

Surface Water Drainage Report

7 Central Drive, Elmer

Planning Reference Number: M/105/18/PL

For

Mr Brian Spong

Rev P1

Reference **C1672**

Date **20th March 2022**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	20.03.22	Initial Issue	CS	LH
P1	15.06.22	Updated to suit Arun DC comments	CS	CS
P2	23.06.22	Updated to suit Arun DC comments	CS	CS

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1 Introduction

- 1.1.1 CGS Civils Ltd have been appointed by Brian Spong to undertake a drainage strategy report for a proposed development at 7 Central Drive, Elmer.
- 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 existing single domestic dwelling. The proposed development will consist of the two storey rear extension and single storey front extension, first floor front extension of the existing property.
- 1.1.4 The proposed floor plan can be found in **Appendix A**.

Fig 1. Site Location

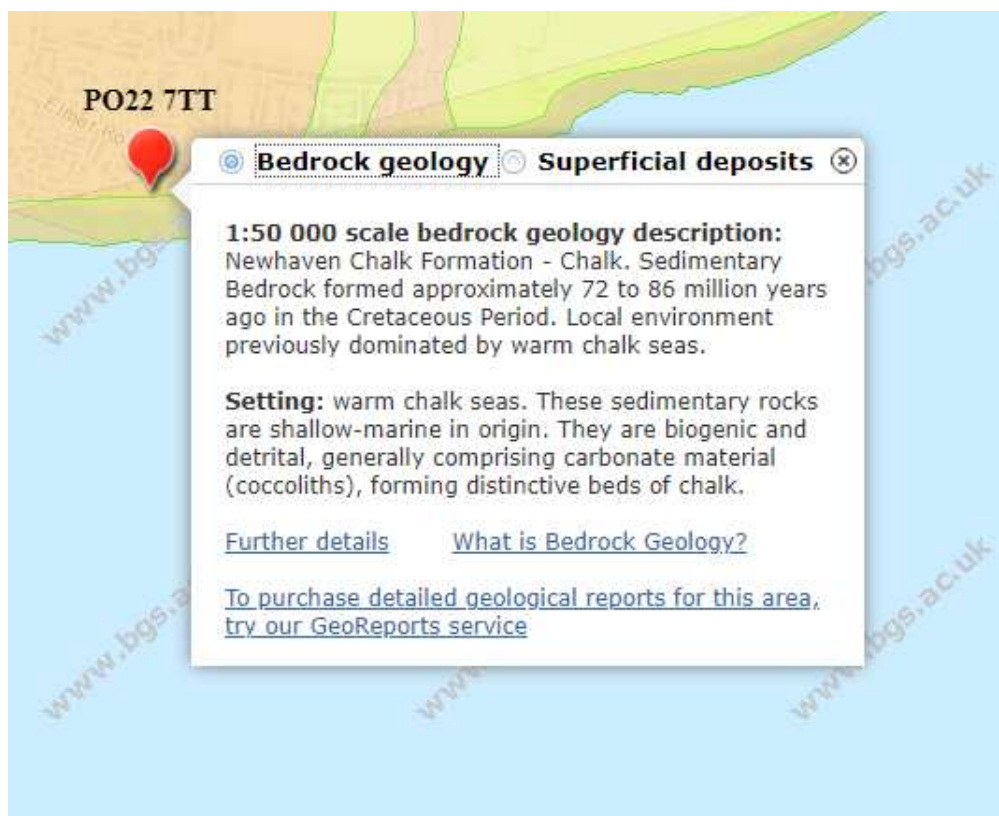


2 Site Geology

2.1 British Geological Survey information

- 2.1.1 The British Geological Survey confirms the bedrock geology to be made up of Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation, which are all primarily comprised of Chalk. The BGS website confirms the superficial deposits on site to be made up of River Terrace Deposits which is primarily comprised of Sand, Silt and Clay.

Fig 2. British Geological Survey



2.2 Geological Assessment

- 2.2.1 An onsite infiltration test to BRE365 was undertaken by CGS Civils on 11th March 2022. A Trial pit with the dimensions 300x1000x900mm deep was dug and filled with water until 75% full. The time it took for the water to soakaway from 75% to 25% full was noted and recorded and performed three times.
- 2.2.2 In addition to the soakaway test pit, a borehole was dug to a depth of 1.5m using a hand auger. This was covered and monitored over 48 hours and remained dry.
- 2.2.3 The results were calculated which confirmed a worst case infiltration rate of $2.44 \times 10^{-5} \text{m/s}$. This rate will be used for the proposed design. A copy of this test can be found in **Appendix E**.

3 Existing Drainage

- 3.1.1 It is not currently known how the existing site discharges surface water runoff. However due to the recorded infiltration rate, it can be safely presumed it discharges to ground via infiltration.

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 – Recorded Infiltration rate of $2.44 \times 10^{-5} \text{m/s}$
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 In order to follow the SuDS hierarchy, the use of soakaways was investigated and an onsite infiltration test to BRE365 was carried out. This test yielded an infiltration rate of $2.44 \times 10^{-5} \text{m/s}$ which is a good rate and infiltration will be possible. It is therefore proposed that all surface water runoff is to be discharged to ground via infiltration; all roof areas are to be collected into a positive drainage network before being discharged to ground via infiltration through the use of geocellular soakaway. The geocellular soakaway has been designed to cater for the 1 in 100-year +40% storm.
- 4.2.2 Hydraulic calculations have been carried out which can be found at **Appendix C**.

4.3 Water Quality

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

Fig 5. Approaches to Water Quality Risk Management

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

- 4.3.6 As per Table 26.1 Simple Index approach will be used as a design method for this site.
- 4.3.7 Table 26.2 will provide hazard classification of different land uses. The land uses for the surface water drainage for this site are.
- Residential Roofs
- 4.3.8 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index $\geq$ pollution hazard index

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

Fig 6. Pollution Hazard Indices for Different Land Use Classifications

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

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

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

Land Use	Destination of Runoff	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roof	Ground Water	Very Low	0.2	0.2	0.05

4.3.11 As noted in the above statement – section 4.2.1 – there are no treatment measures in place on the proposed drainage network, however, the pollutants that will be discharged into the groundwater will be negligible due to it being only residential roof runoff and all TSS will be caught within the silt trap within the network.

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 7 Central Drive, Elmer

- 5.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be **Geocellular Soakaway**
- 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 attenuation tanks, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for attenuation storage tanks/Soakaways		
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

5.4 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. Strim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly
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. Undertake inspection after leaf fall in Autumn	Annually
Occasional Maintenance Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work Repair physical damage if necessary	As required

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.

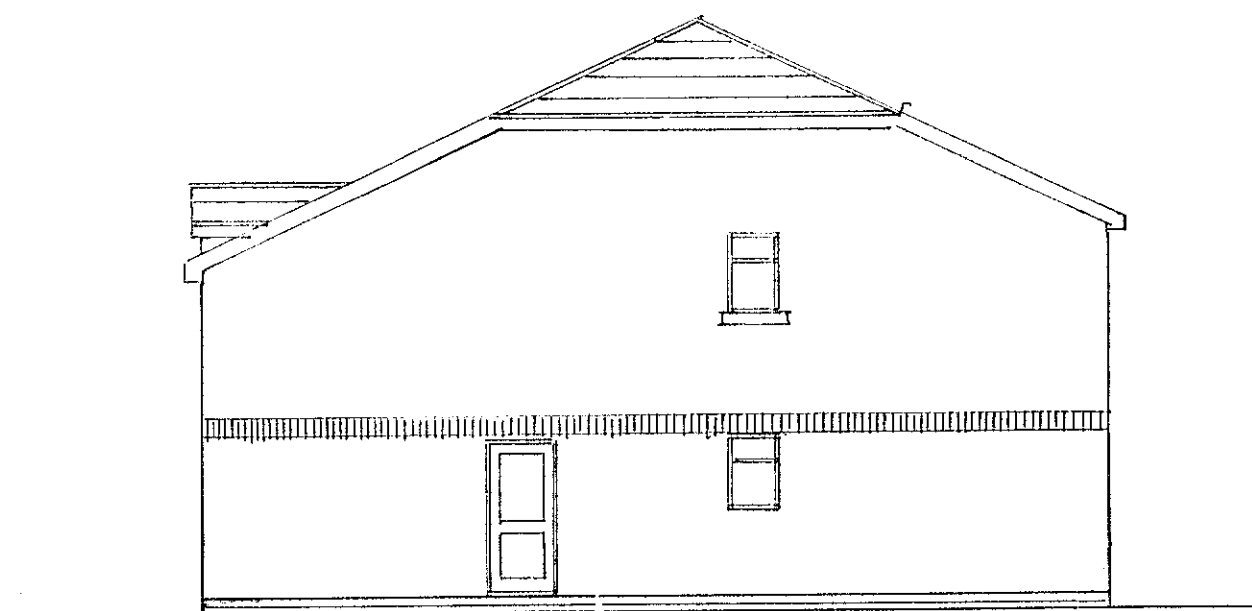
Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment 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 Brain Spong to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the erection of a new dwelling.
- 6.1.2 The Surface Water will discharge to ground via infiltration through the use of a soakaway that has been designed to cater for the 1 in 100-year +40% storm.
- 6.1.3 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water and foul drainage can be achieved for the proposed development.

7 Appendices

7.1 Appendix A – Floor Plans

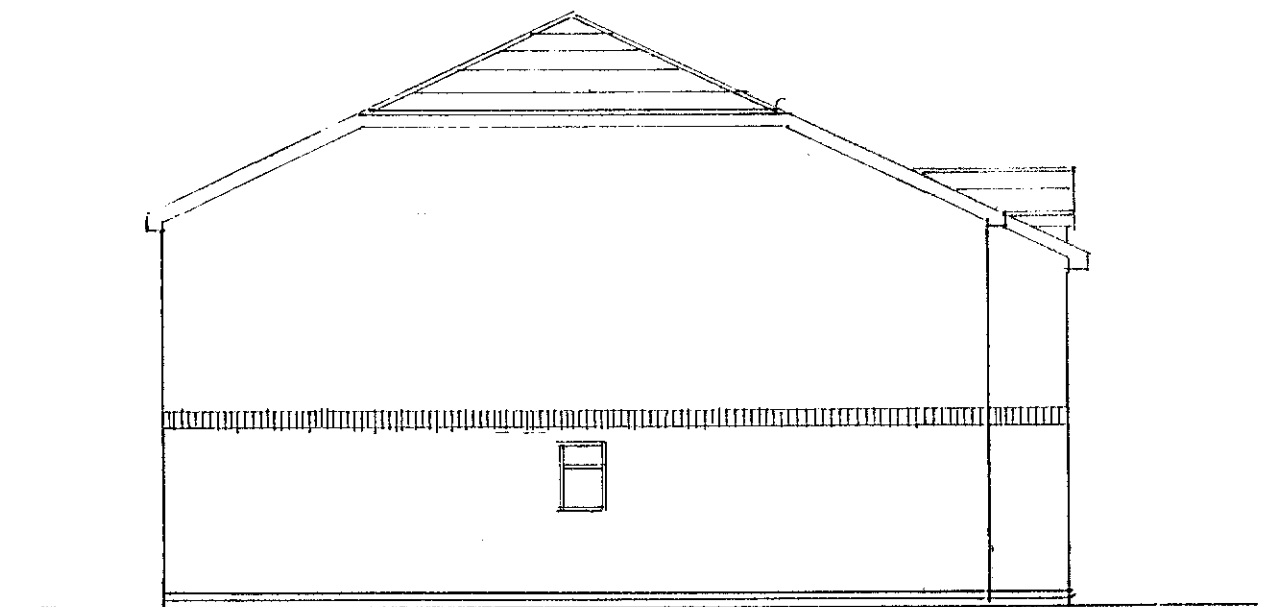


west



north

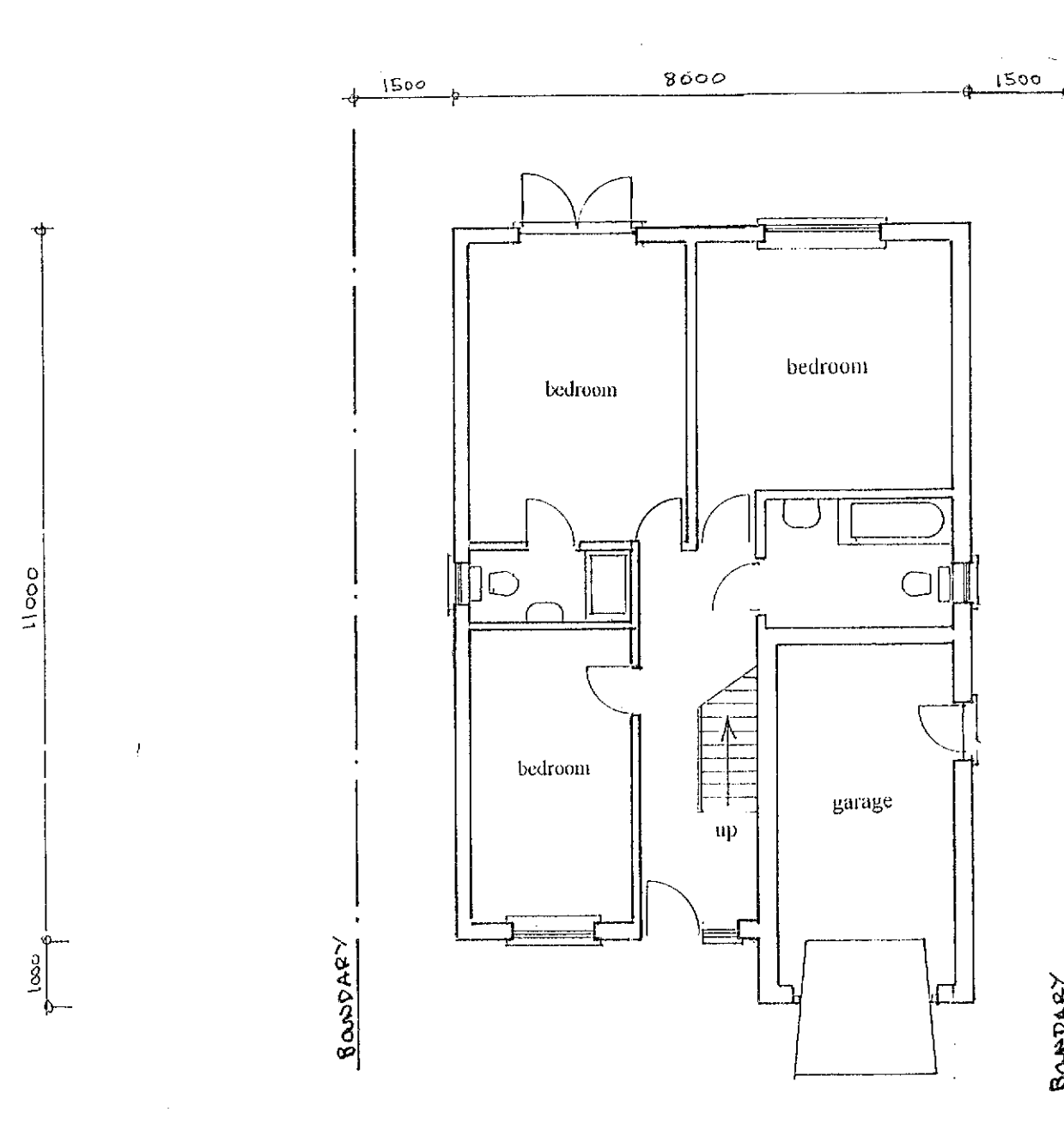
1 : 100



east

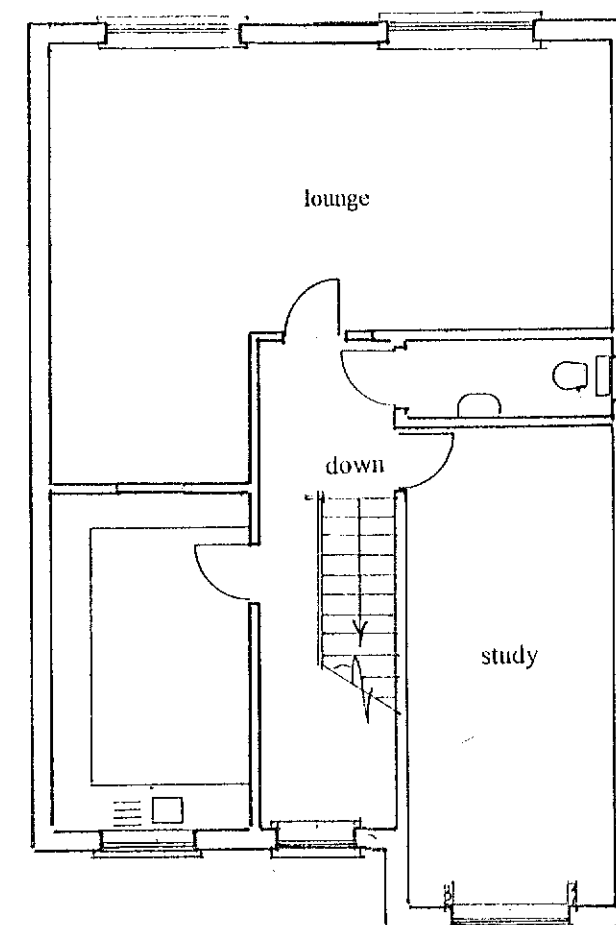


south



Ground floor plan

1 : 100



1st floor plan

The total floor area of the dwelling [excluding garage] is 141 sq. metres.

Lounge/Dining	7400 x 3800mm + 2850 x 2100mm	= 34.11 sq. metres.
Kitchen	2600 x 4400mm	= 11.44 sq. metres.
Study	6350 x 2800mm	= 17.78 sq. metres.
Bedroom 1	4650 x 3400mm	= 15.81 sq. metres.
Bedroom 2	3900 x 3850mm	= 15.02 sq. metres.
Bedroom 3	4500 x 2600mm	= 11.70 sq. metres.

sheet 1a of 2

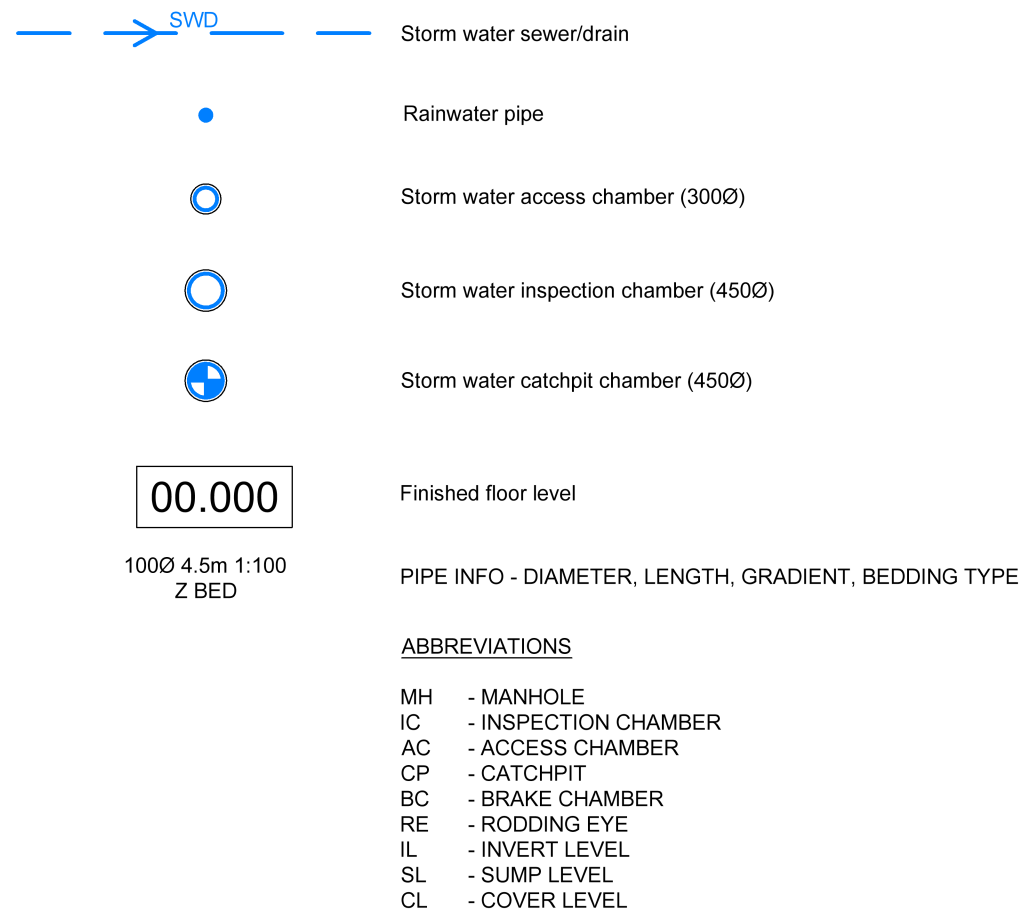
Proposed

PROPOSED DETACHED DWELLING AT ADJ, 7, CENTRAL DRIVE, ELMER FOR MR. B. SPONG.

Bryan Butcher
Rainbow Cottage
Nyetimber Lane
Bognor Regis PO21 3JX
01243 266871
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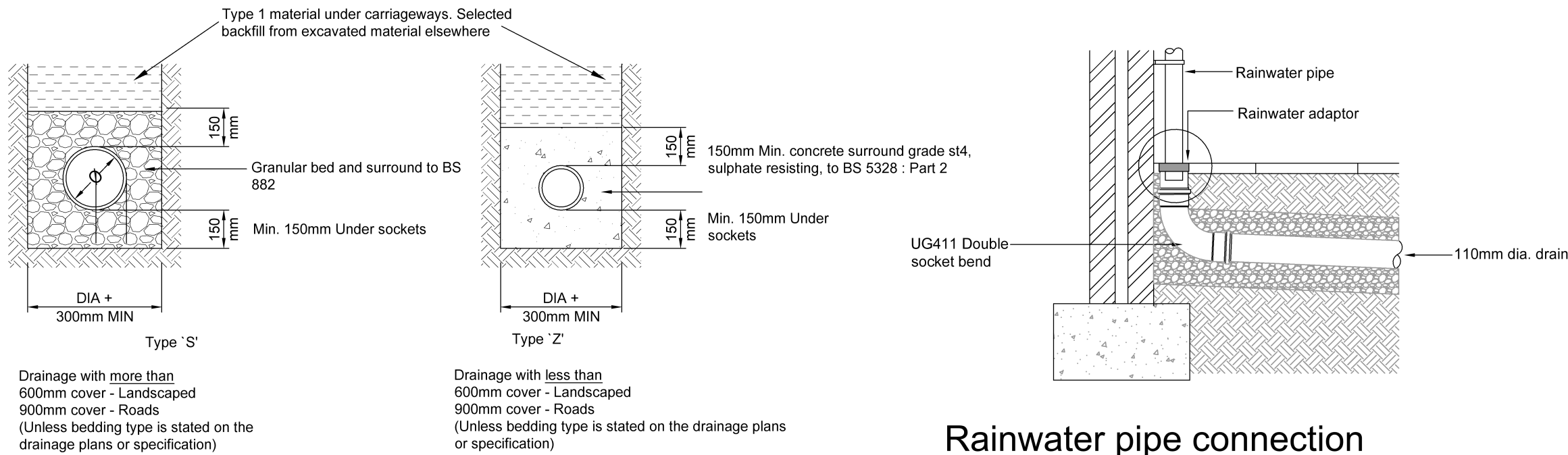
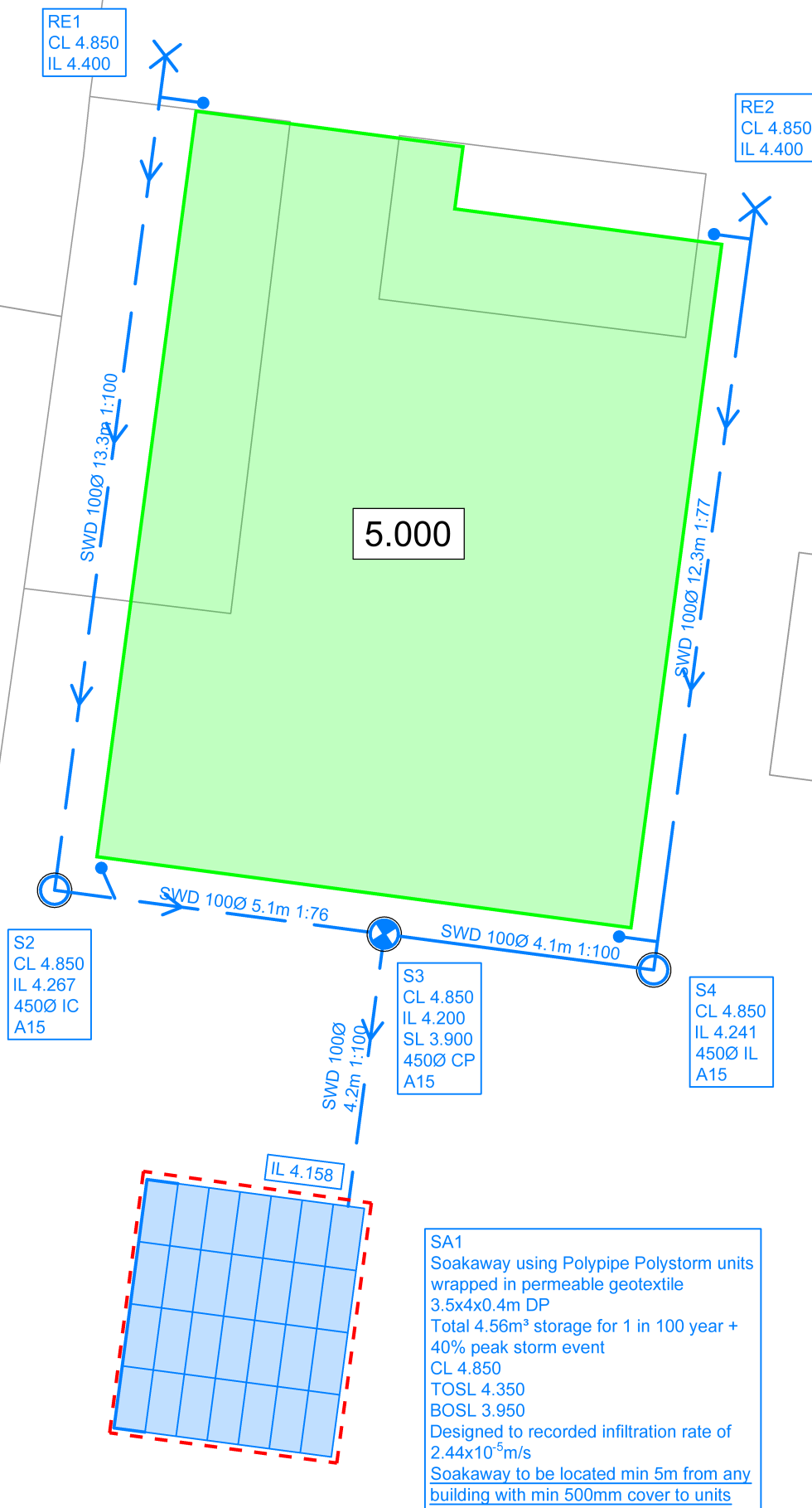
7.2 **Appendix B – Drainage Layout**

DRAINAGE LEGEND (1:100)
PROPOSED FEATURES

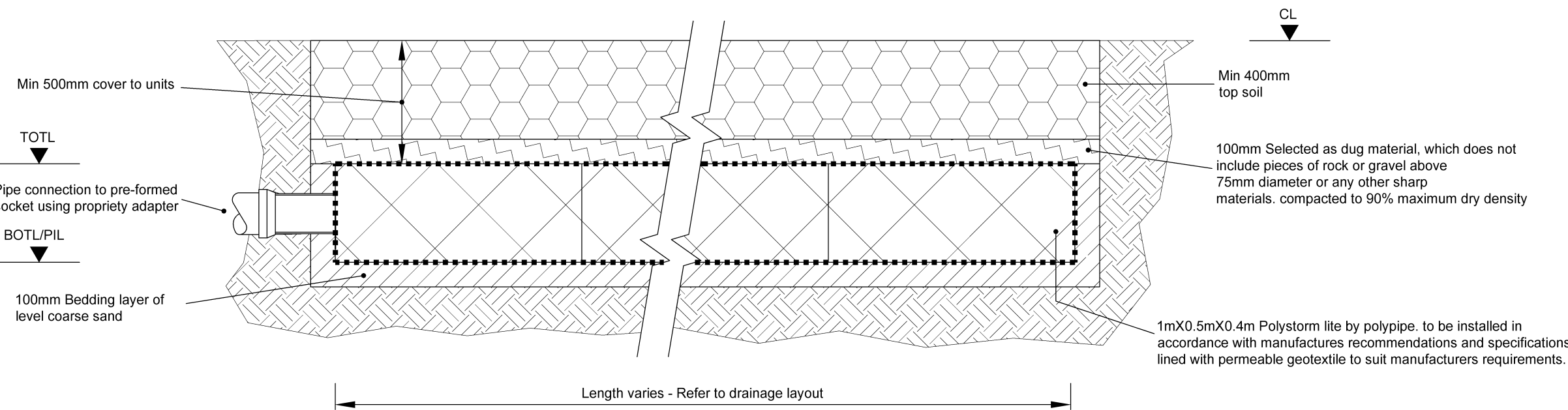


Proposed impermeable drained areas
99m²

Central Drive



Pipe bedding details in private Areas



Trench soakaway using Polystorm Lite Geomodular units

Landscaped areas only

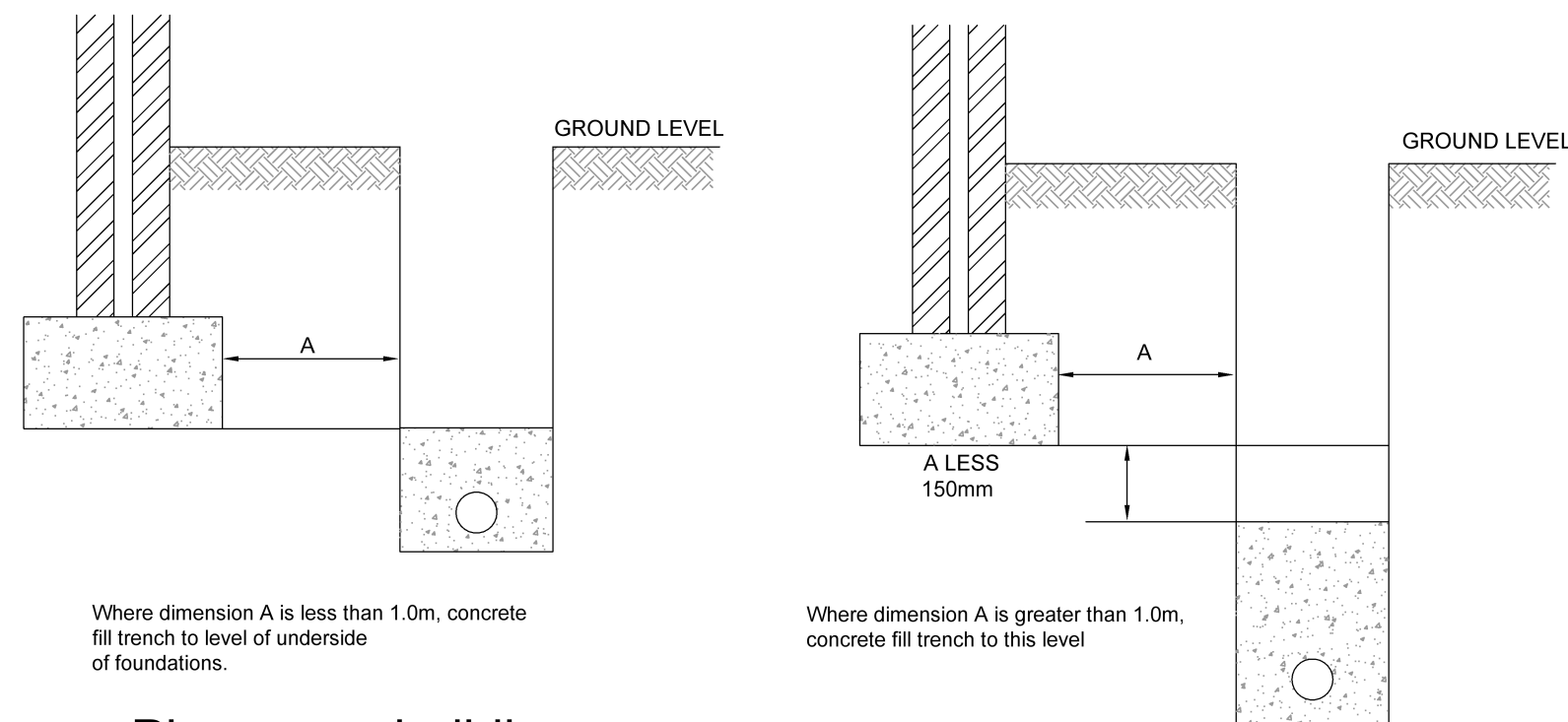
0.4m deep

All storage tank drainage works shall be carried out in accordance with the specifications, method statements and recommendations of Polypipe

STANDARD DRAINAGE NOTES

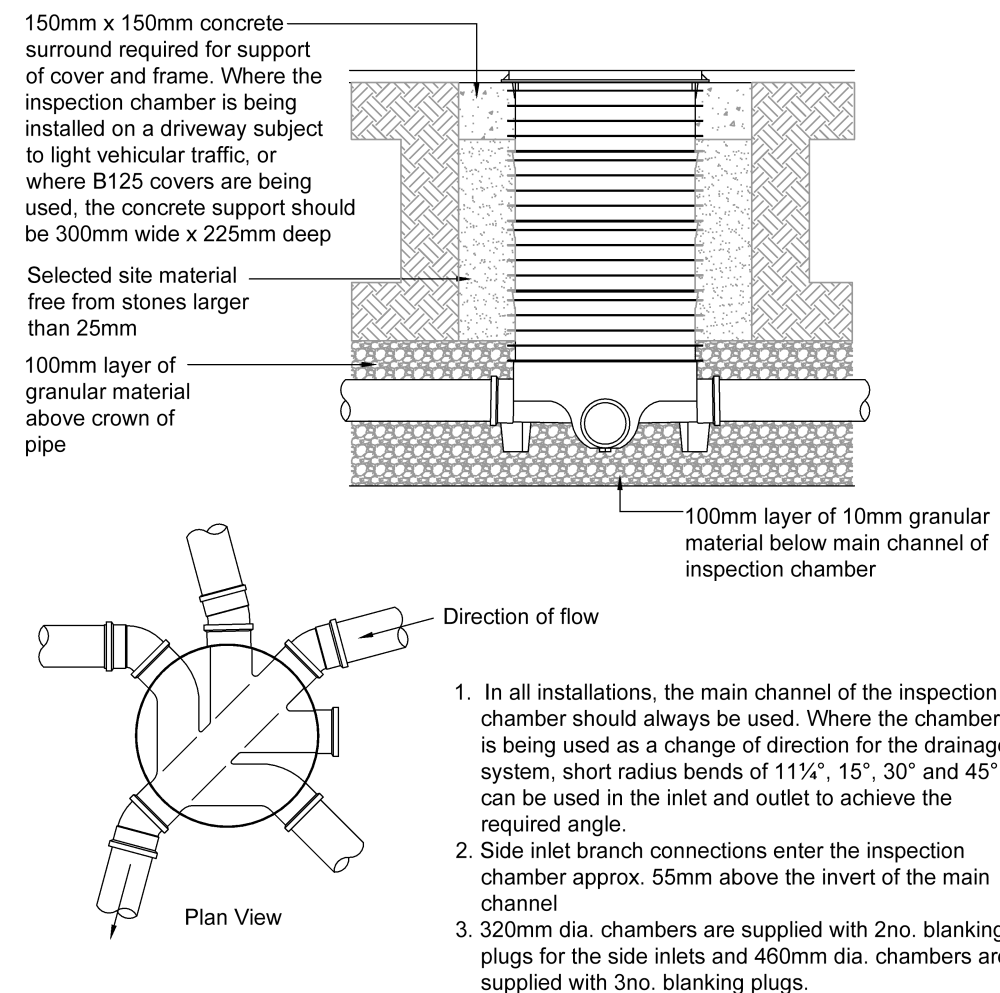
- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, 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.
- 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 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.
- IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
- NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
- ALL EXISTING MANHOLE COVERS, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
- UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT 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

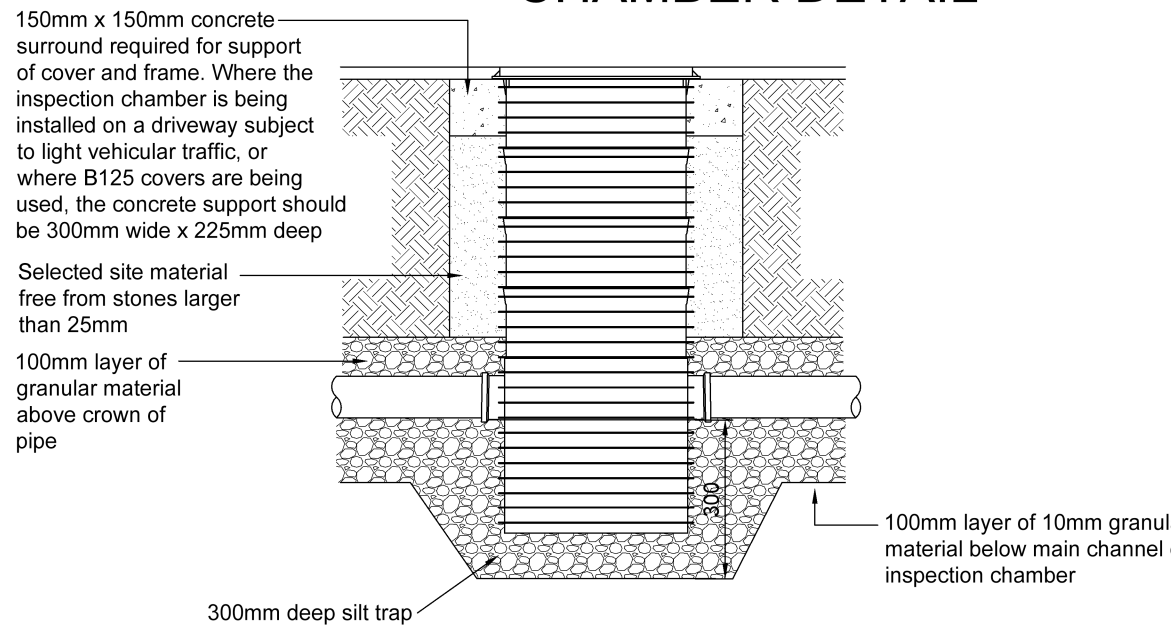


Pipes near buildings

Pipes near buildings



460mmØ INSPECTION CHAMBER DETAIL



450mmØ POLYPIPE BASIC SILT TRAP DETAIL

Prefix to drawing numbers shall signify the following:-

PL = PLANNING	Shall not be used for contract or construction purposes
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

P2	23.06.22	UPDATED TO SUIT ARUN DC COMMENTS	CS	CS	CS
P1	15.06.22	UPDATED TO SUIT ARUN DC COMMENTS	CS	CS	CS
P-	21.03.22	PRELIMINARY ISSUE	CS	LH	CS

REV	DATE	DESCRIPTION	BY	CHK	APP
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cgs
civils
Consulting Civil Engineers

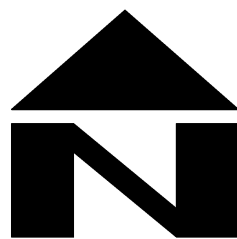
CLIENT
BRIAN SPONG

ARCHITECT
BRYAN BUTCHER

JOB TITLE
LAND ADJACENT 7 CENTRAL DRIVE
ELMER ROAD, ELMER

SURFACE WATER DRAINAGE STRATEGY					
DRAWN	ENGINEER	CHECKED	APPROVED		
CS	C SLADE	LH	CS		
DATE	MARCH 22		SCALE @ A1	1:100	
JOB No.	STATUS	DRAWING No.	REV.		
100	PL	100	P2		

FOR PLANNING ONLY



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)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.350
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)
S3	0.010	5.00	4.850	450	-50785.446	42630.385	0.650
SAT			4.850	100	-50785.863	42627.248	0.692

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	S3	SAT	4.200	0.600	4.200	4.158	0.042	100.0	100	5.09	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	0.550	0.592	0.010	0.0	32	0.621

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	4.200	100.0	100	Circular	4.850	4.200	0.550	4.850	4.158	0.592

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S3	450	Manhole	Adoptable	SAT	100	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S3	-50785.446	42630.385	4.850	0.650	450		0	1.000	4.200	100
SAT	-50785.863	42627.248	4.850	0.692	100		1	1.000	4.158	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
10	40	0	0
30	0	0	0
100	40	0	0

Node SAT Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.08784	Invert Level (m)	3.950	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	260	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	3.500	Number Required	1
Porosity	0.95	Pit Length (m)	4.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S3	10	4.234	0.034	1.4	0.0160	0.0000	OK
120 minute winter	SAT	90	4.009	-0.149	0.5	0.7866	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S3	1.000	SAT	1.4	0.600	0.226	0.0096
120 minute winter	SAT	Infiltration		0.2			

Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S3	10	4.263	0.063	3.8	0.0292	0.0000	OK
180 minute winter	SAT	164	4.139	-0.019	0.9	2.5093	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S3	1.000	SAT	3.7	0.768	0.621	0.0205
180 minute winter	SAT	Infiltration		0.2			

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S3	10	4.259	0.059	3.5	0.0277	0.0000	OK
120 minute winter	SAT	118	4.120	-0.038	1.1	2.2592	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S3	1.000	SAT	3.4	0.754	0.571	0.0192
120 minute winter	SAT	Infiltration		0.2			

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	S3	176	4.310	0.110	1.5	0.0514	0.0000	SURCHARGED
180 minute winter	SAT	176	4.310	0.152	1.5	4.7900	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute winter	S3	1.000	SAT	1.5	0.615	0.248	0.0329
180 minute winter	SAT	Infiltration		0.2			



7.4 **Appendix D – Soakage Test Results**

Ref: CS/C1803

Brian Spong

20th March 2022

Re: 7 Central Drive, Elmer – Soakaway Testing – Infiltration Test Result Summary

Dear Brian

The following investigation was carried out at the above location in accordance with our quotation.

1. Site Works

The purpose of the investigation was to supply soakaway test data in general accordance with BRE document 365 (Soakaway Design) at one location which would be the approximate intended location for a possible infiltration device to serve a new dwelling.

The appended drawing illustrates the position of the test pit. The BRE365 pit was excavated to a depth of 0.9m in line with the approximate depth of the proposed soakaway.

In addition to the soakaway test pit, a borehole was dug to a depth of 1.5m using a hand auger. This was covered and monitored over 48 hours and remained dry.

The testing commenced on 11th March 2022 with three tests being undertaken in accordance with BRE 365.

2. BRE 365 Soakaway Test Findings

Testing of the sub soils which was noted as sandy clays produced a BRE 365 design infiltration rate of **2.44x10⁻⁵m/s** at a depth of 0.9m. This rate was the slowest taken from all three tests. This is considered a good rate and will likely be suitable for most infiltration devices.

3. BRE 365 Soakaway Test Results

Test Pit No	Infiltration Rate (1-3 Tests)			Depth of Test	Soil Type
SAT1	3.10x10 ⁻⁵ m/s	2.48x10 ⁻⁵ m/s	2.44x10⁻⁵m/s	0.9m	Silty clay with sand

Appendix A – Soakaway Test Location Plan



Appendix B – Site Photographs





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Appendix C – Soakaway Test Results



Job: 7 Central Drive, Elmer - Test 1

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} =

1.32 m/squared

t_{p75-25} =

3300 seconds

V_{p75-25} =

0.135 m/cubed

F =

3.1E-05



Job: 7 Central Drive, Elmer - Test 2

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} =

1.32 m/squared

t_{p75-25} =

3600 seconds

V_{p75-25} =

0.135 m/cubed

F =

2.84E-05



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Job: 7 Central Drive, Elmer - Test 3

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} =

1.32 m/squared

t_{p75-25} =

4200 seconds

V_{p75-25} =

0.135 m/cubed

F =

2.44E-05