General Organics							
Phenol	mg/kg	280	5	<0.15	N/A	2	No Further Action
PAH							
Naphthalene	mg/kg	2.3	5	<0.04	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	5	<0.03	N/A	2	No Further Action
Acenaphthene	mg/kg	210	5	<0.05	N/A	2	No Further Action
Fluorene	mg/kg	170	5	<0.04	N/A	2	No Further Action
Phenanthrene	mg/kg	95	5	0.14	N/A	2	No Further Action
Anthracene	mg/kg	2,400	5	<0.04	N/A	2	No Further Action
Fluoranthene	mg/kg	280	5	0.24	N/A	1,2	No Further Action
Pyrene	mg/kg	620	5	0.20	N/A	1,2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	5	0.14	N/A	1	No Further Action
Chrysene	mg/kg	15	5	0.14	N/A	1	No Further Action

Benzo(b)Fluoranthene	mg/kg	2.6	5	0.17	N/A	1	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	5	0.07	N/A	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	5	<0.04	N/A	1	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	5	0.12	N/A	1	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	5	<0.04	N/A	1	No Further Action
Benzo(ghi)Perylene	mg/kg	320	5	0.09	N/A	1	No Further Action
Banded TPH							
TPH EC 5-6**	mg/kg	42	5	<0.1	N/A	4	No Further Action
TPH EC >6-8**	mg/kg	100	5	<0.1	N/A	4	No Further Action
TPH EC >8-10**	mg/kg	27	5	<5	N/A	4	No Further Action
TPH EC > 10-12**	mg/kg	74	5	<10	N/A	2	No Further Action
TPH EC > 12-16**	mg/kg	140	5	<10	N/A	2	No Further Action
TPH EC > 16-21**	mg/kg	260	5	<10	N/A	1	No Further Action
TPH EC > 21-35**	mg/kg	1,100	5	132	N/A	1	No Further Action
TPH EC > 35-44**	mg/kg	1,100	5	<10	N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. Omnia has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit.

(vap) – GAC presented exceeds the vapour saturation limit.

9.2 Controlled Waters Assessment

The site is considered to present a low risk to controlled waters for the following reasons:

- Predominantly fine-grained soils encountered on site;
- No groundwater identified during site works (or first groundwater monitoring visit in December 2022);
- Chemical testing has yielded low level concentrations, which are all are below the conservative Human Health screening criteria. Whilst not directly comparable to controlled waters risk the conformance indicates that values are at a low level;
- The site is not located within a Source Protection Zone;
- No groundwater abstraction licences within 250m of the site; and,
- Bedrock is an unproductive aquifer.

10 REVISED CONCEPTUAL SITE MODEL

Following completion of the Tier 1 risk assessment, no active pollution pathways have been identified based on a residential end use with homegrown produce. As a result, it is considered that the site is suitable for the intended use.

11 GEOTECHNICAL ASSESSMENT

11.1 Proposed Development

It is understood that Elberry Properties Ltd (the Client) are proposing to develop the current open ground to the rear of The Croft, Barnham Road to a residential end use. The draft scheme comprises fourteen (14no.) dwellings with private gardens and associated access roads, spaced around a central green.

The outline proposed site layout is presented as Figure 2.0 (Appendix III).

11.2 Site Preparation

The site should be cleared of any vegetation below the areas of proposed development and stripped in accordance with [Series 200 of Specification of Highway Works](#).

Any roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting voids in-filled with suitable compacted material. This should also be undertaken for any redundant or re-routed services.

11.3 Ground Profile

Based on the findings on the current ground investigation, ground conditions at the site comprise Topsoil overlying superficial deposits of the River Terrace Deposits to the full depth of the ground investigation, discussed in Section 8.1. The bedrock deposits were not encountered during this phase of works. Site ground conditions are summarised in Table 11-1.

Table 11-1 Summary of site ground conditions

Borehole	Topsoil Thickness (m)	Superficial Deposits	Groundwater (m bgl)
		River Terrace Deposits Thickness (m)	
WS101	0.30	1.10	N/A
WS102	0.30	1.30	N/A
WS103	0.32	1.58	N/A
WS104	0.25	1.55	N/A
WS105	0.30	1.60	N/A

11.4 Shallow Foundations

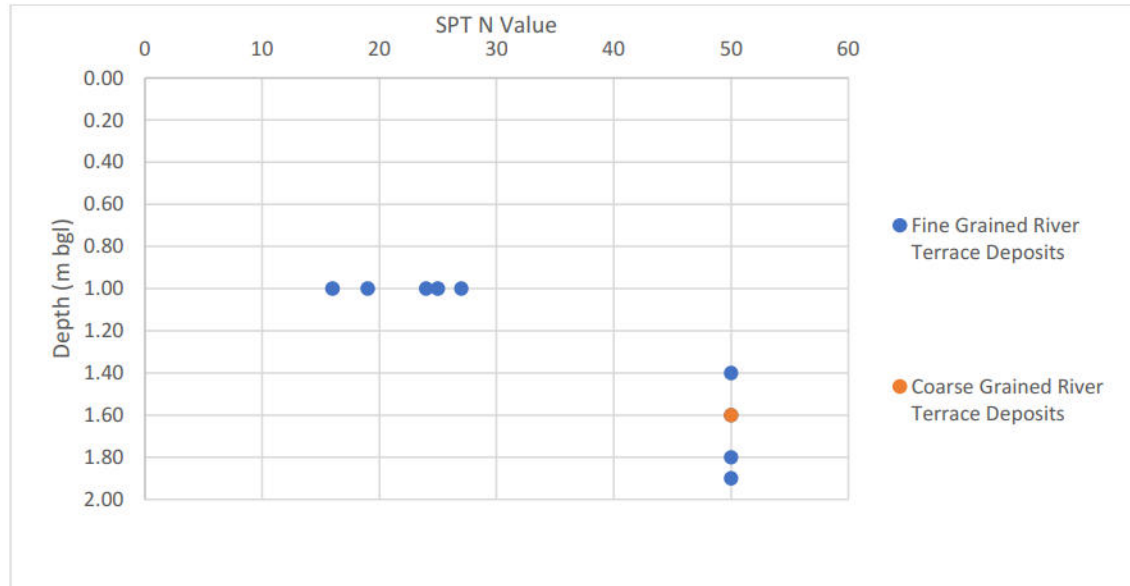
The following geotechnical assessment has been undertaken based on in-situ testing, laboratory analysis, and descriptions on the underlying geology. Foundation depths presented are indicative only based on a minimum presumed bearing value for a particular foundation type. Line loadings have not been made available such that the final depth and type of foundation required following design could vary.

It is considered that Topsoil would not form a suitable founding stratum due to characteristic variability and the associated potential for differential settlement. As such it is recommended that loads are transferred through the Topsoil to a depth at which competent geology, sufficient to support the proposed load, is encountered.

11.4.1 In Situ-Testing

Standard Penetration Testing was undertaken throughout the coarse-grained and fine-grained River Terrace Deposits. The results are presented in Graph 11-1 below:

Graph 11-1 SPT vs Depth



The SPT data shows an increase in N-value with depth from N=16 at 1.20mg to N>50 at 1.90mbgl for the River Terrace Deposits.

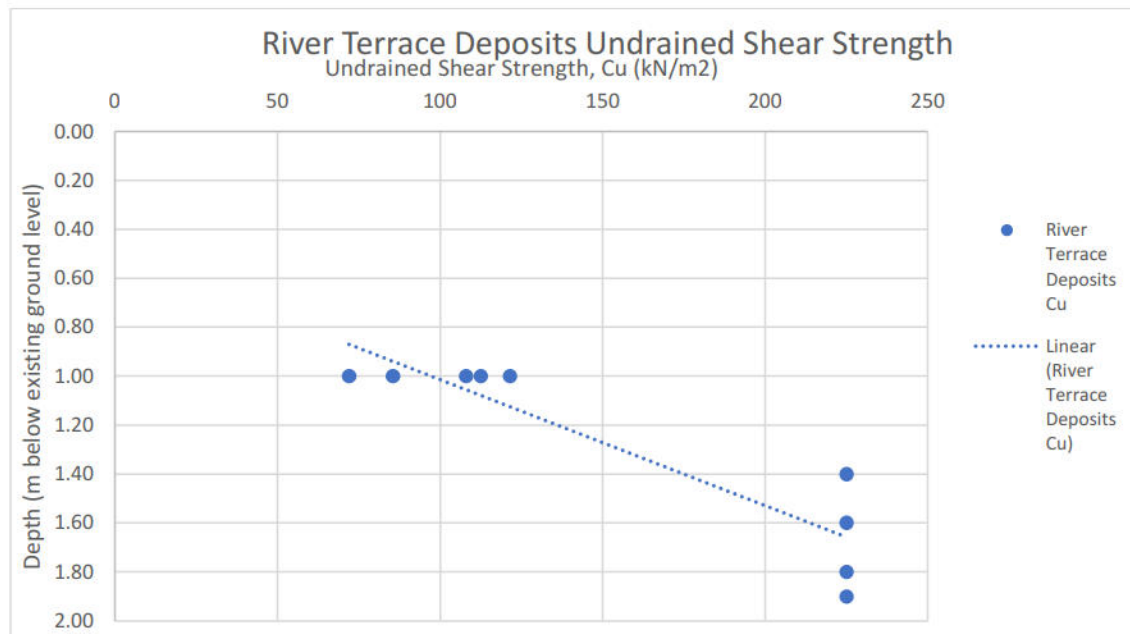
11.4.2 Shear Strength

The undrained Shear Strength of the fine-grained River Terrace Deposits have been determined by using the widely accepted empirical relationship, where f_1 is based on the correlation factor based on the plasticity index of the soil (Stroud, 1974):

$$C_u = f_1 \times SPTN$$

Using a correlation factor of 4.5 gives characteristic undrained shear strengths (C_{uk}) of 72kN/m² at 1.0m bgl rising to 225kN/m² at a depth of 1.90m bgl, represented in Graph 11-2 below. These values are consistent with the formation becoming medium to high strength material.

Graph 11-2 Shear Strength vs Depth



11.4.3 Bearing Capacities

11.4.3.1 River Terrace Deposits

Indicative Bearing Capacity at 1.00m bgl

At a depth of 1.00m bgl within the fine-grained soils of the River Terrace Deposits, SPT N values recorded as N=16, indicating medium strength material.

Across site SPT results range from N=16 to N=27 within fine grained deposits, indicating medium to high strength clays in all locations. It is considered that a traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provided corresponding undrained shear strengths of 72kN/m² to 121.5kN/m² indicating medium strength material.

Utilising an undrained shear strength of 72kN/m² it is considered that a traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 100-200kN/m².

Indicative Bearing Capacity at 2.00m bgl

At a depth of 2.00m bgl within the fine-grained soils of the River Terrace Deposits, SPT N value of N=>50, providing corresponding undrained shear strengths of 225kN/m² indicating very high-strength material within locations WS101, WS103-WS105.

Utilising an undrained shear strength of 225kN/m² it is considered that a traditional strip foundation of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 400-800kN/m².

At a depth of 2.00m bgl within the coarse-grained soils of the River Terrace Deposits, SPT N value of N=>50, indicating very dense material within location WS102 within the north-western corner.

Utilising an N Value of 50 it is considered that a traditional strip foundation of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 800kN/m².

11.5 Groundwater Levels

If groundwater is below the base of the foundation at a depth of less than the width of the proposed foundation, then groundwater can significantly reduce the bearing capacity of fine-grained soils. However, no groundwater was identified during the investigation or the follow-on monitoring visits.

11.6 Building Near Trees

11.6.1 NHBC Minimum Depth to Foundations

The shallow fine-grained soils on site have been shown via laboratory analysis to generally be of low to high plasticity and low volume change potential. Modified plasticity indices range from 3.84 to 15.96% and therefore it is considered that soils of River Terrace Deposits are of Low Volume Change Potential.

NHBC guidance offers two foundation depth scenarios dependant on future planting regimes for Low Volume Change Soils which utilises Tables 4 and 5 of NHBC Chapter 4.2 – Building Near Trees, summarised in Table 11-2 and Table 11-3 below.

Table 11-2 Minimum depth of foundations (after NHBC 2021)

Volume change potential	(A) Minimum foundation depth (m) (allowing for restricted new planting)	(B) Minimum foundation depth (m) (where planting is outside the zone of influence of trees)
High	1.50	1.00
Medium	1.25	0.90
Low	1.00	0.75

Table 11-3 New tree planting (after NHBC 2021)

Water demand	No tree planting zone for column A in Table 11-2	No tree planting zone / zone of influence for column B in Table 11-2
High	1.0 x mature height	1.25 x mature height
Moderate	0.5 x mature height	0.75 x mature height
Low	0.2 x mature height	0.50 x mature height

NHBC guidance indicates a minimum foundation depth of 0.75m bgl for low volume change soils outside of the zone of tree influence, which is dependent on the tree species but may be up to 0.50 x mature tree height (Table 11-3). Foundation depths will need to be increased within the zones of influence of existing or recently removed trees, as set out by NHBC Guidance (Chapter 4.2 – Building near Trees).

11.6.2 Lateral pressure and heave

Where foundations are more than 1.5m deep, within the influence of trees which are to remain or be removed, and may be subject to heave, they should be protected by voids, void formers or compressible materials to be take into account the effects of lateral swelling of soils. Minimum thicknesses of voids are set out in Table 7 of NHBC Chapter 4.2 – Building Near Trees.

Guidance is set out in NHBC the basic requirement is that compressible material or void former should be installed on the inside faces of external foundation walls. With piled foundation additional voids are required below ring beams. Position of heave precautions are set out in Table 8 of NHBC Chapter 4.2 – Building Near Trees.

11.7 Ground Floor Slabs

It is considered that ground floor slabs may be suitable for adoption for the development.

If levels were to be changed on site requiring steps in the substructure, further consideration should be given to the adoption of floor slabs, with reference to NHBC Standards (2011) 5.1 – *Substructure and ground bearing floors*.

11.8 Concrete Durability

The River Terrace Deposits on site are classified as DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 for greenfield locations.

11.9 Discussion

Traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 100-200kN/m² within the fine-grained River Terrace Deposits.

Across the majority of the site traditional strip foundation within the fine-grained River Terrace Deposits of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 400-800kN/m²; and traditional strip foundation within the north-western corner of the site at 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 800kN/m².

A minimum foundation depth of 0.75m bgl is anticipated for a Low Change Volume soil within the River Terrace Deposits outside of the zone of tree influence, in accordance with NHBC. Where foundations are likely to be within the influence of trees foundation depths will require locally deepening. The extent to which they should be deepened should be in accordance with NHBC guidance, Chapter 4.2 – Building Near Trees (Tables 4 and 5).

Should loadings exceed those set out above then alternative founding solutions will need to be explored.

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.

12 CONCLUSIONS AND RECOMMENDATIONS

Revised Conceptual Site Model
Following completion of the Tier 1 risk assessment, no active pollution pathways have been identified based on a residential end use with homegrown produce.
Soil Infiltration Testing
Soils of the shallower fine-grained River Terrace Deposits have soil infiltration rates ranging from 1.89×10^{-4} (SA202 Test 3) to 3.53×10^{-4} m/s (SA203 Test 1), which indicates medium permeability with good drainage conditions.
Soils of the deeper coarse-grained River Terrace Deposits provided soil infiltration rates of between 9.85×10^{-6} m/s (SA101 Test 1) to 3.26×10^{-5} m/s (SA201 Test 1). Within this strata, three (3no.) failed tests (SA101 Test 2, SA102 Test 1 and SA103 Test 1) were observed during the initial phase of soakaway works, where the maximum duration of testing was 5 hours 50 minutes.
Given the calculated infiltration rates within the River Terrace Deposits by in-situ testing, it is considered that the site may prove suitable for conventional soakaway design. It is recommended that the calculated infiltration rates are provided to a suitability qualified drainage engineer. The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365-Soakaway Design.
Concrete Classification
The River Terrace Deposits on site are classified as DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 for greenfield locations.
Geotechnical Assessment
Traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 100-200kN/m ² within the fine-grained River Terrace Deposits.
Across the majority of the site traditional strip foundation within the fine-grained River Terrace Deposits of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 400-800kN/m ² ; and traditional strip foundation within the north-western corner of the site at 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately 800kN/m ² .
A minimum foundation depth of 0.75m bgl is anticipated for a Low Change Volume soil within the River Terrace Deposits outside of the zone of tree influence, in accordance with NHBC. Where foundations are likely to be within the influence of trees foundation depths will require locally deepening. The extent to which they should be deepened should be in accordance with NHBC guidance, Chapter 4.2 – Building Near Trees (Tables 4 and 5).
Should loadings exceed those set out above then alternative founding solutions will need to be explored.
Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.
Recommendations
Environmental
If during the development stage any evidence of contamination is identified, works should be halted, and contact made with a suitably qualified Environmental Consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the regulator to achieve sign off of the works.
Geotechnical
Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and

undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.

It is recommended that the calculated infiltration rates are provided to a suitability qualified drainage engineer. The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365-Soakaway Design.

APPENDIX I - LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Omnia and the Client as indicated in Section 1.2.
 2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
 3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
 4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
 5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
 6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
 7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
 8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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APPENDIX II – GLOSSARY

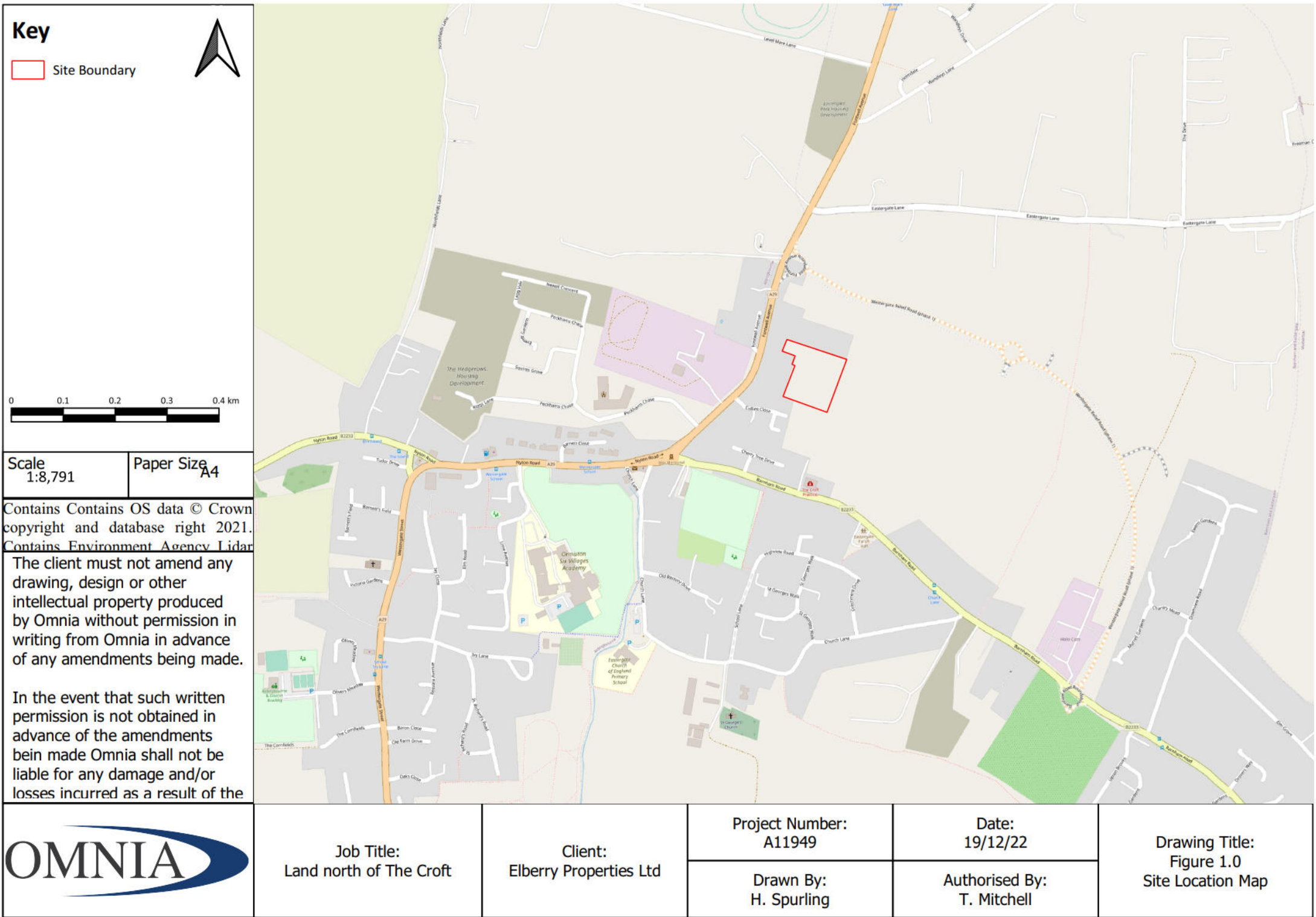
AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (Chlorinated Solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (Petrol, Diesel, Kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo-Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCS	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

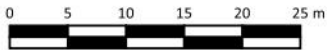
UNITS

M	Metres
KM	Kilometres
%	Percent
%V/V	Percent Volume in Air
MB	Milli Bars (Atmospheric Pressure)
L/HR	Litres Per Hour
µG/L	Micrograms Per Litre (Parts Per Billion)
PPB	Parts Per Billion
MG/KG	Milligrams Per Kilogram (Parts Per Million)
PPM	Parts Per Million
MG/M ³	Milligram Per Metre Cubed
M BGL	Metres Below Ground Level
M BCL	Metres Below Cover Level

MAOD	Metres Above Ordnance Datum (Sea Level)
KN/M ²	Kilo Newtons Per Metre Squared
µM	Micrometre

APPENDIX III - DRAWINGS





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Client:
Elberry Properties Ltd

Project Number:
A11949

Drawn By:
L. Burnett

Date:
30/01/2023

Authorised By:
O. Maxwell

Drawing Title:
Figure 2.0
Proposed Development Plan



Key

Active Dhand construction site

Site Boundary



10 0 10 20 30 40 50 m

Scale
1:2,000

Paper Size
A4

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Project Number:
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Drawn By:
H.spurling

Date:
16/12/2022

Authorised By:
O. Maxwell

Drawing Title:
Figure 2.1
Site Walkover Plan



Key



Window Sample Locations

SA101-SA103 Locations

SA201-SA203 Locations



Scale
1:700

Paper Size
A4

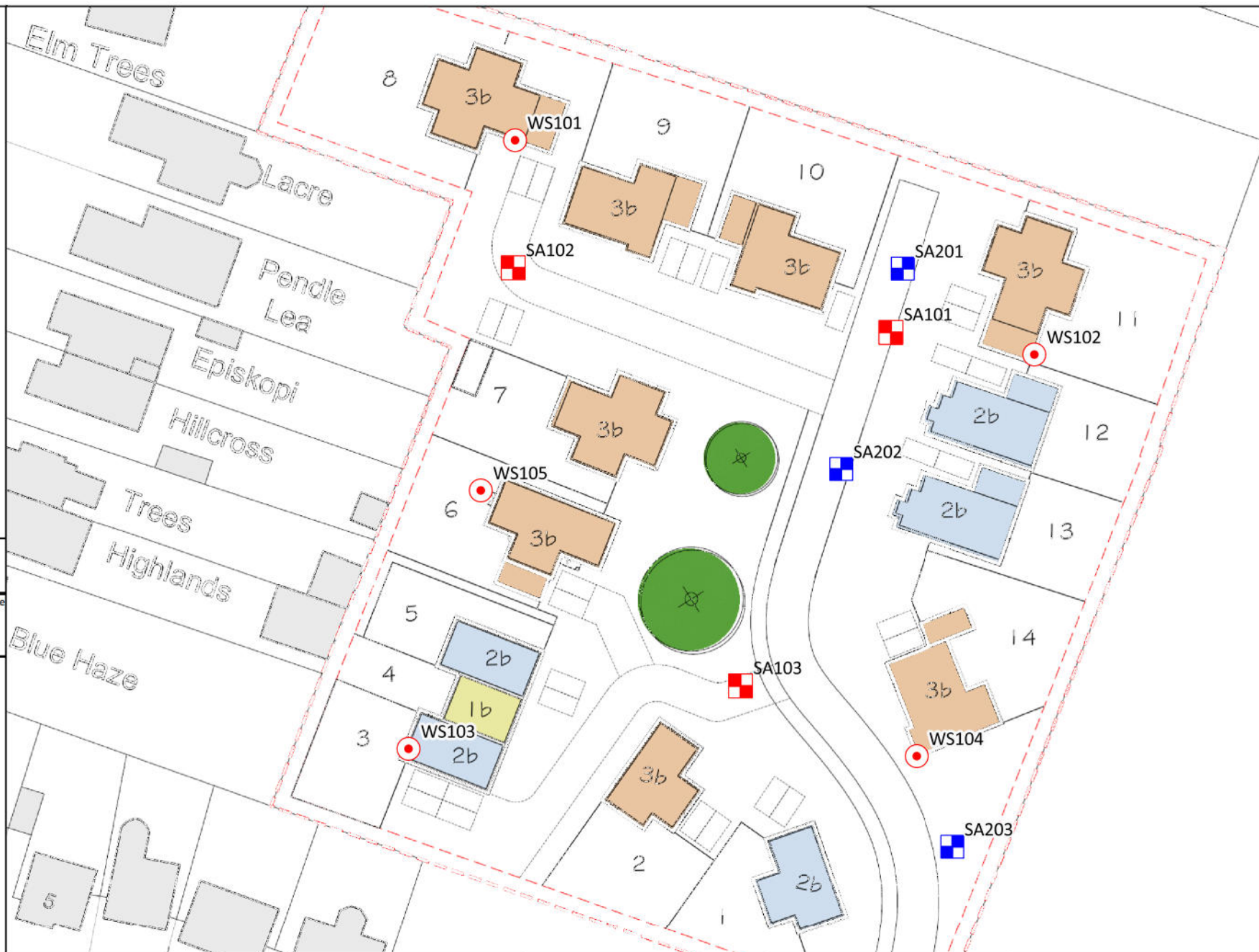
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Elberry Properties Ltd

Project Number:
A11949

Drawn By:
L. Burnett

Date:
06/01/2022

Authorised By:
A. King

Drawing Title:
Figure 3.0
Intrusive Location Plan

APPENDIX IV - PHOTOGRAPHS



Photograph 1 – Overview of the site



Photograph 2 – Active construction site to the south



Photograph 3 – Recovery from WS103



Photograph 4 – Recovery from WS105



Photograph 5 – Arisings from SA101



Photograph 6 – Arisings from SA201



Photograph 7 – Pit horizons of SA202 prior to gravel soakaway cell installation



Photograph 8 – Arisings from SA203

APPENDIX V - HISTORICAL MAPS

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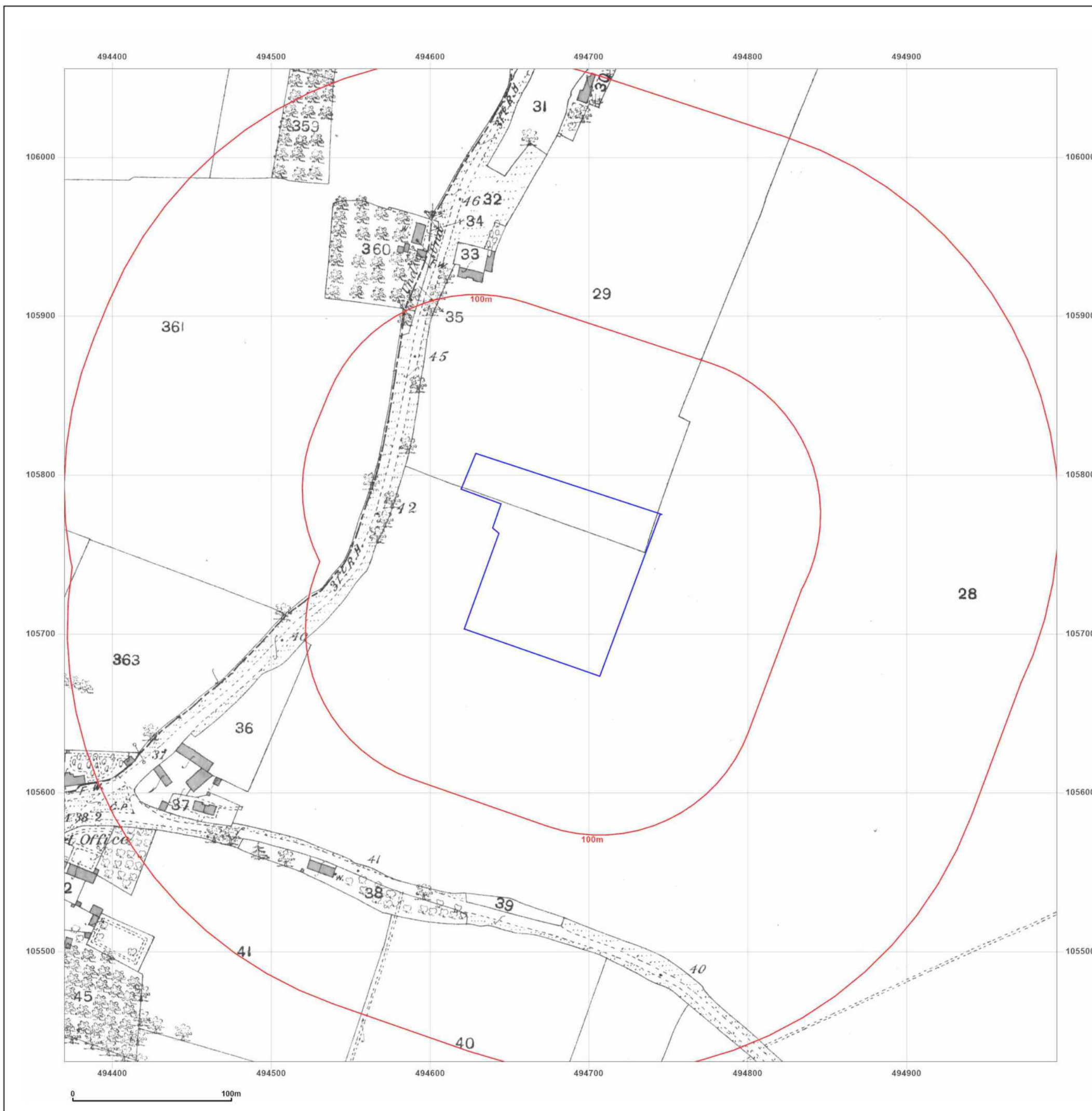


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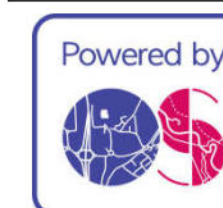
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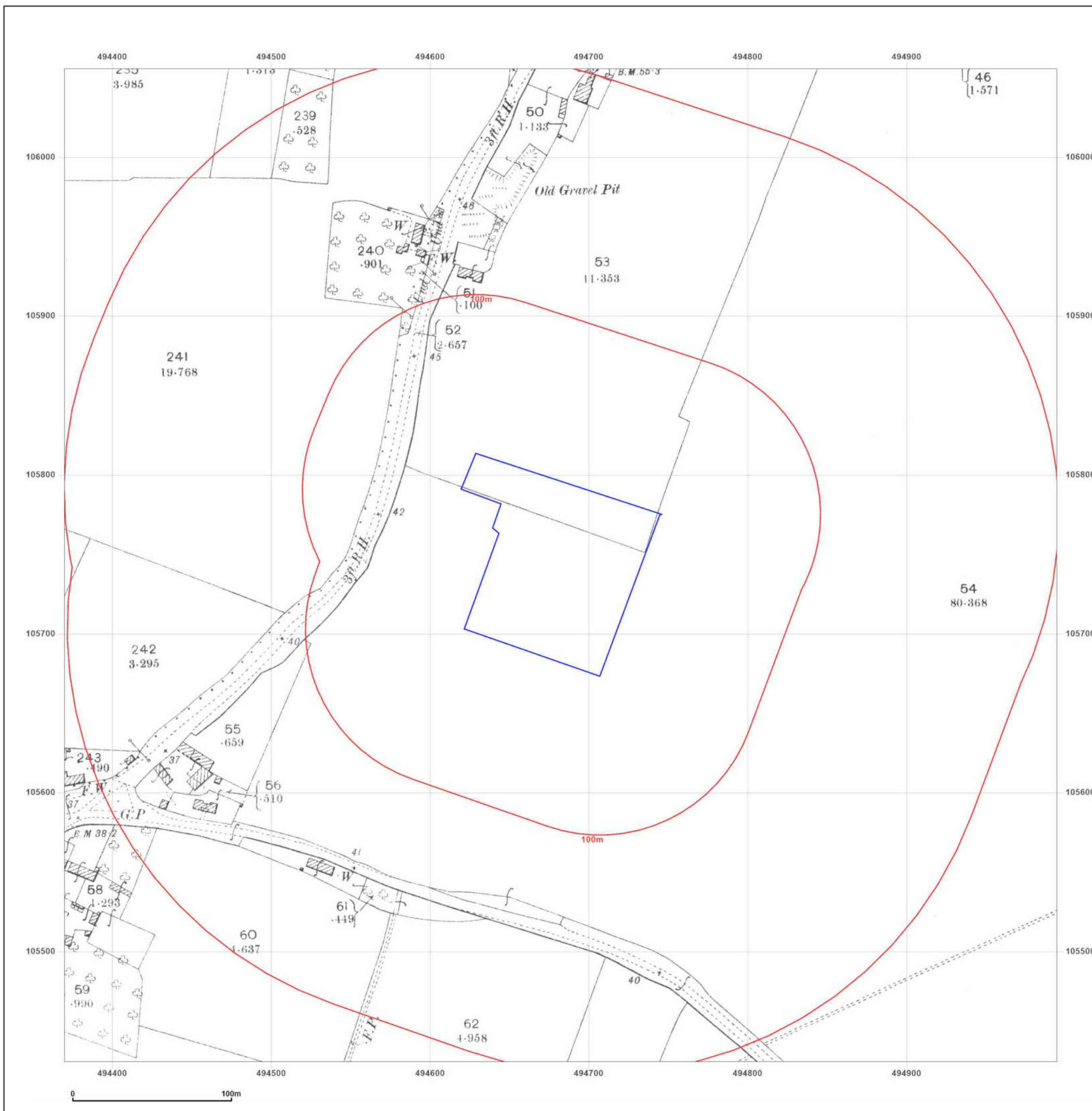


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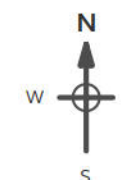
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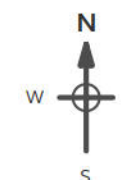
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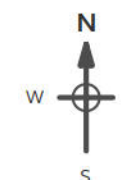
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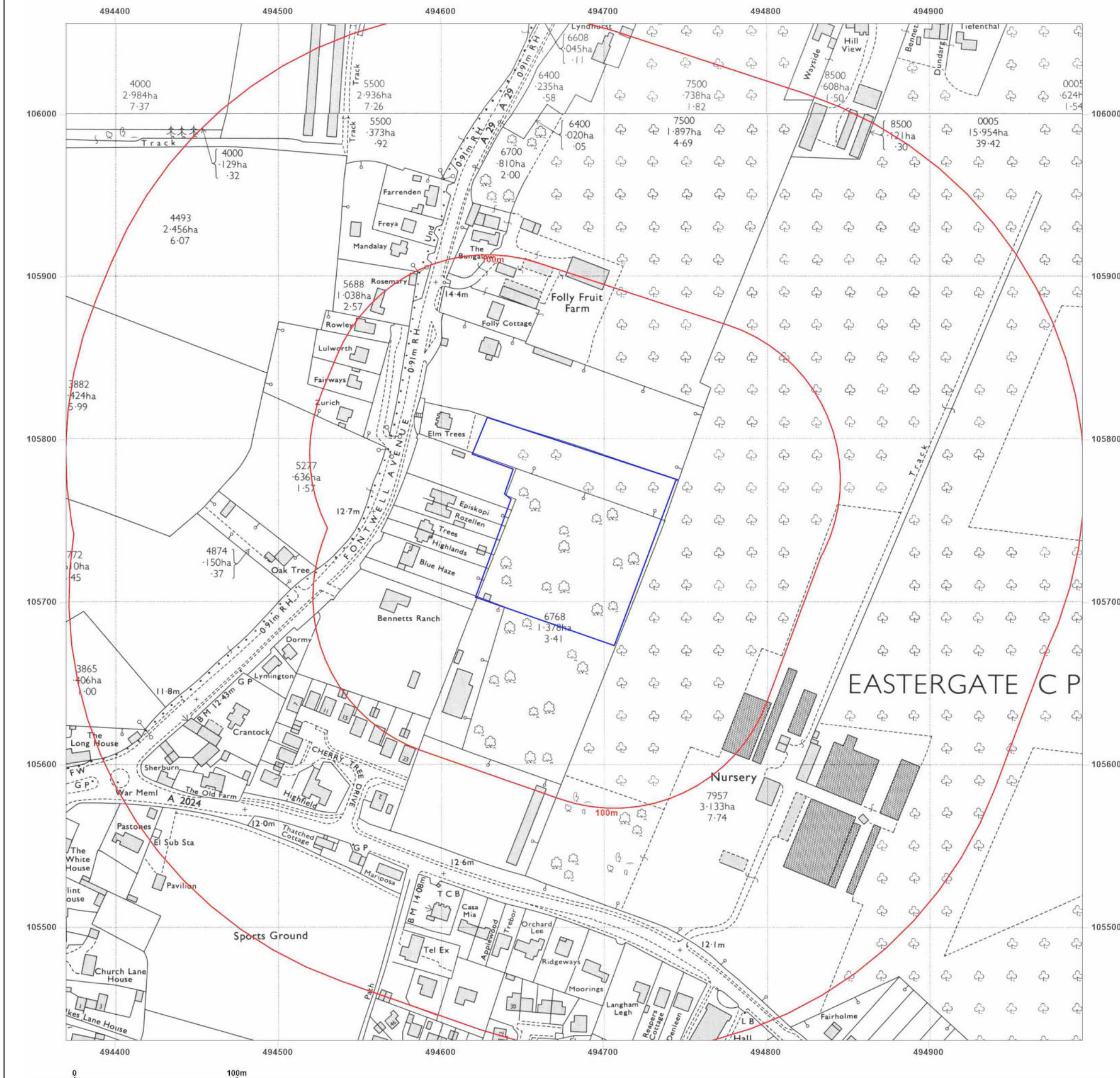


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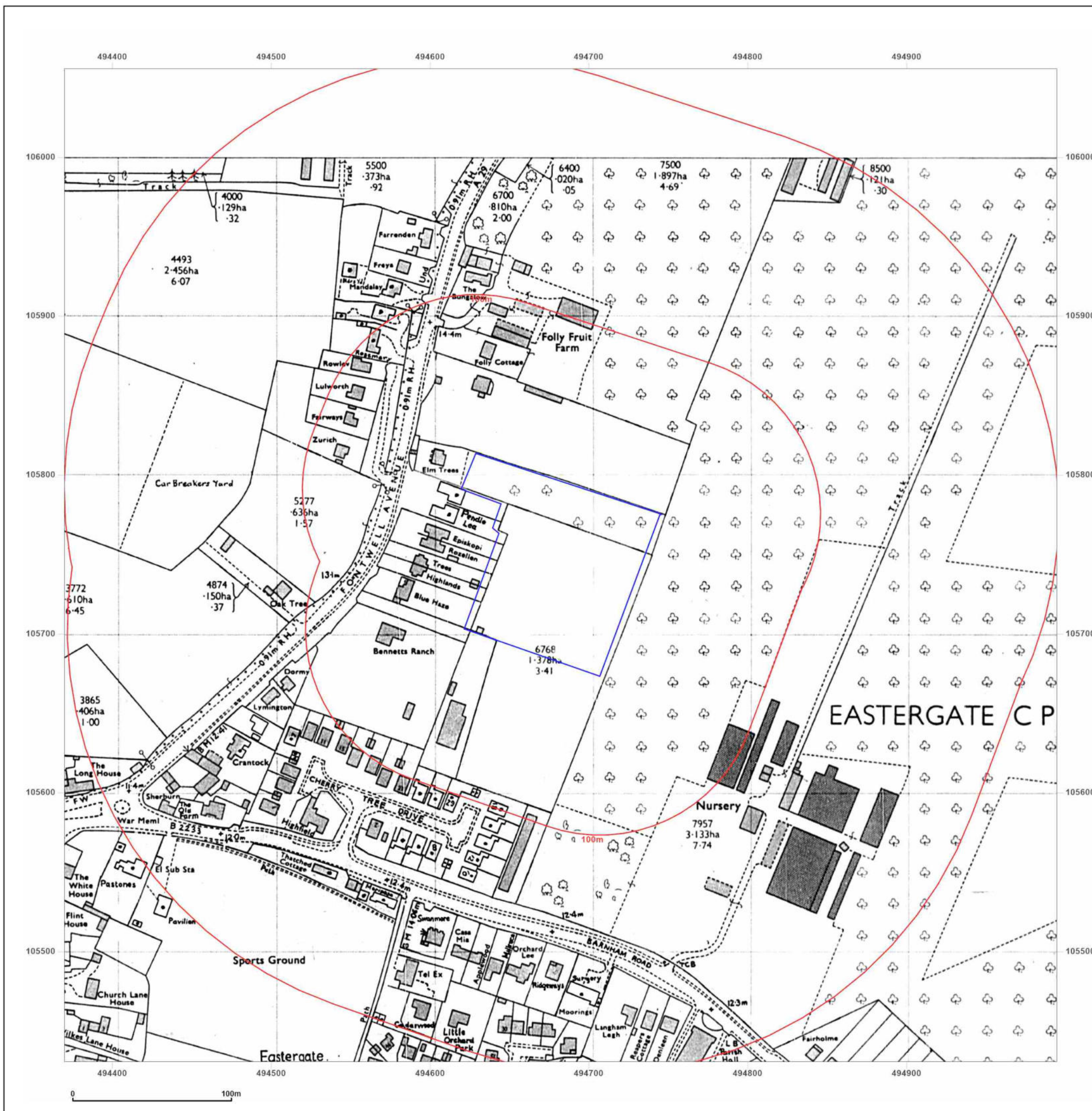


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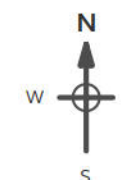
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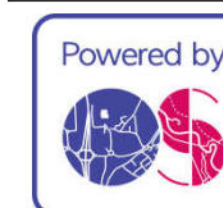
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Production date: 10 November 2022

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



APPENDIX VI - EXPLORATORY HOLE LOGS



Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Land north of The Croft

Project No.
A11949

Co-ords: 494649.14 - 105794.22

Hole Type
WS

Location: Barnham Road, Eastergate, PO20 3RP

Level:

Scale
1:25

Client: Elberry Properties Ltd

Dates: 28/10/2022 - 28/10/2022

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES		0.30			Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]	1
		0.30 - 0.60	ES					Firm orangeish brown sandy CLAY. Sand is fine to medium. [RIVER TERRACE DEPOSITS]	
		0.60 - 1.00	ES						
		1.00 1.00 - 1.10	D	N=27 (7,8/6,6,7,8)					
		1.30 - 1.40 1.40	D	N=50 (10,12/50 for 245mm)	1.30 1.40			Stiff orangeish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium angular to subangular flint. [RIVER TERRACE DEPOSITS] End of borehole at 1.40 m	
									2
									3
									4
									5

Remarks

1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.





Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Land north of The Croft

Project No.
A11949

Co-ords: 494716.07 - 105766.59

Hole Type
WS

Location: Barnham Road, Eastergate, PO20 3RP

Level:

Scale
1:25

Client: Elberry Properties Ltd

Dates: 28/10/2022 - 28/10/2022

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES					Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]	
		0.30 - 0.60	ES		0.30				
		0.60 - 1.00	ES					Soft to firm orangeish brown slightly sandy CLAY. Sand is fine to medium. [RIVER TERRACE DEPOSITS]	
		1.00		N=24 (6,6/6,7,5,6)					1
		1.20 - 1.30	D		1.30				
		1.50 - 1.60	D					Firm orangeish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium angular to subrounded flint. [RIVER TERRACE DEPOSITS]	
		1.60		50 (9,12/50 for 105mm)	1.60			End of borehole at 1.60 m	2
									3
									4
									5

Remarks

1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.





Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Land north of The Croft

Project No.
A11949

Co-ords: 494635.41 - 105715.76

Hole Type
WS

Location: Barnham Road, Eastergate, PO20 3RP

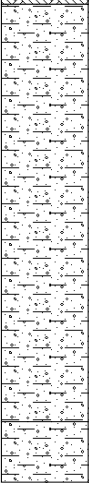
Level:

Scale
1:25

Client: Elberry Properties Ltd

Dates: 28/10/2022 - 28/10/2022

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES		0.32			Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]	1
		0.30 - 0.60	ES						
		0.60 - 1.10	ES						
		1.00		N=19 (4,5/4,4,5,6)		Firm to stiff orangeish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular to subangular flint. [RIVER TERRACE DEPOSITS]			
		1.20 - 1.30	D						
		1.70 - 1.80	D						
1.80		50 (12,15/50 for 90mm)	1.70		Orangeish brown and light brown slightly sandy clayey fine to medium angular to subangular GRAVEL of flint. Sand is fine to coarse. [RIVER TERRACE DEPOSITS]	2			
			1.90						
								End of borehole at 1.90 m	3
									4
									5

Remarks

1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.





Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Land north of The Croft

Project No.
A11949

Co-ords: 494700.92 - 105714.81

Hole Type
WS

Location: Barnham Road, Eastergate, PO20 3RP

Level:

Scale
1:25

Client: Elberry Properties Ltd

Dates: 28/10/2022 - 28/10/2022

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.25	ES					Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine angular to subangular flint. [TOPSOIL]	
		0.25 - 0.60	ES		0.25				
		0.60 - 1.00	ES						
		1.00		N=16 (4,4/3,4,5,4)					1
		1.20 - 1.30	D						
		1.60		50 (25 for 75mm/50 for 100mm)	1.60				
		1.70 - 1.80	D		1.80			Stiff light brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse angular to subangular flint. [RIVER TERRACE DEPOSITS]	
								End of borehole at 1.80 m	2
									3
									4
									5

Remarks

1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.





Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Land north of The Croft

Project No.
A11949

Co-ords: 494644.72 - 105749.07

Hole Type
WS

Location: Barnham Road, Eastergate, PO20 3RP

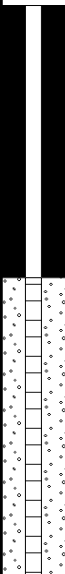
Level:

Scale
1:25

Client: Elberry Properties Ltd

Dates: 28/10/2022 - 28/10/2022

Logged By
JR

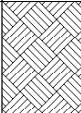
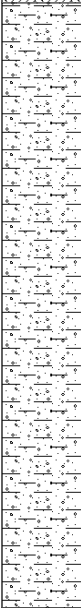
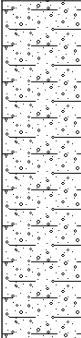
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES					Brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is fine to medium angular to subangular flint. [TOPSOIL]	
		0.30 - 0.60	ES		0.30				
		0.60 - 1.20	ES						
		1.00		N=25 (3,5/6,7,6,6)					1
		1.30 - 1.40	D						
		1.80 - 1.90	D		1.65				
		1.90		N=50 (12,10/50 for 290mm)	1.90			Firm to stiff orangeish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse angular to subangular flint. [RIVER TERRACE DEPOSITS]	2
								End of borehole at 1.90 m	
									3
									4
									5

Remarks

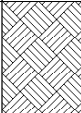
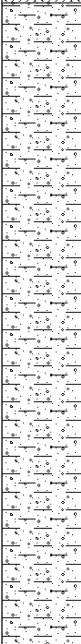
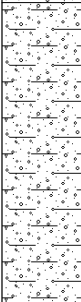
1. Position scanned with calibrated CAT & 'Genny' prior to excavation. No Groundwater encountered.



				Trial Pit Log			Trialpit No SA101 Sheet 1 of 1		
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494700.00 - 105764.00 Level:		Date 08/02/2023	
Location: Barnham Road, Eastergate, PO20 3RP						Dimensions (m): Depth 2.80 0.48 1.7		Scale 1:20 Logged JR	
Client: Elberry Properties Ltd									

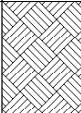
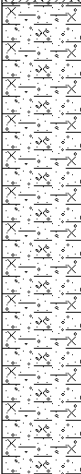
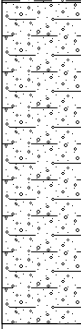
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint. [TOPSOIL].	
				1.90			Soft orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse flint. [RIVER TERRACE DEPOSITS].	1
				2.80			Light brown and cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional cobbles of subangular flint. Sand is fine to coarse. [RIVER TERRACE DEPOSITS].	2
							End of pit at 2.80 m	3
								4

Remarks: Cleared by CAT scanner prior to excavation. No groundwater encountered. Location used for infiltration testing.		
Stability: STABLE		

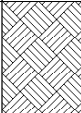
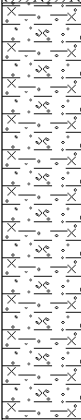
				Trial Pit Log			Trialpit No SA102 Sheet 1 of 1		
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494652.00 - 105773.00 Level:		Date 08/02/2023	
Location: Barnham Road, Eastergate, PO20 3RP						Dimensions (m): 0.5 1.95		Scale 1:20	
Client: Elberry Properties Ltd						Depth 2.80		Logged JR	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.30			Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine flint. [TOPSOIL].		
							Soft orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subangular fine to medium flint. [RIVER TERRACE DEPOSITS].		
				2.00			Light brown and cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional cobbles of subangular flint. Sand is fine to medium. [RIVER TERRACE DEPOSITS].		
				2.80			End of pit at 2.80 m		
1 2 3 4									
Remarks: Cleared by CAT scanner prior to excavation. No groundwater encountered. Location used for infiltration testing.									
Stability: STABLE									
									



				Trial Pit Log			Trialpit No SA201 Sheet 1 of 1		
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494700.00 - 105776.00 Level:		Date 22/02/2023	
Location: Barnham Road, Eastergate, PO20 3RP						Dimensions (m): 2.2 Depth 2.40		Scale 1:20 Logged AD	
Client: Elberry Properties Ltd									

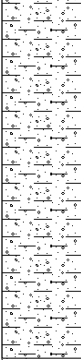
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30		 Grass over dry and friable brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Sand is fine to medium. Gravel is angular to subrounded fine to coarse flint. [TOPSOIL].	1
				1.55	 Soft orangish brown slightly sandy slightly gravelly CLAY with rare cobbles. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].	2	
			2.40	 Cream clayey sandy angular to subrounded fine to coarse GRAVEL of flint with low cobble content. Sand is fine to coarse. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].	3		
							----- End of pit at 2.40 m

Remarks: Cleared by CAT scanner prior to excavation. No groundwater encountered. Position used for infiltration testing.		
Stability: STABLE		

				Trial Pit Log			Trialpit No SA202 Sheet 1 of 1		
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494691.00 - 105749.00 Level:		Date 22/02/2023	
Location: Barnham Road, Eastergate, PO20 3RP						Dimensions (m): Depth 1.40 0.4 2.3		Scale 1:20 Logged AD	
Client: Elberry Properties Ltd									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.30			Grass over brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint. [TOPSOIL].		
				1.40			Soft to firm slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. [RIVER TERRACE DEPOSITS].		
						End of pit at 1.40 m			
1 2 3 4									
Remarks: Cleared by CAT scanner prior to excavation. No groundwater encountered. Position used for infiltration testing.									
Stability: STABLE									



				Trial Pit Log				Trialpit No SA203 Sheet 1 of 1	
Project Name: Land north of The Croft				Project No. A11949		Co-ords: 494707.00 - 105702.00 Level:		Date 22/02/2023	
Location: Barnham Road, Eastergate, PO20 3RP						Dimensions (m): 2.05 Depth 1.20		Scale 1:20 Logged LB	
Client: Elberry Properties Ltd									

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.25			Brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint. [TOPSOIL].
				1.20			Firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS].
							From 1.15m bgl: Gravelly. End of pit at 1.20 m

Remarks: Cleared by CAT scanner prior to excavation. No groundwater encountered. Position used for infiltration testing.

 Stability: STABLE



APPENDIX VII - CHEMICAL ANALYSIS CERTIFICATES

Omnia
3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP



Attention :	Tim Mitchell
Date :	18th November, 2022
Your reference :	A11949
Our reference :	Test Report 22/18458 Batch 1
Location :	Eastergate, Barnham Road
Date samples received :	9th November, 2022
Status :	Final Report
Issue :	1

Fifteen samples were received for analysis on 9th November, 2022 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Omnia
Reference: A11949
Location: Eastergate, Barnham Road
Contact: Tim Mitchell
EMT Job No: 22/18458

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	13-15	25-27	31-33	37-39						Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS102	WS103	WS104	WS105								
Depth	0.00-0.30	0.30-0.60	0.60-1.10	0.25-0.60	0.00-0.30								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022								
Arsenic [#]	9.0	12.2	12.4	11.9	8.8						<0.5	mg/kg	TM30/PM15
Barium [#]	60	69	76	76	64						<1	mg/kg	TM30/PM15
Beryllium	0.7	1.1	1.2	1.2	0.6						<0.5	mg/kg	TM30/PM15
Cadmium [#]	0.4	<0.1	<0.1	<0.1	0.3						<0.1	mg/kg	TM30/PM15
Chromium [#]	43.8	45.6	42.6	49.0	35.3						<0.5	mg/kg	TM30/PM15
Copper [#]	15	18	18	19	19						<1	mg/kg	TM30/PM15
Lead [#]	42	19	14	13	37						<5	mg/kg	TM30/PM15
Mercury [#]	0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Nickel [#]	16.5	23.5	24.4	25.3	15.0						<0.7	mg/kg	TM30/PM15
Selenium [#]	<1	1	<1	1	2						<1	mg/kg	TM30/PM15
Vanadium	30	44	46	47	27						<1	mg/kg	TM30/PM15
Water Soluble Boron [#]	0.6	0.5	0.5	0.4	1.0						<0.1	mg/kg	TM74/PM32
Zinc [#]	87	62	62	62	75						<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [#]	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	<0.05	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	0.06	<0.03	<0.03	<0.03	0.14						<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	0.19	<0.03	<0.03	<0.03	0.24						<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.16	<0.03	<0.03	<0.03	0.20						<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.11	<0.06	<0.06	<0.06	0.14						<0.06	mg/kg	TM4/PM8
Chrysene [#]	0.11	<0.02	<0.02	<0.02	0.14						<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene [#]	0.19	<0.07	<0.07	<0.07	0.24						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	0.09	<0.04	<0.04	<0.04	0.12						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	0.06	<0.04	<0.04	<0.04	0.09						<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.0	<0.6	<0.6	<0.6	1.3						<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.14	<0.05	<0.05	<0.05	0.17						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.05	<0.02	<0.02	<0.02	0.07						<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	100	95	96	94	95						<0	%	TM4/PM8
EPH >C8-C10 (EH_1D_Total) [#]	<5	<5	<5	<5	<5						<5	mg/kg	TM5/PM8
EPH >C10-C12 (EH_1D_Total) [#]	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C12-C16 (EH_1D_Total) [#]	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C16-C21 (EH_1D_Total) [#]	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C21-C35 (EH_1D_Total) [#]	128	19	16	28	132						<10	mg/kg	TM5/PM8
EPH >C35-C44 (EH_1D_Total)	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C8-C44 (EH_1D_Total)	128	<30	<30	<30	132						<30	mg/kg	TM5/PM8
GRO (>C4-C6)	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12

Client Name: Omnia
Reference: A11949
Location: Eastergate, Barnham Road
Contact: Tim Mitchell

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/18458	1	WS101	0.00-0.30	3	Matthew Turner	16/11/2022	General Description (Bulk Analysis)	Brown soil/Stone
					Matthew Turner	16/11/2022	Asbestos Fibres	NAD
					Matthew Turner	16/11/2022	Asbestos ACM	NAD
					Matthew Turner	16/11/2022	Asbestos Type	NAD
22/18458	1	WS102	0.30-0.60	15	Matthew Turner	16/11/2022	General Description (Bulk Analysis)	Brown soil/Stone
					Matthew Turner	16/11/2022	Asbestos Fibres	NAD
					Matthew Turner	16/11/2022	Asbestos ACM	NAD
					Matthew Turner	16/11/2022	Asbestos Type	NAD
22/18458	1	WS103	0.60-1.10	27	Matthew Turner	16/11/2022	General Description (Bulk Analysis)	Brown soil/Stone
					Matthew Turner	16/11/2022	Asbestos Fibres	NAD
					Matthew Turner	16/11/2022	Asbestos ACM	NAD
					Matthew Turner	16/11/2022	Asbestos Type	NAD
22/18458	1	WS104	0.25-0.60	33	Catherine Coles	16/11/2022	General Description (Bulk Analysis)	red sand,stone
					Catherine Coles	16/11/2022	Asbestos Fibres	NAD
					Catherine Coles	16/11/2022	Asbestos ACM	NAD
					Catherine Coles	16/11/2022	Asbestos Type	NAD
22/18458	1	WS105	0.00-0.30	39	Simon Postlewhite	16/11/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	16/11/2022	Asbestos Fibres	NAD
					Simon Postlewhite	16/11/2022	Asbestos ACM	NAD
					Simon Postlewhite	16/11/2022	Asbestos Type	NAD

Client Name: Omnia
Reference: A11949
Location: Eastergate, Barnham Road
Contact: Tim Mitchell

Matrix : Solid

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/18458

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 22/18458

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

EMT Job No: 22/18458

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

APPENDIX VIII - ORIGIN OF GAC VALUES

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Metals				
Arsenic	mg/kg	37	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	1	LQM CIEH Suitable for Use Levels (S4UL) 2015
Boron	mg/kg	290	1	
Cadmium	mg/kg	11	2	
Chromium (III)	mg/kg	910	1	
Chromium (VI)	mg/kg	6	2	
Copper	mg/kg	2,400	2	
Lead	mg/kg	200	1	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 report.
Mercury	mg/kg	40	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	1,2	LQM CIEH Suitable for Use Levels (S4UL) 2015
Selenium	mg/kg	250	1,2	
Vanadium	mg/kg	410	2	
Zinc	mg/kg	3,700	2	
General Inorganics				
Total Cyanide*	mg/kg	50	1	Dutch Intervention Values 2010
Asbestos	%	0.001%	6	OEC Derived Value based on ICRL
General Organics				
Phenol	mg/kg	280	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
PAHs				
Naphthalene	mg/kg	2.3	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Acenaphthylene	mg/kg	170	2	
Acenaphthene	mg/kg	210	2	
Fluorene	mg/kg	170	2	
Phenanthrene	mg/kg	95	2	
Anthracene	mg/kg	2,400	2	
Fluoranthene	mg/kg	280	1,2	
Pyrene	mg/kg	620	1,2	
Benzo(a)Anthracene ^f	mg/kg	7.2	1	
Chrysene	mg/kg	15	1	
Benzo(b)Fluoranthene	mg/kg	2.6	1	
Benzo(k)Fluoranthene	mg/kg	77	1	
Benzo(a)Pyrene	mg/kg	2.2	1	
Indeno(123-cd)Pyrene	mg/kg	27	1	
Dibenzo(a,h)Anthracene	mg/kg	0.24	1	

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5	March 2019	T.Mitchell

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Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Benzo(ghi)Perylene	mg/kg	320	1	
BTEX & MTBE				
Benzene	mg/kg	0.087	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
Toluene	mg/kg	130	2,4	
Ethylbenzene	mg/kg	47	2,4	
Xylenes	mg/kg	56	2,4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene
MTBE	mg/kg	49	4	Soil Generic Assessment Criteria for Human Health Risk Assessment (2010)
TPH-CWG				
Aliphatic				
Aliphatic EC 5-6	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aliphatic EC >6-8	mg/kg	100	4	
Aliphatic EC >8-10	mg/kg	27	4	
Aliphatic EC >10-12	mg/kg	130 ^(vap)	4	
Aliphatic EC > 12-16	mg/kg	1,100 ^(sol)	4	
Aliphatic EC > 16-35	mg/kg	65,000 ^(sol)	1	
Aliphatic EC >35-44	mg/kg	65,000 ^(sol)	1	
Aromatic				
Aromatic EC 5-7	mg/kg	70	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aromatic EC>7-8	mg/kg	130	4	
Aromatic EC> 8-10	mg/kg	34	4	
Aromatic EC> 10-12	mg/kg	74	2	
Aromatic EC> 12-16	mg/kg	140	2	
Aromatic EC> 16-21	mg/kg	260	2	
Aromatic EC> 21-35	mg/kg	1,100	1	
Aromatic EC> 35-44	mg/kg	1,100	1	
Banded TPH				
TPH EC 5-6**	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM, utilising the most conservative of the Ali/Aro chain lengths.
TPH EC >6-8**	mg/kg	100	4	
TPH EC >8-10**	mg/kg	27	4	
TPH EC> 10-12**	mg/kg	74	2	
TPH EC> 12-16**	mg/kg	140	2	
TPH EC> 16-21**	mg/kg	260	1	
TPH EC> 21-35**	mg/kg	1,100	1	

DOCUMENT VERSION	DOCUMENT DATE	OWNER
5	March 2019	T.Mitchell



ENVIRONMENTAL
CONSULTING

DOC REF

TECH11101

DOCUMENT NAME

Residential End Use with Homegrown Produce

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
TPH EC> 35-44**	mg/kg	1,100	1	

Notes

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit.

(vap) – GAC presented exceeds the vapour saturation limit.

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Tier 1 Risk Assessment - Soils – Residential End Use with Homegrown Produce

Determinant	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Inorganics							
Metals							
Arsenic	mg/kg	37			N/A	1	No Further Action
Beryllium	mg/kg	1.7			N/A	1	No Further Action
Boron	mg/kg	290			N/A	1	No Further Action
Cadmium	mg/kg	11			N/A	2	No Further Action
Chromium (III)	mg/kg	910			N/A	1	No Further Action
Chromium (VI)	mg/kg	6			N/A	2	No Further Action
Copper	mg/kg	2,400			N/A	2	No Further Action
Lead	mg/kg	200			N/A	1	No Further Action
Mercury	mg/kg	40			N/A	1	No Further Action
Nickel	mg/kg	180			N/A	1,2	No Further Action
Selenium	mg/kg	250			N/A	1,2	No Further Action
Vanadium	mg/kg	410			N/A	2	No Further Action
Zinc	mg/kg	3,700			N/A	2	No Further Action
General Inorganics							
Asbestos	%	0.001			N/A	5	No Further Action
Total Cyanide *	mg/kg	50			N/A	1	No Further Action
Organics							
General Organics							
Phenol	mg/kg	280			N/A	2	No Further Action
PAH							
Naphthalene	mg/kg	2.3			N/A	2	No Further Action
Acenaphthylene	mg/kg	170			N/A	2	No Further Action
Acenaphthene	mg/kg	210			N/A	2	No Further Action
Fluorene	mg/kg	170			N/A	2	No Further Action
Phenanthrene	mg/kg	95			N/A	2	No Further Action
Anthracene	mg/kg	2,400			N/A	2	No Further Action
Fluoranthene	mg/kg	280			N/A	1,2	No Further Action
Pyrene	mg/kg	620			N/A	1,2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2			N/A	1	No Further Action
Chrysene	mg/kg	15			N/A	1	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6			N/A	1	No Further Action
Benzo(k)Fluoranthene	mg/kg	77			N/A	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.2			N/A	1	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27			N/A	1	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24			N/A	1	No Further Action
Benzo(ghi)Perylene	mg/kg	320			N/A	1	No Further Action
BTEX & MTBE							
Benzene	mg/kg	0.087			N/A	4	No Further Action
Toluene	mg/kg	130			N/A	2,4	No Further Action
Ethylbenzene	mg/kg	47			N/A	2,4	No Further Action
Xylenes	mg/kg	56			N/A	2,4	No Further Action
MTBE	mg/kg	49			N/A	4	No Further Action
Aliphatic TPH							
Aliphatic EC 5-6	mg/kg	42			N/A	4	No Further Action
Aliphatic EC >6-8	mg/kg	100			N/A	4	No Further Action
Aliphatic EC >8-10	mg/kg	27			N/A	4	No Further Action
Aliphatic EC >10-12	mg/kg	130			N/A	4	No Further Action
Aliphatic EC > 12-16	mg/kg	1,100			N/A	4	No Further Action

DOCUMENT VERSION	DOCUMENT DATE	OWNER
5	March 2019	T.Mitchell

Aliphatic EC > 16-35	mg/kg	65,000			N/A	1	No Further Action
Aliphatic EC >35-44	mg/kg	65,000			N/A	1	No Further Action
Aromatic TPH							
Aromatic EC 5-7	mg/kg	70			N/A	4	No Further Action
Aromatic EC>7-8	mg/kg	130			N/A	4	No Further Action
Aromatic EC> 8-10	mg/kg	34			N/A	4	No Further Action
Aromatic EC> 10-12	mg/kg	74			N/A	2	No Further Action
Aromatic EC> 12-16	mg/kg	140			N/A	2	No Further Action
Aromatic EC> 16-21	mg/kg	260			N/A	2	No Further Action
Aromatic EC> 21-35	mg/kg	1,100			N/A	1	No Further Action
Aromatic EC> 35-44	mg/kg	1,100			N/A	1	No Further Action
Banded TPH							
TPH EC 5-6**	mg/kg	42			N/A	4	No Further Action
TPH EC >6-8**	mg/kg	100			N/A	4	No Further Action
TPH EC >8-10**	mg/kg	27			N/A	4	No Further Action
TPH EC> 10-12**	mg/kg	74			N/A	2	No Further Action
TPH EC> 12-16**	mg/kg	140			N/A	2	No Further Action
TPH EC> 16-21**	mg/kg	260			N/A	1	No Further Action
TPH EC> 21-35**	mg/kg	1,100			N/A	1	No Further Action
TPH EC> 35-44**	mg/kg	1,100			N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit.

(vap) – GAC presented exceeds the vapour saturation limit.

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APPENDIX IX - GEOTECHNICAL ANALYSIS CERTIFICATES

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499336

Hole No.: WS101

Sample Reference: Not Given

Sample Description: Brown slightly gravelly sandy CLAY

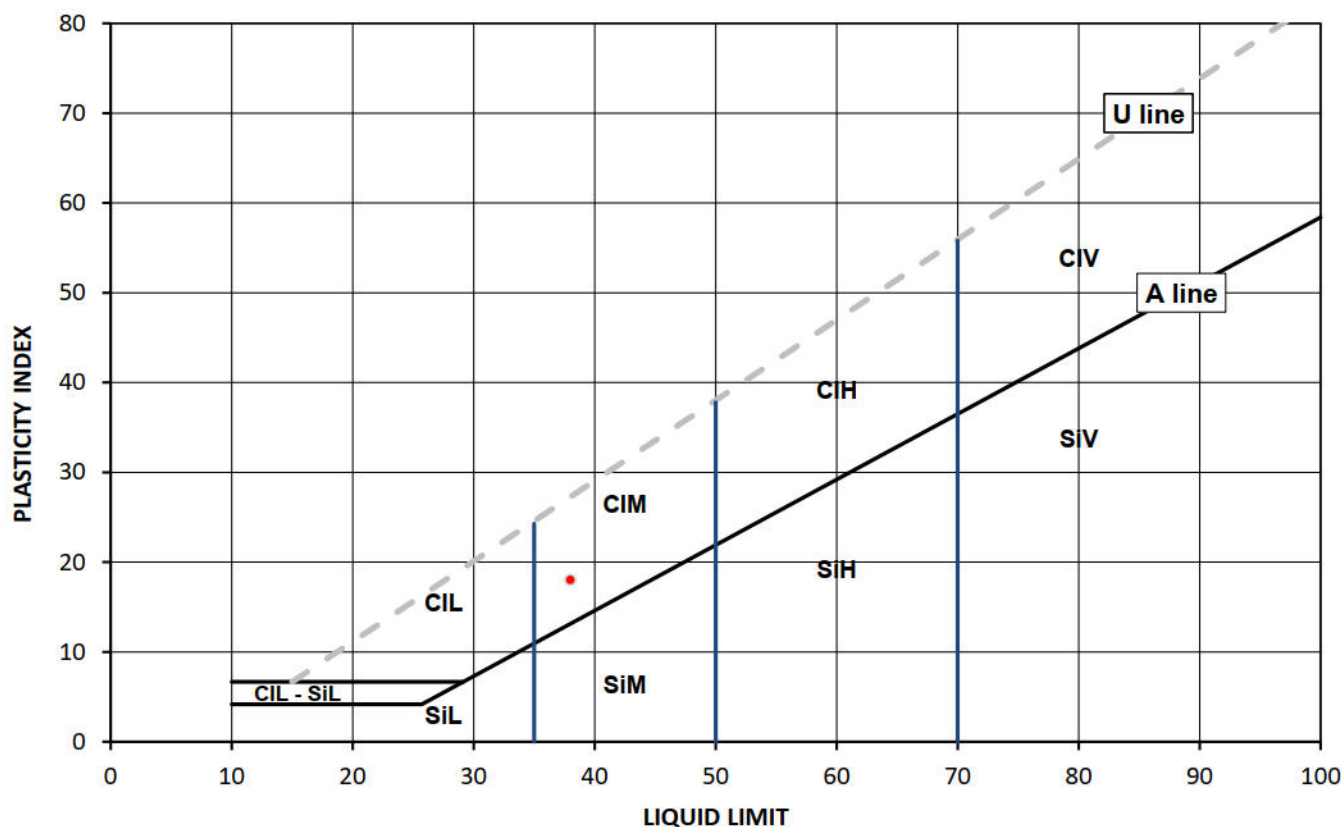
Depth Top [m]: 1.30

Depth Base [m]: 1.40

Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	38	20	18	74



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499337

Hole No.: WS102

Sample Reference: Not Given

Sample Description: Brown slightly sandy clayey GRAVEL

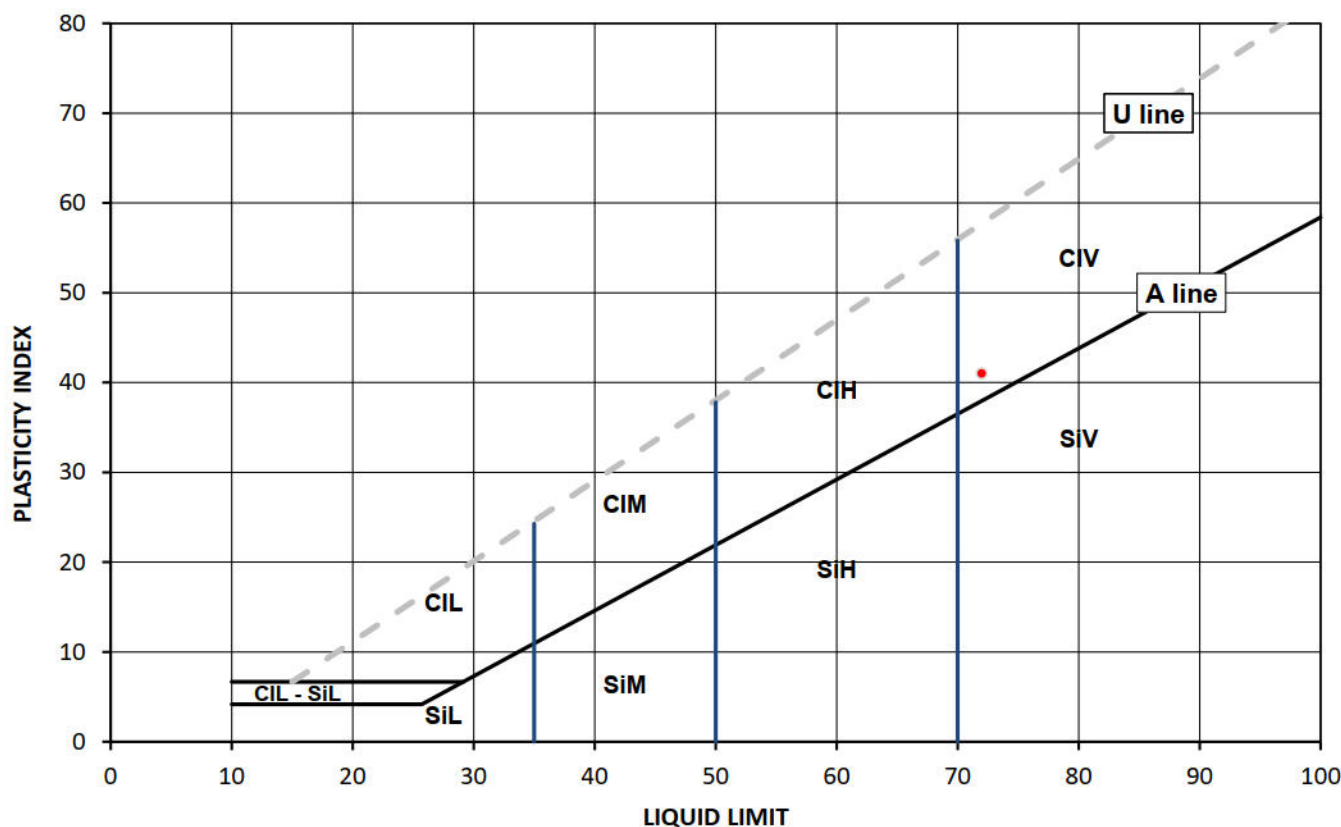
Depth Top [m]: 1.50

Depth Base [m]: 1.60

Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
6.9	72	31	41	24



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:



Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499338

Hole No.: WS103

Sample Reference: Not Given

Sample Description: Brown slightly gravelly sandy CLAY

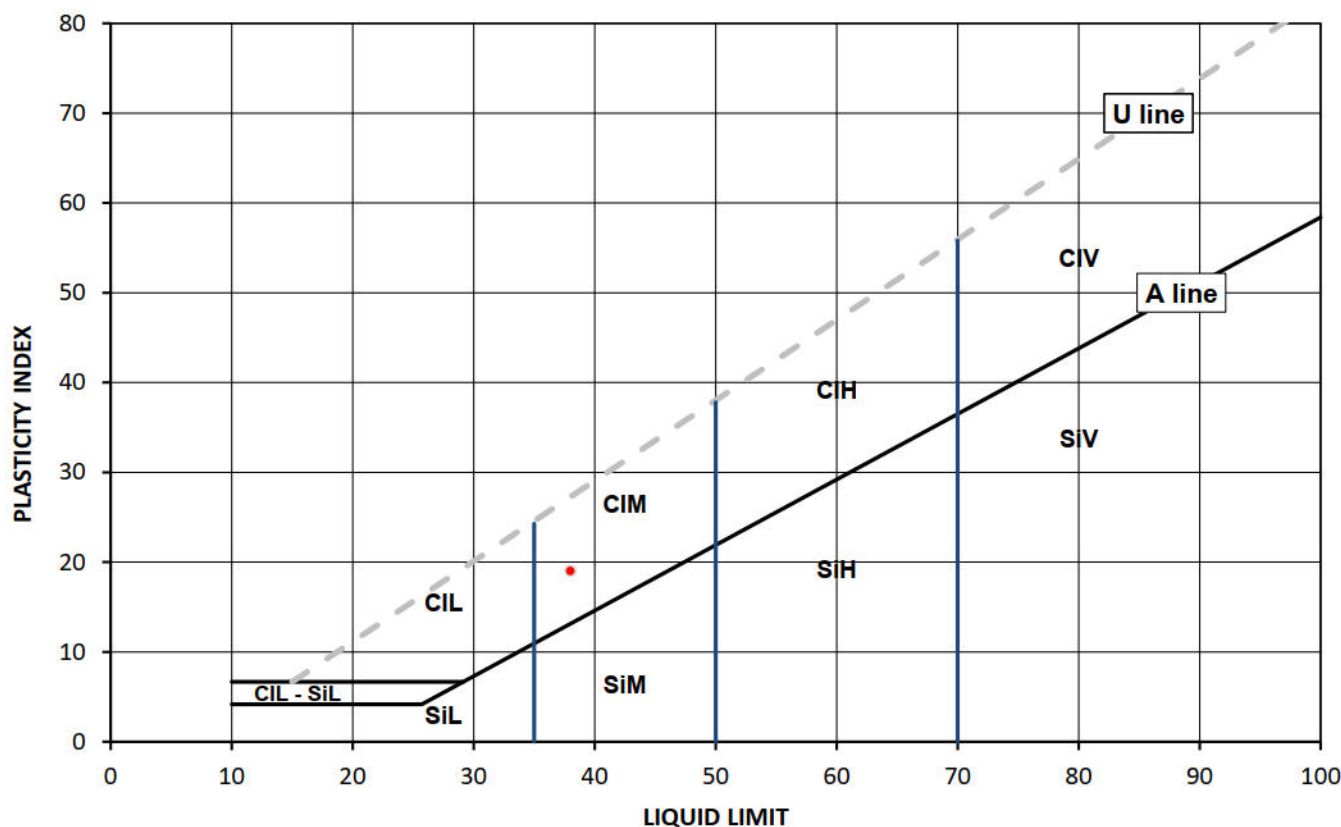
Depth Top [m]: 1.70

Depth Base [m]: 1.80

Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	38	19	19	84



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499339

Hole No.: WS104

Sample Reference: Not Given

Sample Description: Light brown sandy very gravelly CLAY

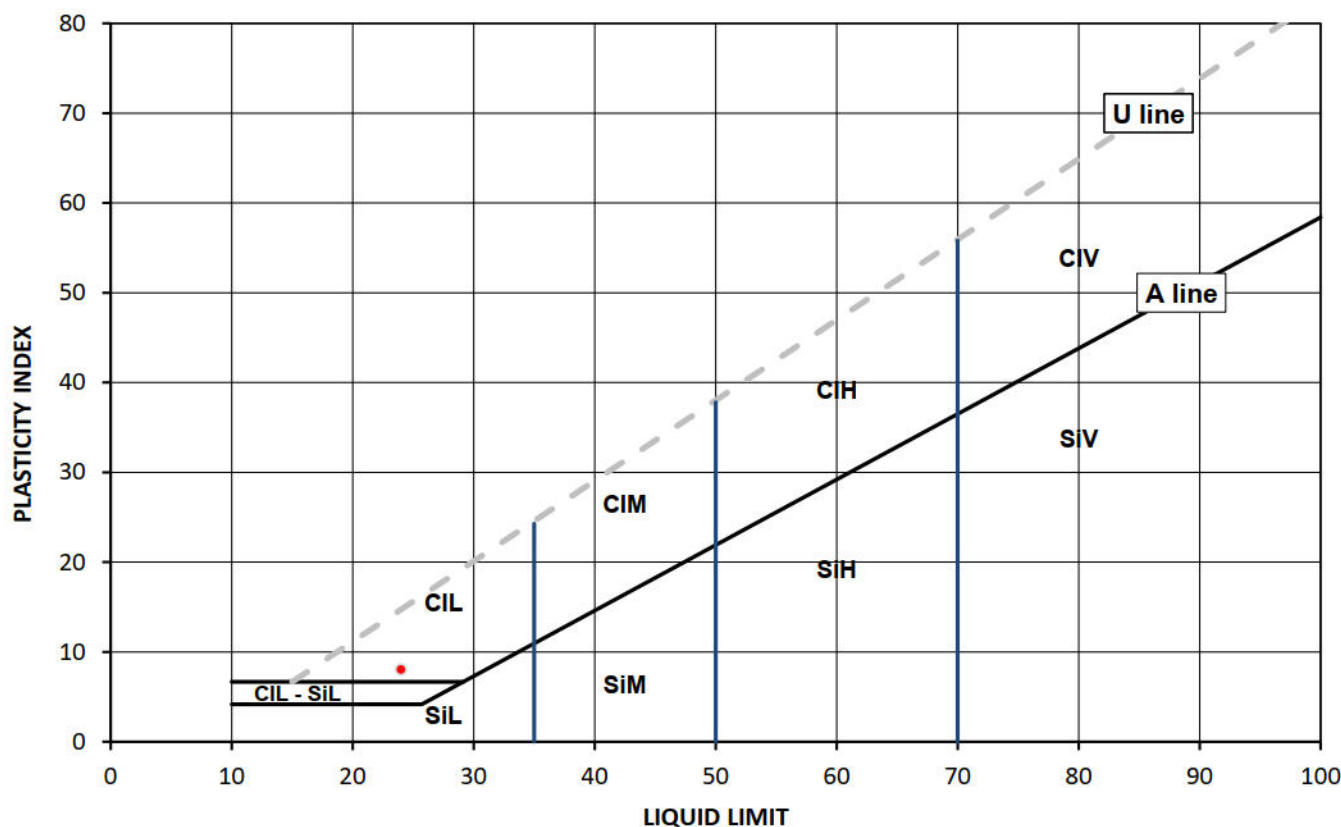
Depth Top [m]: 1.70

Depth Base [m]: 1.80

Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
9.1	24	16	8	48



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:



Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd



4041

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m						%	%	%	%	Mg/m3	Mg/m3	Mg/m3			
2499336	WS101	Not Given	1.30	1.40	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		74	38	20	18						
2499337	WS102	Not Given	1.50	1.60	D	Brown slightly sandy clayey GRAVEL	Atterberg 1 Point	6.9		24	72	31	41						
2499338	WS103	Not Given	1.70	1.80	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	18		84	38	19	19						
2499339	WS104	Not Given	1.70	1.80	D	Light brown sandy very gravelly CLAY	Atterberg 1 Point	9.1		48	24	16	8						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:



Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2499336	WS101	Not Given	1.30	1.40	D	Brown slightly gravelly sandy CLAY		17	Sample was quartered, oven dried at 108.4 °C			
2499337	WS102	Not Given	1.50	1.60	D	Brown slightly sandy clayey GRAVEL		6.9	Sample was quartered, oven dried at 109 °C			
2499338	WS103	Not Given	1.70	1.80	D	Brown slightly gravelly sandy CLAY		18	Sample was quartered, oven dried at 108.4 °C			
2499339	WS104	Not Given	1.70	1.80	D	Light brown sandy very gravelly CLAY		9.1	Sample was quartered, oven dried at 109 °C			

Comments:

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Signed:



Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499337

Hole No.: WS102

Sample Reference: Not Given

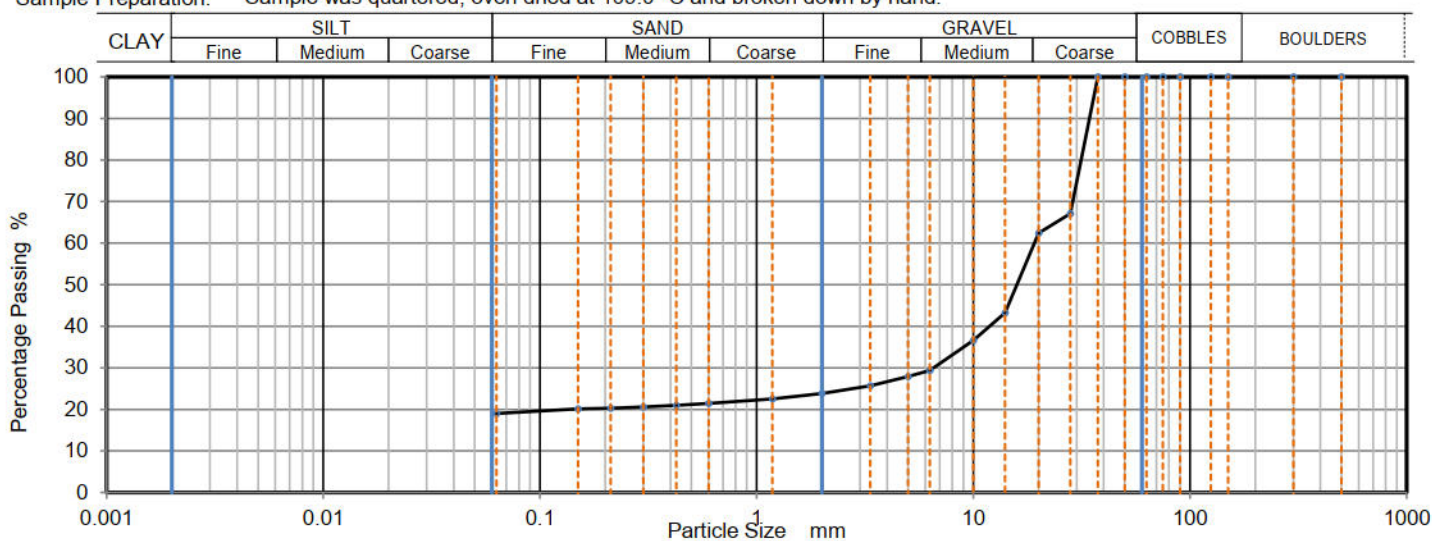
Sample Description: Brown slightly sandy clayey GRAVEL

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 1.50

Depth Base [m]: 1.60

Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	67		
20	62		
14	43		
10	37		
6.3	29		
5	28		
3.35	26		
2	24		
1.18	23		
0.6	21		
0.425	21		
0.3	21		
0.212	20		
0.15	20		
0.063	20		

Sample Proportions	% dry mass
Very coarse	0
Gravel	76
Sand	4
Fines <0.063mm	20

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 300
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Omnia Environmental Consulting

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Samples

Site Address: The Croft, Eastergate

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: A11949

Job Number: 22-96641

Date Sampled: 28/10/2022

Date Received: 10/11/2022

Date Tested: 19/11/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2499339

Hole No.: WS104

Sample Reference: Not Given

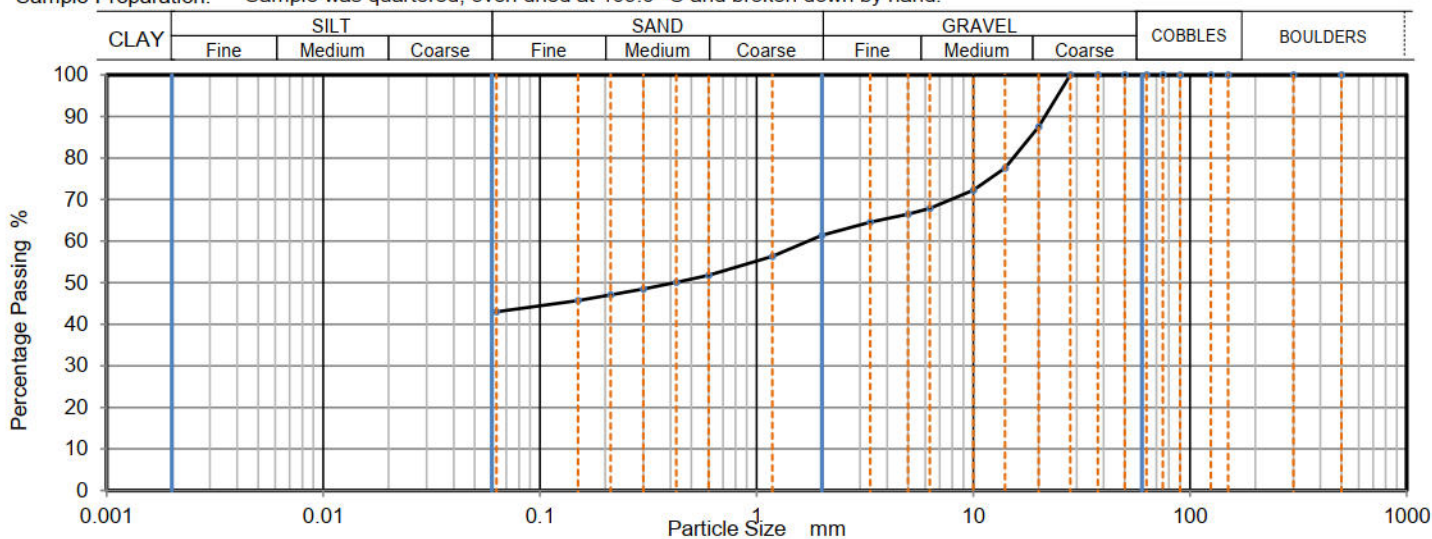
Sample Description: Light brown sandy very gravelly CLAY

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 1.70

Depth Base [m]: 1.80

Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	88		
14	78		
10	72		
6.3	68		
5	67		
3.35	65		
2	61		
1.18	56		
0.6	52		
0.425	50		
0.3	49		
0.212	47		
0.15	46		
0.063	43		

Sample Proportions	% dry mass
Very coarse	0
Gravel	39
Sand	18
Fines <0.063mm	43

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 27
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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APPENDIX X – SOIL INFILTRATION CERTIFICATES

Site Name:	Eastergate
Site Reference:	A11949
Test Date:	08/02/2023



Trial Pit Identification:	SA101
Trial Pit Length (m):	1.70
Trial Pit Width (m):	0.48
Trial Pit Depth (m):	2.51
Groundwater Level (m bgl):	Dry

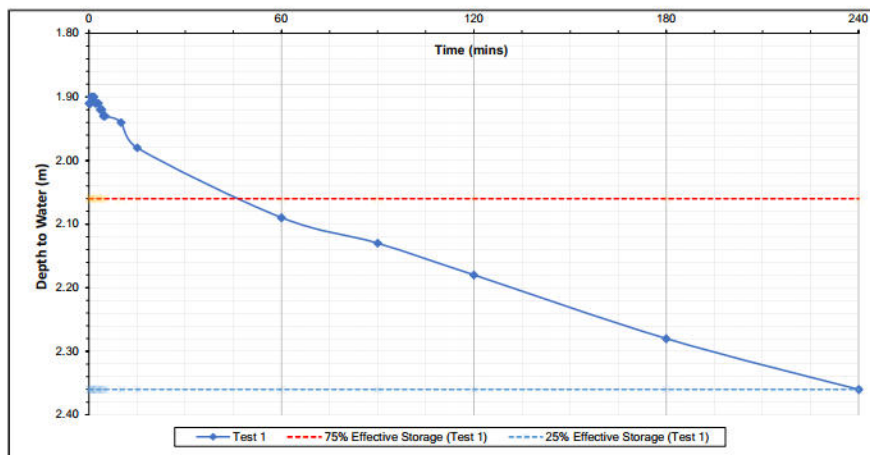
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint [TOPSOIL].
0.30 - 1.90m bgl: Soft to firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse flint. [RIVER TERRACE DEPOSITS].
1.90 - 2.80m bgl: Light brown and occasional cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional cobbles of subangular flint. Sand is fine to coarse [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.60	0.00	1.91
	0.25	1.91
75% Effective Storage Depth (m):	0.50	1.91
0.45	0.75	1.90
	1.00	1.90
(i.e. Depth Below Ground Level) (m):	1.50	1.90
2.06	2.00	1.91
	2.50	1.91
25% Effective Storage Depth (m):	3.00	1.91
0.15	3.50	1.92
	4.00	1.92
(i.e. Depth Below Ground Level) (m):	4.50	1.93
2.36	5.00	1.93
	10.00	1.94
Effective Storage Depth Across 75% - 25% (m):	15.00	1.98
0.30	60.00	2.09
	90.00	2.13
Time to Fall to 75% Effective Depth (min):	120.00	2.18
45	180.00	2.28
	240.00	2.36
Time to Fall to 25% Effective Depth (min):		
240		
Vp75%-25% (m3):		
0.24		
As50% (m2):		
2.12		
Tp75%-25% (mins):		
195		

DESIGN SOIL INFILTRATION RATE, f (m/s):	9.85E-06
---	----------

Comments:
Please note, pit collapse from 2.80 to 2.51m bgl during Test 1.



Site Engineer:	Date:
JR	08/02/2023

Checked and Approved By:	Date:
HS	09/02/2023

Location
SA101

Site Name:	Eastergate
Site Reference:	A11949
Test Date:	08/02/2023



Trial Pit Identification:	SA101
Trial Pit Length (m):	1.70
Trial Pit Width (m):	0.48
Trial Pit Depth (m):	2.50
Groundwater Level (m bgl):	N/A

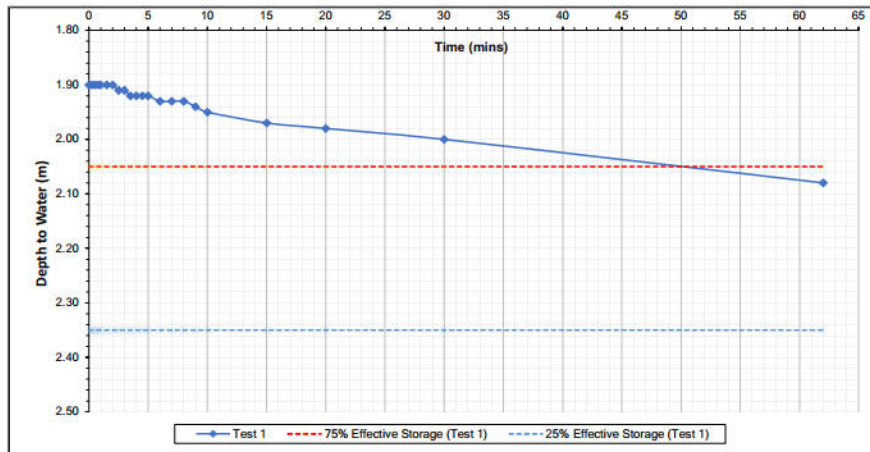
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint [TOPSOIL].
0.30 - 1.90m bgl: Soft to firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse flint. [RIVER TERRACE DEPOSITS].
1.90 - 2.80m bgl: Light brown and occasional cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional cobbles of subangular flint. Sand is fine to coarse [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 2	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.60	0.00	1.90
	0.25	1.90
75% Effective Storage Depth (m):	0.50	1.90
0.45	0.75	1.90
	1.00	1.90
(i.e. Depth Below Ground Level) (m):	1.50	1.90
2.05	2.00	1.90
	2.50	1.91
25% Effective Storage Depth (m):	3.00	1.91
0.15	3.50	1.92
	4.00	1.92
(i.e. Depth Below Ground Level) (m):	4.50	1.92
2.35	5.00	1.92
	6.00	1.93
Effective Storage Depth Across 75% - 25% (m):	7.00	1.93
0.30	8.00	1.93
	9.00	1.94
Time to Fall to 75% Effective Depth (min):	10.00	1.95
50	15.00	1.97
	20.00	1.98
Time to Fall to 25% Effective Depth (min):	30.00	2.00
N/A	62.00	2.08
Vp75%-25% (m3):		
0.24		
As50% (m2):		
2.12		
Tp75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
---	-----

Comments:
Please note, pit collapse to 2.50m bgl during fill of Test 2. During the duration of Test 2 (1 hr 2 mins) the required intercept failed to be reached. Therefore the test is considered not to have been successful within the available time.



Site Engineer:	Date:
JR	08/02/2023

Checked and Approved By:	Date:
HS	09/02/2023

Location
SA101

Site Name:	Eastergate
Site Reference:	A11949
Test Date:	08/02/2023



Trial Pit Identification:	SA102
Trial Pit Length (m):	1.95
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	2.75
Groundwater Level (m bgl):	Dry

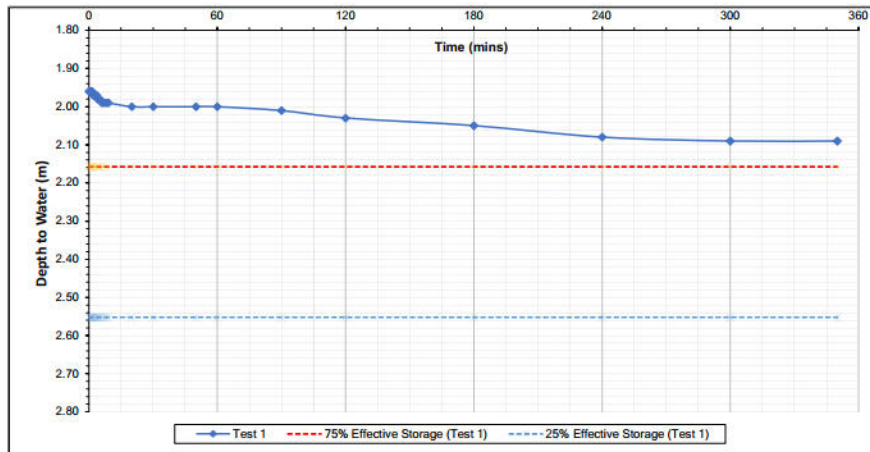
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine flint [TOPSOIL].
0.30 - 2.00m bgl: Soft to firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subangular fine to medium flint. [RIVER TERRACE DEPOSITS].
2.00 - 2.80m bgl: Light brown and occasional cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with occasional cobbles of subangular flint. Sand is fine to medium. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.79	0.00	1.96
	0.25	1.96
75% Effective Storage Depth (m):	0.75	1.96
0.59	1.00	1.96
	1.50	1.96
(i.e. Depth Below Ground Level) (m):	2.00	1.97
2.16	2.50	1.97
	3.00	1.97
25% Effective Storage Depth (m):	3.50	1.97
0.20	4.00	1.98
	4.50	1.98
(i.e. Depth Below Ground Level) (m):	5.00	1.98
2.55	6.00	1.99
	7.00	1.99
Effective Storage Depth Across 75% - 25% (m):	8.00	1.99
0.40	9.00	1.99
	20.00	2.00
Time to Fall to 75% Effective Depth (min):	30.00	2.00
	60.00	2.00
N/A	90.00	2.01
Time to Fall to 25% Effective Depth (min):	120.00	2.03
	180.00	2.05
N/A	240.00	2.08
Vp75%-25% (m3):	300.00	2.09
0.39	350.00	2.09
As50% (m2):		
2.91		
Tp75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
---	-----

Comments:
NOTE: During the duration of the test (5 hrs 50 mins) the required intercepts failed to be reached. Therefore the test is considered not to have been successful during the test interval. Please note, slight collapse to 2.75m bgl during Test 1.



Site Engineer:	Date:
JR	08/02/2023

Checked and Approved By:	Date:
HS	09/02/2023

Location
SA102

Site Name:	Eastergate
Site Reference:	A11949
Test Date:	08/02/2023



Trial Pit Identification:	SA103
Trial Pit Length (m):	2.00
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	2.56
Groundwater Level (m bgl):	N/A

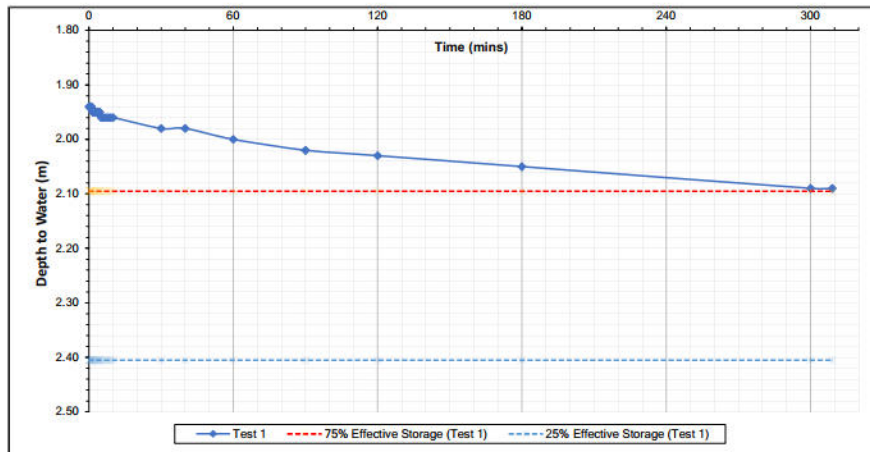
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine flint [TOPSOIL].
0.30 - 1.95m bgl: Soft to firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse flint. [RIVER TERRACE DEPOSITS].
1.95 - 2.60m bgl: Light brown and occasional cream slightly sandy very clayey angular to subrounded fine to coarse GRAVEL of flint with frequent cobbles of subangular to subrounded flint. Sand is fine to medium. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.62	0.00	1.94
	0.25	1.94
75% Effective Storage Depth (m):	0.50	1.94
0.47	0.75	1.94
	1.00	1.94
(i.e. Depth Below Ground Level) (m):	1.50	1.95
2.10	2.00	1.95
	2.50	1.95
25% Effective Storage Depth (m):	3.00	1.95
0.16	3.50	1.95
	4.00	1.95
(i.e. Depth Below Ground Level) (m):	4.50	1.95
2.41	5.00	1.96
	6.00	1.96
Effective Storage Depth Across 75% - 25% (m):	7.00	1.96
0.31	8.00	1.96
	9.00	1.96
Time to Fall to 75% Effective Depth (min):	10.00	1.96
N/A	30.00	1.98
	40.00	1.98
Time to Fall to 25% Effective Depth (min):	60.00	2.00
N/A	90.00	2.02
	120.00	2.03
Vp75%-25% (m3):	180.00	2.05
0.31	300.00	2.09
	309.00	2.09
As50% (m2):		
2.55		
TP75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
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Comments:
NOTE: During the duration of the test (5 hrs 9 mins) the required intercepts failed to be reached. Therefore the test is considered not to have been successful.



Site Engineer:	Date:
JR	08/02/2023

Checked and Approved By:	Date:
HS	09/02/2023

Location:
SA103

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA201
Trial Pit Length (m):	2.20
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	2.40
Groundwater Level (m bgl):	N/A

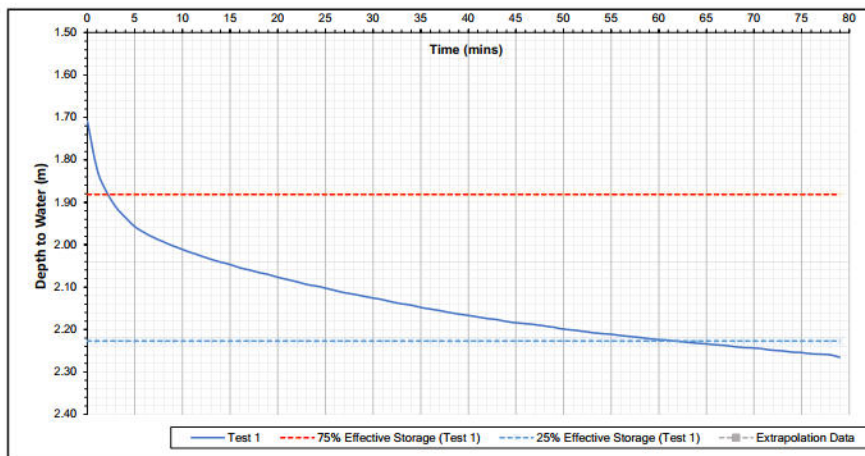
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Grass over dry and friable brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.55m bgl: Soft orangish brown slightly sandy slightly gravelly CLAY with rare cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].
1.55 - 2.40m bgl: Cream clayey sandy angular to subrounded fine to coarse GRAVEL of flint with low cobble content. Sand is medium to coarse. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.69	0.00	1.71
	1.00	1.82
75% Effective Storage Depth (m):	2.00	1.87
0.52	3.00	1.91
	4.00	1.94
(i.e. Depth Below Ground Level) (m):	5.00	1.96
1.88	60.00	2.22
	61.00	2.23
25% Effective Storage Depth (m):	62.00	2.23
0.17	63.00	2.23
	64.00	2.23
(i.e. Depth Below Ground Level) (m):	65.00	2.23
2.23	66.00	2.24
	67.00	2.24
Effective Storage Depth Across 75% - 25% (m):	68.00	2.24
0.35	69.00	2.24
	70.00	2.24
Time to Fall to 75% Effective Depth (min):	71.00	2.25
2.25	72.00	2.25
	73.00	2.25
Time to Fall to 25% Effective Depth (min):	74.00	2.25
71.00	75.00	2.25
	76.00	2.26
Vp75%-25% (m3):	77.00	2.26
0.38	78.00	2.26
	79.00	2.27
As50% (m2):		
2.97		
Tp75%-25% (mins):		
68.75		

DESIGN SOIL INFILTRATION RATE, f (m/s):	3.11E-05
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA201

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

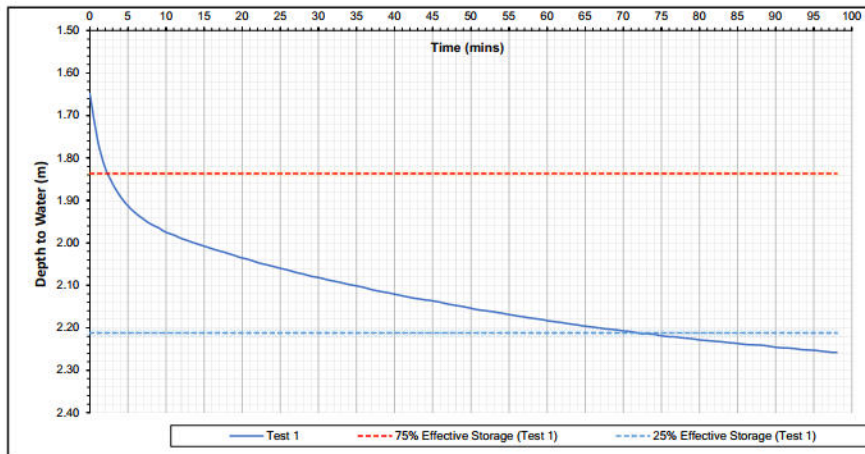
Trial Pit Identification:	SA201
Trial Pit Length (m):	2.20
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	2.40
Groundwater Level (m bgl):	N/A

Geology Description:
0.00 - 0.30m bgl: Grass over dry and friable brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.55m bgl: Soft orangish brown slightly sandy slightly gravelly CLAY with rare cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].
1.55 - 2.40m bgl: Cream clayey sandy angular to subrounded fine to coarse GRAVEL of flint with low cobble content. Sand is medium to coarse. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 2	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.75	0.00	1.65
	1.00	1.76
75% Effective Storage Depth (m):	2.00	1.82
	3.00	1.86
	4.00	1.89
(i.e. Depth Below Ground Level) (m):	5.00	1.91
	6.00	1.93
	7.00	1.94
25% Effective Storage Depth (m):	8.00	1.96
	9.00	1.96
	10.00	1.98
(i.e. Depth Below Ground Level) (m):	51.00	2.16
	52.00	2.16
	53.00	2.16
Effective Storage Depth Across 75% - 25% (m):	54.00	2.17
	55.00	2.17
	56.00	2.17
Time to Fall to 75% Effective Depth (min):	57.00	2.17
	58.00	2.18
	59.00	2.18
Time to Fall to 25% Effective Depth (min):	60.00	2.18
	61.00	2.19
	62.00	2.19
Vp75%-25% (m3):	63.00	2.19
	64.00	2.19
	65.00	2.20
As50% (m2):	66.00	2.20
	67.00	2.20
	68.00	2.20
Tp75%-25% (mins):	69.00	2.20
	70.00	2.21
	71.00	2.21

DESIGN SOIL INFILTRATION RATE, f (m/s):	3.26E-05
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA201

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA201
Trial Pit Length (m):	2.20
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	2.40
Groundwater Level (m bgl):	N/A

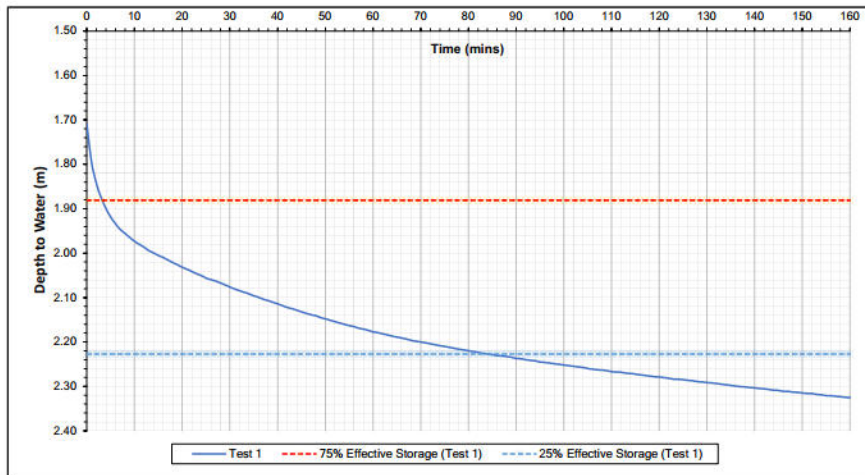
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Grass over dry and friable brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.55m bgl: Soft orangish brown slightly sandy slightly gravelly CLAY with rare cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].
1.55 - 2.40m bgl: Cream clayey sandy angular to subrounded fine to coarse GRAVEL of flint with low cobble content. Sand is medium to coarse. Cobbles are subangular flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 3	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.69	0.00	1.71
	1.00	1.79
75% Effective Storage Depth (m):	2.00	1.84
	3.00	1.87
	4.00	1.90
(i.e. Depth Below Ground Level) (m):	5.00	1.92
	6.00	1.93
	7.00	1.95
25% Effective Storage Depth (m):	8.00	1.96
	9.00	1.97
	10.00	1.97
(i.e. Depth Below Ground Level) (m):	69.00	2.20
	70.00	2.20
	71.00	2.20
Effective Storage Depth Across 75% - 25% (m):	72.00	2.20
	73.00	2.21
	74.00	2.21
Time to Fall to 75% Effective Depth (min):	75.00	2.21
	76.00	2.21
	77.00	2.21
Time to Fall to 25% Effective Depth (min):	78.00	2.22
	79.00	2.22
	80.00	2.22
Vp75%-25% (m3):	81.00	2.22
	82.00	2.22
	83.00	2.23
As50% (m2):	84.00	2.23
	85.00	2.23
	86.00	2.23
Tp75%-25% (mins):	87.00	2.23
	88.00	2.23
	89.00	2.23

DESIGN SOIL INFILTRATION RATE, f (m/s):	2.68E-05
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA201

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA202
Trial Pit Length (m):	2.30
Trial Pit Width (m):	0.40
Trial Pit Depth (m):	1.40
Groundwater Level (m bgl):	N/A

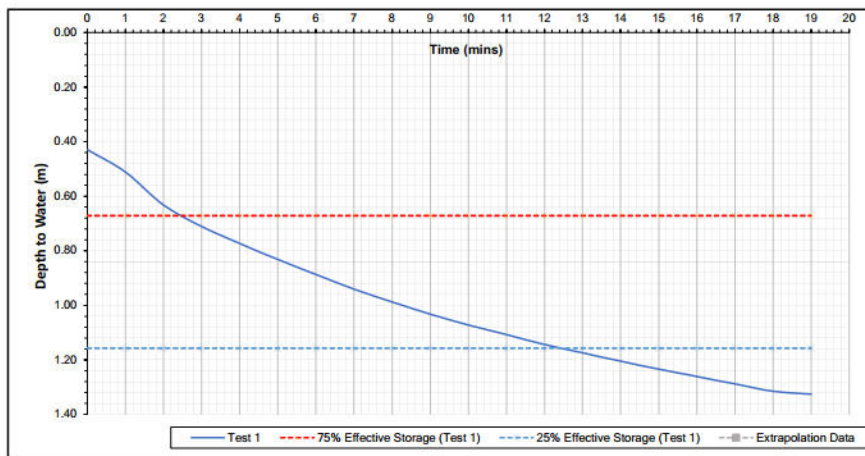
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Grass over brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.40m bgl: Soft to firm orangish brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.97	0.00	0.43
	1.00	0.51
75% Effective Storage Depth (m):	2.00	0.63
0.73	3.00	0.71
	4.00	0.77
(i.e. Depth Below Ground Level) (m):	5.00	0.83
0.67	6.00	0.89
	7.00	0.94
25% Effective Storage Depth (m):	8.00	0.99
0.24	9.00	1.03
	10.00	1.07
(i.e. Depth Below Ground Level) (m):	11.00	1.11
1.16	12.00	1.14
	13.00	1.17
Effective Storage Depth Across 75% - 25% (m):	14.00	1.21
0.49	15.00	1.23
	16.00	1.26
Time to Fall to 75% Effective Depth (min):	17.00	1.29
2.5	18.00	1.32
	19.00	1.33
Time to Fall to 25% Effective Depth (min):		
12.75		
Vp75%-25% (m3):		
0.45		
As50% (m2):		
3.54		
Tp75%-25% (mins):		
10.25		

DESIGN SOIL INFILTRATION RATE, f (m/s):	2.05E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA202

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023

Trial Pit Identification:	SA202
Trial Pit Length (m):	2.30
Trial Pit Width (m):	0.40
Trial Pit Depth (m):	1.40
Groundwater Level (m bgl):	N/A



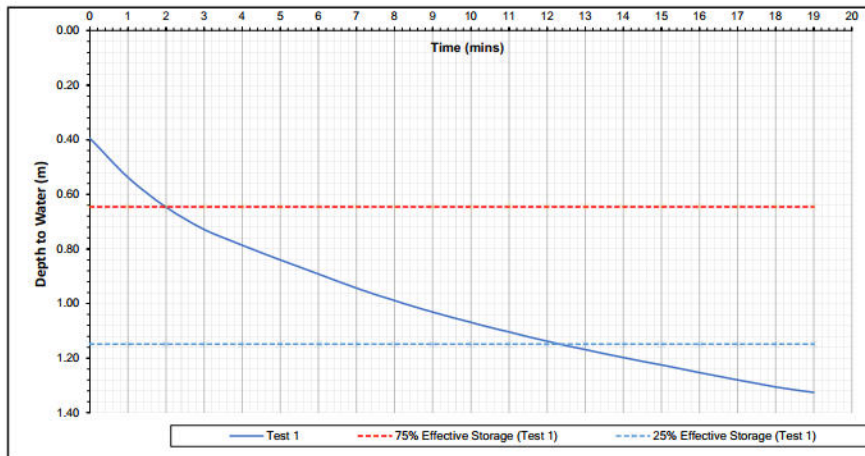
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Grass over brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.40m bgl: Soft to firm orangish brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 2	
Effective Storage Depth (m):	Time (min)	Depth (m)
1.01	0.00	0.39
	1.00	0.54
75% Effective Storage Depth (m):	2.00	0.65
0.75	3.00	0.73
	4.00	0.79
(i.e. Depth Below Ground Level) (m):	5.00	0.84
0.65	6.00	0.89
	7.00	0.94
25% Effective Storage Depth (m):	8.00	0.99
0.25	9.00	1.03
	10.00	1.07
(i.e. Depth Below Ground Level) (m):	11.00	1.10
1.15	12.00	1.14
	13.00	1.17
Effective Storage Depth Across 75% - 25% (m):	14.00	1.20
0.50	15.00	1.23
	16.00	1.25
Time to Fall to 75% Effective Depth (min):	17.00	1.28
2.00	18.00	1.31
	19.00	1.33
Time to Fall to 25% Effective Depth (min):		
12.25		
Vp75%-25% (m3):		
0.46		
As50% (m2):		
3.64		
Tp75%-25% (mins):		
10.25		

DESIGN SOIL INFILTRATION RATE, f (m/s):	2.07E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA202

0.00

0

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA202
Trial Pit Length (m):	2.30
Trial Pit Width (m):	0.40
Trial Pit Depth (m):	1.40
Groundwater Level (m bgl):	N/A

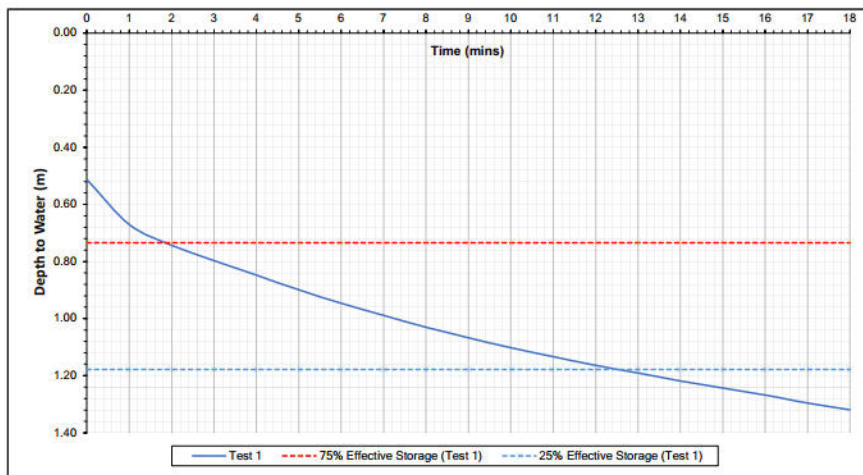
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.30m bgl: Grass over brown slightly sandy slightly gravelly CLAY. [TOPSOIL].
0.30 - 1.40m bgl: Soft to firm orangish brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 3	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.89	0.00	0.51
	1.00	0.67
75% Effective Storage Depth (m):	2.00	0.74
0.67	3.00	0.80
	4.00	0.85
(i.e. Depth Below Ground Level) (m):	5.00	0.90
0.73	6.00	0.95
	7.00	0.99
25% Effective Storage Depth (m):	8.00	1.03
0.22	9.00	1.07
	10.00	1.10
(i.e. Depth Below Ground Level) (m):	11.00	1.13
1.18	12.00	1.16
	13.00	1.19
Effective Storage Depth Across 75% - 25% (m):	14.00	1.22
0.44385	15.00	1.24
	16.00	1.27
Time to Fall to 75% Effective Depth (min):	17.00	1.30
1.9	18.00	1.32
Time to Fall to 25% Effective Depth (min):		
12.75		
Vp75%-25% (m3):		
0.41		
As50% (m2):		
3.31679		
Tp75%-25% (mins):		
10.85		

DESIGN SOIL INFILTRATION RATE, f (m/s):	1.89E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA202

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA203
Trial Pit Length (m):	2.05
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	1.20
Groundwater Level (m bgl):	N/A

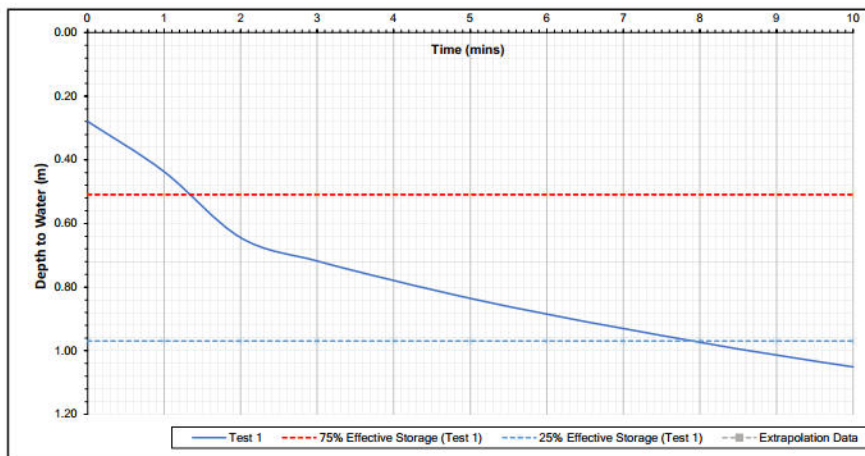
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.25m bgl: Brown slightly sandy slightly gravelly CLAY. [TOPSOIL]. 0.25 - 1.20m bgl: Firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.92	0.00	0.28
	1.00	0.44
75% Effective Storage Depth (m):	2.00	0.64
0.69	3.00	0.72
	4.00	0.78
(i.e. Depth Below Ground Level) (m):	5.00	0.84
0.51	6.00	0.89
	7.00	0.93
25% Effective Storage Depth (m):	8.00	0.97
0.23	9.00	1.01
	10.00	1.05
(i.e. Depth Below Ground Level) (m):		
0.97		
Effective Storage Depth Across 75% - 25% (m):		
0.46		
Time to Fall to 75% Effective Depth (min):		
1.4		
Time to Fall to 25% Effective Depth (min):		
8		
Vp75%-25% (m3):		
0.47		
As50% (m2):		
3.37		
Tp75%-25% (mins):		
6.6		

DESIGN SOIL INFILTRATION RATE, f (m/s):	3.53E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA203

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

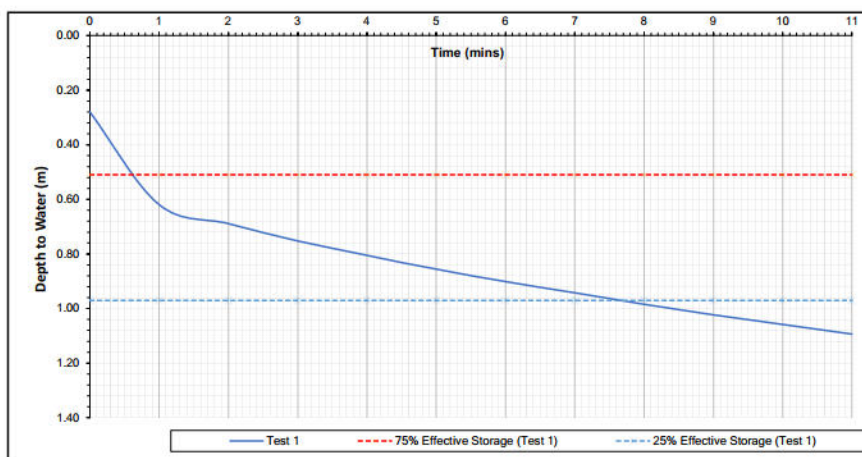
Trial Pit Identification:	SA203
Trial Pit Length (m):	2.05
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	1.20
Groundwater Level (m bgl):	N/A

Geology Description:
0.00 - 0.25m bgl: Brown slightly sandy slightly gravelly CLAY. [TOPSOIL]. 0.25 - 1.20m bgl: Firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 2	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.92	0.00	0.28
	1.00	0.62
75% Effective Storage Depth (m):	2.00	0.69
0.69	3.00	0.75
	4.00	0.81
(i.e. Depth Below Ground Level) (m):	5.00	0.86
0.51	6.00	0.90
	7.00	0.94
25% Effective Storage Depth (m):	8.00	0.98
0.23	9.00	1.02
	10.00	1.06
(i.e. Depth Below Ground Level) (m):	11.00	1.09
0.97		
Effective Storage Depth Across 75% - 25% (m):		
0.46		
Time to Fall to 75% Effective Depth (min):		
0.60		
Time to Fall to 25% Effective Depth (min):		
7.60		
Vp75%-25% (m3):		
0.47		
As50% (m2):		
3.37		
Tp75%-25% (mins):		
7.00		

DESIGN SOIL INFILTRATION RATE, f (m/s):	3.33E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA203

Site Name:	Land North of The Croft, Eastergate
Site Reference:	A11949
Test Date:	22/02/2023



Trial Pit Identification:	SA203
Trial Pit Length (m):	2.05
Trial Pit Width (m):	0.50
Trial Pit Depth (m):	1.20
Groundwater Level (m bgl):	N/A

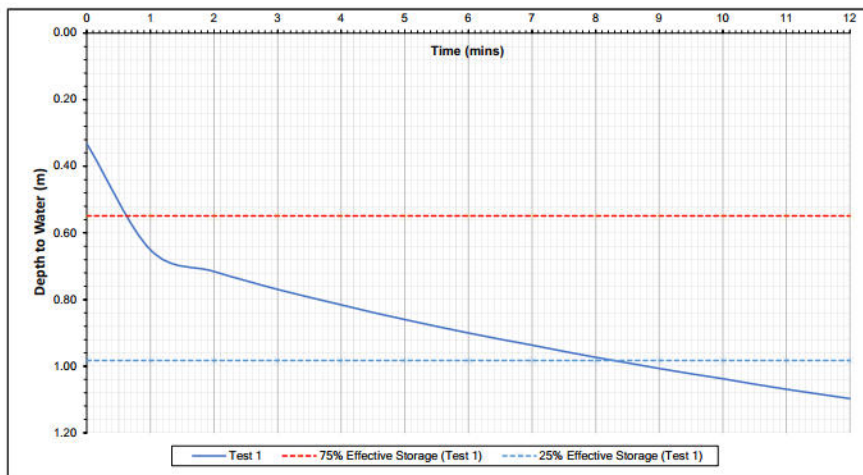
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
0.00 - 0.25m bgl: Brown slightly sandy slightly gravelly CLAY. [TOPSOIL]. 0.25 - 1.20m bgl: Firm orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS].

Test Parameters	TEST 3	
Effective Storage Depth (m):	Time (min)	Depth (m)
0.87	0.00	0.33
	1.00	0.65
75% Effective Storage Depth (m):	2.00	0.72
0.65	3.00	0.77
	4.00	0.82
(i.e. Depth Below Ground Level) (m):	5.00	0.86
0.55	6.00	0.90
	7.00	0.94
25% Effective Storage Depth (m):	8.00	0.97
0.22	9.00	1.01
	10.00	1.04
(i.e. Depth Below Ground Level) (m):	11.00	1.07
0.98	12.00	1.10
Effective Storage Depth Across 75% - 25% (m):		
0.4342		
Time to Fall to 75% Effective Depth (min):		
0.8		
Time to Fall to 25% Effective Depth (min):		
8.4		
Vp75%-25% (m3):		
0.45		
As50% (m2):		
3.23942		
Tp75%-25% (mins):		
7.6		

DESIGN SOIL INFILTRATION RATE, f (m/s):	3.01E-04
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Comments:



Site Engineer:	Date:
AD	22/02/2023

Checked and Approved By:	Date:
AK	28/02/2023

Location
SA203

5th September 2025

Our ref: GE23392/GR02/250905



Amy Nash
Metis Homes
The Old Barn
Vicarage Farm Business Park
Winchester Road
Fair Oak
Hampshire
SO50 7HD

By email only

Dear Amy,

RE: Land to the rear of The Croft, Barnham Road, Barnham, PO20 3RAP

Further to your instruction, we write to present the findings of the intrusive investigation and associated testing undertaken on this site.

Site description

The site comprised an L-shaped parcel of generally level land located at NGR 494687, 105747 and extended to c. 1.05ha.

At the time of the investigation, 4th September 2025, the site was covered by grass, with brambles and trees on the western, north and southern perimeters. Several coniferous trees were located inside the southern boundary, with the boundary marked by a recently constructed wooden fence.

Overgrown bunds were located along the site's northern and eastern boundaries and a smaller bund was present on the southern boundary.

The site was accessed via heras fencing located on the southern boundary. A recently completed healthcare building and associated landscaping was located immediately to the south of the site. Houses were located to the west, with gardens beyond the northern boundary. Overgrown land was located to the east.

The site was accessed via a recently constructed road leading from Barnham Road northwards to the heras fencing on the site's southern boundary. A site location plan is presented as Figure 1.

Form of development

The site is proposed to be developed with 21No. houses, private gardens, access roads and associated infrastructure.

Scope of works

The scope of works requested by the Client comprised the excavation of 4No. trial pits (SA01 - SA04) for soakage testing and excavation of an additional 5No. trial pits (B1 – B5) within the bunds around the site to assess bund composition and facilitate sampling for geochemical laboratory testing. Trial pit locations are presented in Figure 2.

Geo-Environmental Services Ltd
Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL

www.gesl.net

Environmental Consultants | Geotechnical Engineers | Site Investigations

Geo-Environmental Services Ltd incorporated in England number 3214980 VAT number 679544479



Soakage test trial pit positions and test depths were set by the Client. Pits within the soil bunds were positioned to provide general coverage.

Ground and groundwater conditions

Published geological records indicate that the ground conditions are likely to comprise Head Deposits, River Terrace Deposits and London Clay Formation. In addition, soil bunds were present on site and would be considered to comprise Made Ground.

The ground conditions encountered in trial pits SA01 – SA04 comprised a succession of strata considered to represent Topsoil over Head Deposits and River Terrace Deposits. The ground conditions encountered in the pits excavated in the bunds were more variable, with soils in B1, B2 and B4 appearing to comprise reworked Head Deposits, whilst the soils in B3 and B5 incorporated inclusions of brick, plastic or the like, i.e. more akin to Made Ground soils.

A summary of encountered ground conditions is presented in Table 1 and trial pit logs are presented in Appendix A.

Top (m bgl)	Base (m bgl)	Description	Trial Pit
0	0.7+	Dark brown clayey rounded flint gravel with roots with occasional plastic and brick fragments; Brown clayey SILT with some fine to medium flint gravel and occasional brick and concrete gravel to cobble size	B3, B5
0	0.7+	Brown clayey SILT with some fine to medium flint gravel	B1, B2, B4
0	0.20 – 0.25	Brown clayey SILT with rootlets	SA01 – SA04
0.20 – 0.25	1.40 – 1.50	Firm friable brown clayey SILT	SA01 – SA04
1.40 – 1.50	1.60+ - 1.70+	Brown clayey well graded flint GRAVEL	SA03, SA04

Table 1 Summary of encountered ground conditions

Groundwater was not encountered within the trial pits during the intrusive investigation. Longer term groundwater monitoring did not form part of the scope of works.

Soakage testing

Trial pit soakage testing was undertaken at locations and depths as directed by the Client and in accordance with BRE DG365. Test results are presented in Appendix B and summarised in Table 2 below.

Trial Pit	Infiltration rate (m/s)		
	Test cycle 1	Test cycle 2	Test cycle 3
SA01	Insufficient fall	-	-
SA02	Insufficient fall	-	-
SA03	1.1×10^{-4}	3.7×10^{-5}	2.1×10^{-5}
SA04	2.6×10^{-4}	9.2×10^{-5}	5.4×10^{-5}

Table 2 Infiltration rates from trial pit soakage testing

Testing in trial pits SA01 and SA02 demonstrated that infiltration was occurring, but at a slow rate such that test cycle 1 could not be completed and thus, infiltration rates could not be determined based on the requirement of BRE DG365 to achieve a 75% drained (25% full condition). SA01 and SA02 were terminated in Head Deposits such

that clayey silt was tested. Trial pits SA03 and SA04 targeted testing in the clayey gravel of the River Terrace Deposits and three complete test cycles were achieved on both of these trial pits.

Contamination assessment

Soil samples were collected from each of the trial pits excavated into the soil bunds and submitted for geochemical laboratory testing. At the time of writing, testing is ongoing and the assessment will be updated in due course

Closure

We trust we have interpreted your request correctly and provided sufficient information for your current requirements.

Should you have any queries please do not hesitate to contact us.

Yours sincerely
For and on Behalf of Geo-Environmental



GAVIN ROBERTS CGeol, BEng (Hons), MSc, FGS
Technical Director



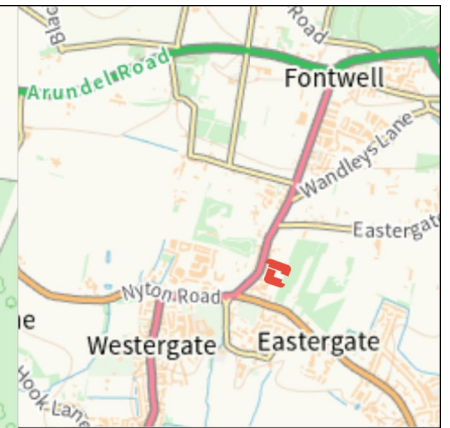
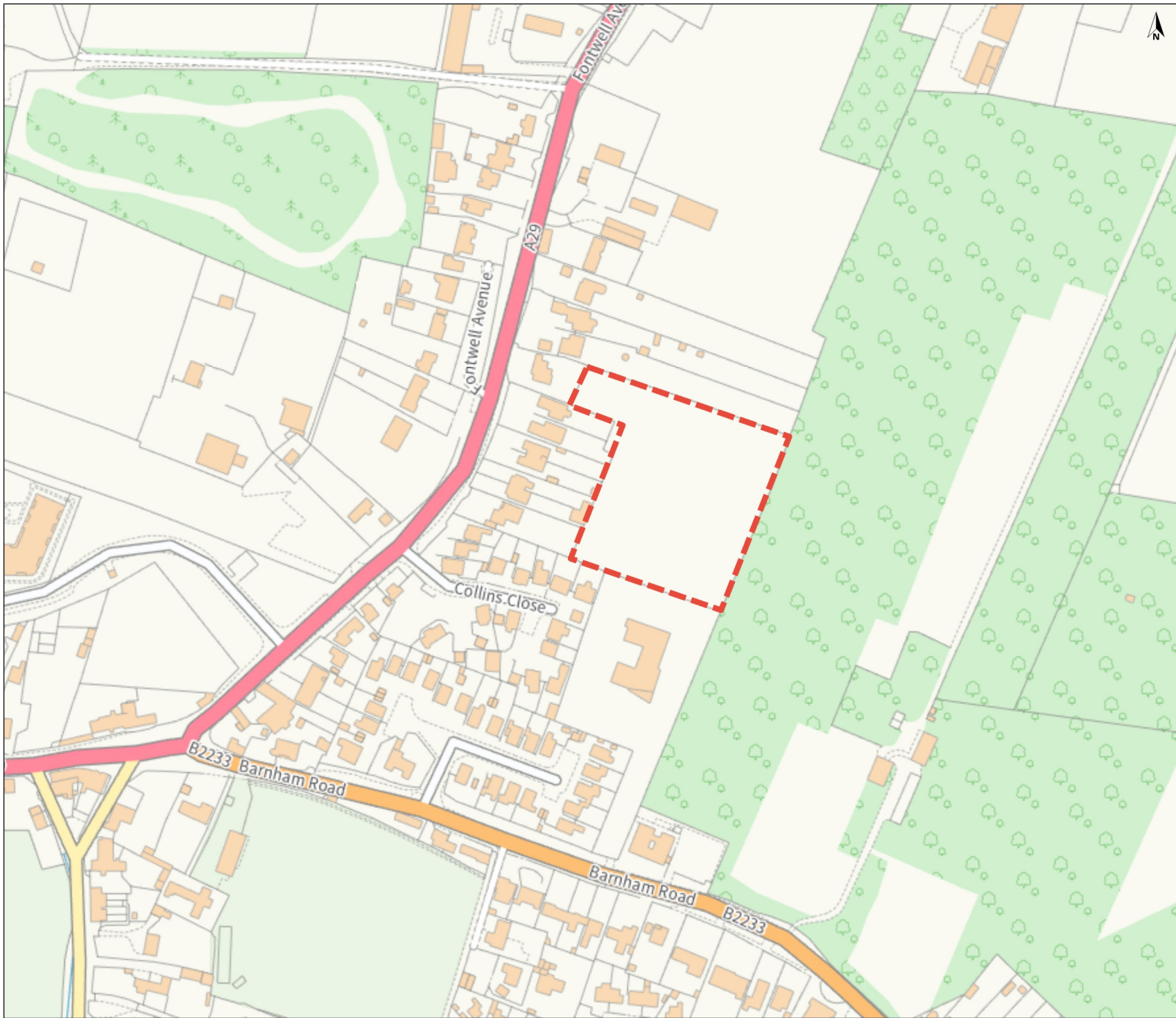
Enc Figure 1 Site Location Plan
 Figure 2 Exploratory Hole Location Plan
 Appendix A – Trial pit logs
 Appendix B – Trial pit soakage test results





FIGURES





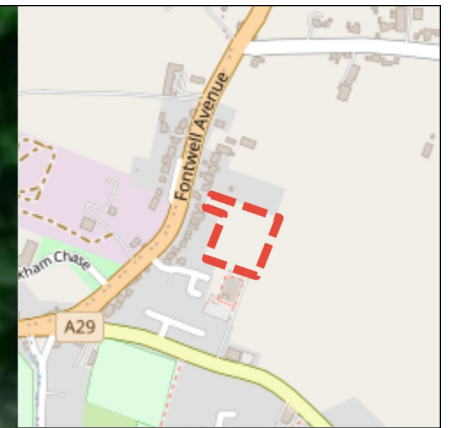
Legend

Site Boundary

0 50 m 100 m
Ordnance Survey

Geo-Environmental
Produced by **Datanest.earth**

Title: Site Location Plan		
Client: Metis Homes		Size: A4
Project: Barnham	Drawn: GR	Figure No.: 1
Date: 05-09-2025	Checked: GR	
Proj No: GE23392	Scale: 1:3000	Version: draft



Legend

- Trial Pit
- Site Boundary

0 10 m 20 m
© Mapbox

Geo-Environmental
Produced by **Datanest.earth**

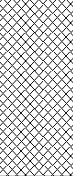
Title: Exploratory Hole Location Plan		
Client: Metis Homes		Size: A4
Project: Barnham	Drawn: GR	Figure No.: 2
Date: 05-09-2025	Checked: GR	
Proj No: GE23392	Scale: 1:1000	Version: draft

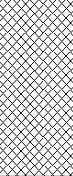


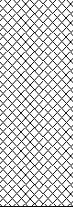
APPENDIX A

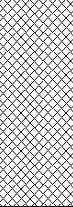
Exploratory Hole Logs

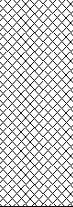


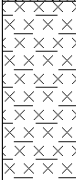
 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: B1		
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1			
	Easting: 494726.0	Northing: 105776.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25			
Trial Pit Log									
Weather: Sunny and showers			Hole Termination:			Stability: Sides stable			
Samples & In Situ Testing			Strata Details					Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description			
0.30	ES1			(0.60)		Brown clayey SILT with some fm flint gravel			
				0.60		End of Trial Pit at 0.60m			
Dimensions:					Photo:				
Final Depth:	0.60m								
Final Width:	0.50m								
Final Length:	1.00m								
Remarks									
Pit dug into bund									
Water Strikes (mbgl)									
Depth Strike		Rose to		Time Elapsed (mins)					

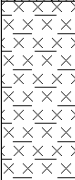
 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: B2		
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1			
	Easting: 494672.0	Northing: 105794.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25			
Trial Pit Log									
Weather: Showers			Hole Termination:			Stability: Sides stable			
Samples & In Situ Testing			Strata Details					Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description			
0.30	ES1			(0.60)		Brown clayey SILT with some fm flint gravel			
				0.60		End of Trial Pit at 0.60m			
Dimensions:						Photo:			
Final Depth:	0.60m								
Final Width:	0.50m								
Final Length:	1.00m								
Remarks									
Pit dug into bund									
Water Strikes (mbgl)									
Depth Strike		Rose to		Time Elapsed (mins)					

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: B3			
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1				
	Easting: 494723.0	Northing: 105729.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25				
Trial Pit Log										
Weather: Showers			Hole Termination:			Stability: Sides stable				
Samples & In Situ Testing			Strata Details						Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description				
0.30	ES1			(0.70)		Dark brown clayey rounded flint gravel with roots with occasional plastic and brick fragments			0.5	
				0.70		End of Trial Pit at 0.70m			1.0	
									1.5	
									2.0	
									2.5	
									3.0	
									3.5	
Dimensions:						Photo:				
Final Depth:	0.70m									
Final Width:	0.50m									
Final Length:	1.00m									
Remarks										
Pit dug into bund										
Water Strikes (mbgl)										
Depth Strike	Rose to		Time Elapsed (mins)							

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: B4			
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1				
	Easting: 494713.0	Northing: 105695.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25				
Trial Pit Log										
Weather: Showers			Hole Termination:			Stability: Sides stable				
Samples & In Situ Testing			Strata Details						Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description				
0.30	ES1			(0.70)		Brown clayey SILT with some fm flint gravel			0.5	
				0.70		End of Trial Pit at 0.70m			1.0	
									1.5	
									2.0	
									2.5	
									3.0	
									3.5	
Dimensions:						Photo:				
Final Depth:	0.70m									
Final Width:	0.50m									
Final Length:	1.00m									
Remarks										
Pit dug into bund										
Water Strikes (mbgl)										
Depth Strike	Rose to		Time Elapsed (mins)							

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: B5			
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1				
	Easting: 494685.0	Northing: 105700.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25				
Trial Pit Log				Weather: Sunny and showers		Hole Termination:		Stability: Sides stable		
Samples & In Situ Testing				Strata Details					Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description				
0.30	ES1			(0.70)		Brown clayey SILT with some fm flint gravel and occasional brick and concrete gravel to cobble size			0.5	
				0.70		End of Trial Pit at 0.70m			1.0	
									1.5	
									2.0	
									2.5	
									3.0	
									3.5	
Dimensions:						Photo:				
Final Depth:		0.70m								
Final Width:		0.50m								
Final Length:		1.00m								
Remarks										
Pit dug into bund										
Water Strikes (mbgl)										
Depth Strike		Rose to		Time Elapsed (mins)						

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: SA01								
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1									
	Easting: 494646.0	Northing: 105770.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25									
Trial Pit Log															
Weather: Wet			Hole Termination:			Stability: Sides stable									
Samples & In Situ Testing			Strata Details						Water	Backfill					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description									
				0.20		Nettles over brown clayey SILT with rootlets			0.5						
				(0.60)		Firm friable brown clayey SILT									
				0.80		End of Trial Pit at 0.80m									
Dimensions:						Photo:									
Final Depth:	0.80m														
Final Width:	0.50m														
Final Length:	1.00m														
Remarks															
											Water Strikes (mbgl)				
											Depth Strike	Rose to	Time Elapsed (mins)		

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: SA02			
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1				
	Easting: 494677.0	Northing: 105726.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25				
Trial Pit Log										
Weather: Wet			Hole Termination:			Stability: Sides stable				
Samples & In Situ Testing			Strata Details						Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description				
				0.20		Grass over brown clayey SILT with rootlets			0.5	
				(0.60)		Firm friable brown clayey SILT				
				0.80	End of Trial Pit at 0.80m					
Dimensions:						Photo:				
Final Depth:	0.80m									
Final Width:	0.50m									
Final Length:	1.20m									
Remarks										
						Water Strikes (mbgl)				
						Depth Strike	Rose to	Time Elapsed (mins)		



SA03

Sheet 1 of 1

Trial Pit Log

Scale:	1:25
--------	------

Weather: Wet

Hole Termination:

Stability: Sides stable

Dimensions:			Photo:
Final Depth:	1.70m		
Final Width:	0.50m		
Final Length:	2.00m		
Remarks			
Water Strikes (mbgl)			
Depth Strike	Rose to	Time Elapsed (mins)	

 Geo-Environmental	Contract Name: Barnham			Client: Metis Homes			Trial Pit ID: SA04								
	Contract Number: GE23392	Date Started: 04/09/2025	Logged By: GR	Checked By:	Status: PRELIM	Sheet 1 of 1									
	Easting: 494707.0	Northing: 105720.0	Ground Level:	Plant Used: 5T	Date Printed: 05/09/2025	Scale: 1:25									
Trial Pit Log															
Weather: Wet			Hole Termination:			Stability: Sides stable									
Samples & In Situ Testing			Strata Details						Water	Backfill					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description									
				0.25		Brown clayey SILT with rootlets									
						Firm friable brown clayey SILT									
															
															
															
				(1.15)											
				1.40		Brown clayey well graded flint GRAVEL									
				1.60		End of Trial Pit at 1.60m									
Dimensions:						Photo:									
Final Depth:	1.60m														
Final Width:	0.50m														
Final Length:	1.90m														
Remarks															
Water Strikes (mbgl)															
Depth Strike		Rose to		Time Elapsed (mins)											



APPENDIX B

Soakage Test Results





Soakaway Test Results (after BRE Digest 365)

Geo-Environmental Services Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL
www.gesl.net

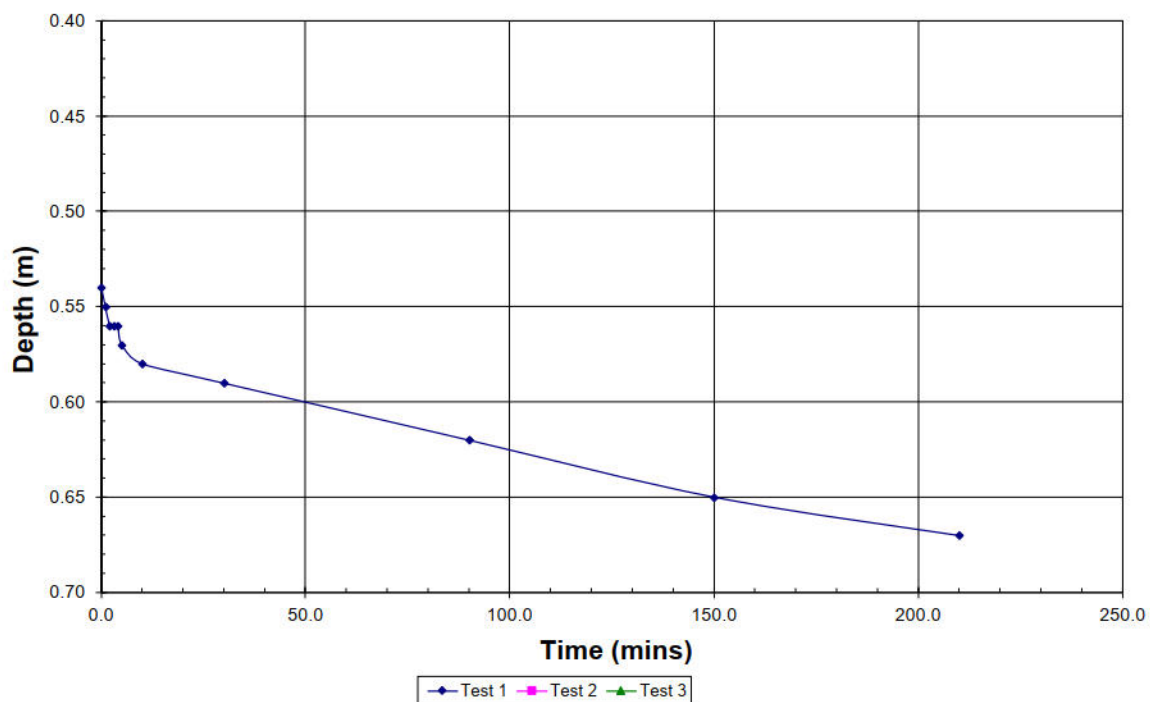
Project Name : Land to the rear of Thhe Croft, Barnham

Job No. : GE23392

Client : Metis Homes

Date : 04/09/2025

Pit reference	SA01
Pit depth (m)	0.90
Pit width (m)	0.50
Pit length (m)	1.40
Depth to standing water (m)	

[illegible][illegible][illegible]

Max. depth (m)	0.90	0.90	0.90
Effective depth (m)	0.36	0.90	0.90
75% effective depth (m)	0.63	0.23	0.23
50% effective depth (m)	0.72	0.45	0.45
25% effective depth (m)	0.81	0.68	0.68
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.13	0.32	0.32
ap 50	1.384	2.41	2.41
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test



Soakaway Test Results (after BRE Digest 365)

Geo-Environmental Services Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL
www.gesl.net

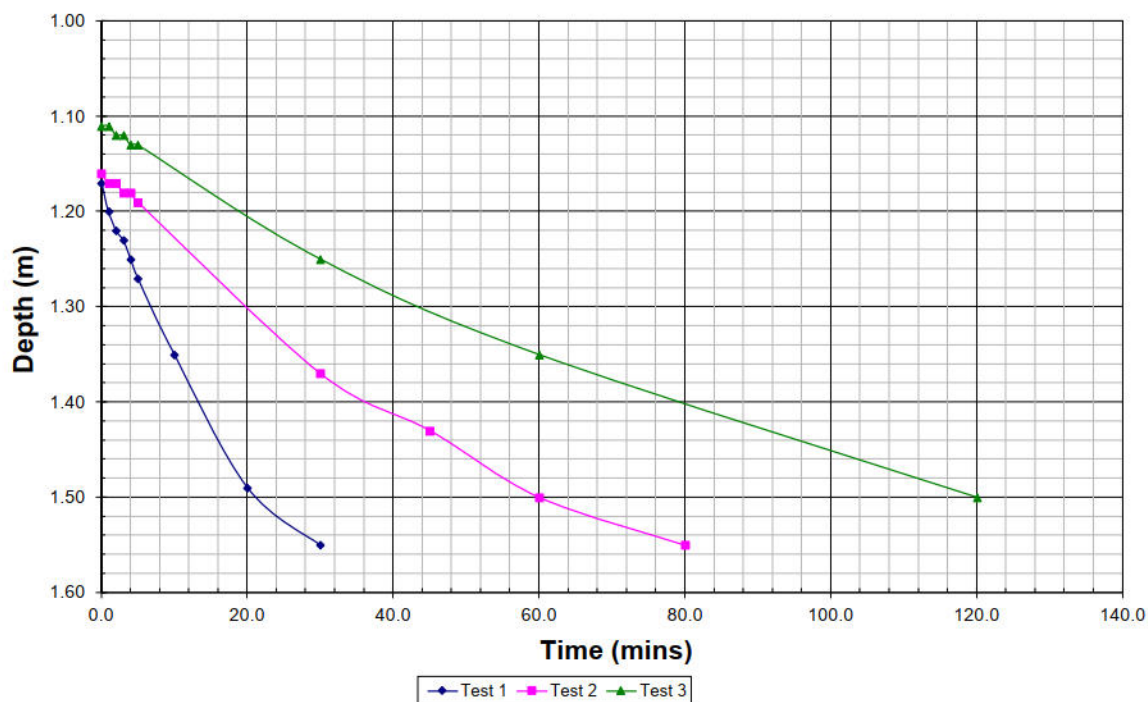
Project Name : Land to the rear of Thhe Croft, Barnham

Job No. : GE23392

Client : Metis Homes

Date : 04/09/2025

Pit reference	SA03
Pit depth (m)	1.62
Pit width (m)	0.50
Pit length (m)	1.80
Depth to standing water (m)	

[illegible][illegible][illegible]

Max. depth (m)	1.62	1.62	1.62
Effective depth (m)	0.45	0.46	0.51
75% effective depth (m)	1.28	1.28	1.24
50% effective depth (m)	1.40	1.39	1.37
25% effective depth (m)	1.51	1.51	1.49
t75 (min)	7.00	17.00	28.00
t50 (min)	14.00	34.00	68.00
t25 (min)	23.00	64.00	116.00
Vp 75-25	0.20	0.21	0.23
ap 50	1.935	1.958	2.073
tp 75-25	16.00	47.00	88.00

Soil infiltration rate (m/s)	1.1E-04	3.7E-05	2.1E-05
Soil infiltration rate (mm/hr)	3.92E+02	1.35E+02	7.55E+01



Soakaway Test Results (after BRE Digest 365)

Geo-Environmental Services Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL
www.gesl.net

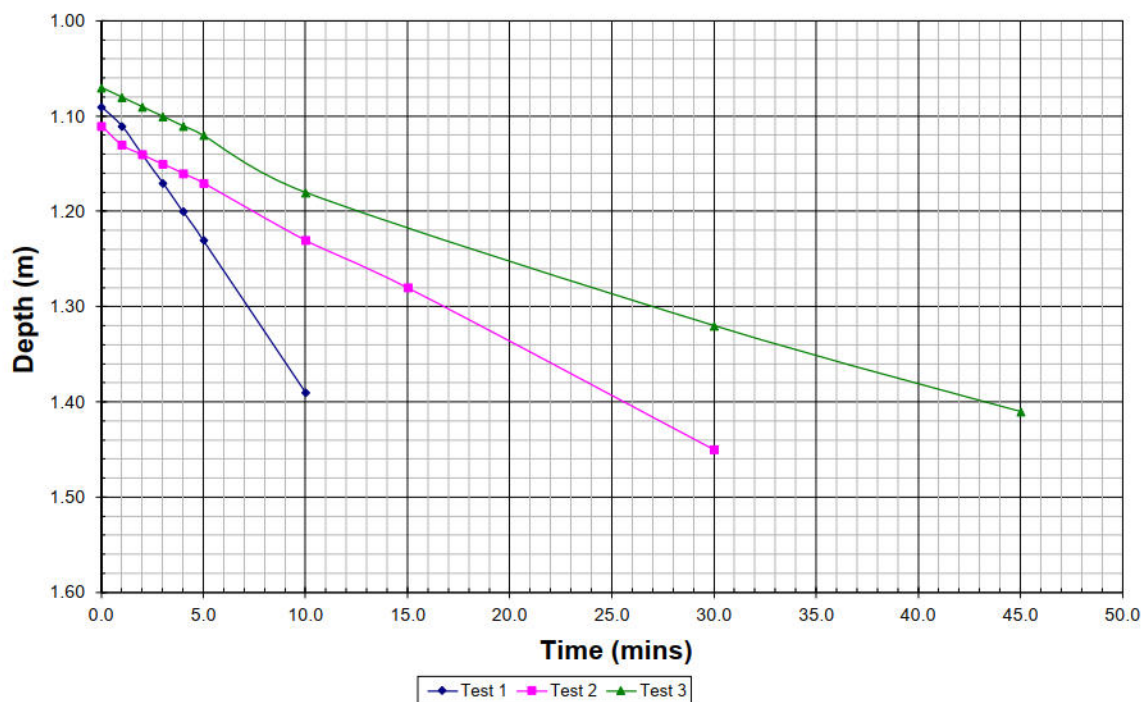
Project Name : Land to the rear of Thhe Croft, Barnham

Job No. : GE23392

Client : Metis Homes

Date : 04/09/2025

Pit reference	SA04
Pit depth (m)	1.49
Pit width (m)	0.50
Pit length (m)	1.90
Depth to standing water (m)	

[illegible][illegible][illegible]

Max. depth (m)	1.49	1.49	1.49
Effective depth (m)	0.40	0.38	0.42
75% effective depth (m)	1.19	1.21	1.18
50% effective depth (m)	1.29	1.30	1.28
25% effective depth (m)	1.39	1.40	1.39
t75 (min)	3.50	8.00	10.00
t50 (min)	7.00	16.50	24.50
t25 (min)	10.00	25.50	41.50
Vp 75-25	0.19	0.18	0.20
ap 50	1.91	1.862	1.958
tp 75-25	6.50	17.50	31.50

Soil infiltration rate (m/s)	2.6E-04	9.2E-05	5.4E-05
Soil infiltration rate (mm/hr)	9.18E+02	3.32E+02	1.94E+02

7.5 **Appendix E – Management and Maintenance Schedule**

SuDS Maintenance Schedule

Land to the Rear of Croft Surgery, Eastergate, West Sussex, PO20 3RP

Planning Ref: BN/38/24/PL

For

Metis Homes

Rev – P1

Reference **C3875**

Date **January 2026**

Revision	Date of Issue	Comments	Prepared By	Checked By
P1	27/01/2026	Initial Issue	SFC	CS

Contents

1 **MAINTENANCE**..... 3

1 Maintenance

1.1 Introduction

- 1.1.1 During construction, the Contractor will be responsible for maintaining the drainage and SuDS (Sustainable Drainage Systems). Upon handover, the developer will appoint a maintenance firm to take on the responsibility of these duties as laid out in this report.
- 1.1.2 The maintenance schedule for the proposed development will be split down into two separate categories; SuDS features and regular private drainage.

1.2 SuDS at Land to the rear of Croft Surgery, Eastergate

- 1.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be Permeable paving with infiltration trenches and a geocellular soakaway.
- 1.2.2 The SuDS features have been designed for easy maintenance and comprise:
- Regular Day-to-Day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS features
 - Occasional tasks – checking the SuDS features and removing any silt that builds up in the SuDS feature
 - Remedial work – repairing damage where necessary

1.3 SuDS Drainage Maintenance Specification

1.3.1 Geocellular Soakaway

In order to maintain the functioning of the soakaway, the following maintenance requirements should be adhered to:

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

1.3.2 Permeable Paving with infiltration trenches

In order to maintain the functioning of the permeable paving with infiltration trenches, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for permeable paving		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rate and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

1.4 General Drainage Maintenance Specification

1.4.1 Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to all free flow through the SuDS
- Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage. Strim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly
Inspections Chambers and below ground control chambers. Remove cover and inspect, ensuring that the 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 chambers to avoid mower damage.	As necessary
Remedial Work Repair physical damage if necessary	As required

1.4.2 Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required