



Consulting Civil Engineers

Desktop Foul and Surface Water Drainage Report

Stoneyfield Nursery, Eastergate Lane, Eastergate PO20 3SL

For

Peter Hake

Rev – **P1**

Reference **C1699**

Date **7th July 2021**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	07.07.2021	Initial Issue	LH	CS
P1	03.08.2021	Revised Site location plan	LH	CS

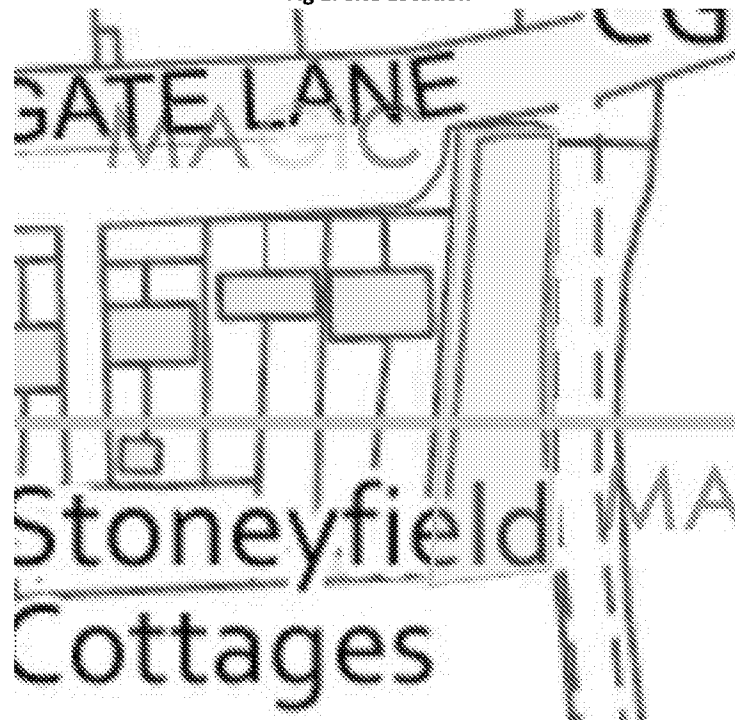
Contents

1	INTRODUCTION.....	3
2	SITE GEOLOGY	4
3	EXISTING DRAINAGE	4
4	PROPOSED DRAINAGE STRATEGY.....	4
5	MAINTENANCE.....	5
6	SUMMARY AND CONCLUSIONS.....	9
7	APPENDICES	10

1 Introduction

- 1.1.1 CGS Civils Ltd have been appointed by Peter Hake to undertake a drainage strategy report for a proposed development at Stoneyfield Nursery in Eastergate.
- 1.1.2 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere.
- 1.1.3 The existing site consists of an undeveloped landscaped area. The proposed development will consist of the development of a new residential dwelling with associated access and parking.
- 1.1.4 The proposed development is located as OS Grid Reference SU 95593 06016 and has the post code PO20 3SL.
- 1.1.5 The total green line boundary is approximately 0.102 Ha and the proposed development will result in an increase of 0.024 Ha of impermeable area.
- 1.1.6 The proposed site will make use of a new constructed access off a small side road located along Eastergate Lane; the site is flanked by residential dwellings on the Northern and Western flank. Large farmland is located along the Southern and Eastern edges of the site.
- 1.1.7 The proposed site plan can be found in **Appendix A**.

Fig 1. Site Location

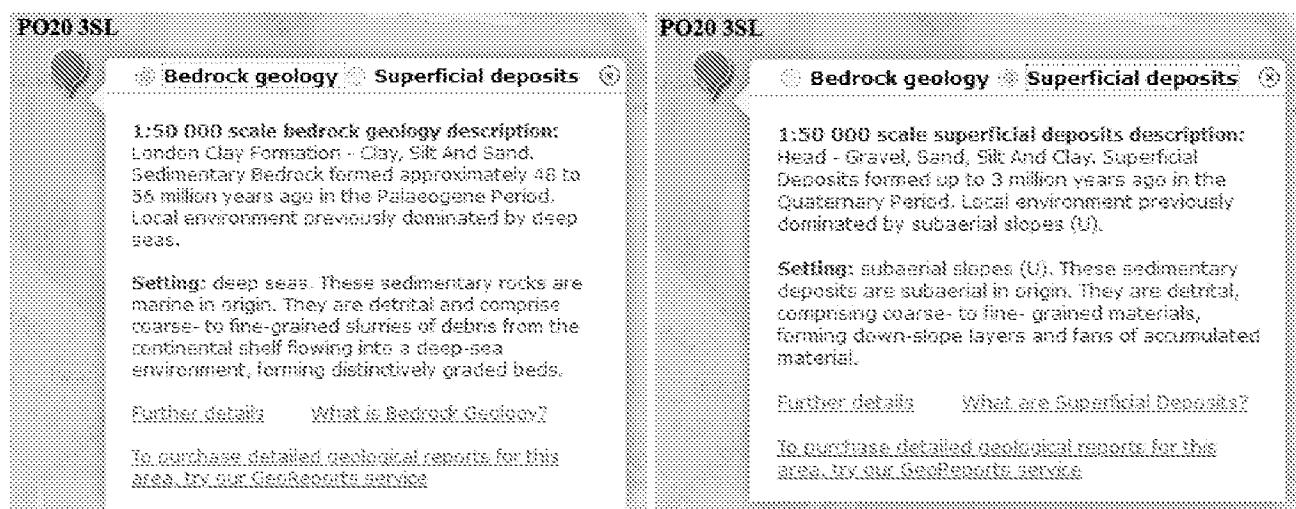


2 Site Geology

2.1 British Geological Survey information

- 2.1.1 The British Geological Survey confirms the bedrock geology to be made up of London Clay Formation, which is primarily comprised of Clay, Silt and Sand. The BGS website confirms the superficial deposits to be made up of Head, which is primary comprised of Gravel, Sand, Silt and Clay.
- 2.1.2 The British Geological survey also holds records of historical boreholes near the site which give some insight into the ground geology.
- Borehole SU90NE32 (Located on site) – Head Gravel, Gravel and compacted clay followed by chalky gravel.

Fig 2. British Geological Survey



3 Existing Drainage

- 3.1.1 Due to the site currently being an undeveloped landscaped area, there is no existing drainage.

4 Proposed Drainage Strategy

4.1 SuDS Hierarchy

- 4.1.1 All options for the destination of run-off generated on site have been assessed in line with the SuDS hierarchy as set out in Building Regulations Part H document and DEFRA's Draft National Standards for SuDS.

Discharge Destination	
Discharge to Ground	Yes – Assumed rate of 1×10^{-5} m/s
Discharge to Watercourse	N/A
Discharge to Surface Water Sewer	N/A
Discharge to Other Sewer	N/A

4.2 Surface Water Drainage

4.2.1 Due to the presence of Sand and Gravels, it is proposed that all surface water runoff is to be discharged to ground via infiltration at an assumed rate of 1x10-5m/s. All roof areas are to be collected into a positive drainage network before being discharged to ground through the use of a geocellular soakaway and all hard paved areas are to be freely drained to ground via porous construction. All infiltration features on site have been designed to cater for the 1 in 100-year +30% storm. An infiltration test to BRE 365 is required to be undertaken to confirm the infiltration rate of the soil on site alongside winter groundwater monitoring to confirm the groundwater levels during the wetter winter months.

4.2.2 Hydraulic calculations have been carried out which can be found at **Appendix C**.

4.3 Foul water drainage

4.3.1 The foul water will discharge into the local foul water sewer via a new 'Y' connection onto the sewer located on the footpath which borders the site. This connection will be subject to Southern Water Approval.

5 Maintenance

5.1 Introduction

5.1.1 During construction, the Contractor will be responsible for maintaining the drainage and SuDS (Sustainable Drainage Systems). Upon handover, the occupier will take on the responsibility of these duties as laid out in this report.

5.1.2 The maintenance schedule for the proposed development will be split down into two separate categories; SuDS features and regular private drainage.

5.2 SuDS at Stoneyfield Nursery, Eastergate Lane, Eastergate

5.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be a geocellular soakaway and porous pavement.

5.2.2 The SuDS features have been designed for easy maintenance and comprise:

- Regular Day-to-Day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS features
- Occasional tasks – checking the SuDS features and removing any silt that builds up in the SuDS feature
- Remedial work – repairing damage where necessary

5.3 SuDS Drainage Maintenance Specification

5.3.1 Soakaway

In order to maintain the functioning of the soakway, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for attenuation storage tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from per-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required

Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

5.3.2 Permeable Paving

In order to maintain the functioning of the permeable paving, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for permeable paving		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
	Stabilise and mow contributing and adjacent areas	As required
Occasional maintenance	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of level of the paving	As required
Remedial Actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rate and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

5.4 General Drainage Maintenance Specification

5.4.1 Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to all free flow through the SuDS
- Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures	
Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage.	Monthly
Strim vegetation 1m min surround to structures and keep area free from silt and debris	
Inspection Chambers and below ground control chambers.	
Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually
Undertake inspection after leaf fall in Autumn	
Occasional Maintenance	
Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work	
Repair physical damage if necessary	As required

5.4.2 Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

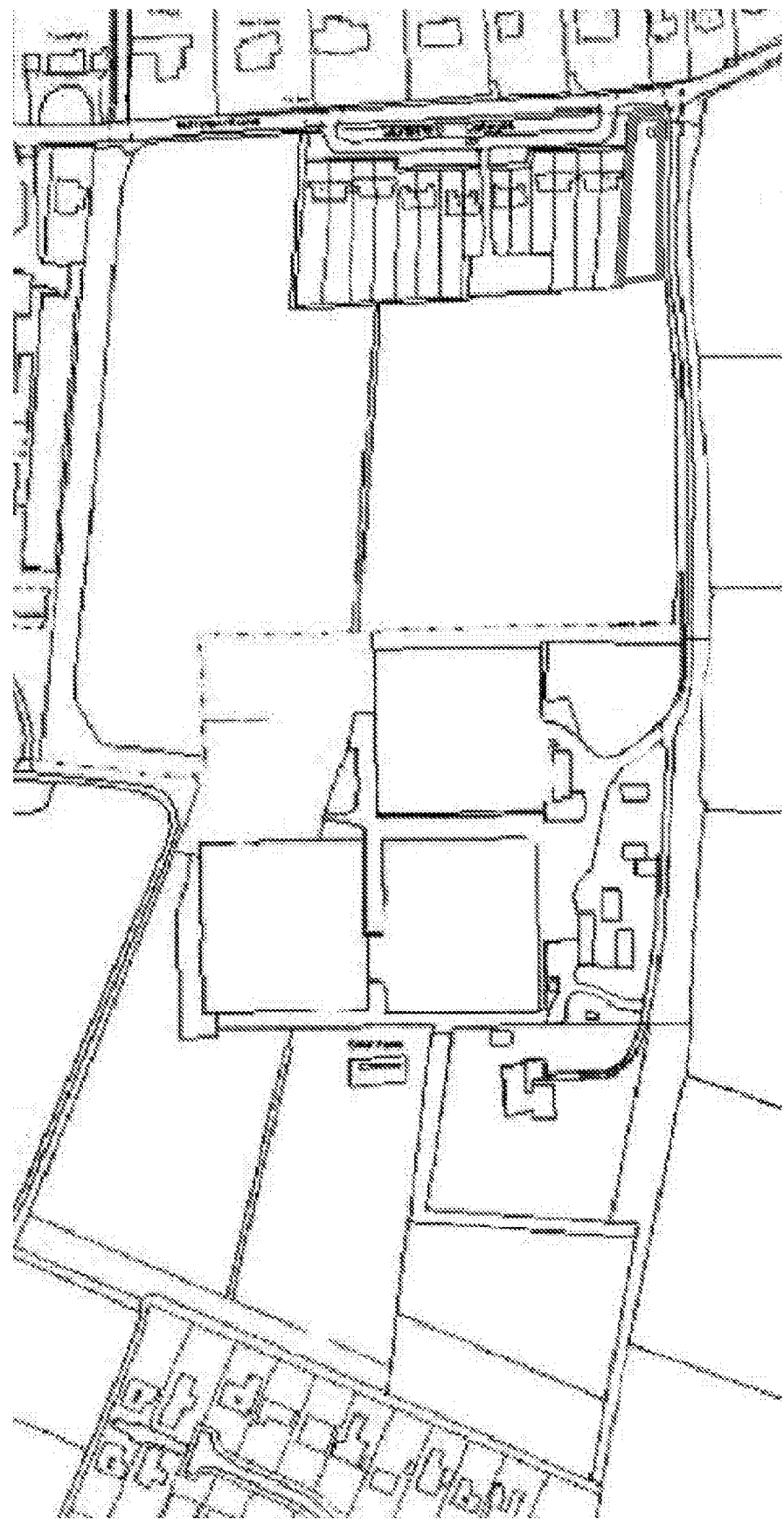
Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

6 Summary and Conclusions

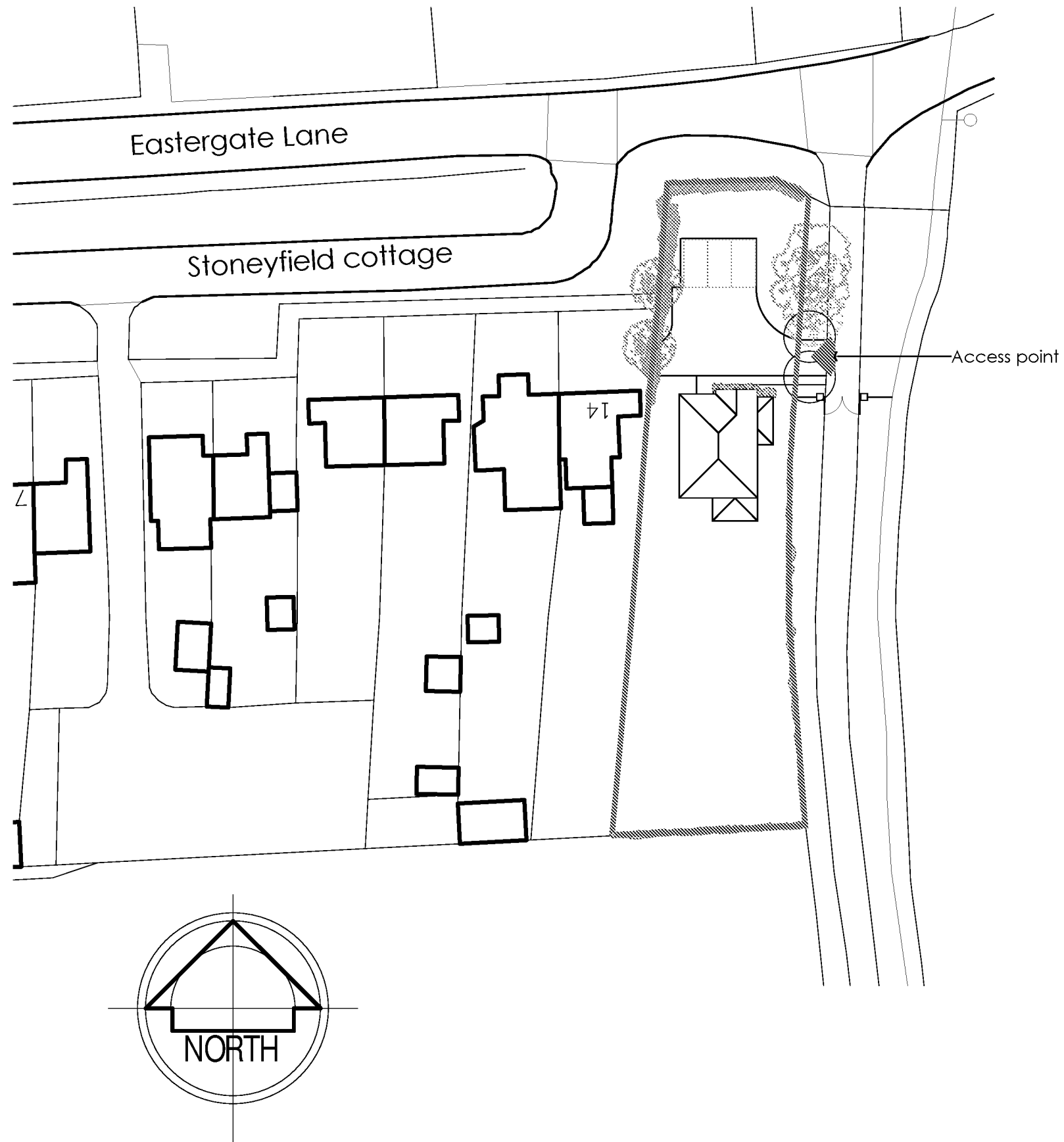
- 6.1.1 CGS CIVILS has been instructed by Peter Hake to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the development of a new residential dwelling with associated access and parking.
- 6.1.2 The Surface Water will discharge to ground via infiltration using a geocellular soakaway and porous construction at an assumed infiltration rate of $1 \times 10^{-5} \text{m/s}$. An infiltration test to BRE365 is to be undertaken to confirm the infiltration rate of the soil alongside winter groundwater monitoring to confirm groundwater levels during the wetter winter months.
- 6.1.3 The foul water will discharge to the adjacent local foul water sewer via a new proposed 'Y' connection, this connection is subject to Southern Water approval.
- 6.1.4 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water can be achieved for the proposed development.

7 Appendices

7.1 Appendix A – Site Plan



Site location plan 1:2500 @ A3 0 10 20 30 40 50 60 70 80 90 100 110 120



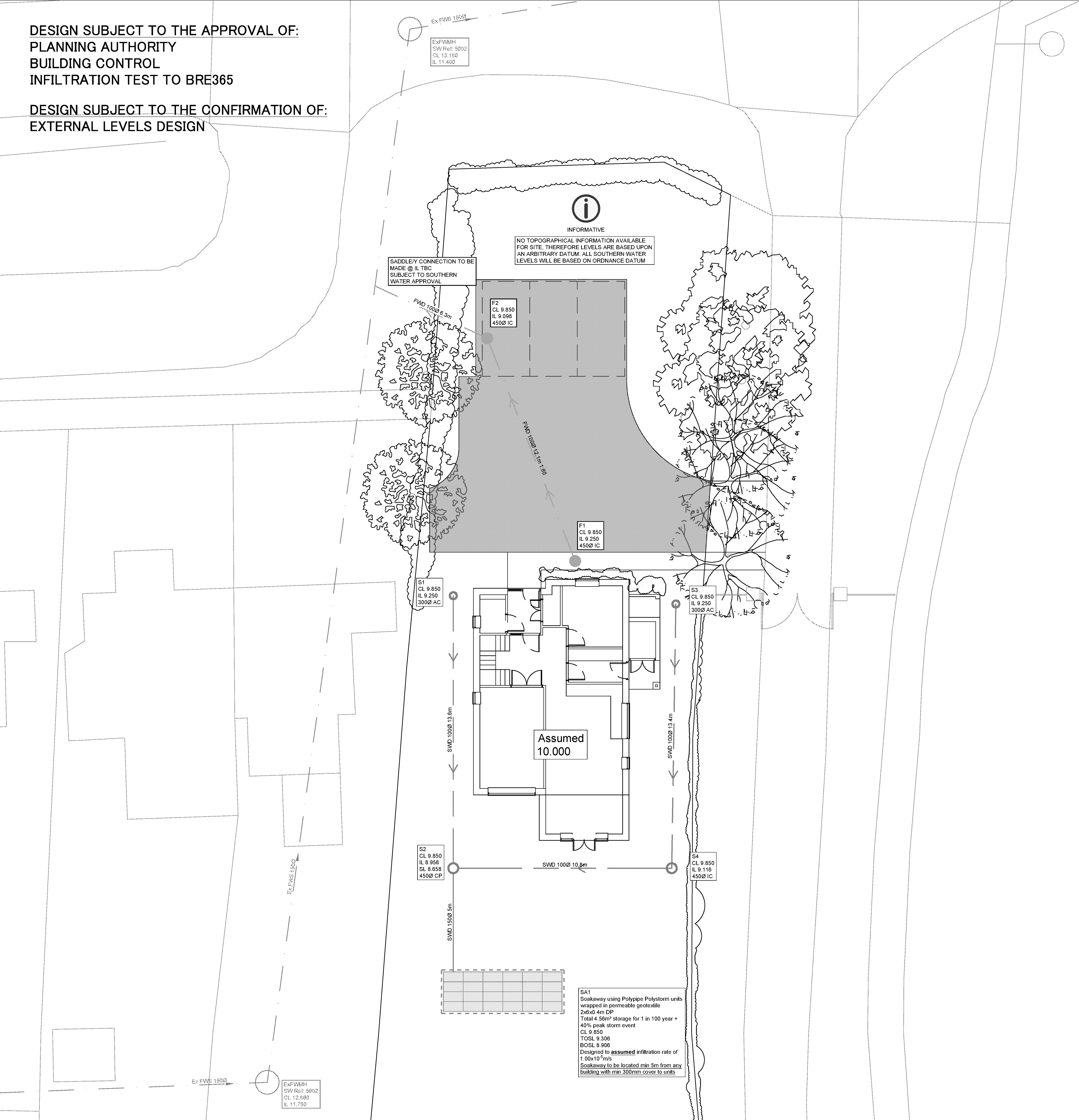
Block & Site plans 1:500 @ A3 0 5 10 15 20 25



7.2 **Appendix B – Surface Water Drainage Strategy**

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
INFILTRATION TEST TO BRE365

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN



DRAINAGE LEGEND (1:100)
EXISTING FEATURES

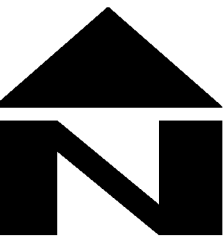
- Ex FWS Existing foul water sewer/drain and manhole
- PROPOSED FEATURES
- SWD Storm water sewer/drain
- Storm water access chamber (300Ø)
- Storm water inspection chamber (450Ø)
- Porous paved parking area
- FWD Foul water sewer/drain
- Foul water inspection chamber (450Ø)
- 00.000 Finished floor level
- PIPE INFO - DIAMETER, LENGTH, GRADIENT, BEDDING TYPE
- 100Ø 4.5m 1:100 Z BED

ABBREVIATIONS

- MH - MANHOLE
IC - INSPECTION CHAMBER
AC - ACCESS CHAMBER
CP - CATCHPIT
BC - BRAKE CHAMBER
RE - RODDING EYE
IL - INVERT LEVEL
SL - SUMP LEVEL
CL - COVER LEVEL

STANDARD DRAINAGE NOTES

- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
- ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
- BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
- ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT. THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
- COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
- ALL UN-REFERENCED PIPES ARE ASSUMED TO BE 100mm DIA.
- ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS85 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911-PART 1.
- ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
- ALL ADAPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
- ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
- THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
- STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
- IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
- NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
- ALL EXISTING MANHOLE COVER'S, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
- UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION.
- MANHOLE AND CHAMBER COVER GRADES:
 - 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
 - 'B125' IN ALL DRIVEWAYS
 - 'C250' IN PRIVATE PARKING AREAS
 - 'D400' IN CARRIAGEWAY/ACCESS ROAD



Prefixed to drawing numbers shall signify the following:-

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

P-	13.07.21	PRELIMINARY ISSUE	LH	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
<div><div><div>cgs</div><div>civils</div><div>Consulting Civil Engineers</div></div></div>					
CLIENT		PETER HAKE			
ARCHITECT		STEVE HUNTING ARCHITECTS			
JOB TITLE		STONEFIELD NURSERY EASTERGATE, PO20 3SL			
DRAWING TITLE		DESKTOP DRAINAGE STRATEGY			
DRAWN	ENGINEER	CHECKED	APPROVED		
LH	C SLADE	CS	CS		
DATE	JULY 2021		SCALE @ A1	1:100	
JOB No.	STATUS	DRAWING No.	REV		
C1699	P	100	P-		

PRELIMINARY

SA1
Soakaway using Polypipe Polystorm units wrapped in permeable geotextile 240x4m DP
Total 4.58m³ storage for 1 in 100 year + 40% peak storm event
CL 9.850
TOSL 9.306
BOSL 8.906
Designed to **assumed** infiltration rate of 1.00x10⁻¹m/s
Soakaway to be located min 5m from any building with min 300mm cover to units

7.3 **Appendix C – Surface Water Calculations**

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.600
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S2	0.010	5.00	9.850	450	355.464	507.140	0.892
SA1			9.850	100	355.464	501.894	0.944

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S2	SA1	5.246	0.600	8.958	8.906	0.052	100.0	100	5.11	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	1.4	0.792	0.844	0.010	0.0	32	0.621

Node SA1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Invert Level (m)	8.906	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.03600	Time to half empty (mins)	500	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	2.000	Number Required	1
Porosity	0.95	Pit Length (m)	6.000		

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	S2	456	9.149	0.191	0.4	0.0731	0.0000	SURCHARGED
480 minute winter	SA1	456	9.149	0.243	0.4	2.7694	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
480 minute winter	S2	1.000	SA1	0.4	0.461	0.062	0.0410
480 minute winter	SA1	Infiltration		0.1			

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S2	352	9.812	0.854	0.9	0.3271	0.0000	FLOOD RISK
360 minute winter	SA1	352	9.812	0.906	0.8	4.5729	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
360 minute winter	S2	1.000	SA1	0.8	0.461	0.138	0.0410
360 minute winter	SA1	Infiltration		0.1			

7.4 **Appendix D – Borehole Logs**

Richard Cobden House, Lion Street, Chichester, West Sussex, PO19 1LW



50 90 NE/32.

311/445.

RD 312P

(For Institute use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

If measurements start below
ground surface, state how far.

THICKNESS

		Feet			Inches		
		Feet	Inches	Metres	Feet	Inches	
Top Soil	Top Soil/brown clay/gravel/Flints	2	9	0.83	2	9	0.83
Head	Gravel and clay (compacted)	2	9	0.83	5	6	1.67
Valley Gravel	compacted shaly Gravel	13	6	4.11	19	-	5.79
↑	Brown Sandy clay	2	-	0.60	21	-	6.40
↑	Stiff Grey clay	65	-	19.81	86	-	26.21
	Mottled clay	8	-	2.43	94	-	28.65
Artisan	Red/Brown clay	30	-	9.14	124	-	37.79
blays.	Grey clay	5	-	1.52	129	-	39.31
woodish	Brown clay	9	-	2.74	138	-	42.06
Reading	Grey clay	9	-	2.74	147	-	44.80
bas	Red/Brown clay	6	-	1.82	153	-	46.63
	Grey clay	10	-	3.04	163	-	49.68
	Mottled clay	14	-	4.26	177	-	53.95
	Grey clay	7	6	2.28	184	6	56.23
1. Breccious (Chalk), V. CK	Shale and Flints	65	6	19.96	250	-	76.20

8-3-78

Date Book