Surface Water Drainage Proposal Checklist

This 'Surface Water Drainage Proposals Checklist' has been designed to clearly define expectations and requirements for any surface water drainage proposals, submitted for appraisal by the Council Engineers throughout West Sussex, during the planning process.

Please be aware that it is in the applicant's interest to provide all the requested information, as this will allow the Council Engineers to quickly and efficiently review your proposals. The omission of any requested information may lead to delays in the planning process.

If, however, there is information that you have been requested to provide but which you consider to be not applicable to your site for whatever reason, please provide an explanation at the Additional Information section at the end of the form quoting the line entry to which it applies.

It is recommended that the check list is consulted at the outset of the planning process, particularly if the applicant wishes to avoid pre-commencement conditions relating to surface water drainage. The Town and Country Planning Regulations now require pre-commencement conditions to have the prior agreement of the applicant regarding their wording and use. Therefore, to avoid pre-commencement conditions, in relation to surface water drainage, applicants will need to submit proposals that provide the information requested in this checklist and also align with the requirements of the following documents:

West Sussex Policy for the Management of Surface Water (WSCC) together with any supplementary planning guidance issued by the respective County or Borough Local Planning Authority.

By submitting all of the information requested by this checklist applicants will enable the respective District/ Borough or County Engineers to determine whether the proposals follow the hierarchy for sustainable drainage and will adequately drain the site.

This document will also be of help to any applicant, or drainage consultant, preparing to submit a 'Discharge of Conditions Application' relating to surface water drainage conditions.

Please be aware that it will be difficult for the appropriate local authority Engineer to undertake a timely assessment of an application if there are gaps in the information requested.

Surface Water Drainage Proposal Checklist

Ground Investigation Results							
Results Required		**Results Provided?**					
1	**Winter groundwater monitoring results** (Please refer to guidance note 1 below)	**Yes**	**X**	**No**			
2	**Period of winter groundwater monitoring** Note a	**From**	**10/02/2021**				
		To	**31/03/2021**				
3	**Maximum recorded groundwater level**	**mAOD 15.20mBGL**					
4	**Winter infiltration test results** Notes b & e	**Yes**	**X**	**No**			
5	**Date of winter infiltration testing (Month/Year)**	**25/03/2021**					
6	**Details of the location and depth of the infiltration testing** Note c	**Yes**	**X**	**No**			
7	**Minimum infiltration rate** Note d (Supply additional page if multiple minimum rates apply due to there being more than one infiltration structure on the site)	**1.09 x 10-5 m/s**					

Guidance Notes

a. A full winter season of groundwater monitoring should be undertaken, (October to March inclusive) to enable the peak annual groundwater levels to be established. The extent of winter monitoring for developments of less than 10 properties should be discussed with the Council Engineers. Groundwater on sites near the coast may be influenced by tidal conditions and therefore needs to be factored into the monitoring.

b. Infiltration testing should be undertaken during the wet winter months (typically January and February) and in line with BRE365, or a similar approved method ie. CIRIA R156. Tests should be repeated 3 times consecutively. Please note that infiltration testing is to be carried out at a time, locations and depth agreed with the Councils engineers.

c. Infiltration testing should be undertaken at the location and depth of any proposed infiltration structures. This must be carried out above the maximum recorded groundwater level in the vicinity of the test pit.

d. The minimum infiltration rate obtained at the location and depth of the proposed infiltration structures should be used to inform the design of the structures.

e. Deepbore Soakaways - where is not possible to undertake conventional BRE365 or CIRIA R156 testing due to depth, advice should be sought from the Council's engineers. Please note that deepbore soakaways are generally resisted unless there is no alternative. Agreement from the Environment Agency will also be required for the principle of using deepbore methods and evidence must be provided with your submission.

f. If on-site infiltration is not being used to drain the site, evidence will need to be provided that demonstrates on-site infiltration is unviable.

Proposed Method of Surface Water Disposal					
8	**Infiltration** On-site, via soakaway structures	**Yes**	✓	**No**	
9	**If on-site infiltration is not to be used, has justification for this been provided?** Note f.	**Yes**	N/A	**No**	
10	**Attenuation** (on-site) with a **restricted discharge to a watercourse** on, or adjacent to, the site	**Yes**	N/A	**No**	
11	**Attenuation** (on-site) with a **restricted discharge to a surface water sewer** on, or adjacent to, the site	**Yes**	N/A	**No**	
12	**Attenuation** (on-site) with a **restricted discharge to a foul water or combined sewer** on, or adjacent to, the site	**Yes**	N/A	**No**	

Drainage Design: Supporting Calculations						
Calculations Required			Calculations Provided?			
Infiltration Structures	13	**Calculations demonstrating that the 1 in 10 year event, plus climate change allowance can be accommodated below the lowest incoming pipe within each structure.** Note h & k	**Yes**	✓	**No**	
	14	**Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site.** Note h &k	**Yes**	✓	**No**	
	15	**Lowest base level of any infiltration structure**	**mAOD 2 mBGL**			
	16	**Half-drain time for 10 year event (plus climate change allowance)**	**Yes**	✓	**No**	
			65 Hours			
	17	**Half-drain time for 100 year event (plus climate change allowance)**	**Yes**	✓	**No**	
			66 Hours			
	18	**Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.**	**Yes**	✓	**No**	
Attenuation and Subsequent Restricted Discharge	19	**Pre-development run-off rate calculations**	**Yes**	✓	**No**	
			Q bar: 6.1l/s			
	20	**Proposed discharge rate** Note g	**N/A**			
	21	**Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site.** Note h	**Yes**	✓	**No**	
	22	**Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.**	**Yes**	N/A	**No**	
	23	**If the proposed scheme incorporates any impermeable lined attenuation features then calculations will be required to demonstrate that appropriate resistance to floatation (due to groundwater levels) is catered for in the design.**	**Yes**	N/A	**No**	
	24	**If discharge into or altering an ordinary watercourse is proposed, then the applicant will need to secure an Ordinary Watercourse/Land Drainage Consent?** Note i	**Yes**	N/A	**No**	
	25	**If discharging to a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system?** Note j	**Yes**	N/A	**No**	

Guidance Notes

g. Any proposed discharge rate must achieve the mean greenfield flow rate (Qbar) for all design storm events and be based upon the positively drained area. It is advised that agreement is sought at an early stage in terms of the area to be considered for this calculation. Additionally, if a brownfield site is being developed, infiltration must be fully investigated as the first option, in accordance with the hierarchy of disposal methods detailed in Approved Document H and the SuDS manual. Brownfield sites, which require attenuated discharge, should also restrict flows from all events to greenfield QBar. If this is not achievable flow should be restricted as

close to this as is achievable, with a minimum requirement of 50% betterment. The applicant will be expected to provide fully detailed plans of the existing surface water drainage arrangements on site, including impermeable areas, gullies, outfalls, pipes & diameters, manholes, etc, to prove the positively drained areas and their associated points of discharge. Please note that the minimum acceptable discharge rate is 2l/s when using formal flow control devices, unless otherwise agreed. For lower flow rates, it will need to be proven that adequate measures have been undertaken to protect the flow control device from future blockage.

h. The appropriate factor of safety from the table below must be applied to calculations to ensure the design is fully in accordance with CIRIA R156/ CIRIA C753. This is applicable to infiltration systems utilising the base area.

Factor of Safety Table						
Size of Area to be Drained	Consequences of failure					
	No damage or inconvenience		Minor inconvenience, e.g. surface water on car park		Damage to buildings or structures or roads.	
	Cv=1.0	Cv=0.75	Cv=1.0	Cv=0.75	Cv=1.0	Cv=0.75
<100 m^2	1.5	2	2	3	10	13
100m^2 to 1000m^2	1.5	2	3	4	10	13
>1000m^2	1.5	2	5	6.5	10	13

i. Ordinary Watercourse/Land Drainage Consent will need to be sought, ideally in parallel with planning permission, if the proposals incorporate discharge into, culverting or altering a watercourse.

j. Modelling is required to ensure that the effects of surcharged outfalls, are taken into account.

k. Climate change allowance on peak rainfall intensities or stored volumes must take into account the lifetime of the development.

Plans/Drawings/Diagrams					
Required		Provided?			
26	**Plan detailing the location of groundwater monitoring and infiltration testing**	**Yes**	✓	**No**	
27	**Detailed drainage layout plan** Note l	**Yes**	✓	**No**	
28	**Construction detail plans** Note m	**Yes**	✓	**No**	
29	**Exceedance flow route plans** Note n	**Yes**	✓	**No**	
30	**Impermeable area plan**	**Yes**	✓	**No**	
31	**If ground levels are being raised ≥ 300mm above existing levels and is unavoidable, have fully detailed plans been provided, together with drainage proposals, to address any potential drainage related issues.**	**Yes**	N/A	**No**	

Guidance Notes

l. Drainage layout plans should include:

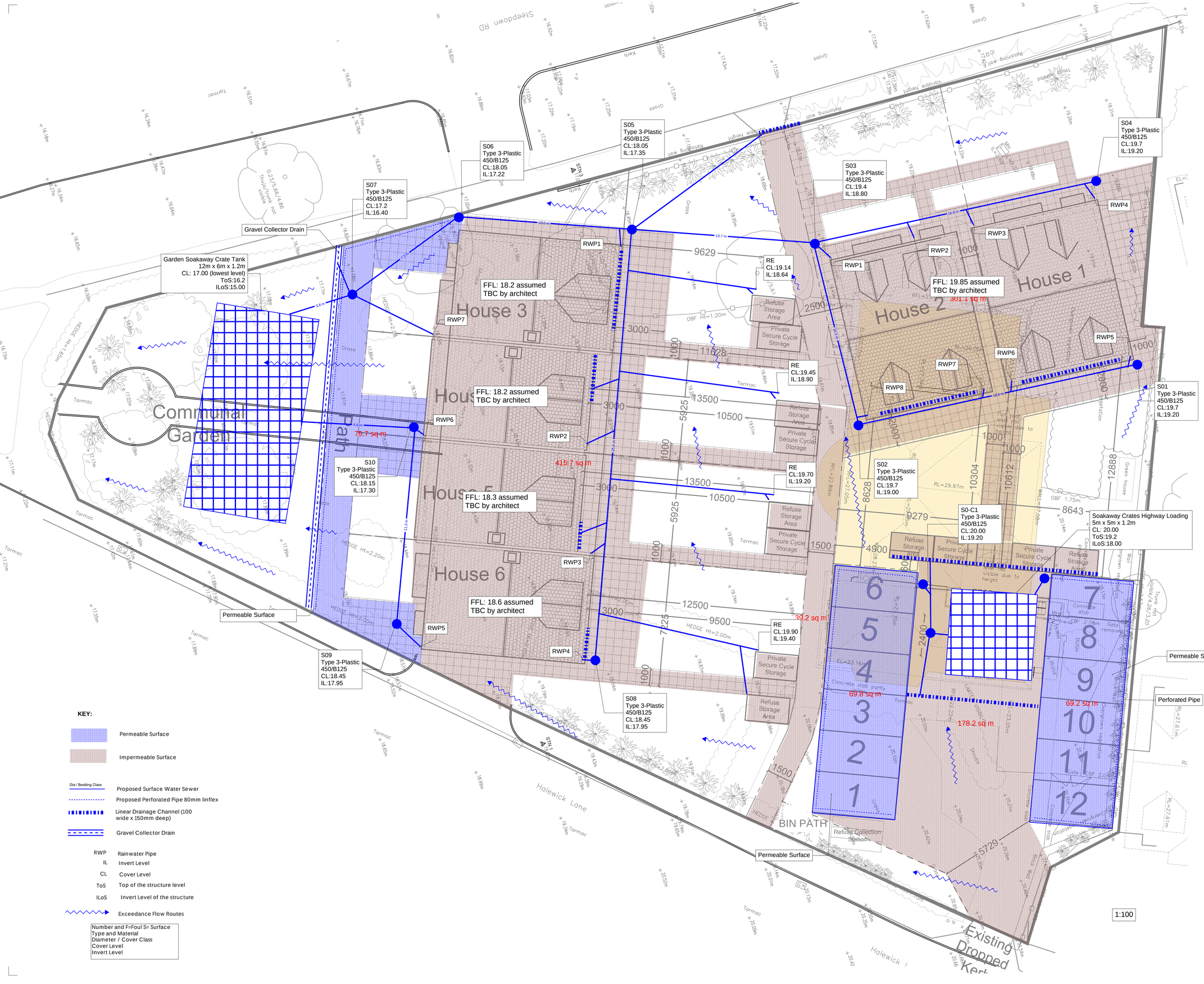
- All surface water drainage pipes labelled with: diameters, pipe materials, gradients and invert levels.
- All infiltrating and attenuating structures (including permeable paving) labelled with; dimensions, invert/base and cover levels.
- All manholes labelled with: a reference number, cover levels, invert levels, cover loading grade.
- All silt traps clearly labelled with sump depths.
- Control structures with discharge rates, hydraulic head and invert levels.

- Proposed/existing levels of any areas subject to ground raising, together with suitable measures/detailed drawings for the associated management of surface water runoff**. Please note that ground raising should be avoided unless there are exceptional circumstances**. In any instances where this is envisaged early consultation with the Council Engineer is recommended.

m. Site specific construction detail plans should be supplied. The following elements must be included (where applicable): infiltrating structures; attenuating structures; manholes; catch-pits/silt traps; flow control devices; permeable paving; headwalls; channel drains; gullies; pipe bedding and surround, etc.

n. Unless specifically requested by the Council's drainage Engineers 'Exceedance Flow Route Plans' are only required for developments of more than 10 residential properties or more than 0.5ha of commercial development.

Additional Information	
Space to be used to provide an explanation for any required information that has been omitted in the submission of this form or to raise specific queries seeking clarification. Please enter the appropriate line entry number to which the comments relate in the box at the left-hand side of the form.	



KEY:

- Permeable Surface
- Impermeable Surface
- Dia / Bedding Class — Proposed Surface Water Sewer
- Proposed Perforated Pipe 80mm linflex
- Linear Drainage Channel (100 wide x 150mm deep)
- Gravel Collector Drain

RWP	Rainwater Pipe
IL	Invert Level
CL	Cover Level
ToS	Top of the structure level
ILoS	Invert Level of the structure

- Exceedance Flow Routes

Number and F=Foul S= Surface
Type and Material
Diameter / Cover Class
Cover Level
Invert Level

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Drawing Scale Bar

Drawing scale	Line length	Drawing scale	Line length
1:5	= 0.25 metres	1:200	= 10.0 metres
1:10	= 0.5 metres	1:250	= 12.5 metres
1:20	= 1.0 metres	1:500	= 25.0 metres
1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres

Measure length of line above for checking of scale

GENERAL NOTES

1. All dimensions are in millimetres and levels in m AOD unless stated otherwise.

2. Do not scale. If in any doubt, consult Engineer.

3. Read in conjunction with the architects and engineers schedule drawings.

4. Check inverts and sizes of existing pipes prior to the commencement of any work. Report any discrepancies to the engineer and await instructions.

5. The location of services is shown as indicative. This drawing should be read in conjunction with the utilities drawings. No warranty to their accuracy can be given. The contractor shall take all necessary measures to satisfy himself as to the location of the existing services and connection points. Excavation should be undertaken in compliance with HSG47.

6. Concrete structures design sulphate class and ACEC concrete class unknown.

7. Pipework to be 110mm Thermoplastics U-PVC (Polypipe or similar) installed at levels marked on this drawing. Pipe bedding should be class Z in pipes within 1.5m of the building or shallower than 700mm below ground level. For all other areas the pipe bedding should be class S.

8. Joints and fittings for gravity sewers shall comply with the relevant provisions of BS EN 1401-1, BS EN 1852 and BS EN 12666-1. Pipes shall have a limit of 6% deformation. Pipes shall be SN8 ring stiffness and stamped accordingly. Pipe sections shall not be longer than 3m.

9. Plastic chambers to be silt traps and rings, including demarcation chambers,shall comply with BS EN 3598-1 or BS EN 13598-2 as appropriate.

10. Inspection chamber covers and frames shall comply with the relevant provisions of BS EN 124 and should be double sealed.

11. All inspection chamber covers shall be the non-ventilating type and shall have closed keyways.

12. Testing of pipelines should be as follow:

Gravity Pipework: Air pipe testing. Pipework should withstand a pressure of 100mm water gauge and this should not fall by more than 25mm in a 5minute period. However where traps or gullies are connected they should withstand a pressure of 50mm water gauge and this should not fall by more than 12mm in a 5minute period. It is recommended that pipework installations are tested in sections rather than waiting to complete in one operation.

13. Manhole covers to be set square to the building. Covers of existing manholes to be adjusted to match final ground levels.

14. Granular Bedding for pipes shall be constructed by spreading and compacting granular bedding material over the full width of the pipe trench. After the pipes have been laid, additional granular material shall, if required, be placed and compacted equally on each side of the pipes and, where practicable, this shall be done in sequence with the removal of the trench supports.

Rev	Details	Date	By	Chkd

Drawing Status:
PRELIMINARY

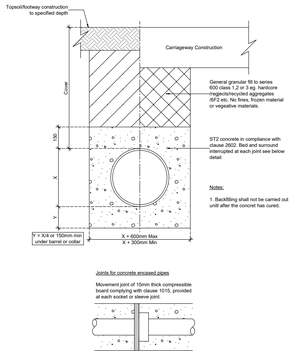
URBANWATER

Client:

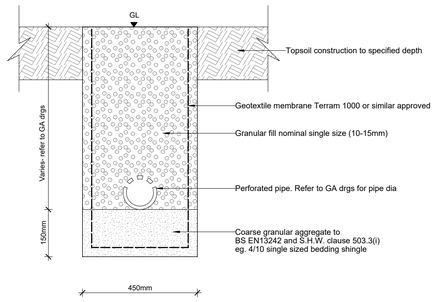
Project:
The Joyful, Steepdown Road, BN15 0LJ

Drawing:
Proposed Drainage Strategy

Print Size:	Project No:	Drawing No:	Revision:
A1	**0116**	003	P1



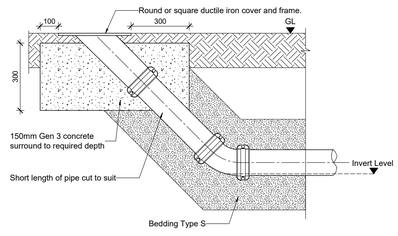
Pipe Bedding Detail Type Z



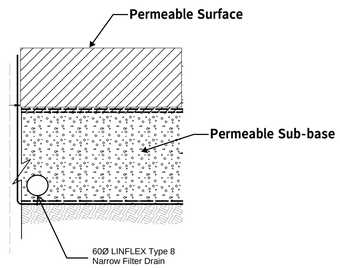
NOTES

1. Refer to GA for location and depths.

Collector/French Drain - Permeable



External Rodding Eye Detail



Perforated Pipe within sub-base



PLAN VIEW

SECTION VIEW

NOTES:

1. The vertical angle between the connecting pipe and the horizontal should be greater than 0° and not more than 60°.

2. Where the connection is being made to a sewer with a nominal internal diameter of 300 mm or less, connections should be made using 45° angle, or 90° angle, curved square junctions.

3. Connections made with junction fittings should be made by cutting the existing pipe, inserting the junction fitting and jointing with flexible repair couplings or slip couplers.

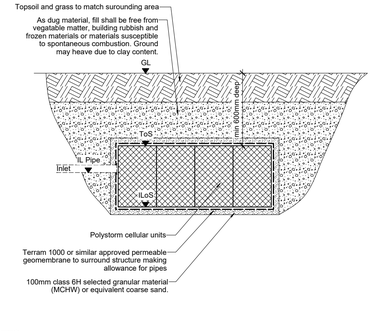
Lateral Connection to private sewer

NOTES:

1. This details shows the standard generic arrangement.

2. The pipe and connector details will be different for each manufacturer of the components. They are to be in installed in accordance with the manufacturers recommendations.

8250 - External Rainwater (High Level)



NOTES:

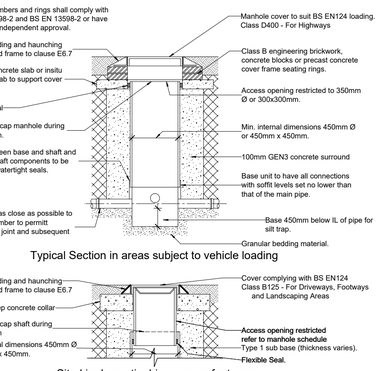
1. Permeable modular storage cell with 95% minimum void ratio. Maximum load 20 tonnes/m².

2. Installation of units as per supplier recommendations.

3. Ground may heave due to clay content in the as dug material. Contractor to level ground where required.

4. The area of the infiltration unit and the minimum total storage volume should be as per approved by the local planning authority documents.

Cellular Infiltration System - Landscape Area



Typical Section in areas subject to vehicle loading

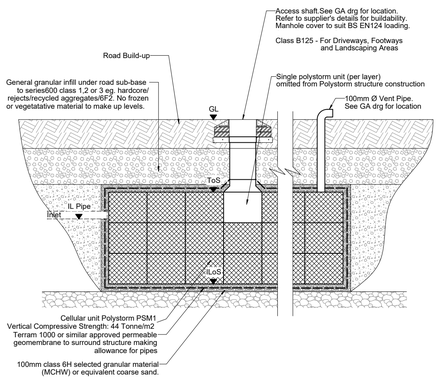
Sited in domestic driveways or footways

Sited in private garden - No loading

Notes:
1. Refer to drawing 8193 for base layouts.

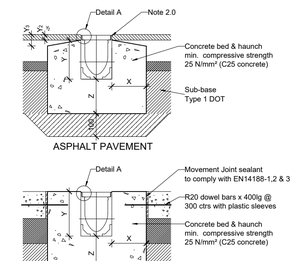
Silt Trap Plastic

Chamber Type 3 Base Layouts



For structure's plan dimensions, GL, ToS, ILoS, IL Pipe refer to GA drawing.

Soakaway Highway Loading



BLOCK PAVEMENT (OPTION 1 & 2)

Minimum Dimensions of Concrete Surround

Load Class		A15	B125	C250	D400*	F900
Minimum Dimensions (mm)	X	100	150	150	250	300
	Y	Full Channel Height (Less Y2 where necessary)				
	Z	100	150	150	250	300
Maximum Dimensions (mm)	Y_1	35	35	35	35	35
	Y_2	100	60	60	60	35

8341 - Linear Drainage Channel Detail (Steel)

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Drawing Scale Bar

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1:25 =	1.25 metres	1:1000 =	50.0 metres
1:50 =	2.5 metres	1:1250 =	62.5 metres
1:100 =	5.0 metres	1:2500 =	125 metres

Measure length of line above for checking of scale

GENERAL NOTES

Rev	Details	Date	By	Ch'd

Drawing Status:

PRELIMINARY

Client:

Project:

The Joyful, Steepdown Road, BN15 0LJ

Drawing:

Standard Details

Print Size:	Project No:	Drawing No:	Revision:
A1	**0116**	002	P1

Supporting Calculations

EXISTING SITE

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.024	4-8	0.015

Total Area Contributing (ha) = 0.039

Total Pipe Volume (m³) = 0.530

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.000	0.200	50.0	0.039	6.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.000	0.200	50.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	10.000	0.200	50.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.12	19.200	0.039	0.0	0.0	0.0	1.43	25.2	5.3
1.001	50.00	6.23	19.000	0.039	0.0	0.0	0.0	1.43	25.2	5.3
1.002	50.00	6.35	18.800	0.039	0.0	0.0	0.0	1.43	25.2	5.3

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		20.000	18.600	0.000	0	0

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Date 19/07/2021 13:54 | Designed by Argemiro
File Existing Site.MDX | Checked by
Innovyze | Network 2018.1.1

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.350		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW01	15 Winter	2	+0%					19.253
1.001	SW02	15 Winter	2	+0%					19.053
1.002	SW03	15 Winter	2	+0%					18.853

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	-0.097	0.000	0.27		6.1	OK	
1.001	SW02	-0.097	0.000	0.27		6.1	OK	
1.002	SW03	-0.097	0.000	0.27		6.1	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW01	15 Winter	30	+0%					19.276
1.001	SW02	15 Winter	30	+0%					19.076
1.002	SW03	15 Winter	30	+0%					18.877

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	-0.074	0.000	0.51		11.5	OK	
1.001	SW02	-0.074	0.000	0.51		11.5	OK	
1.002	SW03	-0.073	0.000	0.51		11.5	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW01	15 Winter	100	+0%					19.290
1.001	SW02	15 Winter	100	+0%					19.090
1.002	SW03	15 Winter	100	+0%					18.890

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	-0.060	0.000	0.66		14.9	OK	
1.001	SW02	-0.060	0.000	0.67		14.9	OK	
1.002	SW03	-0.060	0.000	0.67		14.9	OK	

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CAR PARK

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.026	4-8	0.008

Total Area Contributing (ha) = 0.034

Total Pipe Volume (m³) = 0.383

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.000	0.171	58.5	0.020	6.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	7.700	0.128	60.0	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	4.000	0.067	60.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.13	19.200	0.020	0.0	0.0	0.0	1.32	23.3	2.7
1.001	50.00	6.23	19.029	0.027	0.0	0.0	0.0	1.30	23.0	3.7
1.002	50.00	6.28	18.901	0.027	0.0	0.0	0.0	1.30	23.0	3.7

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		20.000	18.834	0.000	0	0

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Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Pump Manhole: Soakaway , DS/PN: 1.002, Volume (m³): 0.3

Invert Level (m) 18.901

Depth (m)	Flow (l/s)
2.000	0.0000

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Storage Structures for Storm

Cellular Storage Manhole: Soakaway , DS/PN: 1.002

Invert Level (m) 18.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	25.0	25.0	1.300	0.0	49.0
1.200	25.0	49.0			

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S01	15 Winter	2	+0%					19.239
1.001	S02	15 Winter	2	+0%					19.075
1.002	Soakaway	1440 Winter	2	+0%					18.328

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S01	-0.111	0.000	0.15		3.1	OK	
1.001	S02	-0.104	0.000	0.21		4.1	OK	
1.002	Soakaway	-0.723	0.000	0.00		0.0	OK	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S01	15 Winter	30	+0%					19.254
1.001	S02	15 Winter	30	+0%					19.096
1.002	Soakaway	1440 Winter	30	+0%					18.557

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S01	-0.096	0.000	0.28		5.9	OK	
1.001	S02	-0.083	0.000	0.41		8.1	OK	
1.002	Soakaway	-0.494	0.000	0.00		0.0	OK	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S01	15 Winter	100	+40%					19.276
1.001	S02	15 Winter	100	+40%					19.127
1.002	Soakaway	1440 Winter	100	+40%					18.982

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S01	-0.074	0.000	0.52		10.7	OK	
1.001	S02	-0.052	0.000	0.74		14.7	OK	
1.002	Soakaway	-0.069	0.000	0.00		0.0	OK	

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CAR PARK - DRAIN-DOWN TIME

Urban Water		Page 1
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Summary of Results for 10 year Return Period (+40%)

Half Drain Time : 2425 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	98.166	0.166	0.0	4.0	O K
30 min Summer	98.219	0.219	0.0	5.2	O K
60 min Summer	98.277	0.277	0.0	6.6	O K
120 min Summer	98.340	0.340	0.0	8.1	O K
180 min Summer	98.379	0.379	0.0	9.0	O K
240 min Summer	98.407	0.407	0.0	9.7	O K
360 min Summer	98.447	0.447	0.0	10.6	O K
480 min Summer	98.475	0.475	0.1	11.3	O K
600 min Summer	98.497	0.497	0.1	11.8	O K
720 min Summer	98.513	0.513	0.1	12.2	O K
960 min Summer	98.536	0.536	0.1	12.7	O K
1440 min Summer	98.559	0.559	0.1	13.3	O K
2160 min Summer	98.576	0.576	0.1	13.7	O K
2880 min Summer	98.587	0.587	0.1	13.9	O K
4320 min Summer	98.595	0.595	0.1	14.1	O K
5760 min Summer	98.594	0.594	0.1	14.1	O K
7200 min Summer	98.588	0.588	0.1	14.0	O K
8640 min Summer	98.579	0.579	0.1	13.7	O K
10080 min Summer	98.568	0.568	0.1	13.5	O K
15 min Winter	98.186	0.186	0.0	4.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.271	0.0	19
30 min Summer	51.642	0.0	34
60 min Summer	32.757	0.0	64
120 min Summer	20.269	0.0	124
180 min Summer	15.182	0.0	184
240 min Summer	12.329	0.0	244
360 min Summer	9.184	0.0	362
480 min Summer	7.445	0.0	482
600 min Summer	6.324	0.0	602
720 min Summer	5.532	0.0	722
960 min Summer	4.478	0.0	962
1440 min Summer	3.322	0.0	1428
2160 min Summer	2.462	0.0	1732
2880 min Summer	1.990	0.0	2104
4320 min Summer	1.473	0.0	2900
5760 min Summer	1.189	0.0	3744
7200 min Summer	1.008	0.0	4544
8640 min Summer	0.880	0.0	5360
10080 min Summer	0.785	0.0	6160
15 min Winter	78.271	0.0	19

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Summary of Results for 10 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	98.245	0.245	0.0	5.8	O K
60 min Winter	98.310	0.310	0.0	7.4	O K
120 min Winter	98.381	0.381	0.0	9.0	O K
180 min Winter	98.424	0.424	0.0	10.1	O K
240 min Winter	98.456	0.456	0.0	10.8	O K
360 min Winter	98.501	0.501	0.1	11.9	O K
480 min Winter	98.533	0.533	0.1	12.7	O K
600 min Winter	98.557	0.557	0.1	13.2	O K
720 min Winter	98.576	0.576	0.1	13.7	O K
960 min Winter	98.603	0.603	0.1	14.3	O K
1440 min Winter	98.631	0.631	0.1	15.0	O K
2160 min Winter	98.646	0.646	0.1	15.3	O K
2880 min Winter	98.656	0.656	0.1	15.6	O K
4320 min Winter	98.657	0.657	0.1	15.6	O K
5760 min Winter	98.646	0.646	0.1	15.4	O K
7200 min Winter	98.631	0.631	0.1	15.0	O K
8640 min Winter	98.613	0.613	0.1	14.6	O K
10080 min Winter	98.595	0.595	0.1	14.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	51.642	0.0	34
60 min Winter	32.757	0.0	64
120 min Winter	20.269	0.0	122
180 min Winter	15.182	0.0	182
240 min Winter	12.329	0.0	240
360 min Winter	9.184	0.0	358
480 min Winter	7.445	0.0	474
600 min Winter	6.324	0.0	590
720 min Winter	5.532	0.0	706
960 min Winter	4.478	0.0	934
1440 min Winter	3.322	0.0	1372
2160 min Winter	2.462	0.0	1776
2880 min Winter	1.990	0.0	2196
4320 min Winter	1.473	0.0	3112
5760 min Winter	1.189	0.0	4032
7200 min Winter	1.008	0.0	4896
8640 min Winter	0.880	0.0	5712
10080 min Winter	0.785	0.0	6560

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.027

Time (mins) From:	To:	Area (ha)
0	4	0.027

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	25.0	25.0	1.300	0.0	49.0
1.200	25.0	49.0			

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CAR PARK - DRAIN-DOWN TIME

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 2433 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	98.273	0.273	0.0	6.5	O K
30 min Summer	98.366	0.366	0.0	8.7	O K
60 min Summer	98.467	0.467	0.1	11.1	O K
120 min Summer	98.573	0.573	0.1	13.6	O K
180 min Summer	98.634	0.634	0.1	15.1	O K
240 min Summer	98.674	0.674	0.1	16.0	O K
360 min Summer	98.732	0.732	0.1	17.4	O K
480 min Summer	98.771	0.771	0.1	18.3	O K
600 min Summer	98.800	0.800	0.1	19.0	O K
720 min Summer	98.821	0.821	0.1	19.5	O K
960 min Summer	98.849	0.849	0.1	20.2	O K
1440 min Summer	98.872	0.872	0.1	20.7	O K
2160 min Summer	98.883	0.883	0.1	21.0	O K
2880 min Summer	98.887	0.887	0.1	21.1	O K
4320 min Summer	98.883	0.883	0.1	21.0	O K
5760 min Summer	98.868	0.868	0.1	20.6	O K
7200 min Summer	98.849	0.849	0.1	20.2	O K
8640 min Summer	98.828	0.828	0.1	19.7	O K
10080 min Summer	98.808	0.808	0.1	19.2	O K
15 min Winter	98.305	0.305	0.0	7.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.238	0.0	19
30 min Summer	86.178	0.0	34
60 min Summer	55.250	0.0	64
120 min Summer	34.177	0.0	124
180 min Summer	25.410	0.0	184
240 min Summer	20.436	0.0	244
360 min Summer	15.037	0.0	362
480 min Summer	12.081	0.0	482
600 min Summer	10.185	0.0	602
720 min Summer	8.854	0.0	722
960 min Summer	7.093	0.0	962
1440 min Summer	5.178	0.0	1428
2160 min Summer	3.772	0.0	1732
2880 min Summer	3.009	0.0	2104
4320 min Summer	2.184	0.0	2900
5760 min Summer	1.738	0.0	3744
7200 min Summer	1.455	0.0	4544
8640 min Summer	1.260	0.0	5360
10080 min Summer	1.115	0.0	6160
15 min Winter	128.238	0.0	19

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	98.410	0.410	0.0	9.7	O K
60 min Winter	98.523	0.523	0.1	12.4	O K
120 min Winter	98.642	0.642	0.1	15.2	O K
180 min Winter	98.710	0.710	0.1	16.9	O K
240 min Winter	98.755	0.755	0.1	17.9	O K
360 min Winter	98.820	0.820	0.1	19.5	O K
480 min Winter	98.865	0.865	0.1	20.5	O K
600 min Winter	98.897	0.897	0.1	21.3	O K
720 min Winter	98.922	0.922	0.1	21.9	O K
960 min Winter	98.954	0.954	0.1	22.7	O K
1440 min Winter	98.984	0.984	0.1	23.4	O K
2160 min Winter	98.990	0.990	0.1	23.5	O K
2880 min Winter	98.992	0.992	0.1	23.6	O K
4320 min Winter	98.974	0.974	0.1	23.1	O K
5760 min Winter	98.944	0.944	0.1	22.4	O K
7200 min Winter	98.911	0.911	0.1	21.6	O K
8640 min Winter	98.878	0.878	0.1	20.8	O K
10080 min Winter	98.846	0.846	0.1	20.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	86.178	0.0	34
60 min Winter	55.250	0.0	64
120 min Winter	34.177	0.0	122
180 min Winter	25.410	0.0	182
240 min Winter	20.436	0.0	240
360 min Winter	15.037	0.0	358
480 min Winter	12.081	0.0	474
600 min Winter	10.185	0.0	590
720 min Winter	8.854	0.0	706
960 min Winter	7.093	0.0	934
1440 min Winter	5.178	0.0	1372
2160 min Winter	3.772	0.0	1776
2880 min Winter	3.009	0.0	2196
4320 min Winter	2.184	0.0	3112
5760 min Winter	1.738	0.0	4032
7200 min Winter	1.455	0.0	4896
8640 min Winter	1.260	0.0	5712
10080 min Winter	1.115	0.0	6560

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.027

Time (mins) From:	To:	Area (ha)
0	4	0.027

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	25.0	25.0	1.300	0.0	49.0
1.200	25.0	49.0			

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HOUSES

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.057	4-8	0.028

Total Area Contributing (ha) = 0.085

Total Pipe Volume (m³) = 0.998

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.000	0.833	12.0	0.055	6.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	7.700	0.123	62.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	11.300	0.565	20.0	0.022	6.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	5.900	1.085	5.4	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	4.000	0.024	169.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.04	17.350	0.055	0.0	0.0	0.0	3.80	151.0	7.4
1.001	50.00	6.12	16.517	0.055	0.0	0.0	0.0	1.66	65.8	7.4
2.000	50.00	6.11	17.950	0.022	0.0	0.0	0.0	1.73	13.6	3.0
2.001	50.00	6.14	17.385	0.026	0.0	0.0	0.0	3.34	26.2	3.5
1.002	50.00	6.20	16.175	0.081	0.0	0.0	0.0	1.00	39.9	11.0

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		17.000	16.151	0.000	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Pump Manhole: Soakaway , DS/PN: 1.002, Volume (m³): 0.5

Invert Level (m) 16.175

Depth (m)	Flow (l/s)
2.000	0.0000

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Storage Structures for Storm

Cellular Storage Manhole: Soakaway , DS/PN: 1.002

Invert Level (m) 15.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	72.0	72.0	1.300	0.0	115.2
1.200	72.0	115.2			

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S06	15 Winter	2	+0%					17.388
1.001	S07	15 Winter	2	+0%					16.579
2.000	S09	15 Winter	2	+0%					17.985
2.001	S10	15 Winter	2	+0%					17.413
1.002	Soakaway	1440 Winter	2	+0%					15.367

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S06	-0.187	0.000	0.07		8.6	OK	
1.001	S07	-0.162	0.000	0.17		8.6	OK	
2.000	S09	-0.065	0.000	0.27		3.4	OK	
2.001	S10	-0.072	0.000	0.17		4.0	OK	
1.002	Soakaway	-1.033	0.000	0.00		0.0	OK	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S06	15 Winter	30	+0%					17.403
1.001	S07	15 Winter	30	+0%					16.605
2.000	S09	15 Winter	30	+0%					18.001
2.001	S10	15 Winter	30	+0%					17.425
1.002	Soakaway	1440 Winter	30	+0%					15.623

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S06	-0.172	0.000	0.13		16.2	OK	
1.001	S07	-0.136	0.000	0.33		16.2	OK	
2.000	S09	-0.049	0.000	0.51		6.5	OK	
2.001	S10	-0.060	0.000	0.33		7.7	OK	
1.002	Soakaway	-0.777	0.000	0.00		0.0	OK	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	100.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S06	15 Winter	100	+40%					17.423
1.001	S07	15 Winter	100	+40%					16.642
2.000	S09	15 Winter	100	+40%					18.025
2.001	S10	15 Winter	100	+40%					17.442
1.002	Soakaway	1440 Winter	100	+40%					16.099

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S06	-0.152	0.000	0.23		29.5	OK	
1.001	S07	-0.100	0.000	0.60		29.5	OK	
2.000	S09	-0.025	0.000	0.92		11.8	OK	
2.001	S10	-0.043	0.000	0.60		14.0	OK	
1.002	Soakaway	-0.301	0.000	0.00		0.0	OK	

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HOUSES - DRAIN-DOWN TIME

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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 3892 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	98.270	0.270	0.1	18.5	O K
30 min Summer	98.363	0.363	0.1	24.8	O K
60 min Summer	98.464	0.464	0.1	31.7	O K
120 min Summer	98.571	0.571	0.1	39.0	O K
180 min Summer	98.633	0.633	0.1	43.3	O K
240 min Summer	98.676	0.676	0.1	46.2	O K
360 min Summer	98.738	0.738	0.1	50.5	O K
480 min Summer	98.783	0.783	0.2	53.5	O K
600 min Summer	98.816	0.816	0.2	55.8	O K
720 min Summer	98.843	0.843	0.2	57.7	O K
960 min Summer	98.882	0.882	0.2	60.3	O K
1440 min Summer	98.928	0.928	0.2	63.5	O K
2160 min Summer	98.954	0.954	0.2	65.3	O K
2880 min Summer	98.962	0.962	0.2	65.8	O K
4320 min Summer	98.969	0.969	0.2	66.3	O K
5760 min Summer	98.968	0.968	0.2	66.2	O K
7200 min Summer	98.961	0.961	0.2	65.7	O K
8640 min Summer	98.952	0.952	0.2	65.1	O K
10080 min Summer	98.940	0.940	0.2	64.3	O K
15 min Winter	98.303	0.303	0.1	20.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.238	0.0	23
30 min Summer	86.178	0.0	38
60 min Summer	55.250	0.0	68
120 min Summer	34.177	0.0	128
180 min Summer	25.410	0.0	186
240 min Summer	20.436	0.0	246
360 min Summer	15.037	0.0	366
480 min Summer	12.081	0.0	484
600 min Summer	10.185	0.0	604
720 min Summer	8.854	0.0	724
960 min Summer	7.093	0.0	962
1440 min Summer	5.178	0.0	1442
2160 min Summer	3.772	0.0	2160
2880 min Summer	3.009	0.0	2484
4320 min Summer	2.184	0.0	3204
5760 min Summer	1.738	0.0	3984
7200 min Summer	1.455	0.0	4832
8640 min Summer	1.260	0.0	5624
10080 min Summer	1.115	0.0	6456
15 min Winter	128.238	0.0	23

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	98.406	0.406	0.1	27.8	O K
60 min Winter	98.519	0.519	0.1	35.5	O K
120 min Winter	98.639	0.639	0.1	43.7	O K
180 min Winter	98.710	0.710	0.1	48.5	O K
240 min Winter	98.757	0.757	0.1	51.8	O K
360 min Winter	98.827	0.827	0.2	56.6	O K
480 min Winter	98.877	0.877	0.2	60.0	O K
600 min Winter	98.915	0.915	0.2	62.6	O K
720 min Winter	98.945	0.945	0.2	64.7	O K
960 min Winter	98.990	0.990	0.2	67.7	O K
1440 min Winter	99.043	1.043	0.2	71.3	O K
2160 min Winter	99.077	1.077	0.2	73.7	O K
2880 min Winter	99.085	1.085	0.2	74.2	O K
4320 min Winter	99.085	1.085	0.2	74.2	O K
5760 min Winter	99.076	1.076	0.2	73.6	O K
7200 min Winter	99.059	1.059	0.2	72.4	O K
8640 min Winter	99.039	1.039	0.2	71.1	O K
10080 min Winter	99.018	1.018	0.2	69.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	86.178	0.0	37
60 min Winter	55.250	0.0	66
120 min Winter	34.177	0.0	126
180 min Winter	25.410	0.0	184
240 min Winter	20.436	0.0	242
360 min Winter	15.037	0.0	360
480 min Winter	12.081	0.0	478
600 min Winter	10.185	0.0	596
720 min Winter	8.854	0.0	714
960 min Winter	7.093	0.0	946
1440 min Winter	5.178	0.0	1402
2160 min Winter	3.772	0.0	2076
2880 min Winter	3.009	0.0	2688
4320 min Winter	2.184	0.0	3332
5760 min Winter	1.738	0.0	4264
7200 min Winter	1.455	0.0	5184
8640 min Winter	1.260	0.0	6056
10080 min Winter	1.115	0.0	6960

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.077

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.055	4	8	0.022

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	72.0	72.0	1.300	0.0	115.2
1.200	72.0	115.2			

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HOUSES - DRAIN-DOWN TIME

Summary of Results for 10 year Return Period (+40%)

Half Drain Time : 3914 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	98.165	0.165	0.0	11.3	O K
30 min Summer	98.217	0.217	0.0	14.9	O K
60 min Summer	98.275	0.275	0.1	18.8	O K
120 min Summer	98.338	0.338	0.1	23.2	O K
180 min Summer	98.378	0.378	0.1	25.9	O K
240 min Summer	98.408	0.408	0.1	27.9	O K
360 min Summer	98.451	0.451	0.1	30.8	O K
480 min Summer	98.482	0.482	0.1	33.0	O K
600 min Summer	98.507	0.507	0.1	34.7	O K
720 min Summer	98.527	0.527	0.1	36.0	O K
960 min Summer	98.557	0.557	0.1	38.1	O K
1440 min Summer	98.595	0.595	0.1	40.7	O K
2160 min Summer	98.623	0.623	0.1	42.6	O K
2880 min Summer	98.636	0.636	0.1	43.5	O K
4320 min Summer	98.654	0.654	0.1	44.7	O K
5760 min Summer	98.662	0.662	0.1	45.3	O K
7200 min Summer	98.665	0.665	0.1	45.5	O K
8640 min Summer	98.665	0.665	0.1	45.5	O K
10080 min Summer	98.662	0.662	0.1	45.3	O K
15 min Winter	98.185	0.185	0.0	12.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.271	0.0	23
30 min Summer	51.642	0.0	38
60 min Summer	32.757	0.0	68
120 min Summer	20.269	0.0	128
180 min Summer	15.182	0.0	186
240 min Summer	12.329	0.0	246
360 min Summer	9.184	0.0	366
480 min Summer	7.445	0.0	484
600 min Summer	6.324	0.0	604
720 min Summer	5.532	0.0	724
960 min Summer	4.478	0.0	962
1440 min Summer	3.322	0.0	1442
2160 min Summer	2.462	0.0	2160
2880 min Summer	1.990	0.0	2484
4320 min Summer	1.473	0.0	3204
5760 min Summer	1.189	0.0	3984
7200 min Summer	1.008	0.0	4832
8640 min Summer	0.880	0.0	5624
10080 min Summer	0.785	0.0	6456
15 min Winter	78.271	0.0	23

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Summary of Results for 10 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	98.243	0.243	0.0	16.6	O K
60 min Winter	98.308	0.308	0.1	21.1	O K
120 min Winter	98.379	0.379	0.1	25.9	O K
180 min Winter	98.424	0.424	0.1	29.0	O K
240 min Winter	98.457	0.457	0.1	31.2	O K
360 min Winter	98.505	0.505	0.1	34.6	O K
480 min Winter	98.541	0.541	0.1	37.0	O K
600 min Winter	98.568	0.568	0.1	38.9	O K
720 min Winter	98.591	0.591	0.1	40.4	O K
960 min Winter	98.625	0.625	0.1	42.8	O K
1440 min Winter	98.669	0.669	0.1	45.8	O K
2160 min Winter	98.703	0.703	0.1	48.1	O K
2880 min Winter	98.717	0.717	0.1	49.1	O K
4320 min Winter	98.731	0.731	0.1	50.0	O K
5760 min Winter	98.736	0.736	0.1	50.4	O K
7200 min Winter	98.733	0.733	0.1	50.2	O K
8640 min Winter	98.726	0.726	0.1	49.7	O K
10080 min Winter	98.716	0.716	0.1	49.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	51.642	0.0	37
60 min Winter	32.757	0.0	66
120 min Winter	20.269	0.0	126
180 min Winter	15.182	0.0	184
240 min Winter	12.329	0.0	242
360 min Winter	9.184	0.0	360
480 min Winter	7.445	0.0	478
600 min Winter	6.324	0.0	596
720 min Winter	5.532	0.0	714
960 min Winter	4.478	0.0	946
1440 min Winter	3.322	0.0	1402
2160 min Winter	2.462	0.0	2076
2880 min Winter	1.990	0.0	2688
4320 min Winter	1.473	0.0	3332
5760 min Winter	1.189	0.0	4264
7200 min Winter	1.008	0.0	5184
8640 min Winter	0.880	0.0	6056
10080 min Winter	0.785	0.0	6960

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.077

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.055	4	8	0.022

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03924

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	72.0	72.0	1.300	0.0	115.2
1.200	72.0	115.2			

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Ground Investigation Results

SEVENOAKS ENVIRONMENTAL CONSULTANCY

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Tel: 01892 822 999

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enquiries@sevenoaksenvironmental.co.uk

Urfan Mehmood,
The Joyful Whippet,
Steepdown Road,
Sompting,
BN15 0LJ

21st May 2021

Our Ref: 3993 21 05 21 Ltr 03 Rpt 03 REV A RD UM

Dear Urfan,

SITE: The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ
SERVICE: BRE 365 Soakage Tests

Following your instruction, via email, to conduct BRE 365 Soakage Tests, SEC attended site on the 20th May to undertake the work.

At the time of writing the site comprised an approximately rectangular plot laid to soft landscaping and was overgrown with vegetation (see Figure 1 for Site Location Plan). The scope of investigation undertaken was prescribed by your Drainage Engineers and consisted of 4no. mechanically excavated trial pits up to 2.00m bgl (See Figure 2 for Exploratory Hole Location Plan). It is understood that this work was required to help inform the drainage strategy for the proposed development which includes the construction of 6no. residential dwellings with associated parking and landscaping.

From a brief review of BGS Geological Mapping, the site was identified to be possibly underlain by bedrock geology comprising Newhaven Chalk Formation (Chalk) with Head (Clay, Silt and Gravel) as overlying superficial deposits.

The scope of works undertaken generally comprised:

- Full time site supervision by an SEC Engineer to conduct soakage tests in accordance with BRE365 guidance which involves filling the test pits three times in quick succession whilst monitoring the rate of seepage, as well logging the ground conditions to BS 5930 / Eurocode 7 and CIRIA 574 and documenting the investigation;
- Provision of a mechanical excavator with an operator to excavate 4no. trial pits up to 2.00m bgl (BRE01-BRE04) as specified by the appointed Drainage Engineers;
- Provision of a 2000 litre water bowser to supply “clean” mains water; and
- Production of a Factual Report

An SEC Engineer supervised the excavation of 4no. trial pits (BRE01-BRE04) up to 2.00m bgl (see Appendix B Site Photos). Ground conditions encountered appeared to be generally consistent with those indicated by the

BGS records. BRE01 had to be relocated (BRE01a) due to a lead pipe being identified within BRE01 at 0.42m bgl causing the location to be abandoned.

Soakage tests were commenced within the 4 no. trial pits; however, the progress of the tests was slow. This was observed specifically in BRE02 and BRE04 which were located close to the eastern boundary of site. This area comprised fine, sandy, clayey material. 2no. pits (BRE01 and BRE03) were able to carry out 2no. tests while the other 2no. pits (BRE02 and BRE04) carried out 1no. test due to slow progress.

Please see Appendix C for Soakage Test Data and Trial Pit Logs.

See Appendix D for General Limitation and Exceptions

Kind regards

Damian Jones
Managing Director
d.jones@sevenoaksenvironmental.co.uk

enc.
Appendix A – Figures
Figure 1 – Site Location Plan
Figure 2 – Exploratory Hole Location Plan
Appendix B – Site Photos
Appendix C – BRE 365 Soakage Data
Appendix D – General Limitations and Exceptions

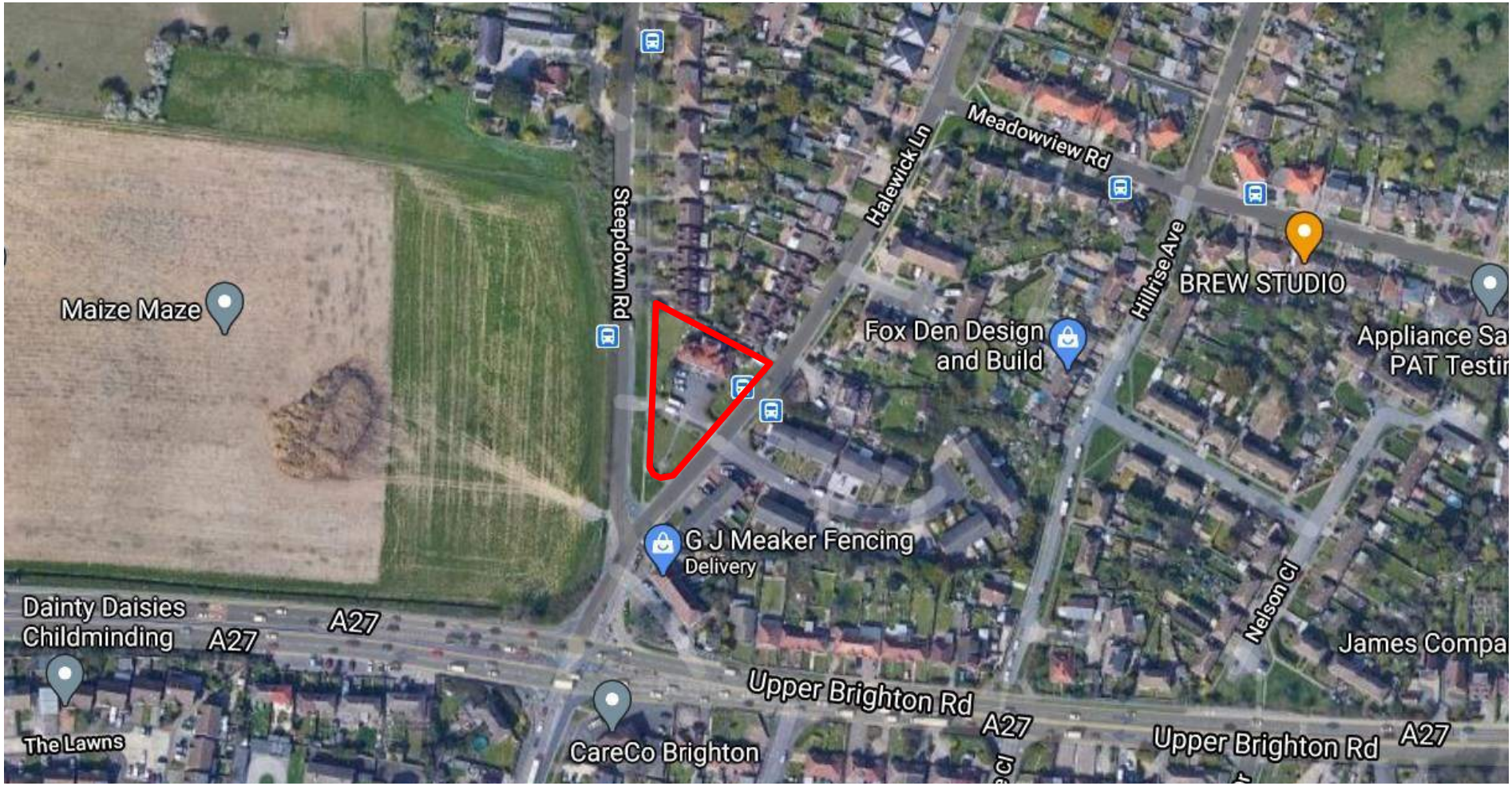
Appendix A

Figures

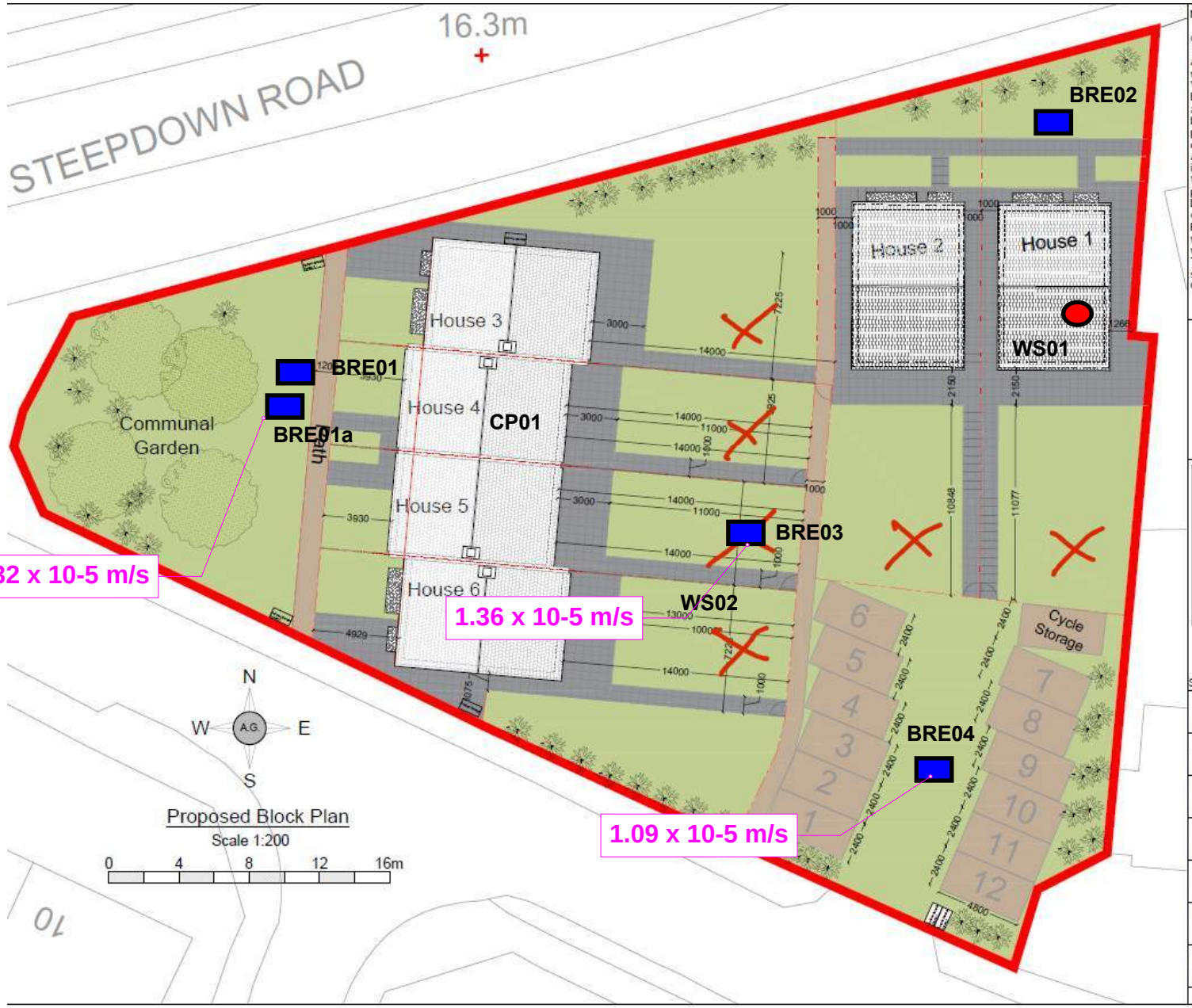
W

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This map is not to be relied upon for accuracy and is for identification purposes only

E



SITE: The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ	SCALE: NTS	JOB NO: 3993	SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Site Location Plan	REV: 01	FIGURE NO: 01	



NOTES:

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All dimension should be checked on site prior to works commencing.
Variations in squareness, depth of plaster etc, must be checked for. Where new walls are shown as aligned with existing walls, physical removal of brickwork and / or plaster to establish the actual position of the wall being attached to must be checked.
Any discrepancies should be reported in writing immediately.
When printing off PDF's, check that the drawings are printed to correct paper size and scale.
Documents should be used as to the drawing status described
Property owner to ensure that all aspects of the "party wall etc., act 1996" are complied with prior to any works commencing on site.
These drawings are not to be re-drawn, copied or sold unless permission has been given by Alexander Gemini Ltd.

0 1 2 3m
SCALE: 1:50
0 1 2 3 4 5 6m
SCALE: 1:100

Alexander Gemini Ltd.
WWW.ALEXANDERGEMINI.CO.UK
INFO@ALEXANDERGEMINI.CO.UK
SITE FINDING - DESIGN - PLANNING - DEVELOPING

PROJECT DESCRIPTION
New Build Development of 6x New Houses

SITE ADDRESS
The Joyful Whippet Steepdown Road Sompting BN15 0LJ

DRAWING TITLE
Proposed Block Plan

PROJECT STATUS
Planning

DRAWING SCALE : 1:100 @ A3

DATE : OCT. 2020
DRAWN BY T.A.K **CHECKED BY** L.P.

REVISION : P

DRAWING NUMBER : SH17

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This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Joyful Whippet, Steepdown Road, Sompting, West Sussex, BN15 0LJ	SCALE: NTS	JOB NO: 3993	SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Proposed Exploratory Hole Location Plan	REV: 01	FIGURE NO: 2	

Appendix B

Site Photographs



Photo 1 – View of BRE02

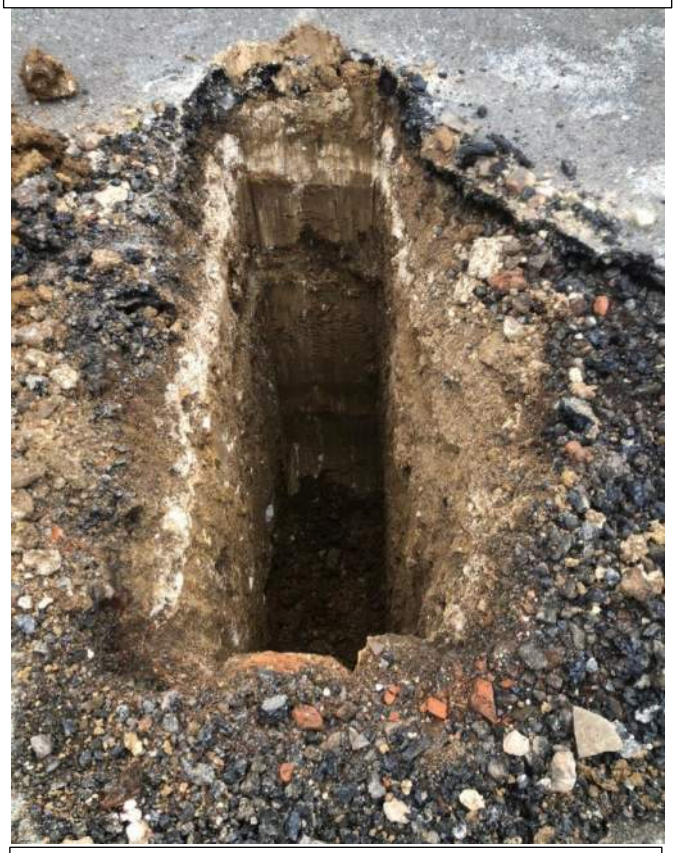


Photo 2 – View of BRE03



Photo 3 – View of BRE04



Photo 4 – Photo of lead pipe in BRE01



Photo 5 – General view facing west.



Photo 6 – General view facing east.



Photo 7 – General view facing west.

Appendix C

Soakage Test Data and Trial Pit Logs

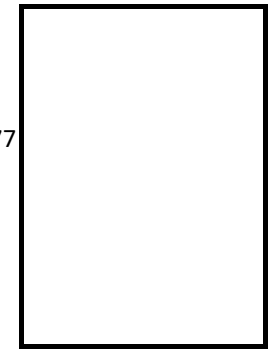
3993	BRE01a
Soakage Test 1	
Time (Minutes)	Depth (m bgl)
0	1.14
1	1.18
2	1.2
3	1.22
5	1.25
6	1.27
7	1.29
12	1.35
15	1.39
16	1.4
18	1.42
20	1.43
25	1.48
30	1.51
35	1.56
40	1.59
50	1.63
73	1.74
90	1.86

3993	BRE01a
Soakage Test 2	
Time (Minutes)	Depth (m bgl)
0	1.13
1	1.13
2	1.14
4	1.16
6	1.18
7	1.19
8	1.2
9	1.22
10	1.23
11	1.24
12	1.24
13	1.26
15	1.28
18	1.29
20	1.31
25	1.33
30	1.36
50	1.46
75	1.56
92	1.62
108	1.66
113	1.67

Trial Pit Parameters

North Depth 2.15

Length 1.77



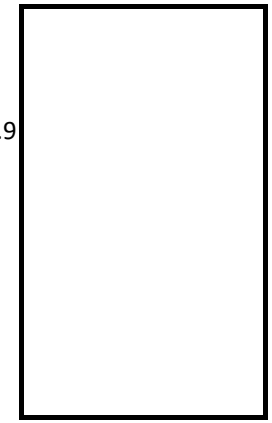
South Width 0.7

3993	BRE02
Soakage Test 1	
Time (Minutes)	Depth (m bgl)
0	0.99
1	1.09
2	1.13
3	1.15
5	1.19
10	1.32
20	1.43
30	1.49
60	1.54
120	1.69
180	1.78
240	1.82

Trial Pit Parameters

East Depth 2.1

Length 1.9

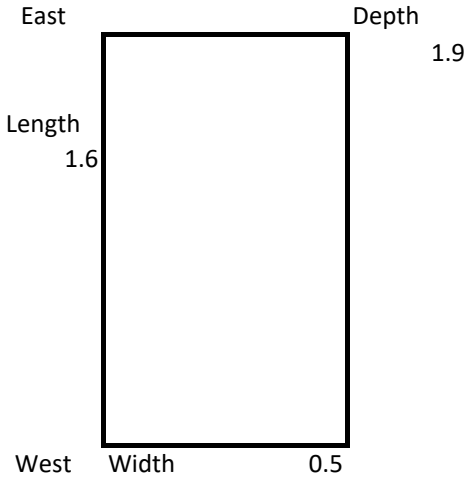


West Width 0.6

3993	BRE03
Soakage Test 1	
Time (Minutes)	Depth (m bgl)
0	0.96
1	1.06
2	1.11
3	1.16
5	1.26
10	1.29
20	1.41
30	1.49
90	1.68
120	1.7
130	1.71
180	1.73
240	1.76

3993	BRE03
Soakage Test 2	
Time (Minutes)	Depth (m bgl)
0	0.98
1	1.01
2	1.04
3	1.06
5	1.11
10	1.16
20	1.27
30	1.38
60	1.49
90	1.59

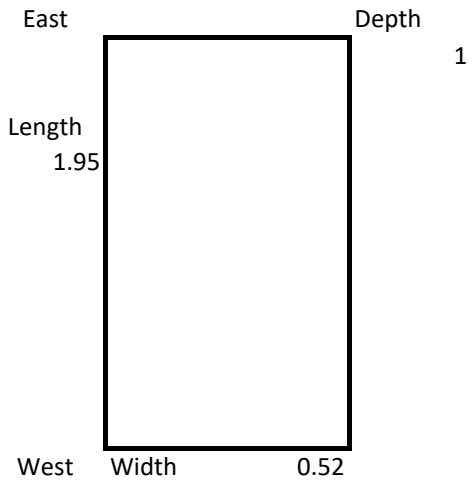
Trial Pit Parameters



3993	BRE04
Soakage Test 1	
Time (Minutes)	Depth (m bgl)
0	1
2	1.11
3	1.17
4	1.18
5	1.21
6	1.23
8	1.27
9	1.28
10	1.31
11	1.32
12	1.33
13	1.35
14	1.37
15	1.37
16	1.38
18	1.4
22	1.44
24	1.46
26	1.48
28	1.49
30	1.5
40	1.55
50	1.58
60	1.59
90	1.62
134	1.66
218	1.71
303	Dry

3993	BRE04
Soakage Test 2	
Time (Minutes)	Depth (m bgl)
0	1.16
1	1.25
2	1.28
3	1.31
4	1.35
5	1.39
6	1.41
7	1.41
8	1.44
9	1.45
10	1.46
11	1.48
12	1.49
14	1.51
16	1.52
20	1.54
22	1.55
24	1.56
26	1.57
28	1.59
30	1.59

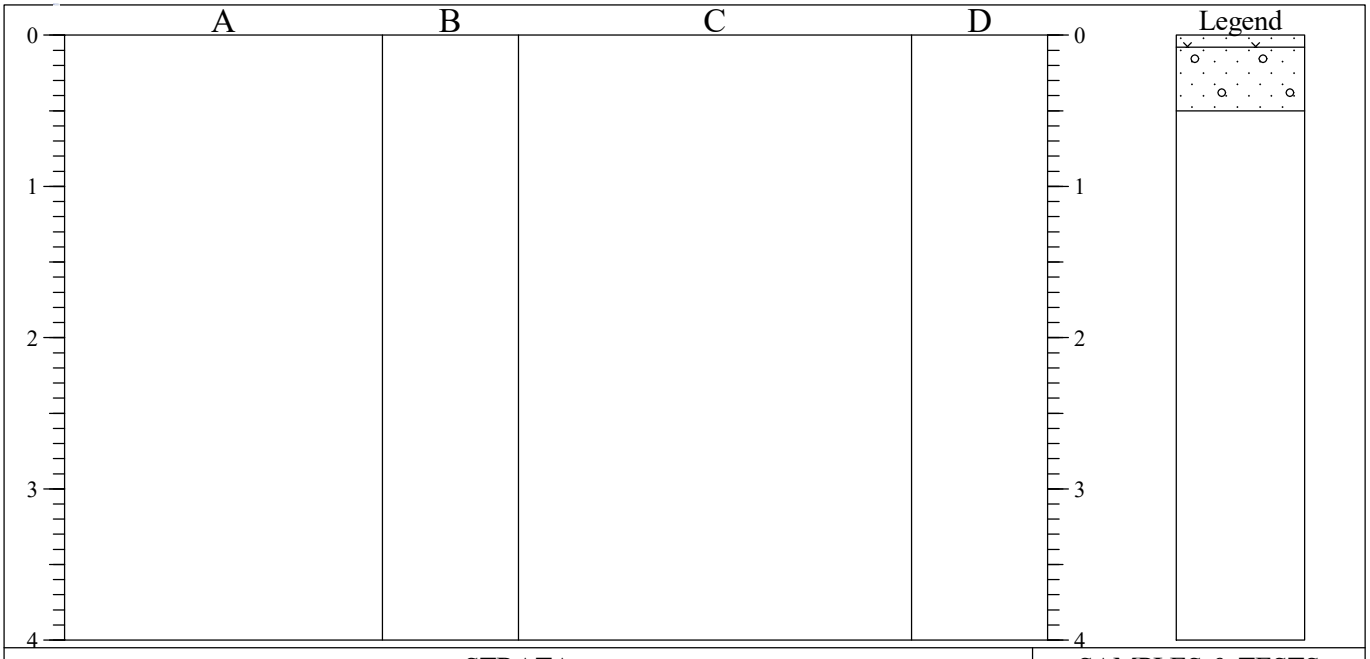
Trial Pit Parameters



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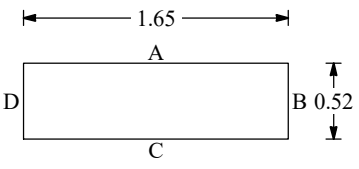
TRIAL PIT LOG

Project				TRIAL PIT No
BRE 365 Soakaway Tests at The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ				**BRE01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	20-05-21 20-05-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.08		MADE GROUND Grass over brown silty Sand (Topsoil) with frequent fine rootlets.			
0.08-0.50		Light brown slightly gravelly SAND with frequent fine rootlets. Gravel is as frequent fine subrounded flint and chalk.			

Shoring/Support:
Stability:





GENERAL REMARKS

Terminated upon encountering lead pipe @0.42m bgl. No Groundwater encountered.

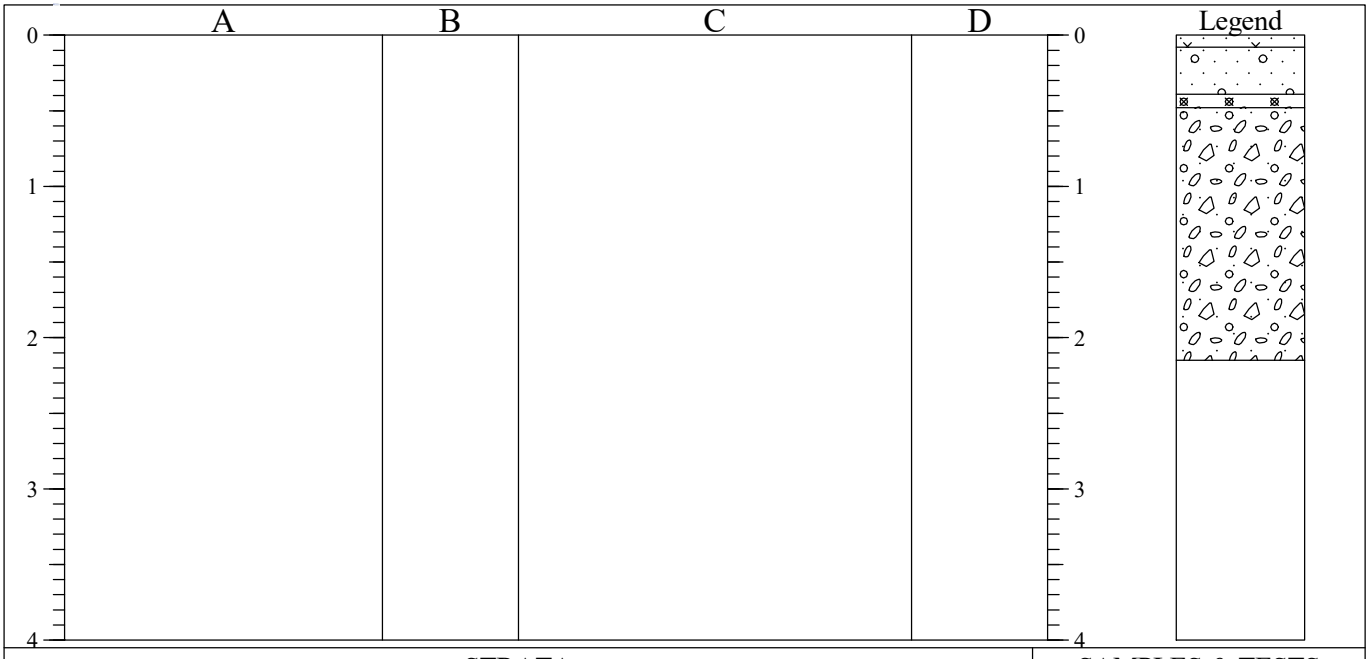
All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/ Plant Used JCB 3CX	Logged By RD

AGS3 UK TP 3993 THE JOYFUL WHIPPET TRIAL PITS.GPJ AGS3_ALL.GDT 21/5/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

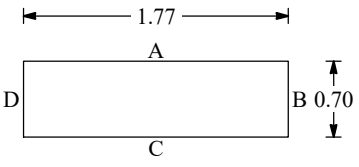
TRIAL PIT LOG

Project				TRIAL PIT No
BRE 365 Soakaway Tests at The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ				**BRE01a**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	20-05-21 20-05-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.08		MADE GROUND Grass over brown silty Sand (Topsoil) with frequent fine rootlets.			
0.08-0.39		Light brown slightly gravelly SAND with frequent fine rootlets. Gravel is as frequent fine subrounded flint and chalk.			
0.39-0.48		Whiteish cream slightly clayey silty GRAVEL. Gravel is as frequent fine subrounded siltstone/ chalk and fine to coarse subrounded to subangular flint.			
0.48-2.15		Creamy yellow sandy slightly silty GRAVEL. Gravel is as frequent fine to coarse subrounded to subangular flint, fine to coarse subrounded chalk/ siltstone, frequent fine to medium subrounded limestone/ sandstone. @0.98m bgl Colour becomes yellowish orange.	1.00	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No Groundwater encountered.

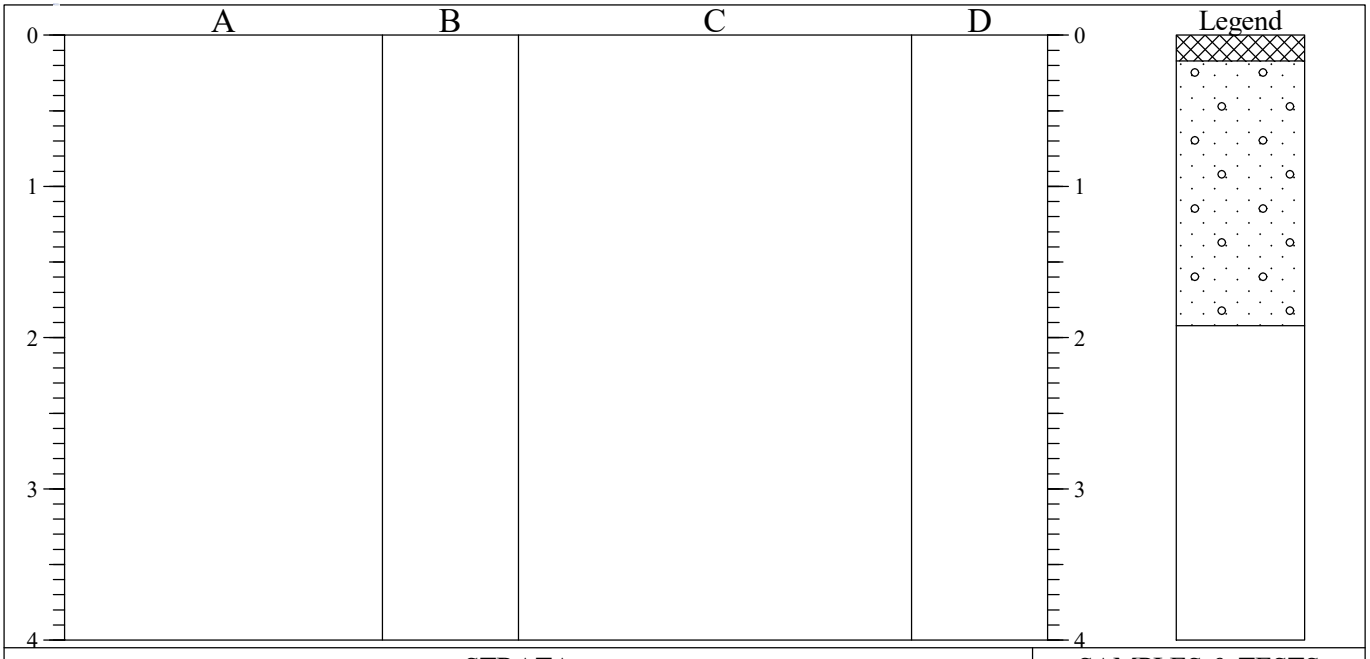
All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/ Plant Used JCB 3CX	Logged By RD

AGS3 UK TP 3993 THE JOYFUL WHIPPET TRIAL PITS.GPJ AGS3_ALL.GDT 21/5/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

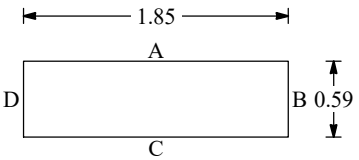
TRIAL PIT LOG

Project				TRIAL PIT No
BRE 365 Soakaway Tests at The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ				**BRE02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	20-05-21 20-05-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.17		MADE GROUND Grass over brown sandy slightly gravelly Clay (topsoil) with frequent fine rootlets. Sand is fine. Gravel is as numerous fine to medium subrounded flint.	0.10	D	
0.17-1.92		Light brown slightly clayey very gravelly SAND. Sand is fine to coarse. Gravel is as frequent fine to coarse subangular to subrounded flint and subrounded some fine chalk.	1.00	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No Groundwater encountered.

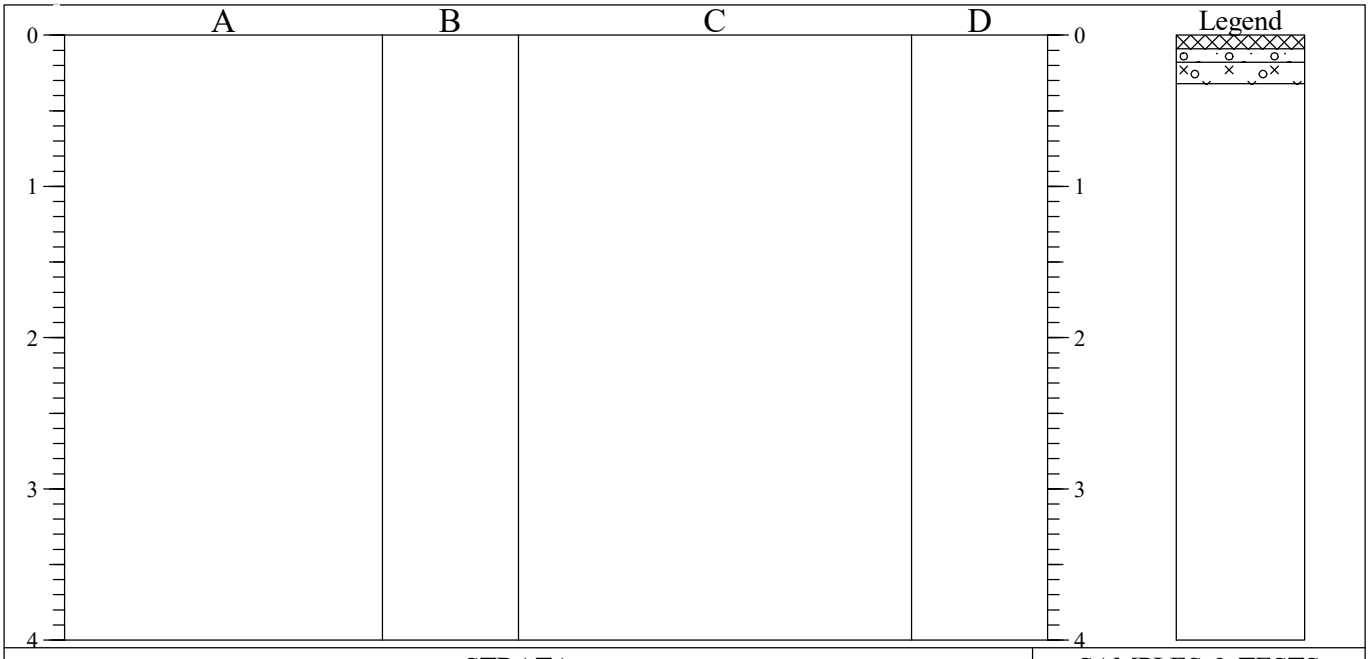
All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/ Plant Used JCB 3CX	Logged By RD

AGS3 UK TP 3993 THE JOYFUL WHIPPET TRIAL PITS.GPJ AGS3_ALL.GDT 21/5/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

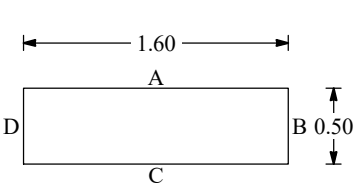
TRIAL PIT LOG

Project				TRIAL PIT No
BRE 365 Soakaway Tests at The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ				**BRE03**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	20-05-21 20-05-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.09		MADE GROUND Tarmac			
0.09-0.18		MADE GROUND Brown slightly clayey sandy GRAVEL. Gravel is as frequent fine subrounded tarmac and numerous fine to coarse subabngular to subrounded concrete and occasional fine to coarse subangular brick.			
0.18-0.32		Cream slightly gravelly SILT (recovered as chalk). Gravel is as numerous fine to medium subrounded silt stone.	1.00	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No Groundwater encountered.

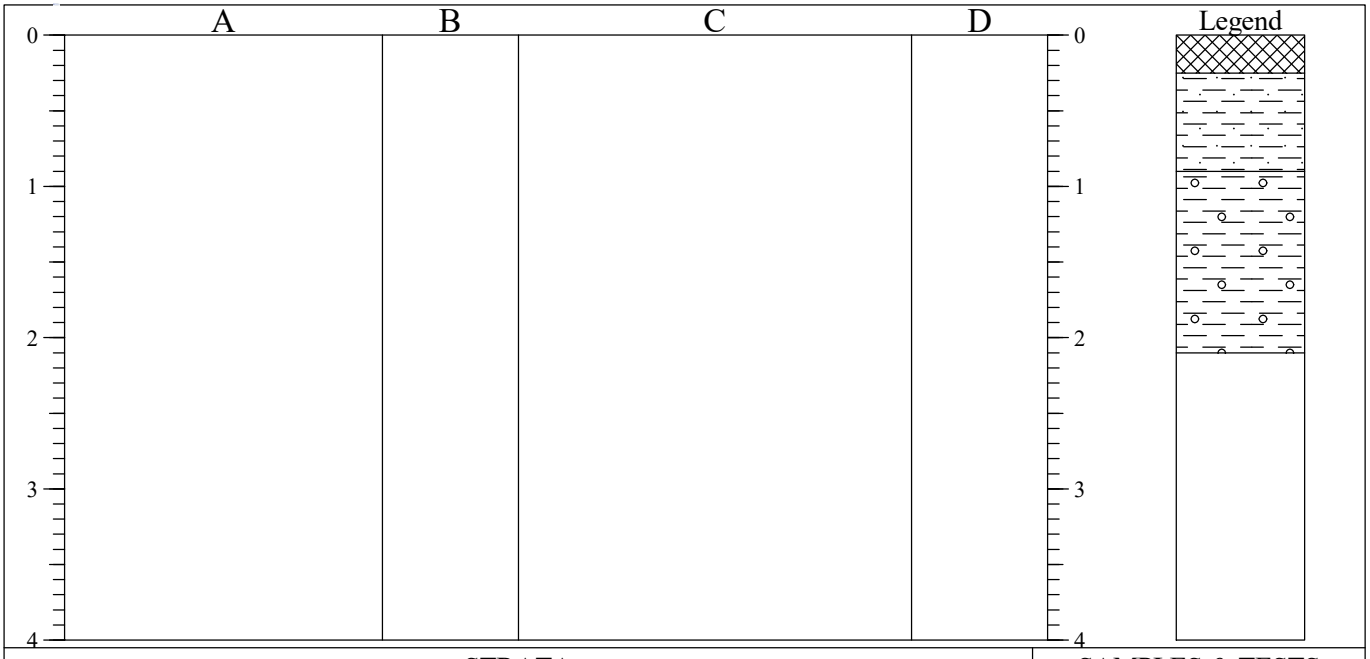
All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/ Plant Used JCB 3CX	Logged By RD

AGS3 UK TP 3993 THE JOYFUL WHIPPET TRIAL PITS.GPJ AGS3_ALL.GDT 21/5/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

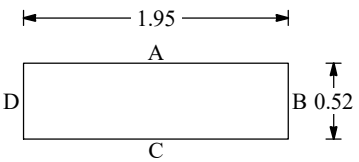
TRIAL PIT LOG

Project				TRIAL PIT No
BRE 365 Soakaway Tests at The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ				**BRE04**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	20-05-21 20-05-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.25		MADE GROUND Grass over brown slightly clayey gravelly Sand (topsoil) with frequent fine rootlets. Gravel is as frequent fine to coarse subangular to subrounded flint.	0.15	D	
0.25-0.90		Light brown very gravelly slightloy sandy CLAY. Gravel is as frequent fine to coarse subrounded chalk and frequent fine to coarse subangular flint. Sand is fine to coarse.	0.60	D	
0.90-2.10		Brown very sandy slightly gravelly CLAY. Gravel is as frequent fine to coarse subangular flint and frequent fine subrounded chalk.	1.50	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No Groundwater encountered.

All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/ Plant Used JCB 3CX	Logged By RD

AGS3 UK TP 3993 THE JOYFUL WHIPPET TRIAL PITS.GPJ AGS3_ALL.GDT 21/5/21

Appendix D

General Limitations and Exceptions

General Limitations and Exceptions

1. The advice given in this report with respect to contaminated land/pollution is based on the guidelines available at the time of writing.

2. This report does not include for an assessment of above-ground structures on site for the presence of potential asbestos containing materials.

3. The Client is advised that the conditions observed on site by SEC at the time of the investigation or assessment is subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance or investigation and they may subsequently have become observable.

4. Comments made relating to land gas or groundwater conditions are based on observations made at the time of an investigation unless otherwise stated. However, land gas or groundwater conditions may vary as a result of seasonal or other effects. It would be prudent to conduct groundwater monitoring.

5. This assessment may be subject to amendment in light of additional information becoming available.

6. The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from chemical testing laboratories, and which SEC has assumed are correct. Nevertheless, SEC cannot and does not guarantee the authenticity or reliability of the information it has relied upon. SEC can accept no responsibility for inaccuracies within the data supplied by other parties.

7. This report is written in the context of an agreed scope of work between SEC and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation amendment or re-interpretation of the assessment or report in whole or part may be necessary after its original submission.

8. This report is provided for sole use by the Client and is confidential to them. No responsibility whatsoever for the contents of the report will be accepted to anyone other than the Client.

9. SEC believes that providing information about limitations is essential to help the Client identify and thereby manage risks.

10. The copyright of written materials supplied shall remain the property of SEC but with a royalty free perpetual licence, granted to the Client on payment in full of any outstanding monies.

11. SEC does not provide legal advice and the advice of the Client‘s legal advisors may also be required.

12. No allowance has been made in this report for testing which may be required for waste categorisation prior to the removal of any material from site for disposal.

13. The report is issued on the condition that SEC will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the borehole, trial pits or other tests carried out during the investigation.

14. In addition, SEC will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.

15. No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.

16. Copyright of this Report remains with SEC and in addition we will not accept any responsibility for the report and recommendations given until our invoice is settled in full.

17. That this investigation has relied on information from a discrete number of exploratory hole locations and allowances should be made for the variation in ground conditions between these locations and within the site boundary.

18. It should be noted that the Made Ground depth recorded above is that encountered within the trial pits undertaken during the phase of work to which this report pertains. Owing to the variable nature and unknown deposition criteria of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which have not been revealed by the current work.

19. Should the proposed end use or site layout change then a reassessment of potential risks will be required.

Soil Infiltration Rate - Soakaway Test BRE01a

Pit Dimensions:

L:	1700	mm	0.75
W:	700	mm	
D:	2150	mm	

Key

	Input
	Calculation

Test 1

Time Since Start	Depth of water	Time Since Start	Depth of water	
min	mm	min	mm	
0	1010	18	730	
1	970	20	720	
2	950	25	670	
3	930	30	640	
5	900	35	590	
6	880	40	560	
7	860	50	520	
12	800	73	410	
15	760	90	290	
16	750	226	252.5	Interpolated

Mean Surface Area: 3.61 m2
Depth of water at start of test: 1010 mm
Time at 25% or at: 252.5 mm of water

Interpolating Values

Time	Water Depth
90	290
226	252.5

t: 226 min. From interpolating values

Time at 75% or at: 757.5 mm of water

Interpolating Values

Time	Water Depth
15	760
16	750

t: 15.25 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth: 0.601 m3
Time Taken to drain between 25% and 75% of water depth: 210.75 min or 3.513 hr

Test 1 - Soil Infiltration rate: 1.32E-05 m/s
0.047341 m/hr

Test 2

Time Since Start	Depth of water	Time Since Start	Depth of water	
min	mm	min	mm	
0	1020	18	860	
1	1020	20	840	
2	1010	25	820	
4	990	30	790	
6	970	50	690	
7	960	75	590	
8	950	92	530	
9	930	108	490	
10	920	113	480	
11	910	226	255	Interpolated
12	910	1660		
13	890	1670		
15	870	1895		

Mean Surface Area: 3.64 m2
Depth of water: 1020 mm
Time at 25% or at: 255 mm of water

Interpolating Values

Time	Water Depth
113	480
226	255

t: 226 min. From interpolating values

Time at 75% or at: 765 mm of water

Interpolating Values

Time	Water Depth
30	790
50	690

t: 35 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth: 0.6069 m3
Time Taken to drain between 25% and 75% of water depth: 191 min or 3.183 hr

Test 2 - Soil Infiltration rate: 1.46E-05 m/s
0.052405 m/hr

Soil Infiltration Rate - Soakaway Test BRE3

Pit Dimensions:

L:	1600	mm
W:	500	mm
D:	1900	mm

0.75

Key

	Input
	Calculation

Test 1

Mean Surface Area	2.77	m2
Depth of water at start of test	940	mm
Time at 25% or at	235	mm of water

Time Since Start	Depth of water	Time Since Start	Depth of water
min	mm	min	mm
0	940	130	190
1	840	180	170
2	790	240	140
3	740		
5	640		
10	610		
20	490		
30	410		
90	220		
120	200	226	235
		0	
		0	
		1665	

Interpolating Values

Time	Water Depth
30	410
90	220

t: 85.263 min. From interpolating values

Time at 75% or at 705 mm of water

Interpolating Values

Time	Water Depth
3	740
5	640

t: 3.7 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth: 0.376 m3

Time Taken to drain between 25% and 75% of water depth: 81.563 min or 1.359 hr

Test 1 - Soil Infiltration rate: 2.77E-05 m/s

0.099710 m/hr

Test 2

Mean Surface Area	2.73	m2
Depth of water	920	mm
Time at 25% or at	230	mm of water

Time Since Start	Depth of water	Time Since Start	Depth of water
min	mm	min	mm
0	920	240	176
1	890		
2	860		
3	840		
5	790		
10	740		
20	630		
30	520		
60	410		
90	310		

Interpolating Values

Time	Water Depth
90	310
240	176

t: 179.55 min. From interpolating values

Time at 75% or at 690 mm of water

Interpolating Values

Time	Water Depth
10	740
20	630

t: 14.545 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth: 0.368 m3

Time Taken to drain between 25% and 75% of water depth: 165.01 min or 2.750 hr

Test 2 - Soil Infiltration rate: 1.36E-05 m/s

0.048980 m/hr

Soil Infiltration Rate - Soakaway Test BRE4

Pit Dimensions:

L:	1950	mm	0.75
W:	520	mm	
D:	2000	mm	

Key

	Input
	Calculation

Test 1

Mean Surface Area	3.48	m2
Depth of water at start of test	1000	mm
Time at 25% or at	250	mm of water

Time Since Start	Depth of water	Time Since Start	Depth of water
min	mm	min	mm
0	1000	15	630
2	890	16	620
3	830	18	600
4	820	22	560
5	790	24	540
6	770	26	520
8	730	28	510
9	720	30	500
10	690	40	450
11	680	50	420
12	670	60	410
13	650	90	380
14	630	134	340
		218	290
		303	0

Interpolating Values

Time	Water Depth
218	290
303	0

t: 229.72 min. From interpolating values

Time at 75% or at	750	mm of water

Interpolating Values

Time	Water Depth
6	770
8	730

t: 7 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth:	0.507	m3	
Time Taken to drain between 25% and 75% of water depth:	222.72	min or	3.712 hr

Test 1 - Soil Infiltration rate: 1.09E-05 m/s

0.039203 m/hr

Test 2

Mean Surface Area	3.09	m2
Depth of water	840	mm
Time at 25% or at	210	mm of water

Time Since Start	Depth of water	Time Since Start	Depth of water
min	mm	min	mm
0	840	10	540
1	750	11	520
2	720	12	510
3	690	14	490
4	650	16	480
5	610	20	460
6	590	22	450
7	590	24	440
8	560	26	430
9	550	28	410
		30	410
	303		0

Interpolating Values

Time	Water Depth
30	410
303	0

t: 163.17 min. From interpolating values

Time at 75% or at	630	mm of water

Interpolating Values

Time	Water Depth
4	650
5	610

t: 4.5 min. From interpolating values

Volume of test Pit between 25% and 75% of water depth:	0.4259	m3	
Time Taken to drain between 25% and 75% of water depth:	158.67	min or	2.645 hr

Test 2 - Soil Infiltration rate: 1.45E-05 m/s

0.052138 m/hr

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Urfan Mehmood,
The Joyful Whippet,
Steepdown Road,
Sompting,
BN15 0LJ

14th April 2021

Our Ref: 3993 21 04 09 Ltr Rpt 01 REV A RD UM

Dear Urfan,

SITE: The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ
SERVICE: Winter Groundwater Monitoring & Falling Head Infiltration Tests

Following your instruction to proceed with the conduct of Winter Groundwater Monitoring & Falling Head Infiltration Tests within 4no. mini boreholes in accordance with our quotation (Ref: 3993 21 01 19 Ltr 02 FPA 02 Rev A JY UM), Sevenoaks Environmental Consultancy Ltd (SEC) attended the above site on the 29th January to undertake the fieldwork.

Geotechnical data and testing was also carried out as part of this assessment however is presented under a separate cover (Report Ref: 3993 21 04 12 Rpt 02 Rev A JY UM).

At the time of writing the site comprised an approximately triangular shaped plot comprising a single 2-storey building and car park laid to a combination of hardstanding and soft landscaping (see Figure 1 for Site Location Plan). The scope of investigation undertaken was prescribed by Sevenoaks Environmental Consultants Ltd and consisted of 4no. mini borehole up to 6.45m bgl (See Figure 2 for Exploratory Hole Location Plan). It is understood that this work was required to help confirm groundwater levels across the site and provide an indication of the sites potential for infiltration ahead of the proposed development which includes the demolition of the existing building and the erection of 4 no. residential dwellings with associated soft landscaping and car parking.

From a review of the BGS online mapping the site is underlain by bedrock geology comprising the Newhaven Chalk Formation with Head (Clay, Silt, Sand and Gravel) superficial deposits overlying this.

The scope of works undertaken by SEC generally comprised:

- Full time site supervision by an SEC Engineer during drilling of the boreholes to log the ground conditions to BS 5930 / Eurocode 7 and CIRIA 574 and document the investigation;
- Mobilisation of a Continuous Dynamic Sampler drill rig (windowless sampler) and crew to undertake 4no. mini boreholes up to 6.45m bgl (WS01-WS04);
- Provision and installation of monitoring pipework within the mini boreholes to facilitate groundwater monitoring;
- Conduct of Falling Head Infiltration tests within the mini boreholes and;

- Production of a Factual Report to provide raw falling head test data.

An SEC Engineer supervised the drilling of 4no. mini boreholes (WS01-WS04) up to 6.45m bgl (see Appendix B Site Photos) which were positioned to provide good coverage across the site and focusing on areas that would possibly be utilized for soakaway's. Ground conditions encountered appeared to be generally consistent with those indicated by the BGS records with WS01, WS02 and WS04 all reaching their target depth of 6.45m bgl however, WS03 refused at 2.15m bgl on a concrete obstruction with Made Ground encountered to this depth within this location. Anecdotal information provided to SEC has suggested this area of the site was previously quarried and subsequently infilled. A more detailed account of ground conditions can be found in Appendix C – Exploratory Hole Records. No Groundwater was encountered during drilling. All boreholes were installed with 1m plain HDPE pipe and then slotted HDPE pipe to the base with a 1m bentonite seal at the top and clean pea shingle surround below.

All borehole installations were monitored across 6no. monitoring visits between 10th February and the 31st March 2021 using a dip meter to establish groundwater level. Groundwater was only identified within WS03 and was recorded between 1.25m bgl and 1.70m bgl (See Appendix D – Groundwater Monitoring Data). However, it should be noted that groundwater identified within WS03 is likely to be perched within the overlying Made Ground above the concrete obstruction and not representative of true groundwater level across the site. All other locations were noted to be dry on all visits.

During the fifth groundwater monitoring visit, SEC performed a single falling head test in each of the 4no. boreholes to inform on infiltration performance across the site. During the infiltration tests ~30 litres of clean mains water was added to each of the boreholes and the time taken for the water to infiltrate into the surrounding geology was recorded (see Appendix E – Falling Head Infiltration Data). Tests generally performed favorable however, further infiltration tests by the BRE 365 method should be carried out as part of the drainage design for the site as part of the proposed development.

Given the deep Made Ground within WS03 and anecdotal information that this part of the site has been subject to quarrying and subsequent infilling, SEC would recommend that a Desk Study is carried out for the site ahead of any development on site, including for determining the extent of this quarried area. It is likely that soakaway's would not be suitable within this area.

See Appendix F for General Limitation and Exceptions.

Kind regards

Damian Jones
Managing Director
d.jones@sevenoaksenvironmental.co.uk

Appendix A – Figures
Figure 1 – Site Location Plan
Figure 2 – Exploratory Hole Location Plan
Appendix B – Site Photos
Appendix C – Exploratory Hole Records
Appendix D – Groundwater Monitoring Data
Appendix E – Falling Head Infiltration Data
Appendix F – General Limitations and Exception

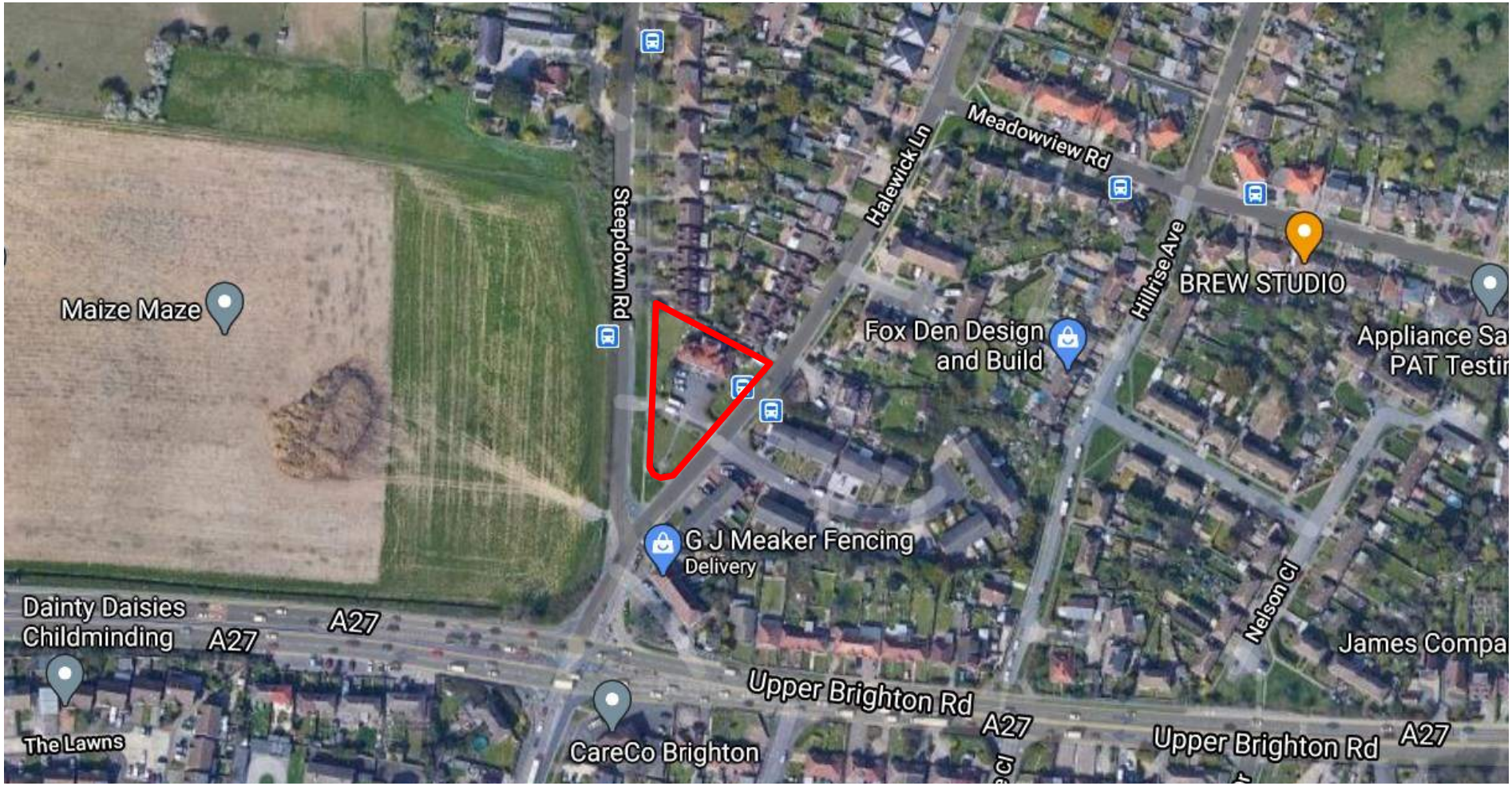
Appendix A

Figures

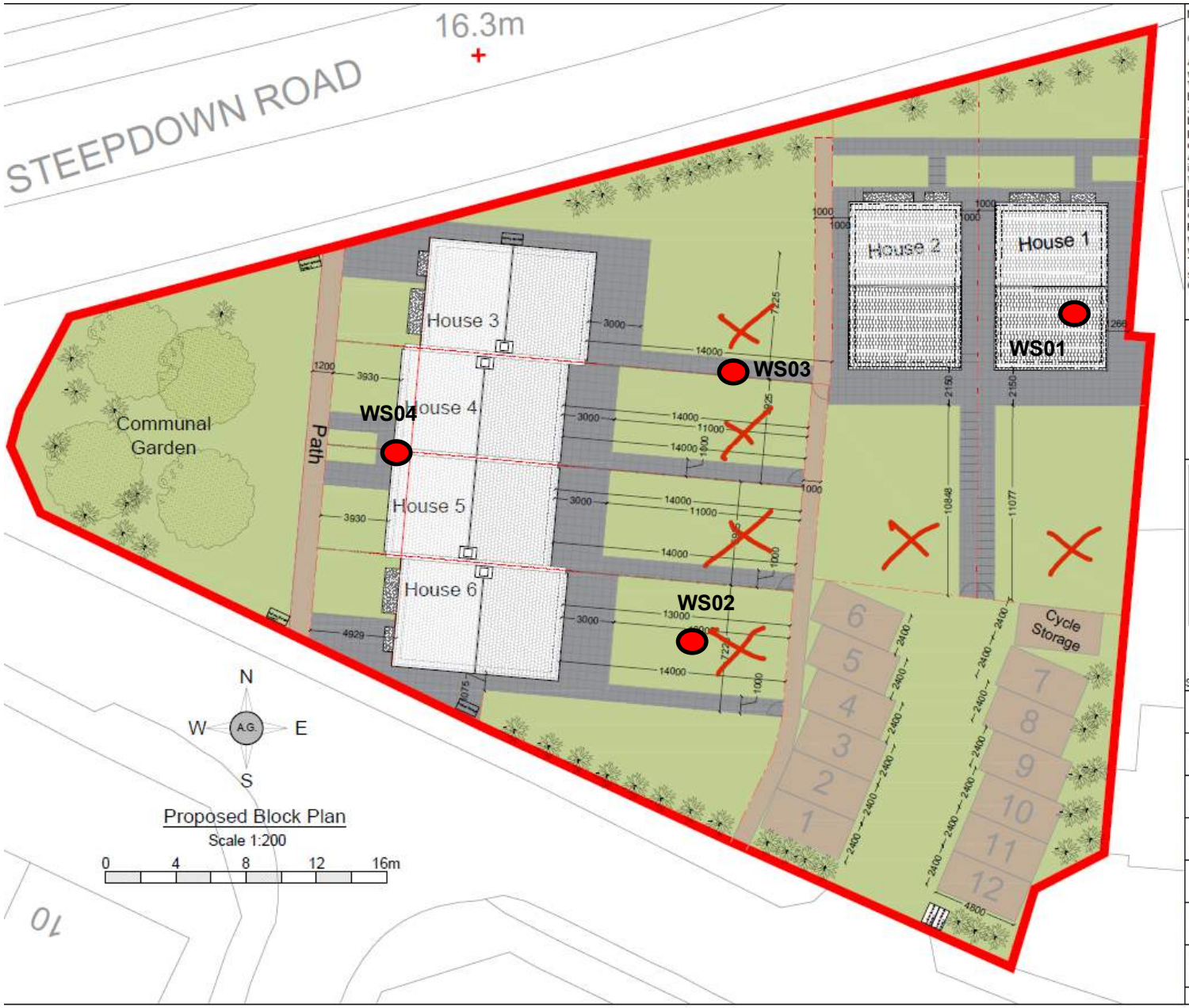
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E



SITE: The Joyful Whippet, Steepdown Road, Sompting, BN15 0LJ	SCALE: NTS	JOB NO: 3993	SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Site Location Plan	REV: 01	FIGURE NO: 01	



NOTES:

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All dimension should be checked on site prior to works commencing.
Variations in squareness, depth of plaster etc, must be checked for. Where new walls are shown as aligned with existing walls, physical removal of brickwork and / or plaster to establish the actual position of the wall being attached to must be checked.
Any discrepancies should be reported in writing immediately.
When printing off PDF's, check that the drawings are printed to correct paper size and scale.
Documents should be used as to the drawing status described
Property owner to ensure that all aspects of the "party wall etc., act 1996" are complied with prior to any works commencing on site.
These drawings are not to be re-drawn, copied or sold unless permission has been given by Alexander Gemini Ltd.

0 1 2 3m
SCALE: 1:50

0 1 2 3 4 5 6m
SCALE: 1:100

Alexander Gemini Ltd.
WWW.ALEXANDERGEMINI.CO.UK
INFO@ALEXANDERGEMINI.CO.UK
SITE FINDING - DESIGN - PLANNING - DEVELOPING

PROJECT DESCRIPTION
New Build Development of 6x New Houses

SITE ADDRESS
The Joyful Whippet Steepdown Road Sompting BN15 0LJ

DRAWING TITLE
Proposed Block Plan

PROJECT STATUS
Planning

DRAWING SCALE : 1:100 @ A3

DATE : OCT. 2020
DRAWN BY T.A.K **CHECKED BY** L.P.

REVISION : P

DRAWING NUMBER : SH17

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This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Joyful Whippet, Steepdown Road, Sompting, West Sussex, BN15 0LJ	SCALE: NTS	JOB NO: 3993	SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Proposed Exploratory Hole Location Plan	REV: 01	FIGURE NO: 2	

Appendix B

Site Photographs



Image 1 – The Joyful Whippet, accessed via Steepdown Road to the west



Image 2 – Hand dug safety start pit exposing Made Ground in WS03



Image 3 – Made Ground from WS03



Image 4 – Sample of Made Ground from WS02 at 0.30m bgl



Image 5 – Sample of Natural Material from WS01 at 4.50m bgl

Appendix C

Exploratory Hole Records

SEVENOAKS ENVIRONMENTAL CONSULTANCY

WINDOW SAMPLE LOG

Project				Window Sample No
Ground Investigation				**WS01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	29-01-21 29-01-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	D					0.15	MADE GROUND: Grass over firm dark brown slightly silty sandy Clay with occasional fine to medium sub-angular flint fragments and rare fine to medium sub-angular brick fragments		
0.75	D					(0.95)	Firm light brown slightly clayey sandy SILT with occasional fine to medium sub-angular flint fragments		
1.20	SPT	16 blows				1.10	Very stiff light brownish grey slightly sandy gravelly CLAY with frequent fine to coarse sub-angular to sub-rounded flint fragments and frquent fine to medium sub-rounded chalk fragments		
1.50	D						@ 2.00m bgl becomes soft		
2.00	SPT	4 blows					@ 2.80m bgl occasional fine to coarse sub-angular flint fragments		
2.50	D						@ 3.00m bgl becomes firm		
3.00	SPT	8 blows							
3.50	D					(5.35)			
4.00	SPT	6 blows							
4.50	D								
5.00	SPT	5 blows							
5.50	D								
6.00	SPT	9 blows				6.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	No Groundwater Encountered

All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/Plant Used Continuous Dynamic Sampler Rig	Logged By JY

WINDOW SAMPLE LOG 3993 THE JOYFUL WHIPPET.GPJ AGS3_ALL.GDT 14/4/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

WINDOW SAMPLE LOG

Project				Window Sample No
Ground Investigation				**WS02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	29-01-21 29-01-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.05	D					0.06	MADE GROUND: Asphalt		
0.30	D					(0.49) 0.55	MADE GROUND: Loose light greyish brown slightly silty clayey Sand with frequent fine to coarse angular to sub-rounded flint, brick and chalk fragments, numerous fine to coarse angular glass fragments and occasional fine sub-angular asphalt fragments.		
0.75	D					(0.80)	MADE GROUND: Very stiff light brown slightly silty sandy Clay with numerous fine to coarse sub-angular to sub-rounded chalk and flint fragments and occasional fine to coarse sub-angular glass and brick fragments		
1.20	SPT	41 blows				1.35			
1.25	D						Very stiff light brownish grey slightly sandy gravelly CLAY with frequent fine to coarse sub-angular to sub-rounded flint and frequent fine to medium sub-rounded chalk fragments		
1.75	D								
2.00	SPT	30 blows					@ 3.40m bgl occasional fine to coarse sub-angular to sub-rounded flint fragments		
2.50	D						@ 4.00m bgl becomes stiff		
3.00	SPT	31 blows					@ 4.70m bgl becomes orangish brown with rare fine to medium sub-angular flint fragments		
3.50	D						@ 5.00m bgl becomes very stiff		
4.00	SPT	12 blows				(5.10)	@ 5.35m bgl becomes light browish grey		
4.50	D								
5.00	SPT	16 blows							
5.50	D								
6.00	SPT	19 blows							
						6.45			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

No Groundwater Encountered

All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/Plant Used Continuous Dynamic Sampler Rig	Logged By JY

WINDOW SAMPLE LOG 3993 THE JOYFUL WHIPPET.GPJ AGS3_ALL.GDT 14/4/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

WINDOW SAMPLE LOG

Project				Window Sample No
Ground Investigation				**WS03**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	29-01-21 29-01-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.05	D					0.08	MADE GROUND: Asphalt		
0.15	D					0.35	MADE GROUND: Loose reddish brown gravelly Sand (Sub Base)		
0.40	D					0.45	with frequent fine to coarse sub-angular brick and concrete fragments and rare fine to medium sub-angular asphalt fragments		
							MADE GROUND: Concrete		
						(0.90)	MADE GROUND: Loose reddish brown gravelly Sand (Sub Base) with frequent fine to coarse sub-angular brick and concrete fragments and rare fine to medium sub-angular asphalt fragments		
1.20	SPT	4 blows				1.35			
1.25	D						MADE GROUND: Soft dark grey slightly sandy silty Clay with rare fine to medium sub-angular brick, chalk and flint fragments		
						(0.63)			
1.75	D					1.98			
2.00	SPT	>50 blows				2.15	MADE GROUND: Concrete		
							@ 2.15m bgl refusal on concrete		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No Groundwater Encountered

All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/Continuous Dynamic Sampler Plant Used Rig	Logged By JY

WINDOW SAMPLE LOG 3993 THE JOYFUL WHIPPET.GPJ AGS3_ALL.GDT 14/4/21

SEVENOAKS ENVIRONMENTAL CONSULTANCY

WINDOW SAMPLE LOG

Project				Window Sample No
Ground Investigation				**WS04**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
3993	29-01-21 29-01-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	D					0.14	MADE GROUND: Firm dark brown slightly silty sandy Clay with occasional fine to medium sub-angular flint and chalk fragments and rare fine to medium sub-angular glass and brick fragments		
0.50	D					(0.71)	MADE GROUND: Weak light greyish white rubble Chalk with a lightly grey matrix comprising a silty Clay with numerous fine to coarse sub-angular flint fragments and rare fine sub-angular brick fragments.		
1.00	D					0.85			
1.20	SPT	22 blows				(0.60)	MADE GROUND: Very stiff dark brown slightly sandy gravelly Clay with frequent fine to coarse sub-angular flint and chalk fragments and numerous medium to coarse sub-angular asphalt and concrete fragments		
						1.45			
1.90	D						Very stiff light brownish grey slightly sandy gravelly CLAY with frequent fine to coarse sub-angular to sub-rounded flint fragments and frequent fine to coarse sub-rounded chalk fragments		
2.00	SPT	9 blows					@ 2.00m bgl becomes firm		
2.50	D						@ 3.00m bgl becomes stiff		
3.00	SPT	12 blows					@ 4.00m bgl becomes very stiff		
3.50	D						@ 5.00m bgl becomes firm		
4.00	SPT	19 blows				(5.00)			
4.50	D								
5.00	SPT	5 blows							
5.50	D								
6.00	SPT	10 blows							
						6.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No Groundwater Encountered

All dimensions in metres Scale 1:50	Client Urfan Mehmood	Method/Continuous Dynamic Sampler Plant Used Rig	Logged By JY

WINDOW SAMPLE LOG 3993 THE JOYFUL WHIPPET.GPJ AGS3_ALL.GDT 14/4/21

Appendix D

Groundwater Monitoring
Data

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 10/02/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 1
Engineer RD

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	6.00
WS02	-	6.03
WS03	1.42	2.07
WS04	-	6.07

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 19/02/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 2
Engineer RD

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	5.90
WS02	-	5.94
WS03	1.25	1.96
WS04	-	5.97

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 03/03/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 3
Engineer RD

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	5.90
WS02	-	5.94
WS03	1.60	1.96
WS04	-	5.97

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 12/03/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 4
Engineer JY

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	6.03
WS02	-	6.08
WS03	1.55	2.09
WS04	-	6.10

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 25/03/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 5
Engineer RD

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	5.90
WS02	-	5.94
WS03	1.63	1.96
WS04	-	5.97

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Date: 31/03/2021
Site: Joyful Whippet
Job Ref: 3993
Monitoring Round: 6
Engineer JY

Borehole Ref:	Dip [m]	Plumb [m]
WS01	-	6.03
WS02	-	6.09
WS03	1.70	2.09
WS04	-	6.10

Appendix E

Falling Head Infiltration Data

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 3993
Site: The Joyful Whippet

Job Number	3993
Borehole Location	WS01
Test No.	Test 1
GW Dip Prior to test (m)	dry
Plumb Depth (m)	5.90
Vol of water added (l)	30
Borehole diameter	40mm
Date	25/03/2021

WS01 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head (m)
0	00:00:00	2.31	3.59
15	00:00:15	2.64	3.26
30	00:00:30	2.76	3.14
45	00:00:45	2.92	2.98
60	00:01:00	3.03	2.87
90	00:01:30	3.28	2.62
120	00:02:00	3.48	2.42
150	00:02:30	3.61	2.29
180	00:03:00	3.85	2.05
210	00:03:30	4	1.90
240	00:04:00	4.06	1.84
270	00:04:30	4.18	1.72
300	00:05:00	4.34	1.56
360	00:06:00	4.58	1.32
420	00:07:00	4.74	1.16
480	00:08:00	4.91	0.99
540	00:09:00	5.06	0.84
600	00:10:00	5.18	0.72
660	00:11:00	5.27	0.63
720	00:12:00	5.33	0.57
780	00:13:00	5.41	0.49
840	00:14:00	5.48	0.42
900	00:15:00	5.53	0.37
1,380	00:23:00	5.81	0.09
3,000	00:50:00	5.9	0.00

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 3993
Site: The Joyful Whippet

Job Number	3993
Borehole Location	WS02
Test No.	Test 1
GW Dip Prior to test (m)	dry
Plumb Depth (m)	5.94
Vol of water added (l)	30
Borehole diameter	40mm
Date	25/03/2021

WS02 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head (m)
0	00:00:00	2.76	3.18
10	00:00:15	2.96	2.98
30	00:00:30	3.01	2.93
40	00:00:45	3.11	2.83
60	00:01:00	3.16	2.78
90	00:01:30	3.24	2.70
120	00:02:00	3.3	2.64
150	00:02:30	3.34	2.60
180	00:03:00	3.38	2.56
210	00:03:30	3.43	2.51
240	00:04:00	3.47	2.47
270	00:04:30	3.5	2.44
300	00:05:00	3.54	2.40
360	00:06:00	3.57	2.37
420	00:07:00	3.58	2.36
480	00:08:00	3.61	2.33
540	00:09:00	3.63	2.31
600	00:10:00	3.64	2.30
720	00:12:00	3.68	2.26
780	00:13:00	3.7	2.24
840	00:14:00	3.71	2.23
900	00:15:00	3.73	2.21
960	00:16:00	3.75	2.19
1,020	00:17:00	3.77	2.17
1080	00:18:00	3.79	2.15
1,140	00:19:00	3.8	2.14
1200	00:20:00	3.81	2.13
1500	00:25:00	3.91	2.03
1800	00:30:00	3.97	1.97
2460	00:41:00	4.14	1.8
3000	00:50:00	4.26	1.68
3600	01:00:00	4.38	1.56
4200	01:10:00	4.49	1.45

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 3993
Site: The Joyful Whippet

Job Number	3993
Borehole Location	WS03
Test No.	Test 1
GW Dip Prior to test (m)	1.63
Plumb Depth (m)	1.96
Vol of water added (l)	30
Borehole diameter	40mm
Date	25/03/2021

WS03 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head (m)
0	00:00:00	0.71	0.92
15	00:00:15	0.76	0.87
30	00:00:30	0.78	0.85
45	00:00:45	0.79	0.84
60	00:01:00	0.8	0.83
90	00:01:30	0.8	0.83
120	00:02:00	0.82	0.81
150	00:02:30	0.82	0.81
180	00:03:00	0.82	0.81
210	00:03:30	0.83	0.80
240	00:04:00	0.83	0.80
270	00:04:30	0.84	0.79
300	00:05:00	0.84	0.79
360	00:06:00	0.86	0.77
420	00:07:00	0.89	0.74
480	00:08:00	0.92	0.71
540	00:09:00	0.95	0.68
600	00:10:00	0.98	29.02
660	00:11:00	1	0.63
720	00:12:00	1.03	0.60
780	00:13:00	1.06	0.57
840	00:14:00	1.07	0.56
900	00:15:00	1.09	0.54
960	00:16:00	1.11	0.52
1,020	00:17:00	1.12	0.51
1080	00:18:00	1.14	0.49
1,140	00:19:00	1.15	0.48
1200	00:20:00	1.16	0.47
1500	00:25:00	1.2	0.43
3150	00:52:30	1.33	0.30
3600	00:01:00	1.34	0.29

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 3993
Site: The Joyful Whippet

Job Number	3993
Borehole Location	WS04
Test No.	Test 1
GW Dip Prior to test (m)	dry
Plumb Depth (m)	5.97
Vol of water added (l)	30
Borehole diameter	40mm
Date	25/03/2021

WS04 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head (m)
0	00:00:00	3.96	2.01
15	00:00:15	4.45	1.52
30	00:00:30	4.56	1.41
45	00:00:45	4.57	1.40
60	00:01:00	4.64	1.33
90	00:01:30	4.67	1.30
120	00:02:00	4.72	1.25
150	00:02:30	4.77	1.20
180	00:03:00	4.77	1.20
210	00:03:30	4.8	1.17
240	00:04:00	4.87	1.10
270	00:04:30	4.92	1.05
300	00:05:00	5.03	0.94
360	00:06:00	5.1	0.87
420	00:07:00	5.15	0.82
480	00:08:00	5.22	0.75
540	00:09:00	5.32	0.65
600	00:10:00	5.4	0.57
660	00:11:00	5.45	0.52
720	00:12:00	5.52	0.45
780	00:13:00	5.56	0.41
840	00:14:00	5.62	0.35
900	00:15:00	5.66	0.31
2,400	00:40:00	5.97	0.00

Appendix F

General Limitations and Exceptions

General Limitations and Exceptions

1. The advice given in this report with respect to contaminated land/pollution is based on the guidelines available at the time of writing.

2. This report does not include for an assessment of above-ground structures on site for the presence of potential asbestos containing materials.

3. The Client is advised that the conditions observed on site by SEC at the time of the investigation or assessment is subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance or investigation and they may subsequently have become observable.

4. Comments made relating to land gas or groundwater conditions are based on observations made at the time of an investigation unless otherwise stated. However, land gas or groundwater conditions may vary as a result of seasonal or other effects. It would be prudent to conduct groundwater monitoring.

5. This assessment may be subject to amendment in light of additional information becoming available.

6. The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from chemical testing laboratories, and which SEC has assumed are correct. Nevertheless, SEC cannot and does not guarantee the authenticity or reliability of the information it has relied upon. SEC can accept no responsibility for inaccuracies within the data supplied by other parties.

7. This report is written in the context of an agreed scope of work between SEC and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation amendment or re-interpretation of the assessment or report in whole or part may be necessary after its original submission.

8. This report is provided for sole use by the Client and is confidential to them. No responsibility whatsoever for the contents of the report will be accepted to anyone other than the Client.

9. SEC believes that providing information about limitations is essential to help the Client identify and thereby manage risks.

10. The copyright of written materials supplied shall remain the property of SEC but with a royalty free perpetual licence, granted to the Client on payment in full of any outstanding monies.

11. SEC does not provide legal advice and the advice of the Client‘s legal advisors may also be required.

12. No allowance has been made in this report for testing which may be required for waste categorisation prior to the removal of any material from site for disposal.

13. The report is issued on the condition that SEC will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the borehole, trial pits or other tests carried out during the investigation.

14. In addition, SEC will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.

15. No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.

16. Copyright of this Report remains with SEC and in addition we will not accept any responsibility for the report and recommendations given until our invoice is settled in full.

17. That this investigation has relied on information from a discrete number of exploratory hole locations and allowances should be made for the variation in ground conditions between these locations and within the site boundary.

18. It should be noted that the Made Ground depth recorded above is that encountered within the trial pits undertaken during the phase of work to which this report pertains. Owing to the variable nature and unknown deposition criteria of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which have not been revealed by the current work.

19. Should the proposed end use or site layout change then a reassessment of potential risks will be required.