



BROWN FISHER ENVIRONMENTAL REPORTS 4 PLANNING

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Client:

Lee Smallwood
Eiling Lodge
Drivers End
Codicote
SG4 8T

DRAINAGE STRATEGY

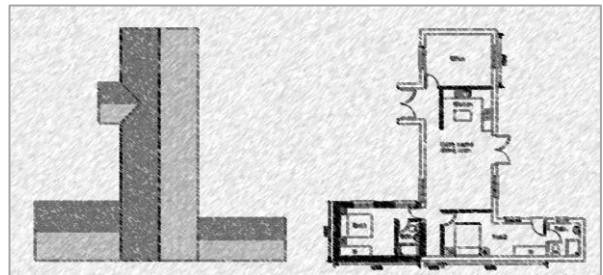
Eiling Lodge
Drivers End
Codicote
Hitchin
Hertfordshire
SG4 8T

Consultant: **Ray Clark**
B. Eng (Hons)

Position: Civil Engineering Consultant

Report Ref: 257591DRA

Date: 28th August 2025



EXECUTIVE SUMMARY

Reports4Planning has been appointed to design the foul and surface water drainage aspects of the proposed development at Eiling Lodge, Drivers End Lane, Codicote, Hitchin, SG4 8TP.

The site is Brownfield with an area of approximately 0.3Ha. It is an existing house with outbuildings and drive area. The largest outbuilding is habitable. The site is triangular with a field to the east, Drivers End Lane to the south and the B656 to the west.

The proposed development includes construction of an extension and internal alterations to the largest outbuilding to provide additional bedrooms. The extension roof area is 20m².

The report outlines the strategy for the surface water drainage for the proposed development with reference to Ciria 753, the SUDS manual, the National Planning Policy Framework and the North Hertfordshire Sustainability Supplementary Planning Document.

The Flood Warning Information Services website confirms that the site is in flood zone 1 and that there is no risk of surface water flooding.

The British Geological Society website confirms that the site is underlain by superficial deposits, of the Lowestoft Formation (Chalky Till) of over bedrock of the Lewes Nodular Chalk Formation (Chalk). Nearby borehole records confirm the superficial deposits are at least 4m deep and of clay content that would be unsuitable for conventional soakaways.

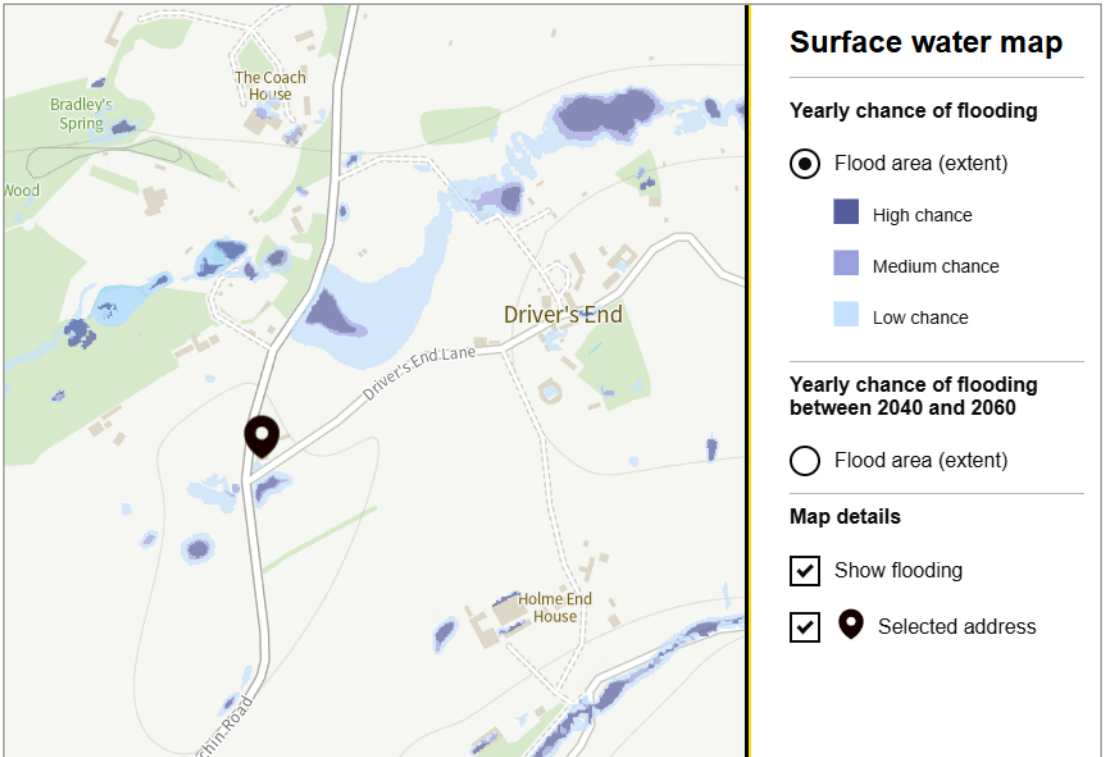
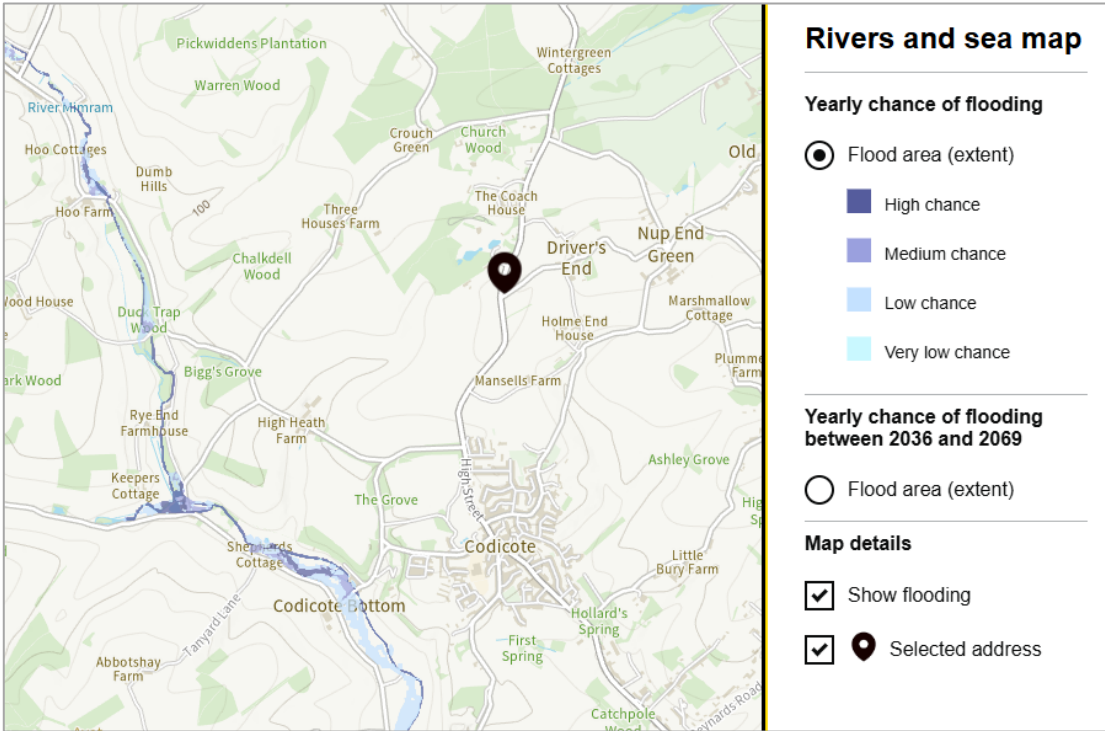
Surface water from the extension roof will discharge to the existing gravel drive via a *Permavoid*® distribution tank.

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1.0 PLUVIAL AND FLUVIAL FLOODING

The Flood Warning Information Service website extracts below confirm that the site is in flood zone 1 and that the site is not at risk of surface water flooding.



2.0 EXISTING DRAINAGE

The site is Brownfield with an area of approximately 0.3 hectares. It is an existing house with outbuildings and drive area. The largest outbuilding is habitable. The site is triangular in shape, with an agricultural field to the east, Drivers End Lane to the south and the B656 to the west.

A copy of the existing building being extended is shown in Appendix A.

The British Geological Society website confirms that the site is underlain by superficial deposits, of the Lowestoft Formation (Chalky Till) of over bedrock of the Lewes Nodular Chalk Formation (Chalk). Nearby borehole records (included in Appendix A) confirm the superficial deposits are at least 4m deep and of clay content that would be unsuitable for conventional soakaways.

Foul drainage from the existing house discharges to an existing on-site septic tank.

The nearest watercourse is the River Mimram approximately 2 kilometres west of the site.

It was not possible to provide greenfield discharge rates for a roof area as small as 20m², suffice to say that flows will be less than 1l/s.

3.0 PROPOSED DRAINAGE STRATEGY

The proposed development includes construction of an extension and internal alterations to the largest outbuilding to provide additional bedrooms (see Appendix A). The extension roof area is 20m².

Surface water from the extension roof will discharge to the existing gravel drive via a *Permavoid*® distribution tank.

A rainwater butt is proposed for rainwater harvesting purposes.

The Drainage Strategy Layout is shown in Appendix B.

Post-development surface water calculations are shown in Appendix C.

The Flood Exceedance Plan in Appendix D shows the route flood water will take in the unlikely event of SUDs failure.

4.0 SURFACE WATER DRAINAGE

In accordance with Ciria 753, SUDS Manual, flooding is permitted above ground during the 1 in 100 year storm event with climate change allowance but all flood water is to be contained within the site boundaries. No flooding is permitted during the 1 in 30 year storm event.

The post development surface water calculations for the 1 in 100 year storm event with 40% climate change allowance, confirm that no flooding occurs.

The half drain time for the 1 in 100 year storm is less than 24 hours.

4.1 SURFACE WATER FLOWS AND VOLUMES

A summary of the proposed peak flows and volumes are detailed in Table A on the drainage layout shown in Appendix B.

The drainage calculations shown in Appendix C confirm that no flooding occurs during the worst-case 1 in 100 year storm event, with a 40% climate change allowance.

4.2 STANDARDS

The performance of the surface water drainage system will be designed to BS EN 752 Parts 3 and 4, and the most current issue of Part H of the Building Regulations.

The materials specification for the scheme will be in accordance with the Highways Agency Specification for Highway Works. For the purposes of the indicative design, the following material types have been assumed:

- Drainage pipes up to 300mm diameter – Vitrified clayware, plastic pipes will be permitted subject to ground conditions.
- Manholes and chambers - Precast concrete with concrete surround or PPIC.
- Chamber covers – Class D400 infill type in hard paved areas.
- Pipe bedding - Imported granular material.
- Pipe Trench backfill - Selected as dug or imported material.
- Manholes should be located at every change of alignment or gradient; at the head of all sewers; at every junction of a public sewer.

The drainage shall be designed utilizing the following criteria:

- Minimum flow velocity 1.0m/s for self-cleansing.
- Standard pipe roughness “Ks” of 0.6.

5.0 FOUL WATER DRAINAGE

Foul drainage from the building will be collected via pipes and will be discharged to the existing foul sewer and on-site septic tank.

An additional 300 litres will be generated by the second bedroom, equating to an average flow of 0.003l/s.

5.1 STANDARDS

The performance of the foul drainage system has been designed to BS EN 752 Parts 3 and 4, and the most current issue of Part H of the Building Regulations. The main criteria used are as follows.

- Drainage pipes up to 100mm diameter – Vitrified clayware, plastic pipes will be permitted subject to ground conditions.
- Manholes and chambers - Precast concrete with concrete surround or PPIC.
- Chamber covers – Class D400 infill type in higher quality paved areas.
- Class D400 standard type in all other road / parking areas
- Class C250 standard type in all footpath areas
- Pipe bedding - Imported granular material.
- Pipe Trench backfill - Selected as dug or imported material.
- Manholes should be located at every change of alignment or gradient; at the head of all sewers; at every junction of a public sewer (where present).

The drainage shall be designed utilizing the following criteria:

- Minimum flow velocity 0.75m/s for self-cleansing
- Standard pipe roughness “Ks” of 1.5.

6.0 ATTENUATION

It is proposed that Sustainable Urban Drainage Systems (SUDS) will be the primary consideration for surface water management. There are several different methods that may be used to provide sufficient attenuation of the surface water described in Section 7 below.

Attenuation should be positioned as close to the outfall as possible and would control the surface water discharge from the site. Implementation of one or all of the SUDS methods outlined in Section 7 of this report is highly recommended to reduce the requirement for below ground storage.

The proposed drainage design includes pipework that has been designed to attenuate the worst case 1 in 100 year storm event with a 40% climate change allowance so that no flooding occurs.

7.0 SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

The objective of SUDS is to minimise the impacts of the development on the quantity and quality of site runoff and maximise amenity and biodiversity opportunities. Surface water SUDS will be designed and installed in accordance with NPPF and associated technical guidance March 2012 and associated CIRIA documents.

The mix of SUDS to be used is determined by the conditions on site, in this case a development with areas of external space which can be utilised for SUDS. The methodology of surface water control is to slow the entry of the surface water into the system by using flow control devices (orifice plate), then retain the runoff by using below ground storage (pipework and chambers). The reduced impact of the development upon the drainage infrastructure will therefore reduce the potential for flooding.

7.1 INFILTRATION DEVICES

Infiltration devices drain water directly into the ground. Infiltration trenches and soakaways are more practicable for urban sites with limited space available. Infiltration devices can be integrated into and form part of the landscaped areas.

Infiltration trenches are completely below ground, and water should not occur on the surface.

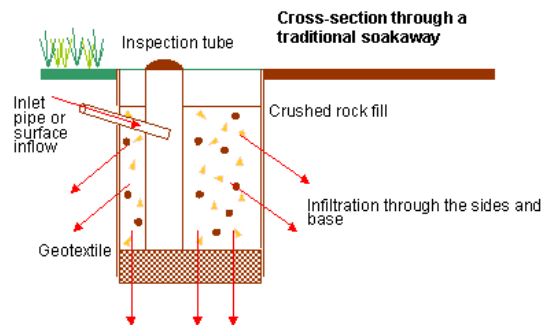


Figure 1 – Typical cross section through infiltration trench

Advantages – Reduces the volume of runoff, effective at pollutant removal, contributes to ground water recharge, simple and cost effective.

Disadvantages – Potentially high failure rates, comprehensive ground investigations required, offset from foundations (min. 5m away), risk of ground water pollution, reduced performance during prolonged wet periods.

Suitable for use – No, The British Geological Society website confirms that the site is underlain by superficial deposits, of the Lowestoft Formation (Chalky Till) of over bedrock of the Lewes Nodular Chalk Formation (Chalk). Nearby borehole records confirm the superficial deposits are at least 4m deep and of clay content that would be unsuitable for conventional soakaways.

7.2 BROWN, GREEN AND BLUE ROOFS

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping over a drainage layer. They are designed to intercept and retain precipitation, increasing the time of concentration and reducing the volume of runoff and attenuation peak flows. Green roofs can be anything from a thin growing layer of sedums and mosses to plants, shrubs and large trees.

These roofs vary in specification and can be designed to attract bird and invertebrate species. Referring to CIRIA document C644, green and brown roofs also participate in attenuating rainwater. This would reduce the requirement for below ground storage attenuation on the site.

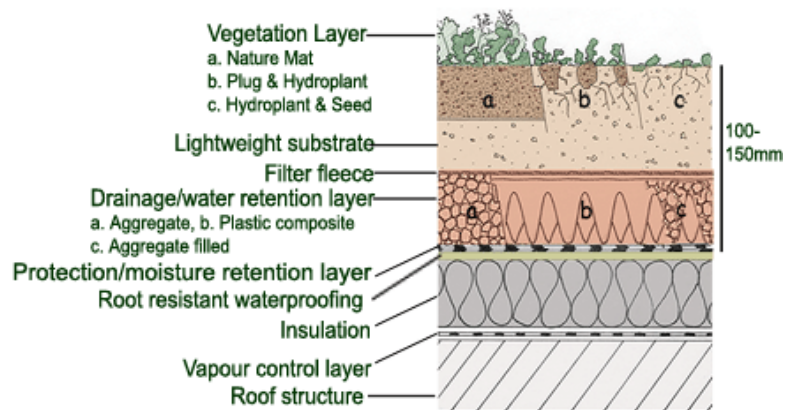


Figure 2 – Typical section through green roof build up

Advantages – Mimic greenfield state of building footprint, good removal of pollutants, ecological and amenity benefits, improve air quality, insulates building.

Disadvantages – Costs, increased structural loading, roof height, design, maintenance and exposure may preclude use.

Suitable for use – No, the roofs will be pitched and will not be able to accommodate a green roof.

7.3 RAINWATER HARVESTING

These tanks act as mini-storage chambers for surface water, reducing the extent of underground storage required. They provide a source of water for plant irrigation, washing machines and for flushing toilets.

Harvested rainwater is stored below ground and pumped to provide a substitute for potable mains water reducing both the site discharge and water consumption.



Figure 4 – Rainwater Harvesting

Advantages – Provided source control of storm water runoff, reduces demand on mains water.

Disadvantages – Costs, Risk to public health, use dependant on demand requirements and seasonal rainfall characteristics, maintenance of pumps & control systems.

Suitable for use – **Yes**, a rainwater butt is proposed for gardening purposes.

7.4 POROUS PAVING

Porous pavement is an alternative to conventional paving in which water permeates through the paved structure rather than draining off it. The surface water will be held in a reservoir structure (high void content sub-base) under the pavement for subsequent delayed discharge or infiltration into the sub-strata below.

The porous paving can be materials such as gravel, grasscrete, porous (no fines) concrete, concrete blocks or porous asphalt. Pollutant removal rates have been shown to be high, as the majority of the removal occurs as a result of the filtration of the water through the aggregate sub-base.

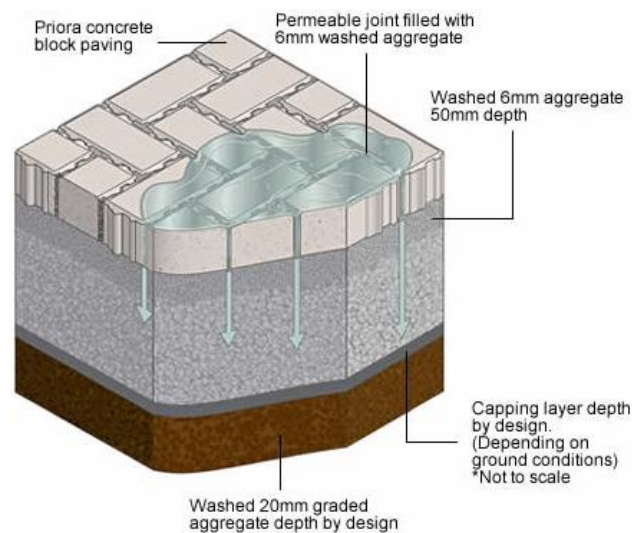


Figure 3 – Typical section through porous paving

Advantages – Effective in removing pollutants, lined systems can be used to avoid infiltration, reduces volume and rate of surface water runoff, suitable for high density developments. Mimics existing Greenfield conditions by filtering into the surrounding soft landscaped areas.

Disadvantages – Costs, used for low traffic volumes, low axle loads and speeds, risk of long-term clogging due to poor maintenance.

Suitable for use – **No**, no paving is proposed.

7.5 BELOW GROUND ATTENUATION

Attenuation involves the storing of surface water within pipework or underground tanks prior to controlled discharge into the public system. Attenuation tanks can also provide offline storage.

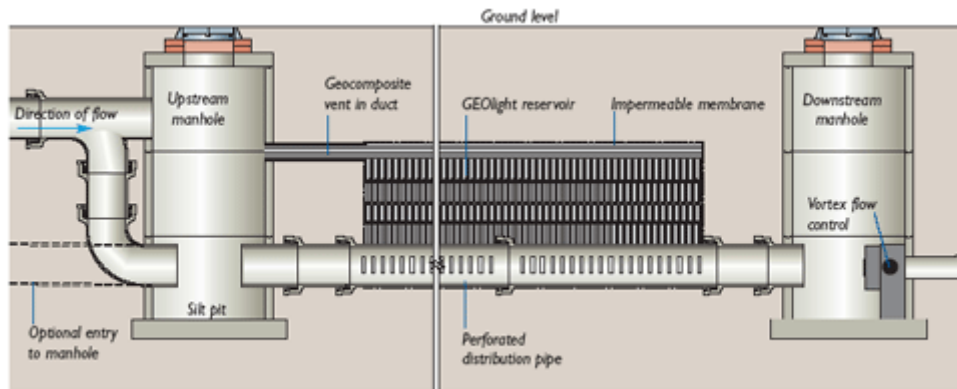


Figure 5 – Typical section through below ground attenuation chamber (cellular storage)

Advantages – Effective storage of surface water, can be used below trafficked areas, can be used below public open areas, minimum maintenance.

Disadvantages – No water quality treatment.

Suitable for use – **No**, the British Geological Society website confirms that the site is underlain by superficial deposits, of the Lowestoft Formation (Chalky Till) of over bedrock of the Lewes Nodular Chalk Formation (Chalk). Nearby borehole records confirm the superficial deposits are at least 4m deep and of clay content that would be unsuitable for conventional soakaways.

7.6 WETLANDS

Wetlands provide both stormwater attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation. Wetlands provide settlement of sediment and remove contaminants.

Advantages – Effective storage of surface water, good pollutant removal, ecological and amenity benefits.

Disadvantages – Requires large surface area. Health & Safety issues associated with large bodies of water.

Suitable for use – **No**, there is no space available.

7.7 SWALES

Swales are vegetated drainage structures up to 500mm deep and used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits the extent of trees used in landscaping. Health & Safety issues associated with large bodies of water following heavy rainfall.

Suitable for use – **No**, there is no space available.

7.8 PONDS/RAIN GARDENS

Ponds or rain gardens are irregular shaped vegetated drainage structures used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits the extent of trees used in landscaping. Health & Safety issues associated with large bodies of water following heavy rainfall.

Suitable for use – **No**, there is no space available.

8.0 MANAGEMENT AND MAINTENANCE OF SUDS

The homeowner will be responsible for completion of routine maintenance of the development, including all SUDs elements.

The catchpit is to be inspected and cleaned out on an annual basis.

9.0 IMPLEMENTATION OF SUDS

Construction will commence shortly after planning consent has been granted and it is expected the development will take approximately one year to complete.

10.0 CONTAMINATION MITIGATION

The site lies above a principal bedrock aquifer, covered by a secondary undifferentiated superficial aquifer and the groundwater vulnerability is medium to high.

CIRIA 753 Chapter 26 Mitigation indices:

Pre-development pollution indices:

Chapter 26 identifies the pre-development use as residential and is identified in Table 26.2 as a low pollution hazard level;

Roofs: Total Solids = 0.2, Metals = 0.2 and Hydrocarbons = 0.05

The mitigation index is therefore $MI = 0.2 + (0.5 \times 0.2) + (0.5 \times 0.05) = 0.325$

Post-development

Residential use is identified in Table 26.2 as very low pollution hazard level;

Roofs: Total Solids = 0.2, Metals = 0.2 and Hydrocarbons = 0.05

The mitigation index is therefore $MI = 0.2 + (0.5 \times 0.2) + (0.5 \times 0.05) = 0.325$

The post-development mitigation indices are the same as the pre-development indices therefore no further mitigation is required. However a rainwater butt is proposed to capture the first 5mm of rainfall.

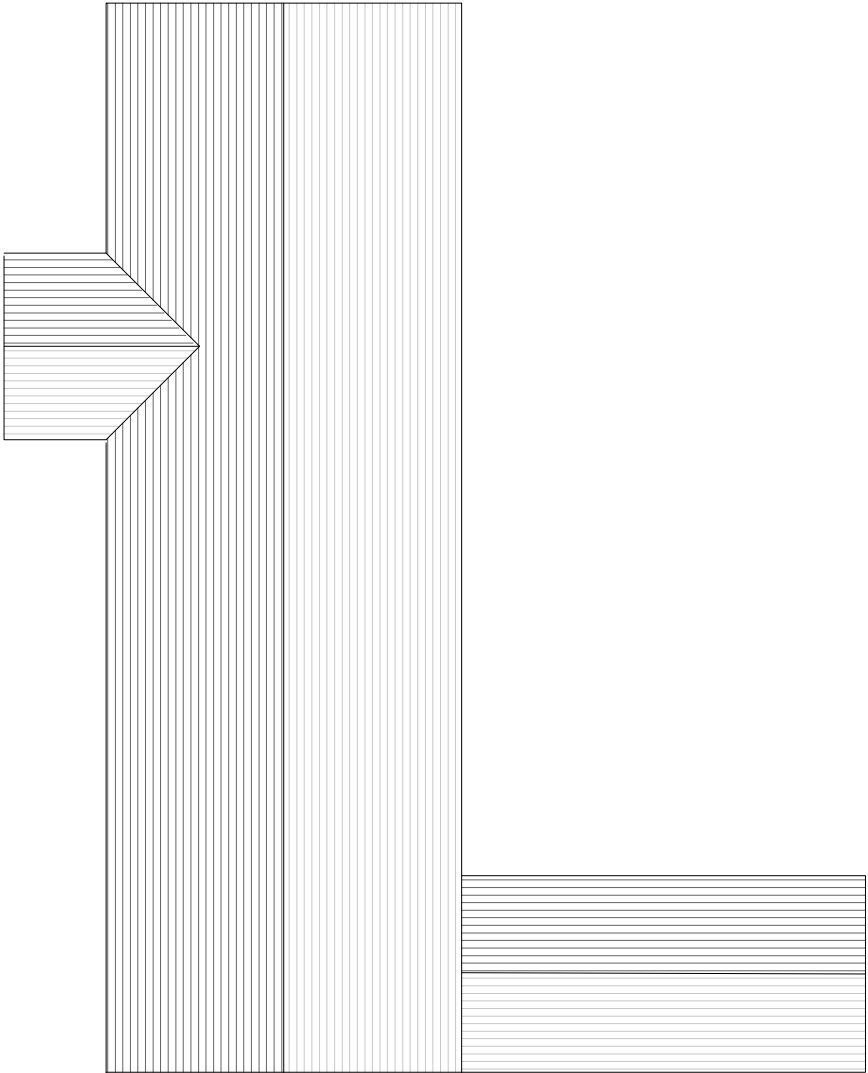
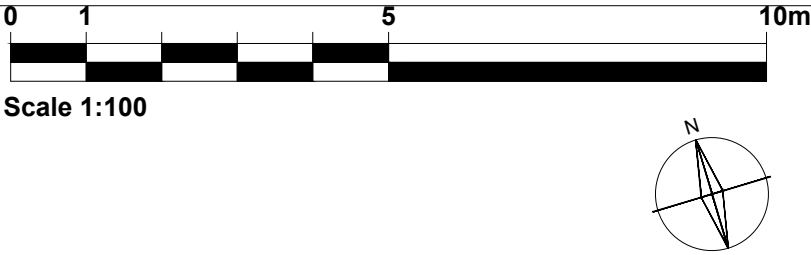
Table 26.5 Risk matrix

Element Number	Description	Risk Score	Weighting Factor	Score
1	Pollution Hazard Traffic Density	1	15	15
2	Average annual rainfall	2	15	30
3	Type of SUDS	2	15	30
4	Unsaturated zone depth	1	20	20
5	Flow through sub-soils	1	20	20
6	Unsaturated zone material	1	10	10
7	Soil organic matter	1	5	5
8	Unsaturated zone pH	1	5	5
Total				135

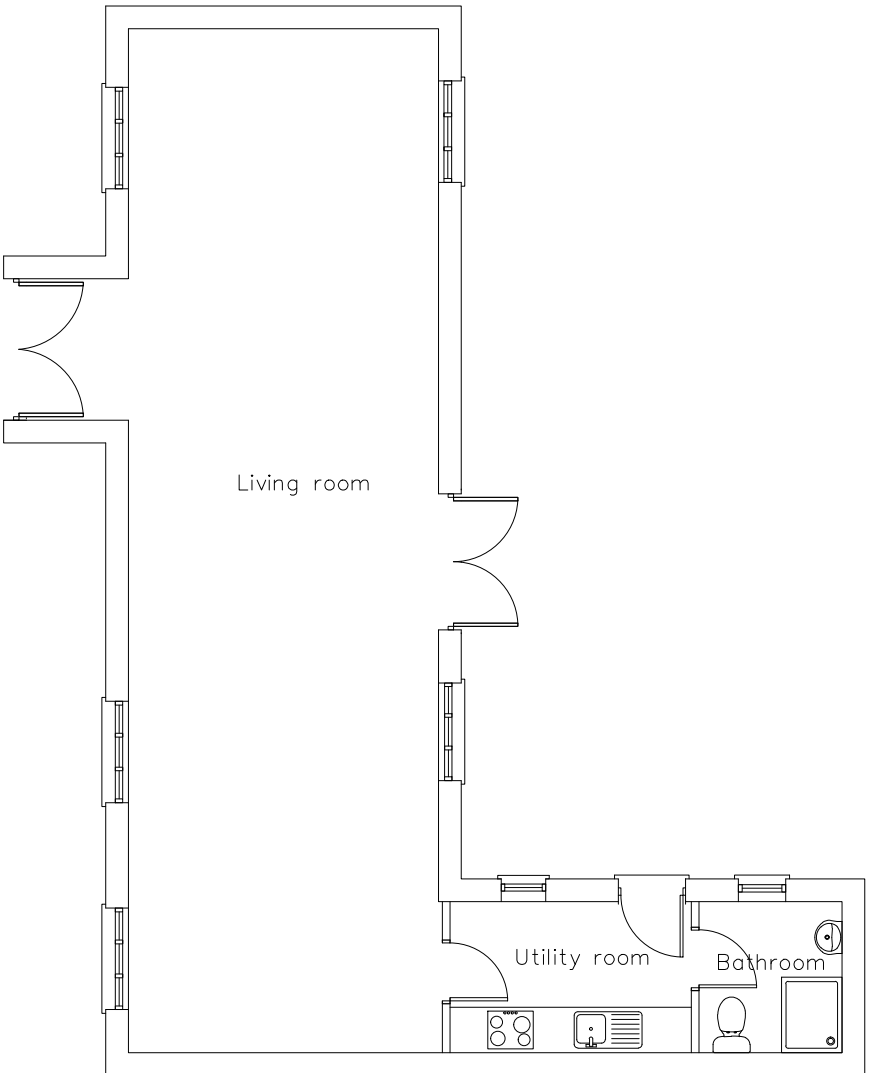
Table 26.6 indicates that the risk is low therefore mitigation is not required.

APPENDICES

APPENDIX A – Existing & Proposed Floor Plans and Borehole Record



Roof Plan



Floor Plan

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Existing gross internal area 68.7 sqm
Proposed gross internal area A 84.6 sqm
Proposed gross internal area B 79.3 sqm
Existing site area: 852.7 sqm
Proposed site area: 328.7 sqm

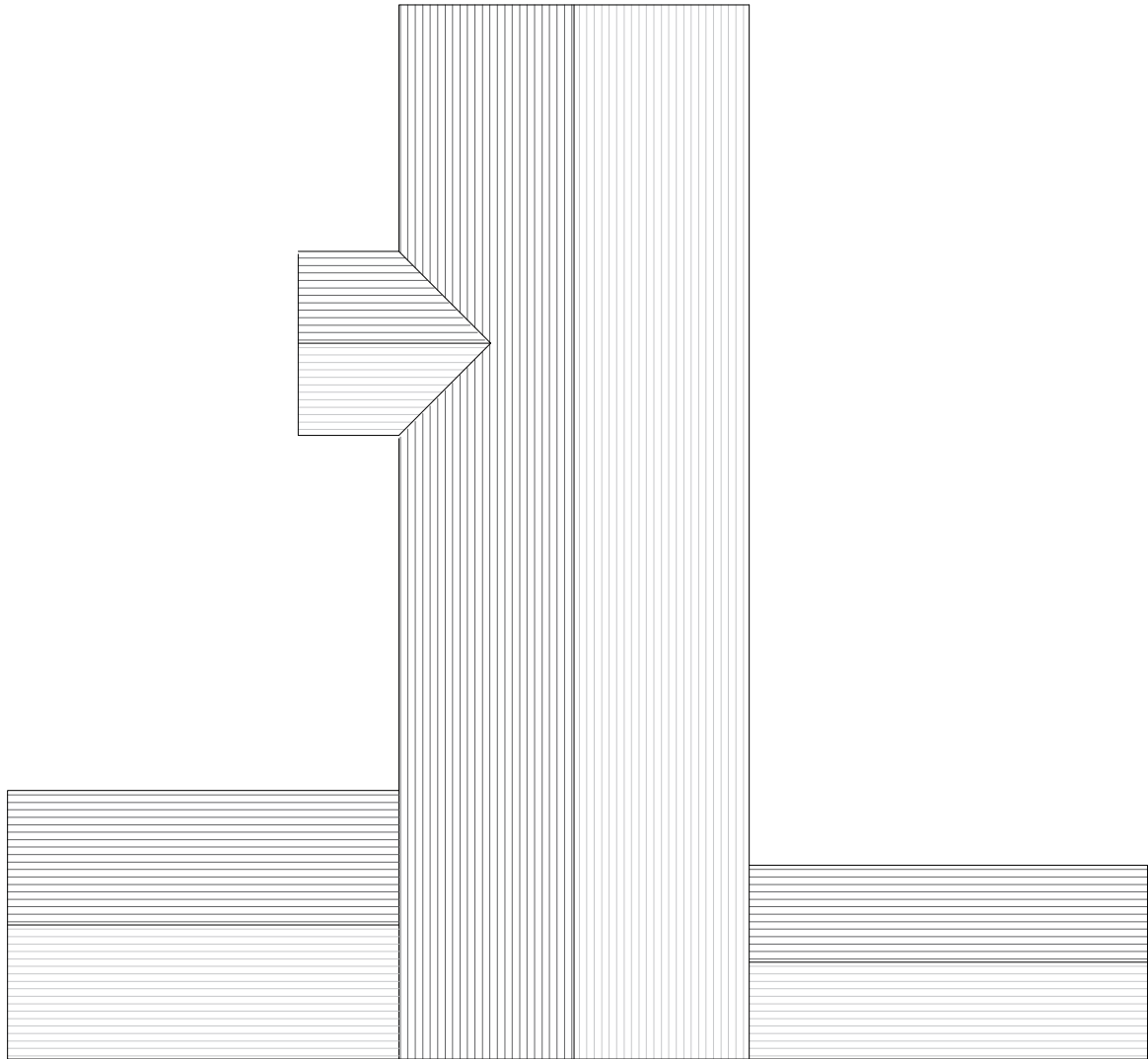
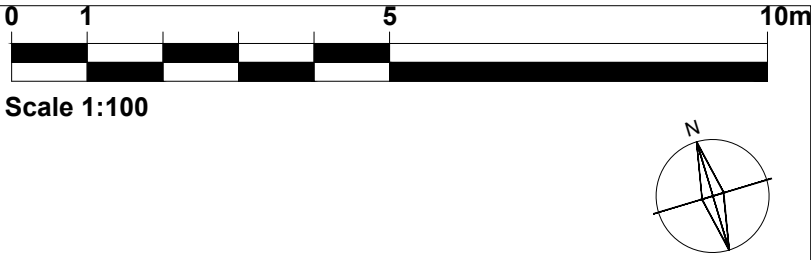
Rev	Date	Description	Drm By
-	-	-	-
-	-	-	-
-	-	-	-

Planning			
Drawing Title: Existing floor plans			
Project & Drawing Number: 25.EL.P01v1			
Rev:	Scale:	Sheet size:	Date:
-	1:100	A3	May 25

Site Address: Neil Smallwood,
Eiling Lodge, Drivers End Lane,
Codicote, Hitchin SG4 8TP



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Roof Plan



Floor Plan

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Rev	Date	Description	Drn By
-	-	-	-
-	-	-	-
-	-	-	-

Planning			
Drawing Title: Proposed floor plans			
Project & Drawing Number: 25.EL.P03v1			
Rev:	Scale:	Sheet size:	Date:
-	1:100	A3	May 25

Site Address: Neil Smallwood,
Eiling Lodge, Drivers End Lane,
Codicote, Hitchin SG4 8TP



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221/37 Hitchin R.D.C., Public Well, Codicote. (Sealed)

TL 2159 1950

TL21/7

W.S.B.H. p. 210. Surface -400. Shaft 195 x 6; test bore 6 in. R.T.L. -c.250. Section -186. Yield 700 g.p.h. Before 1913.

Clay-with-flints	...	12	12
Uck	...	? 128	? 140
Mck	...	? 235	? 375
Lck	...	? 25	400

GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

THICKNESS
ft.

DEPTH
ft.

Clay with flints 12'	Clay with flints	12	12
Upper chalk ? 128'	Upper Chalk	128	140
Middle chalk ? 235'	Middle chalk	220	260
	Melbourne Rock	15	375
Lower chalk ? 25	Belemnite Marl	5	380
	Lower chalk	20	400

pp. L.P. Thomas 8/3/68.

APPENDIX B – Drainage Strategy Layout

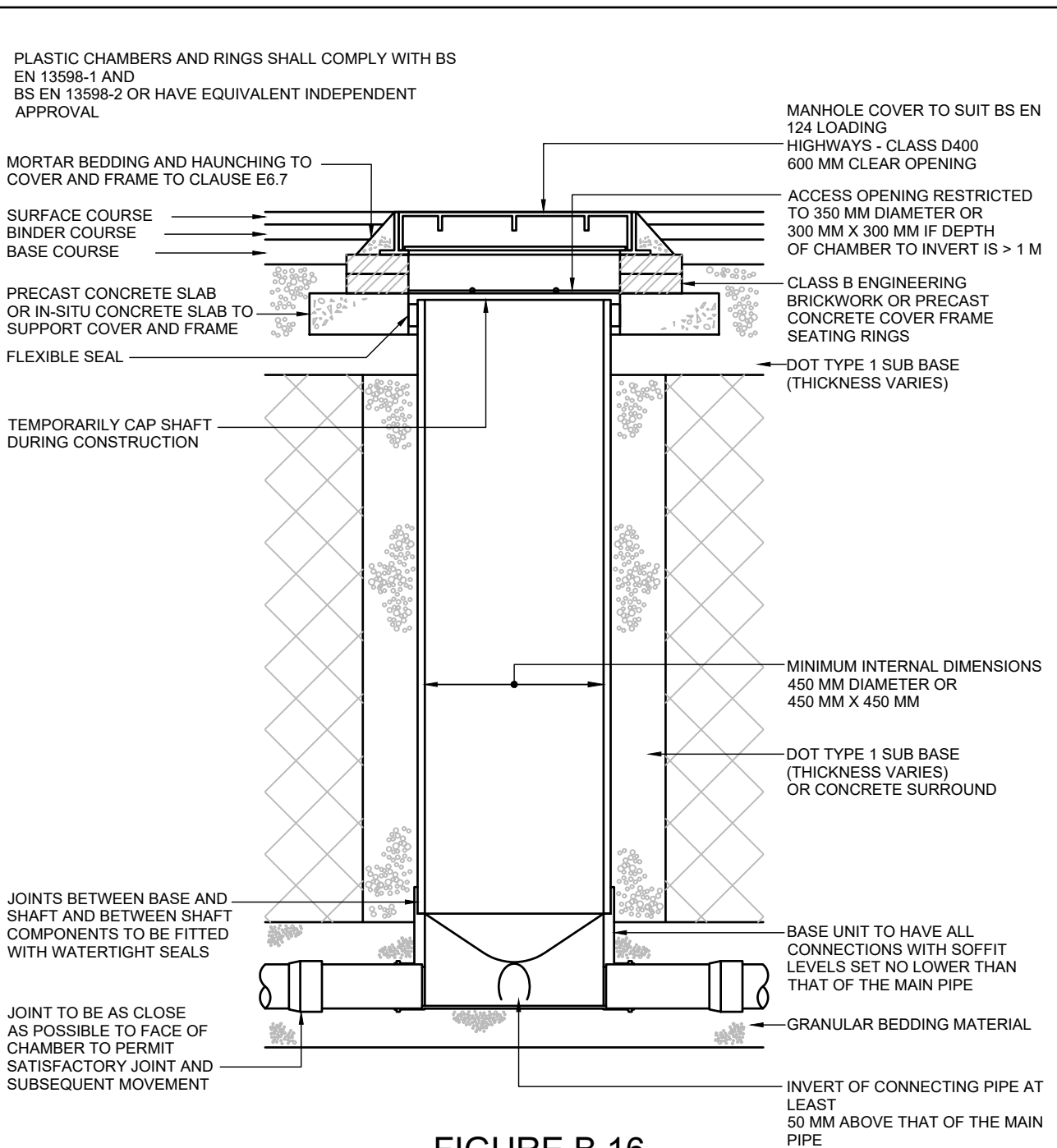
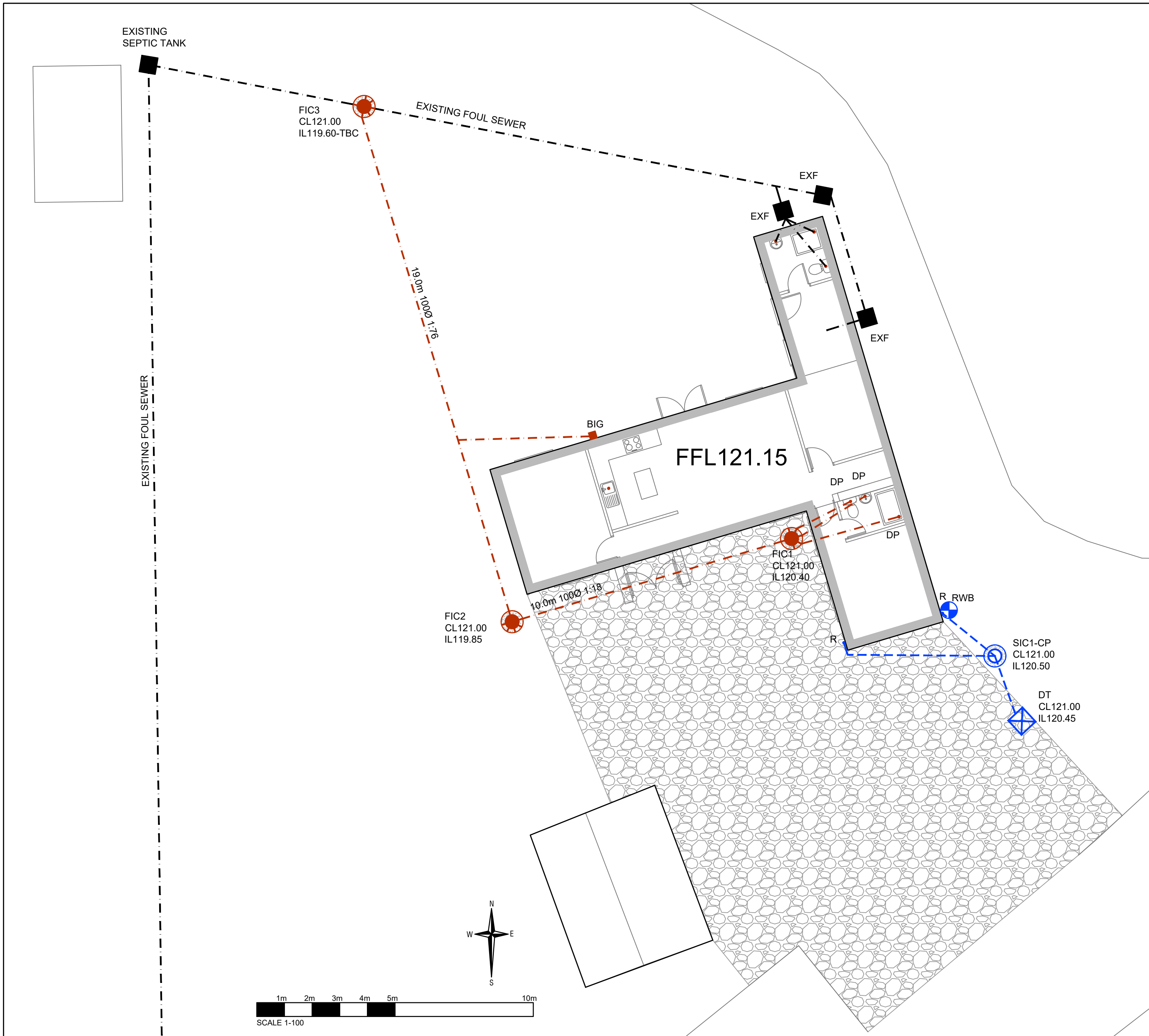
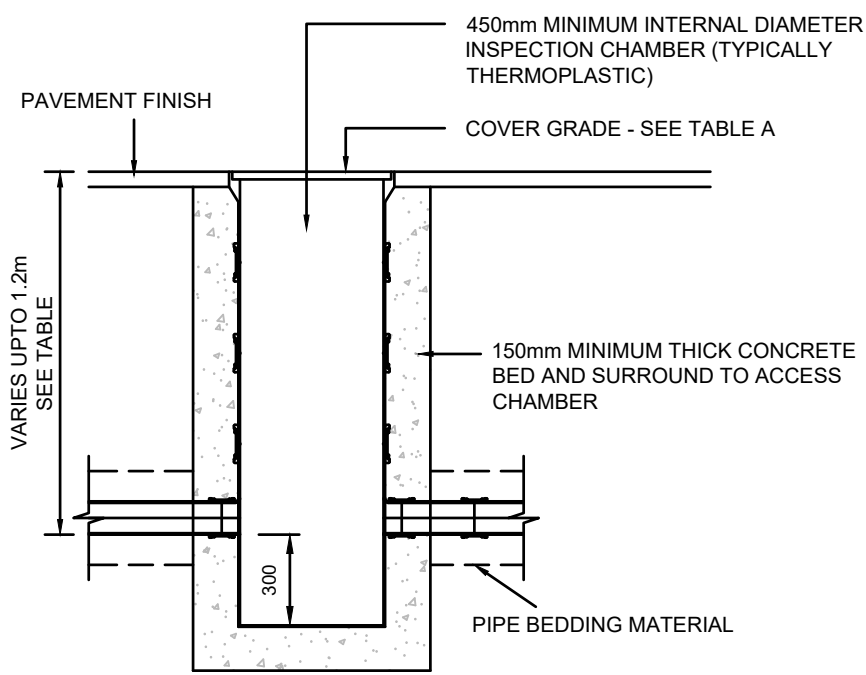


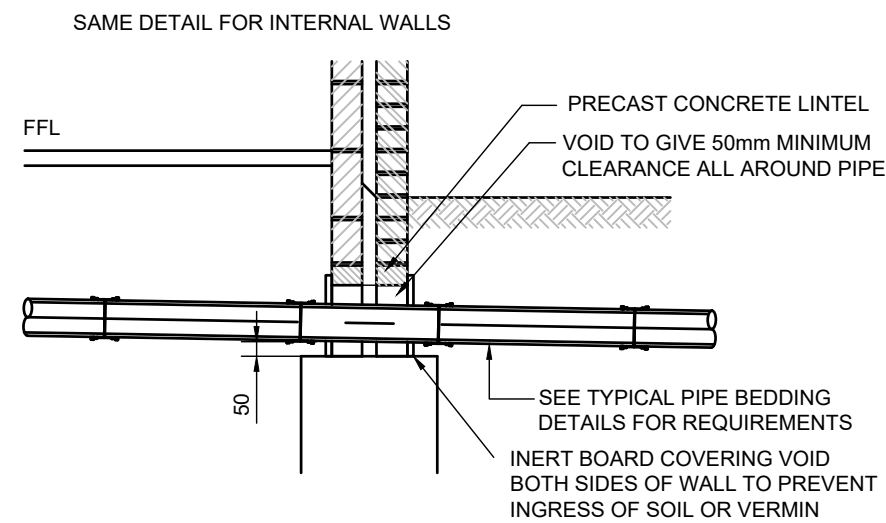
FIGURE B.16
TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3
(FLEXIBLE MATERIAL DETAIL)
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
IN AREAS SUBJECT TO VEHICLE LOADING 3 M, NON-ENTRY
NTS

DRAWING LEGEND	
SURFACE WATER DRAINAGE	
EXSMH	EXISTING SURFACE WATER MANHOLE
---	EXISTING SURFACE WATER SEWER
SIC	INSPECTION CHAMBER CP DENOTES CATCHPIT
---	SURFACE WATER SEWER
R	RAINWATER PIPE
RWB	RAINWATER BUTT
DT	708x708x150 PERMAVOID DISTRIBUTION TANK
	EXISTING GRAVEL DRIVE
FOUL WATER DRAINAGE	
	EXISTING FOUL MANHOLE
---	EXISTING FOUL WATER SEWER
FIC	INSPECTION CHAMBER
---	FOUL WATER SEWER

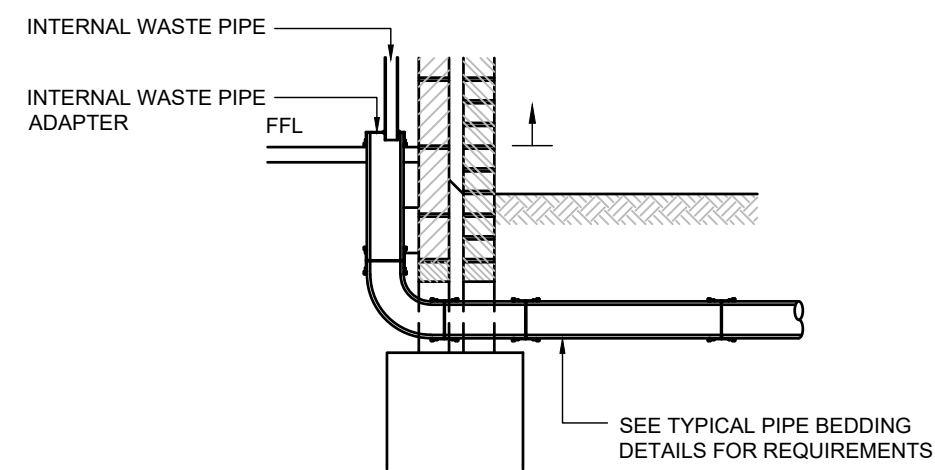
- NOTES
- CONTRACTORS MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK ON SHOP DRAWINGS
- DO NOT SCALE FROM THIS DRAWING
- REPORTS4PLANNING COPYRIGHT
- NOTES
1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.
 2. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERING DRAWINGS AND CALCULATIONS ASSOCIATED WITH THIS PROJECT.
 3. ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.
 4. THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING OUT DIMENSIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTNESS OF THE POSITION, LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.
 5. ALL DRAINAGE TO BE INSTALLED AND TESTED IN COMPLIANCE WITH THE BUILDING REGULATIONS DRAINAGE AND WASTE DISPOSAL APPROVED DOCUMENT H CURRENT EDITION.
 6. SMALL LIGHTWEIGHT ACCESS COVERS SHOULD BE SECURED (FOR EXAMPLE WITH SCREWS) TO DETER UNAUTHORISED ACCESS.
 7. INSITU CONCRETE FOR USE IN GENERAL DRAINAGE WORKS, GRADE TO BS: 5328.
 8. ALL PIPES TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.



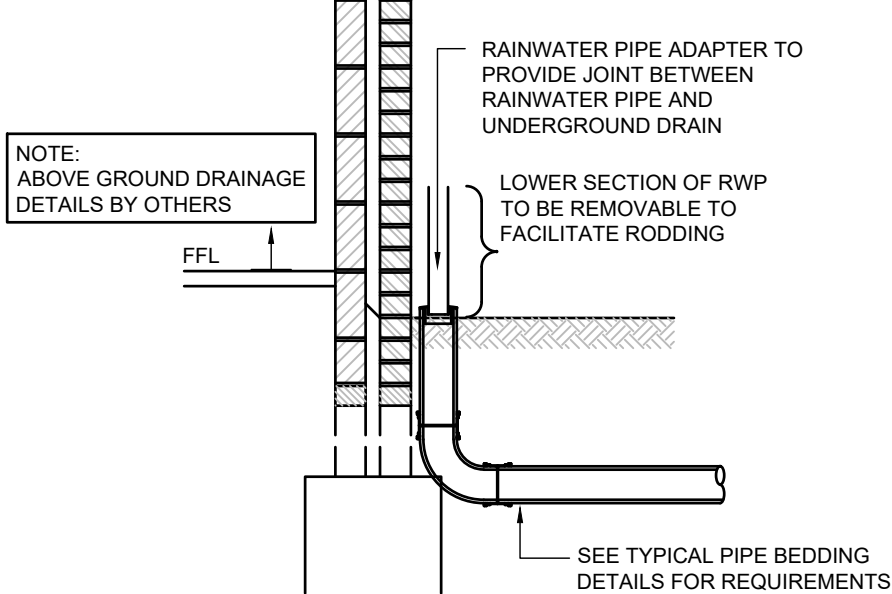
TYPICAL MEDIUM DEPTH PPIC SILT TRAP DETAIL
FOR USE IN DRIVEWAYS/CAR PARKING AREAS
(NOT SUBJECT TO HEAVY VEHICLE LOADING)
SCALE 1:25



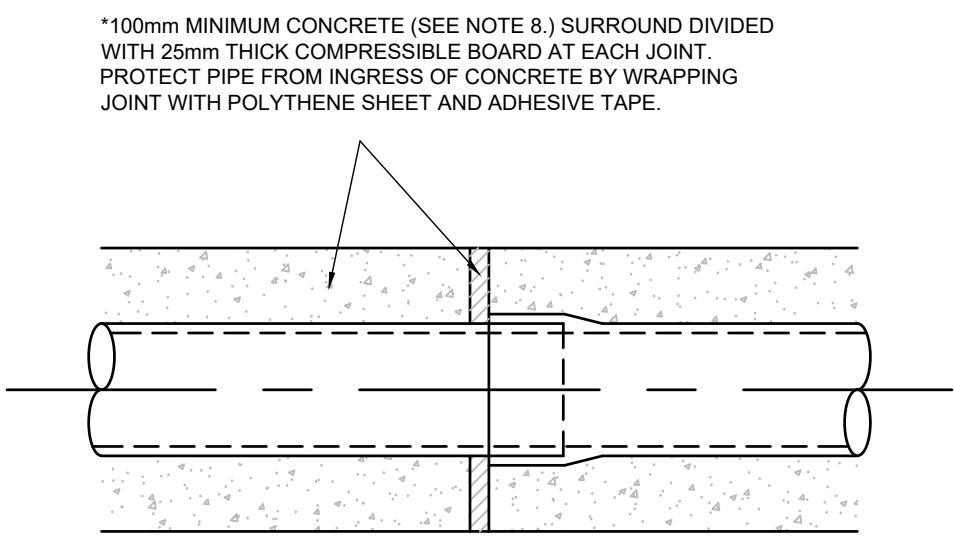
TYPICAL SECTION OF DRAIN PASSING
OVER FOUNDATION
SCALE 1:25



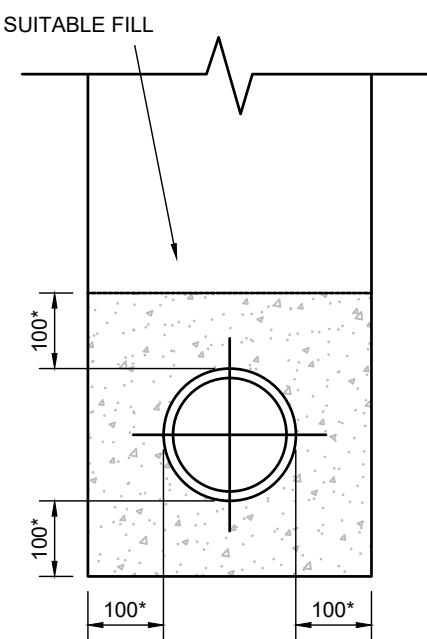
TYPICAL INTERNAL WASTE PIPE
CONNECTION DETAIL
SCALE 1:25



TYPICAL RAINWATER PIPE
CONNECTION POINT DETAIL
SCALE 1:25



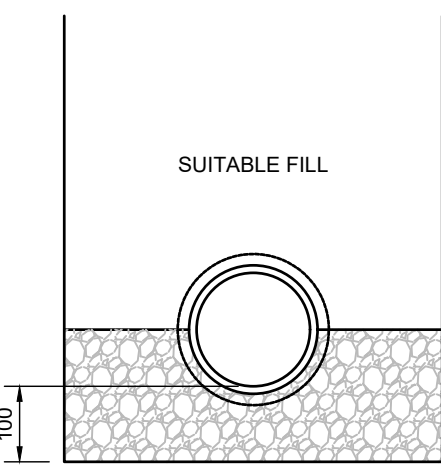
SIDE ELEVATION
TYPE Z BEDDING (CONCRETE ENCASED PIPES) FOR PIPES
WITH LESS THAN 1.2m COVER
NOT TO SCALE



CROSS SECTION
TYPE Z BEDDING (CONCRETE ENCASED PIPES) FOR PIPES
WITH LESS THAN 1.2m COVER
NOT TO SCALE

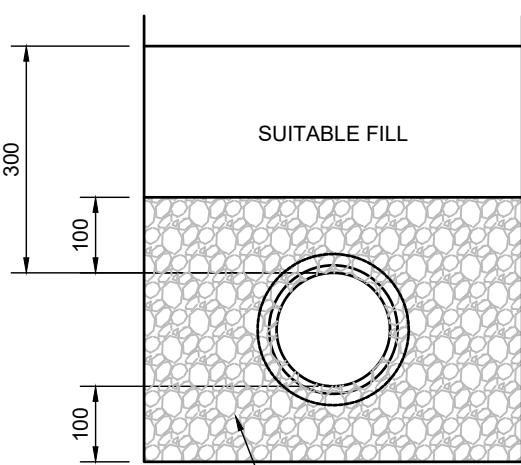
NOTE :
ALL PIPE BEDDING MATERIAL TO BE
IMPORTED GRANULAR MATERIAL.

FOR RIGID PIPES:
eg. CLAYWARE, CONC.



CLASS B PIPE BEDDING

FOR FLEXIBLE PIPES: eg.
THERMOPLASTIC

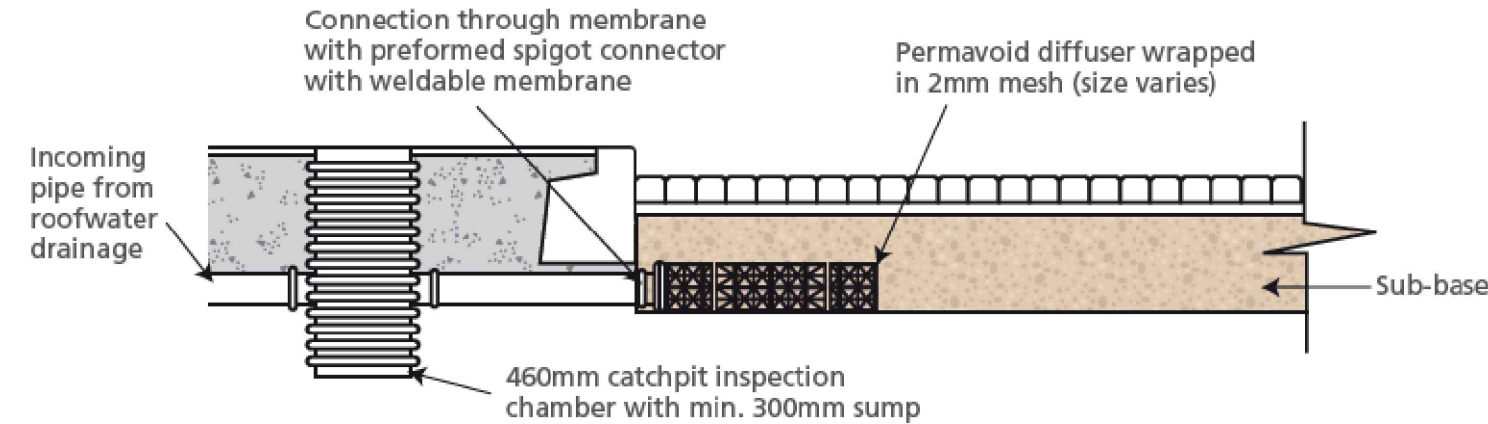


TYPE S PIPE BEDDING

TYPICAL PIPE BEDDING DETAILS

SUITABLE FILL - THE SUITABLE FILL SHALL BE SUITABLE FOR THE LOCATION AND SHALL BE CAREFULLY COMPACTED TO PROVIDE A STABLE FILL WITHOUT DAMAGING THE PIPE. FILL UNDER CAR PARKING AREAS, SHARED DRIVES AND PRIVATE ROADS SHALL BE WELL COMPACTED GRADED GRANULAR MATERIAL. FILL UNDER ADOPTABLE ROADS MAY NEED TO BE TYPE 1 GRANULAR SUB-BASE MATERIAL - CHECK WITH HIGHWAY AUTHORITY IF APPROPRIATE.

GRANULAR MATERIAL - FOR RIGID PIPES THE GRANULAR MATERIAL SHOULD CONFORM TO BS EN: 1510 Annex B Table B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UPTO A MAXIMUM SIZE OF 10mm FOR 100mm DIAMETER PIPES, 14mm FOR 150mm DIAMETER PIPES, 20mm FOR PIPES FROM 150mm TO 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.



TYPICAL DISTRIBUTION TANK ARRANGEMENT
SCALE NTS

P2	PRELIMINARY ISSUE	15.08.2025	RAC
P1	PRELIMINARY ISSUE	02.08.2025	RAC
REV	AMENDMENT	DATE	CHKD
DRAWING STATUS			
PRELIMINARY			
BROWN FISHER ENVIRONMENTAL REPORTS 4 PLANNING			
CLIENT			
LEE SMALLWOOD			
PROJECT			
PROPOSED RESIDENTIAL DEVELOPMENT EILING LODGE, DRIVERS END LANE CODICOTE, SG4 8TP			
DRAWING TITLE			
DRAINAGE LAYOUT			
CIVILS			
SCALE	DRAWN BY	CHECKED	DATE
AS SHOWN @ A1	STC	RAC	AUG 2025
DRAWING NUMBER			REVISION
7591-CIV-10			P2

APPENDIX C – Post-development Surface Water Calculations



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	0.0
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)	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)	Width (mm)	Depth (m)
SIC1	0.002	5.00	121.000	450		0.500
DRIVE	0.023		121.000	700	700	0.550

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	SIC1	DRIVE	5.000	0.600	120.500	120.450	0.050	100.0	100	5.11	0.0

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	0.0	0.400	0.450	0.002	0.0	0	0.000

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	5.000	100.0	100	Circular	121.000	120.500	0.400	121.000	120.450	0.450

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
1.000	SIC1	450	Manhole	Adoptable	DRIVE	700	700	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	121.000	0.500	450					
						0	1.000	120.500
DRIVE	121.000	0.550	700	700	1	1.000	120.450	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)	10080
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	35	0	0

Node DRIVE Online Head/Flow Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	120.450
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Head (m)	Flow (l/s)
0.001	0.000

Node DRIVE Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	120.550	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00360	Time to half empty (mins)	1320	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.000		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	SIC1	585	120.762	0.262	0.1	0.0417	0.0000	FLOOD RISK
600 minute winter	DRIVE	585	120.762	0.312	1.1	12.2816	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	SIC1	1.000	DRIVE	-0.1	-0.017	-0.017	0.0391	
600 minute winter	DRIVE	Head/Flow		0.0				0.0
600 minute winter	DRIVE	Infiltration		0.1				



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	0.0
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)	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)	Width (mm)	Depth (m)
SIC1	0.002	5.00	121.000	450		0.500
DRIVE	0.023		121.000	700	700	0.550

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	SIC1	DRIVE	5.000	0.600	120.500	120.450	0.050	100.0	100	5.11	0.0

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	0.0	0.400	0.450	0.002	0.0	0	0.000

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	5.000	100.0	100	Circular	121.000	120.500	0.400	121.000	120.450	0.450

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
1.000	SIC1	450	Manhole	Adoptable	DRIVE	700	700	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	121.000	0.500	450					
						0	1.000	120.500
DRIVE	121.000	0.550	700	700	1	1.000	120.450	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)	10080
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node DRIVE Online Head/Flow Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	120.450
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Head (m)	Flow (l/s)
0.001	0.000

Node DRIVE Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	120.550	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00360	Time to half empty (mins)	2130	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.000		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

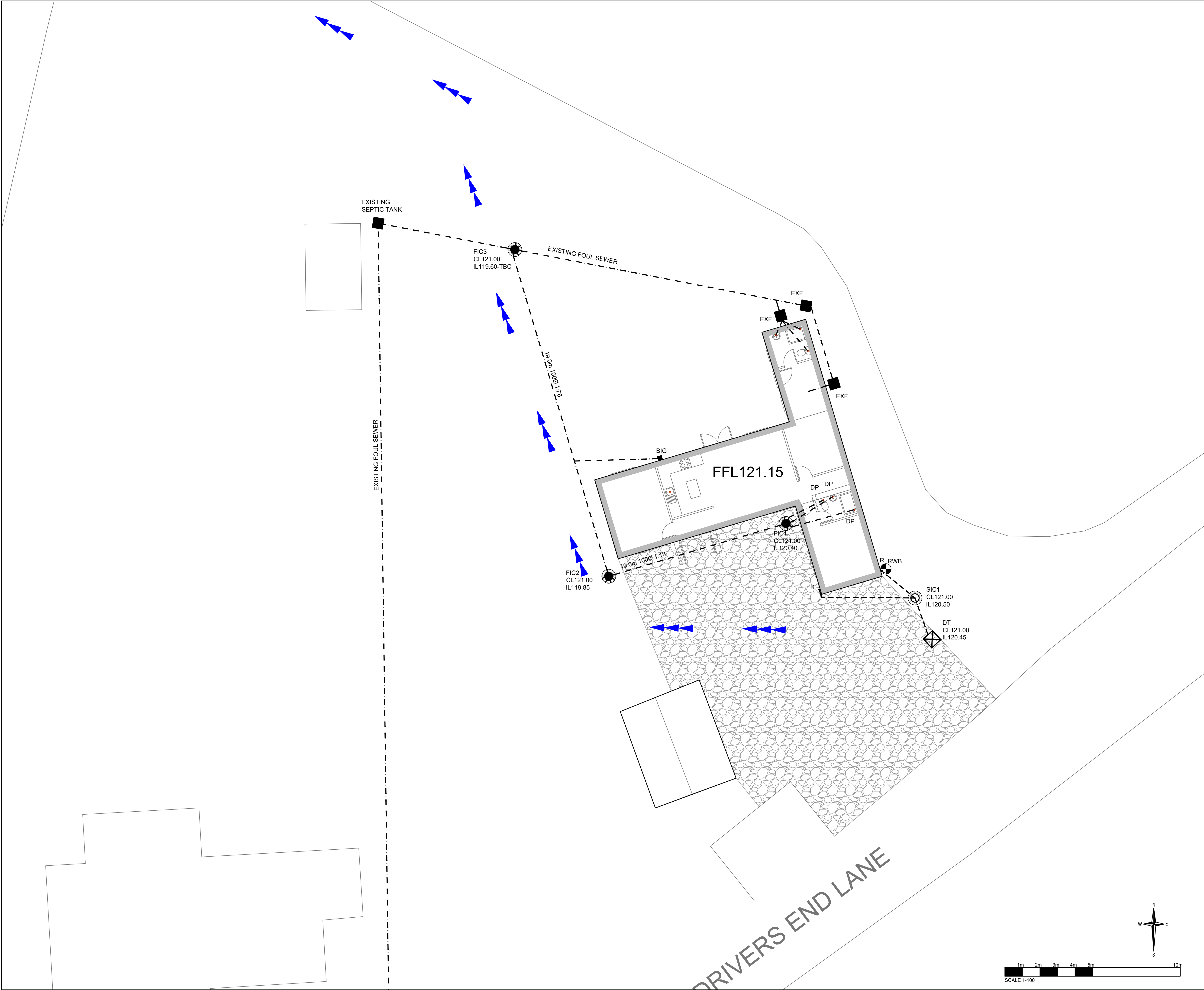
Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	SIC1	900	120.843	0.343	0.1	0.0545	0.0000	FLOOD RISK
960 minute winter	DRIVE	900	120.843	0.393	1.0	17.1762	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	SIC1	1.000	DRIVE	0.1	0.012	0.015	0.0391	
960 minute winter	DRIVE	Head/Flow		0.0				0.0
960 minute winter	DRIVE	Infiltration		0.1				

APPENDIX D – Flood Exceedance Plan



NOTES
CONTRACTORS MUST VERIFY ALL DIMENSIONS ON SITE BEFORE
COMMENCING ANY WORK ON SHOP DRAWINGS
DO NOT SCALE FROM THIS DRAWING
REPORTS4PLANNING COPYRIGHT

EXISTING AND PROPOSED
FLOOD EXCEEDANCE ROUTE

P2	PRELIMINARY ISSUE:	15.08.2025	RAC
P1	PRELIMINARY ISSUE:	04.08.2025	RAC
REV	AMENDMENT	DATE	CHKD

DRAWING STATUS

PRELIMINARY



**BROWN FISHER
ENVIRONMENTAL
REPORTS 4 PLANNING**

CLIENT
LEE SMALLWOOD

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
EILING LODGE, DRIVERS END LANE
CODICOTE, SG4 8TP

DRAWING TITLE
FLOOD EXCEEDANCE PLAN

CIVILS

SCALE AS SHOWN @ A1	DRAWN BY STC	CHECKED RAC	DATE AUG 2025
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DRAWING NUMBER 7591-CIV-11	REVISION P2
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