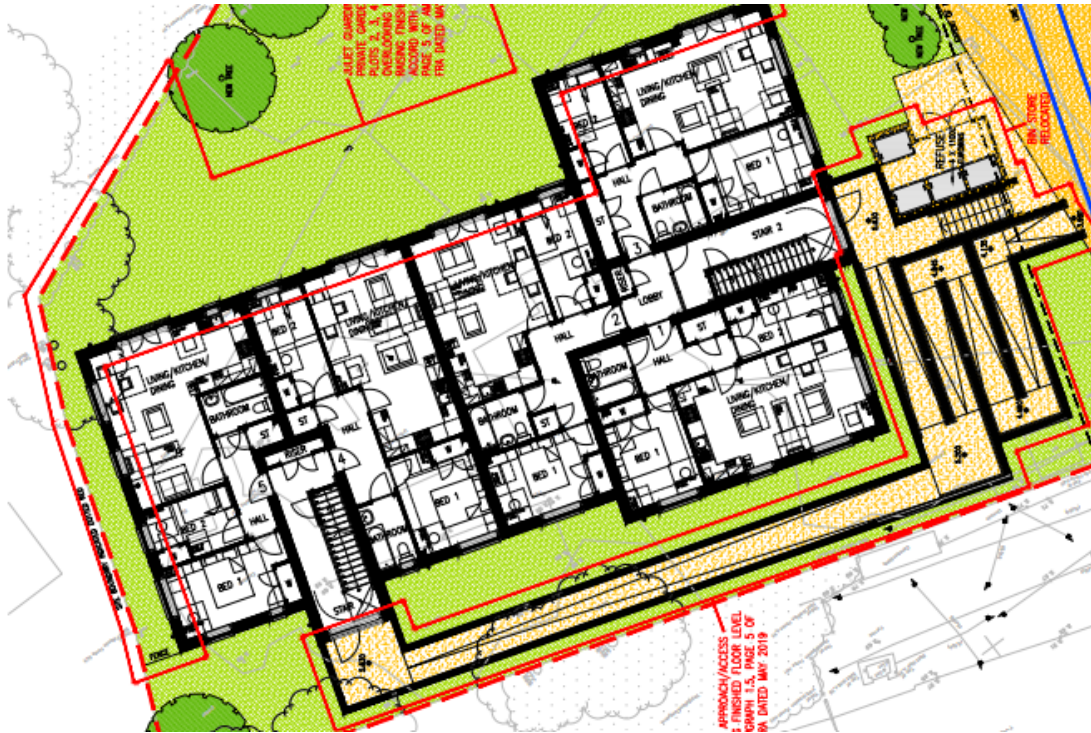


Drainage Strategy Report



Wilson & Partners LLP

South East Regional Office

Studio 19
Canterbury Innovation Centre
University Road
Canterbury
Kent
CT2 7FG

T: 01227 696100

Registered Office

Trident House
Grassington Rd
Sidcup
DA14 6BY

Document Revision History

Project: 2580
Document: 6001
Document Ref: 2580/6001
Author: RAC
Date: 20th January 2026

Revision	Description	Author	Checked	Date
00	Drainage strategy report.	RAC	MS	20.01.2026

Table of Contents

Executive Summary.....	3
1.0 Existing Drainage.....	5
2.0 Proposed Drainage Strategy.....	5
2.1 Surface Water Drainage.....	5
3.2 Foul Water Drainage	7
4.0 Surface Water Flows.....	8
4.1 Existing and proposed site run-off flows	8
4.2 Existing and proposed site run-off volumes.....	8
5.0 Attenuation	8
6.0 Sustainable Urban Drainage Systems (SUDS)	9
6.1 Infiltration Devices	10
6.2 Brown/Green Roofs	11
6.3 Rainwater Harvesting.....	12
6.4 Porous Paving.....	13
6.5 Below Ground Attenuation	14
6.6 Wetlands.....	15
8.0 Management and Maintenance of SUDS	16
9.0 Contamination mitigation	17

Executive Summary

This alternative surface water drainage strategy aims to satisfy the discharge of condition 4 for approved variation of condition 2 planning 20250262 of original planning permission reference number 20190520 for the erection of a three storey building to form 14no. two bedroom self-contained flats; to allow increase in building height, a new ramped and stepped approach to both principle entrances along with omitting private gardens to Units 2, 3, 4 & 5.

It should be noted that the original Wilson Building Consultancy scheme for sustainable surface water drainage submitted 09.09.2022 and approved 04.11.2022 under original planning permission 20190520 (reference 20220991) is not referred to in the approval notice 20250262 dated 20.08.2025 and to which this document refers.

Wilson & Partners LLP have been re-appointed to design the alternative surface water and foul water drainage aspects of the development to satisfy the approved variation of condition 2 planning 20250262 at the Builders Yard, Lower Range Road, Gravesend, Kent, DA12 2QL.

This new report outlines the strategy for the surface water drainage for the proposed development with reference to Ciria 753, the SUDS manual, the NPPF, the National Planning Policy Framework and the Kent County Council drainage and planning policy – a local flood risk management strategy document dated December 2019.

The site is Brownfield with an area of approximately 0.17Ha. The site is a former builder's yard with an impermeable area of approximately 0.09Ha.

The proposed development includes a total roof area of 400m², a 350m² permeable carpark and a 120m² impermeable access road.

The British Geological Survey website shows the site to be underlain by superficial deposits of Alluvium and Taplow Gravel over bedrock of the Upper Chalk Formation. This alternative scheme utilises deep bore soakaway dispersal as an alternative surface water dispersal to the approved previous scheme which discharged into an adjacent sewer found not to be possible since the previous approval under 20190520 (ref 20220991)

Deep bore soakage testing results on site have confirmed an infiltration rate of 2.1x10⁻⁵m/s.

To accord with Environment Agency requirements a climate change of 45% and 35% has been applied to the 1 in 100 year and 1 in 30 year storm events respectively. The calculations confirm that no flooding occurs and the half drain time is less than 24 hours.

FEH 2022 data has been used in all calculations together with a Cv value of 1.0.

1.0 Existing Drainage

The site is Brownfield with an area of approximately 0.17Ha. The site is a former builder's yard with an impermeable area of approximately 0.09Ha.

The existing site layout is shown in Appendix A.

The British Geological Survey website shows the site to be underlain by superficial deposits of Alluvium and Taplow Gravel over bedrock of the Upper Chalk Formation. Deep Bore soakage testing results confirmed and infiltration rate of $2.1 \times 10^{-5} \text{m/s}$. A copy of the testing is shown in Appendix A.

HR Wallingford Greenfield surface water calculations are shown in Appendix B.

2.0 Proposed Drainage Strategy

The proposed development includes an apartment block with a total roof area of 400m², a 130m² ramp, a 350m² permeable carpark and a 120m² impermeable access road.

Surface water from the roof and hard landscape areas will discharge to a deep bore soakaway.

Foul drainage will discharge to the existing foul sewer in Lower Range Road.

The Drainage Layout is shown in Appendix C.

2.1 Surface Water Drainage

To accord with Environment Agency requirements a climate change of 45% and 35% has been applied to the 1 in 100 year and 1 in 30 year storm events respectively. The calculations confirm that no flooding occurs and the half drain time is less than 24 hours.

FEH 2022 data has been used in all calculations together with a Cv value of 1.0.

2.1.1 Proposed Infrastructure

It is proposed that the surface water drainage system will take the form of a network of pipes transferring surface water from the building and hard landscaped areas and will discharge to a SUDs system that includes porous paving, geocellular storage, catchpits and a deepbore soakaway.

2.1.2 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.

In accordance with the Local Water Authority guidance a flood exceedance plan shown in Appendix E indicates the routes water will take in the unlikely event of SUDS failure.

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.

3.2 Foul Water Drainage

3.2.1 Proposed Infrastructure

Foul drainage from the buildings will be collected via pipes and will discharge to the existing foul sewer in Lower Range Road.

It is estimated that average daily foul water flows will be 1.0l/s.

3.2.2 Standards

The performance of the foul drainage system has been designed to Sewers for Adoption current Edition, 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 – plastic pipes.
- 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.

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.

4.0 Surface Water Flows

4.1 Existing and proposed site run-off flows

Pre-development surface water calculations are shown in Appendix B.

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

The 1 in 100-year storm event calculations with a 45% climate change allowance show that no flooding occurs and that the half drain time is less than 24 hours.

All drainage discharges via infiltration so the flow rates for the pre and post development sites have not been summarized.

4.2 Existing and proposed site run-off volumes

Pre-development surface water calculations are shown in Appendix B.

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

All drainage discharges via infiltration so the flow rates for the pre and post development sites have not been summarized

5.0 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 6 below.

The proposed drainage design includes porous paving parking area, a geocellular storage tank and a deep-bore soakaway.

6.0 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 (in this instance infiltration), then retain the runoff by using below ground storage (porous paving and a geocellular storage tank) which will release surface water at an agreed rate to limit the impact of the development on drainage infrastructure and therefore reduce the potential for flooding.

6.1 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.

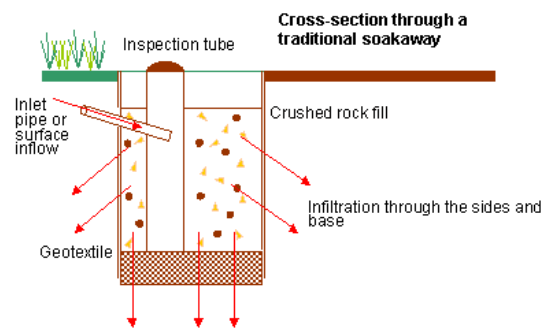


Figure 1 – Typical cross section through infiltration trench

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 – **Yes**, a deep-bore soakaway is proposed.

6.2 Brown/Green 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.

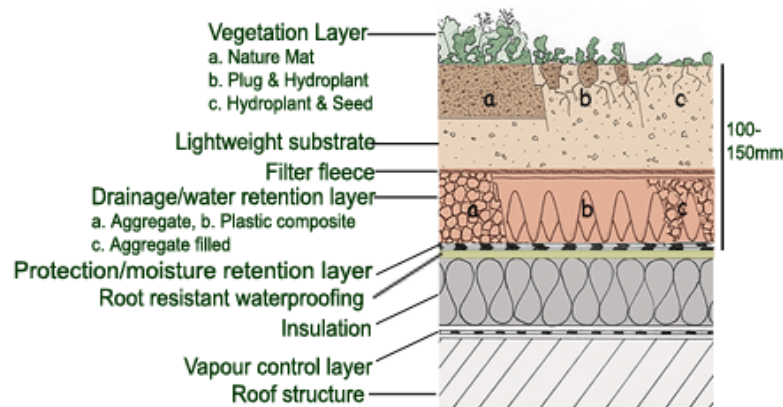


Figure 2 – Typical section through green roof build up

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 style of development will not include the use of Green roof construction.

6.3 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 – **No**, the average annual rainfall together with water demand for each apartment makes the installation of rainwater harvesting tanks unviable.

6.4 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.

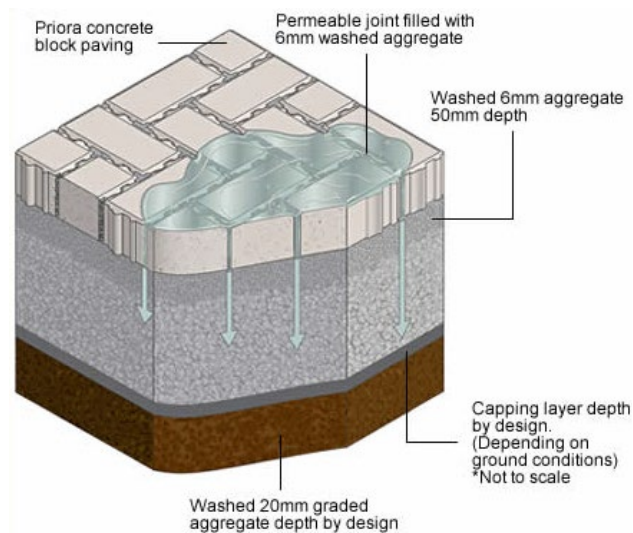


Figure 3 – Typical section through porous paving

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 – **Yes**, porous paving is proposed.

6.5 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 off-line storage.

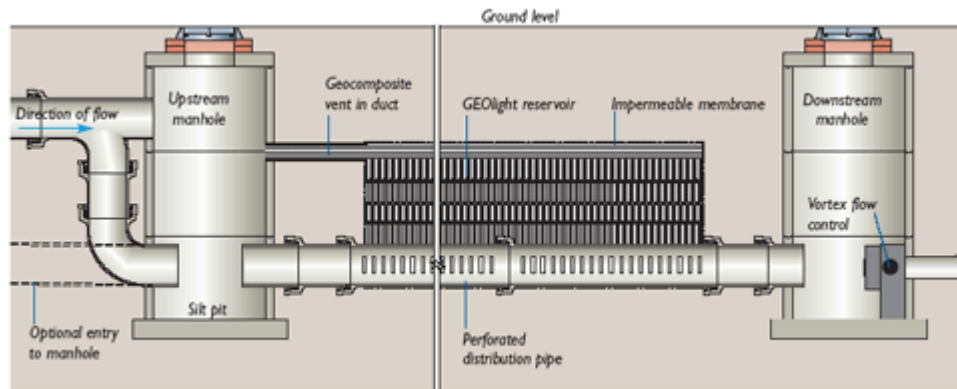


Figure 5 – Typical section through below ground attenuation chamber (cellular storage)

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 – **Yes**, a geocellular storage tank is proposed.

6.6 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.

6.7 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 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.

6.8 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 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.

7.0 Proposed SUDS solution

It is advised that a combination of Sustainable Drainage Systems (SUDS) is used to increase the time of concentration of the surface water system, this is achieved by using a deep-bore soakaway where infiltration will limit the discharge rate.

Attenuation will be provided with tanked porous paving and a geocellular storage tank.

8.0 Management and Maintenance of SUDS

A management company will be appointed to complete routine maintenance of the development including all SUDs elements.

A copy of the SUDS operation and maintenance schedule is shown in Appendix F.

9.0 Contamination mitigation

The British Geological Survey website shows the site to be underlain by superficial deposits of Alluvium and Taplow Gravel over bedrock of the Upper Chalk Formation.

The site lies above a principal bedrock aquifer and a secondary undifferentiated superficial deposit aquifer and the Groundwater vulnerability is medium.

Ciria 753 Chapter 26 Mitigation indices:

Pre-development pollution indices:

Site construction compound is identified in Table 26.2 as medium pollution hazard level;

Roofs: Total Solids = 0.7, Metals = 0.6 and Hydrocarbons = 0.7

The mitigation index is therefore $MI = 0.7 + 0.5 \times 0.6 + 0.5 \times 0.7 = 1.35$

Post-development pollution indices:

Residential development 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 index is lower than the pre-development site and the proposed porous paving will provide a betterment, therefore no further mitigation is required.

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	1	15	15
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	3	10	30
7	Soil organic matter	1	5	5
8	Unsaturated zone ph	1	5	5
Total				140

Based upon the above table the risk to groundwater is low as the total value is less than 180.

Appendix A

Topographical survey and infiltration results





Permeability Calculation Sheet (after BS-EN-ISO 22282-1&2)
PRELIMINARY

Client Gravesham Borough Council

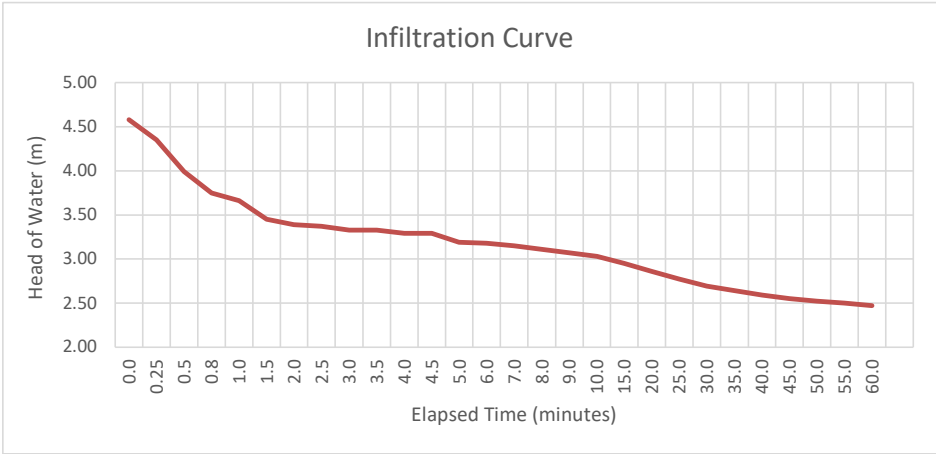
Project Gravesend Lower Range Road

Job Number 1779

Date 16/12/2025

Parameter	Units	BH Reference	
Borehole Location		BH3	
Test Cycle		IT1	
Borehole Depth	m	4.58	
Diameter	m	0.05	
Uncased length	m	3.58	
Length/Diameter (L/D)		71.60	
Area	m ²	0.56	
H1 = Head measured at time T1	m	4.58	
H5 = Head measured at time T2	m	2.47	
H1/H5	Dip	1.85	Head (m)
Time T1	0	0.0	4.58
	0.23	0.25	4.35
	0.59	0.5	3.99
	0.83	0.8	3.75
	0.92	1.0	3.66
	1.13	1.5	3.45
	1.19	2.0	3.39
	1.21	2.5	3.37
	1.25	3.0	3.33
	1.25	3.5	3.33
	1.29	4.0	3.29
	1.29	4.5	3.29
	1.39	5.0	3.19
	1.4	6.0	3.18
	1.43	7.0	3.15
	1.47	8.0	3.11
	1.51	9.0	3.07
	1.55	10.0	3.03
	1.63	15.0	2.95
	1.72	20.0	2.86
	1.81	25.0	2.77
	1.89	30.0	2.69
	1.94	35.0	2.64
	1.99	40.0	2.59
	2.03	45.0	2.55
	2.06	50.0	2.52
	2.08	55.0	2.50
Time T2	2.11	60.0	2.47
Elapsed Time T2-T1	seconds	3600	
Permeability k	m/s	2.1E-05	

Remarks: Groundwater level measured previously as 2.3m below ground level



Appendix B

Pre-development surface water calculations

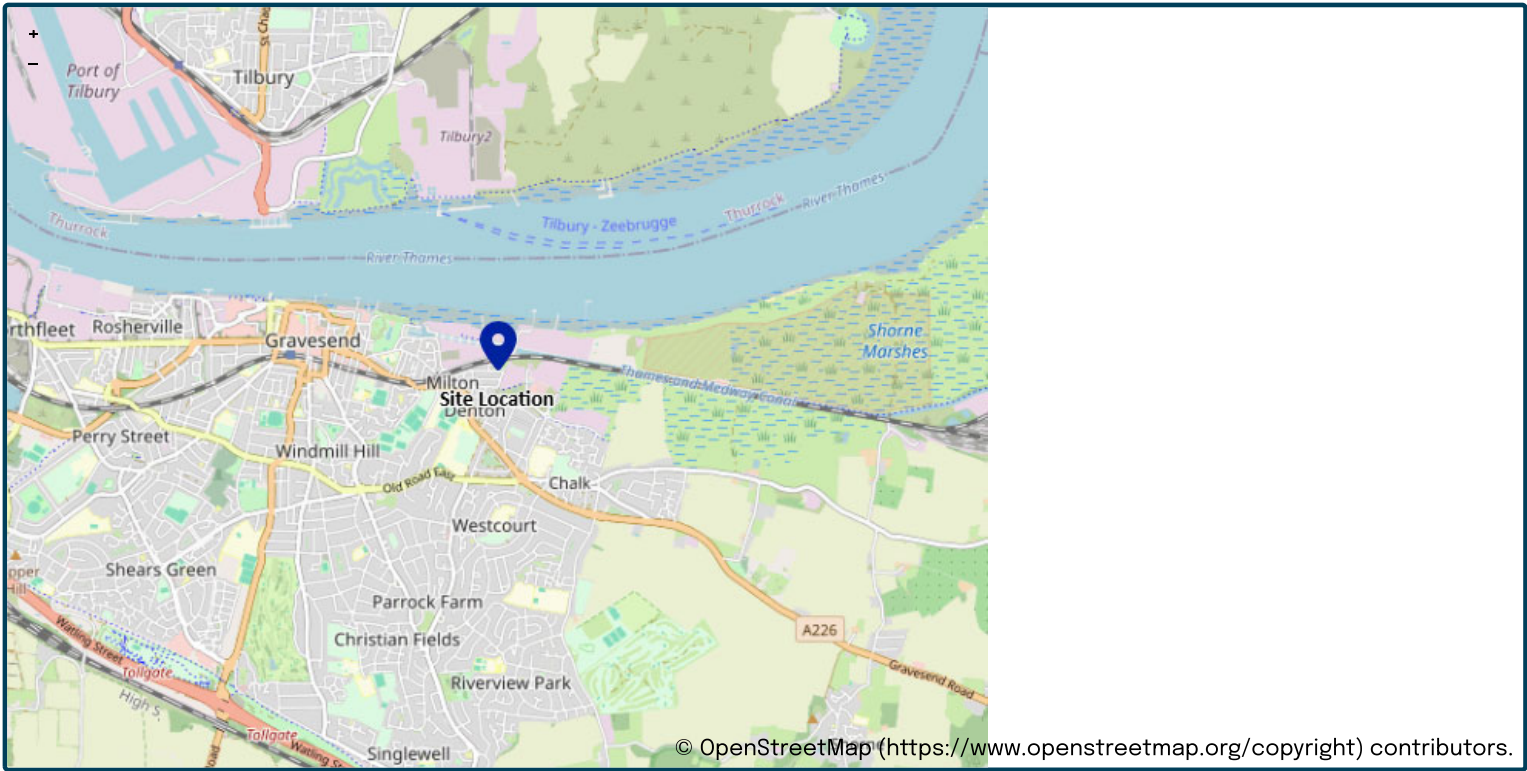
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	19/01/2026
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	BUILDERS YARD
Site location	GRAVESEND



Site easting (British National Grid)	566277
Site northing (British National Grid)	173790

Site details

Total site area (ha)	0.09	ha
----------------------	-----------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	560	mm
BFIHOST19scaled	0.818	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	0.03	l/s
QBar (FEH statistical 2025) (l/s)	0.04	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	0.03
Flow rate 2 year (l/s)	0.03
Flow rate 10 years (l/s)	0.1
Flow rate 30 years (l/s)	0.1
Flow rate 100 years (l/s)	0.1
Flow rate 200 years (l/s)	0.1

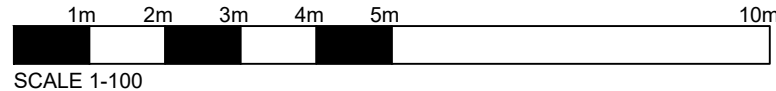
Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix C

Drainage layout



THIS REGISTER IS A NON-EXHAUSTIVE LIST OF RESIDUAL HAZARDS RELATING TO THE WORKS SHOWN ON THIS DRAWING THAT HAVE BEEN IDENTIFIED DURING THE DESIGN STAGE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A CONTRACTOR WITH THE APPROPRIATE SKILLS, KNOWLEDGE & EXPERIENCE, AND IF THEY ARE AN ORGANISATION, THE ORGANISATIONAL CAPABILITY NECESSARY TO FULFILL THE ROLE.

FOUL WATER DRAINAGE	
	EXISTING FOUL MANHOLE
	EXISTING FOUL SEWER
	EXISTING COMBINED MANHOLE
	EXISTING COMBINED SEWER
 FIC	INSPECTION CHAMBER
	PRIVATE FOUL WATER SEWER
 DP	DRAINAGE POINT
 FG	FLOOR GULLY
	SEWER EASEMENT

0 1 2 3 4

Scale 1:50 metres

T02	Tank size and porous depth amended.	RAC	19.01.26	MS
T01	Tender issue	RAC	16.01.26	MS
Rev	Comment	By	Date	Ckd

Client:

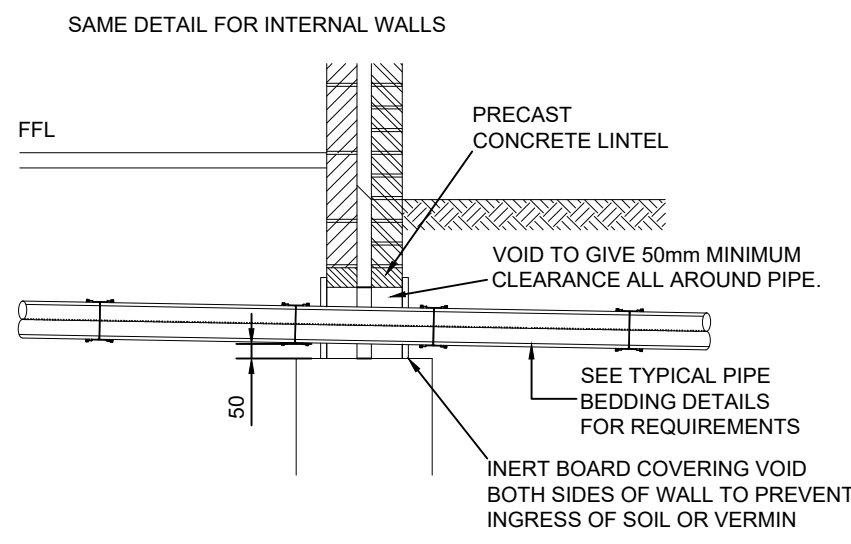
Project Title:

The Builders Yard Residential Dev
Lower Range Road, Gravesend
Kent, DA12 2QL

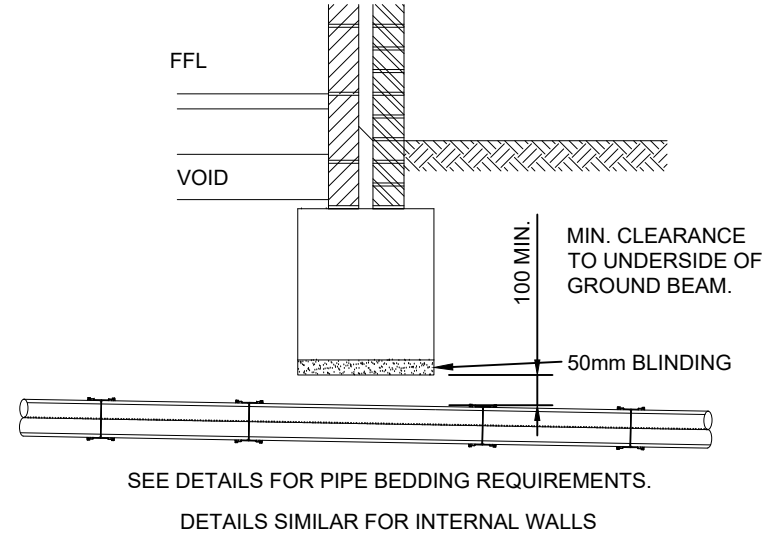
Tender

Original Issue	Drawn	Designed	Checked	Approved
16.01.26	RAC	RAC	MS	MS

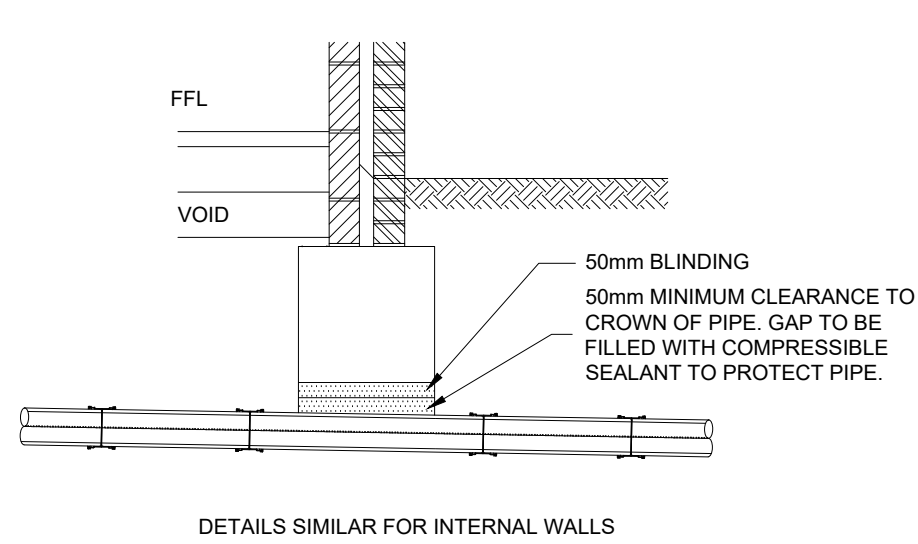
Project No	Originator	Volume	Level
2580	WP	BY	ZZ
Type	Role	Drp No	Revision
DR	C	3100	T02



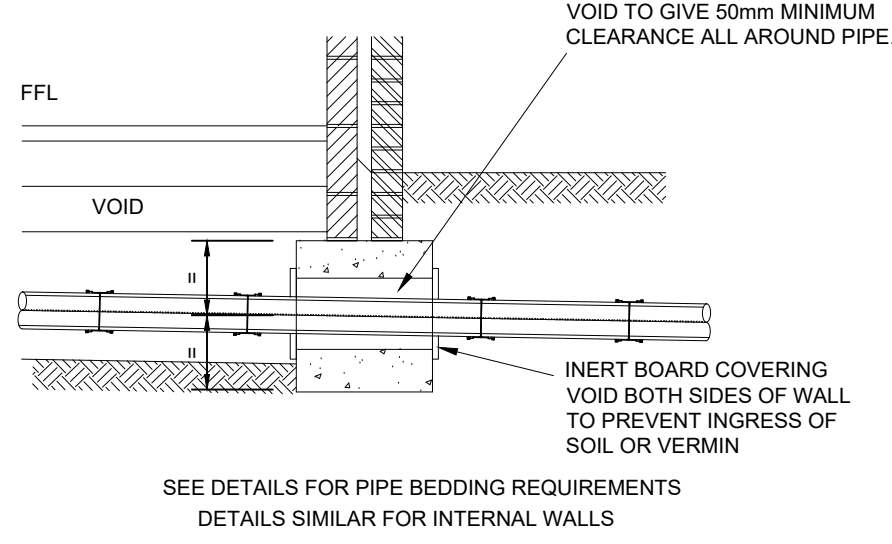
TYPICAL SECTION OF DRAIN PASSING
OVER FOUNDATION
SCALE 1:25



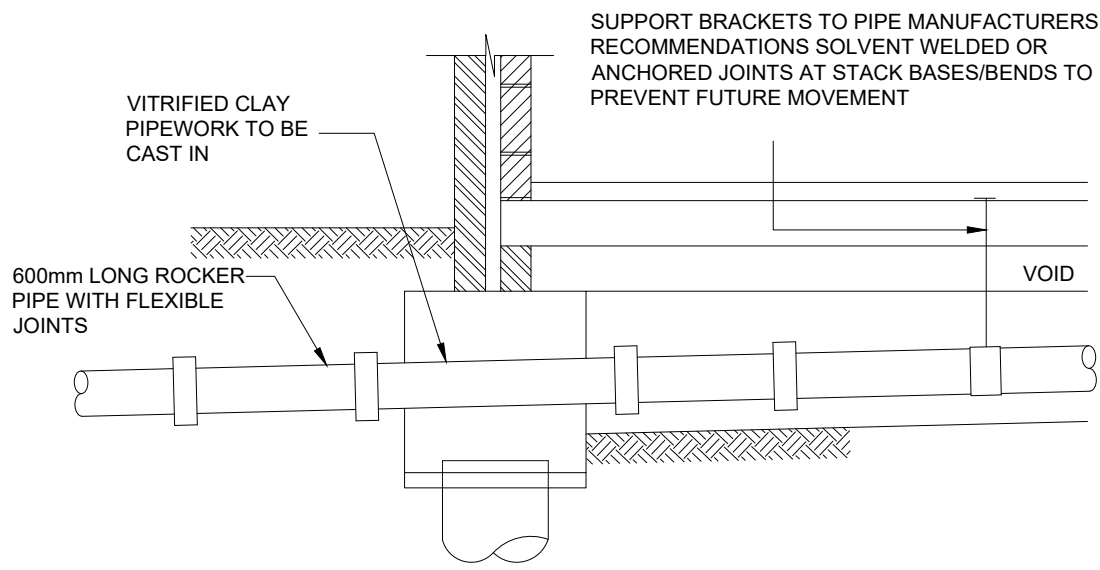
TYPICAL DETAIL OF DRAIN PASSING
UNDER GROUND BEAM
ALTERNATIVE 1
SCALE 1:25



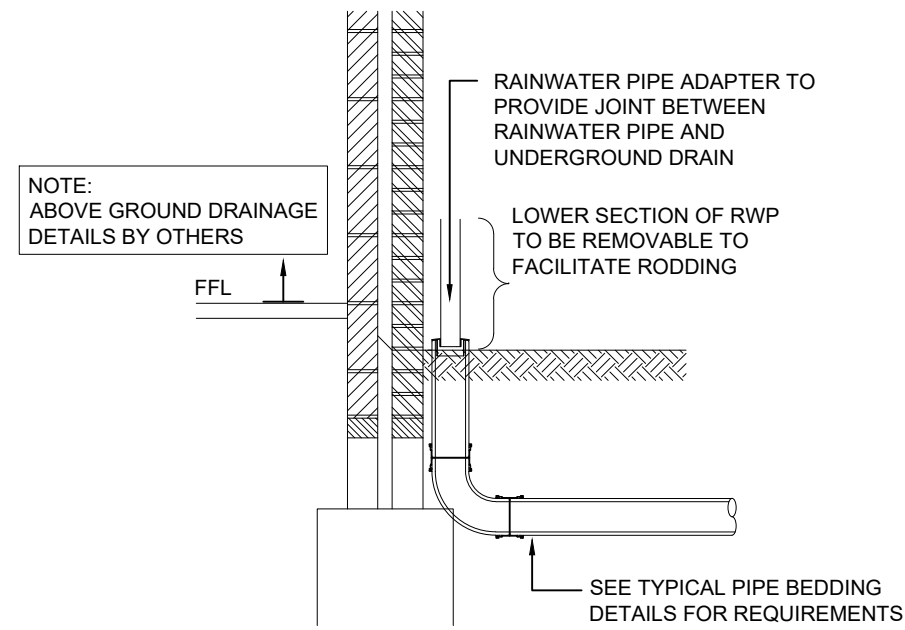
TYPICAL DETAIL OF DRAIN PASSING
UNDER GROUND BEAM
ALTERNATIVE 2
SCALE 1:25



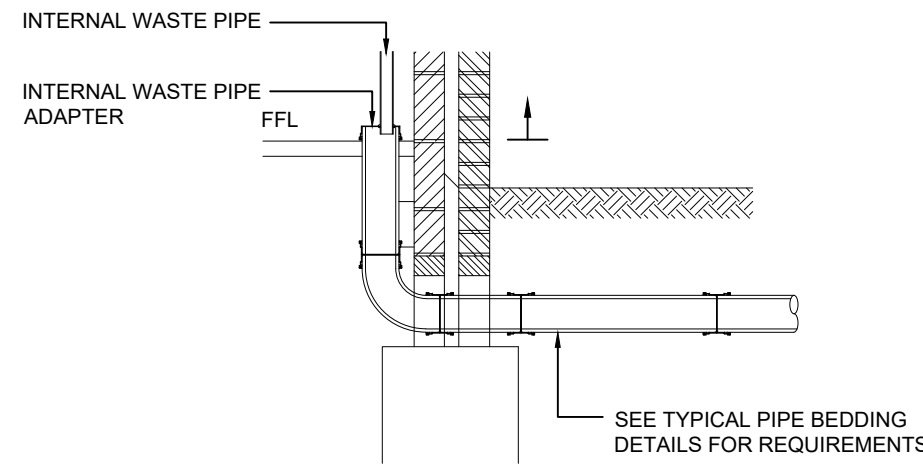
TYPICAL DETAIL OF DRAIN PASSING
THROUGH GROUND BEAM
OPTION 1 (uPVC)
SCALE 1:25



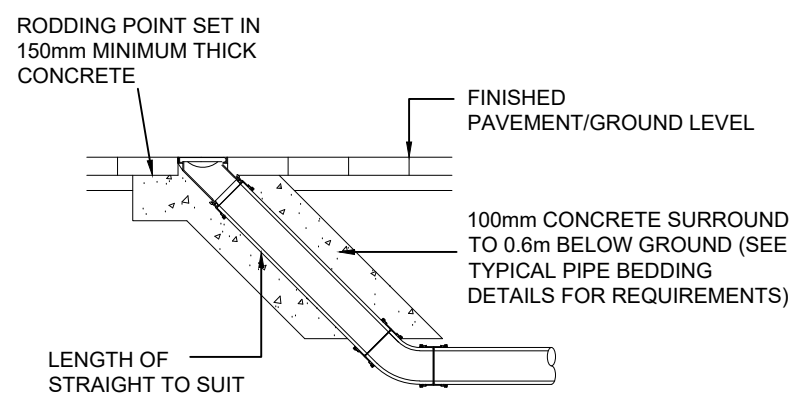
TYPICAL DETAIL OF DRAIN PASSING
THROUGH GROUND BEAM
OPTION 2 (VC)
SCALE 1:25



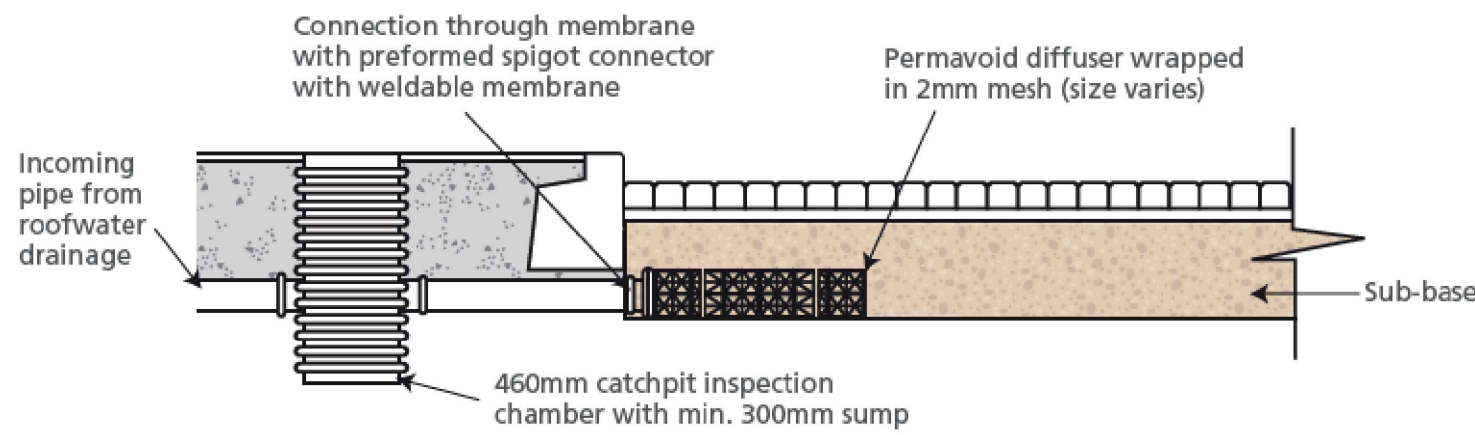
TYPICAL RAINWATER PIPE
CONNECTION POINT DETAIL
SCALE 1:25



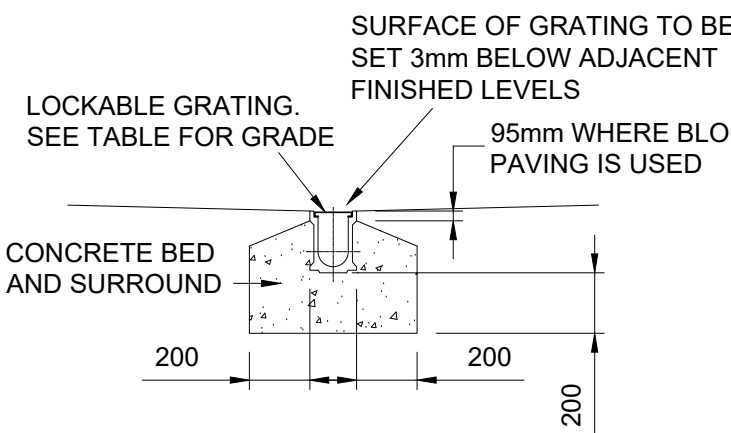
TYPICAL INTERNAL WASTE PIPE
CONNECTION DETAIL
SCALE 1:25



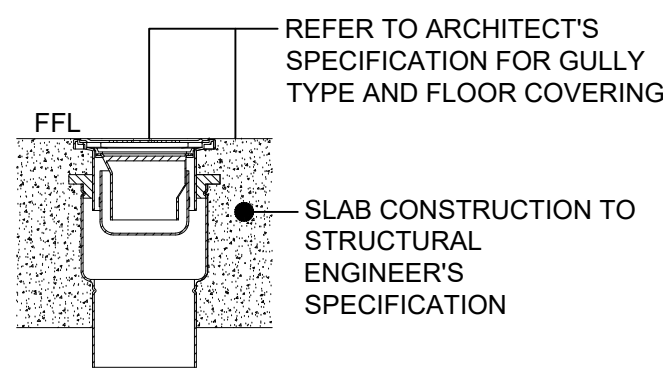
TYPICAL RODDING EYE
ACCESS POINT
SCALE 1:25



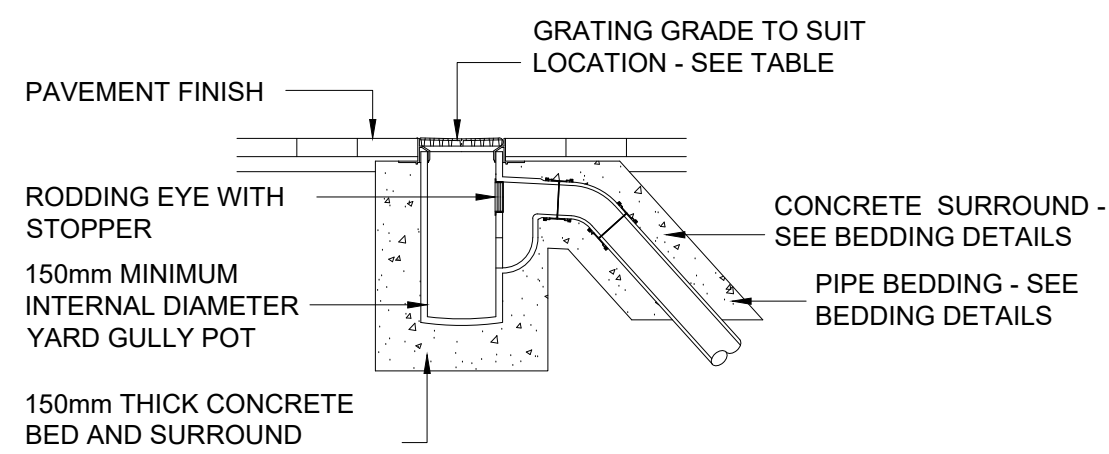
TYPICAL DISTRIBUTION TANK ARRANGEMENT
SCALE NTS



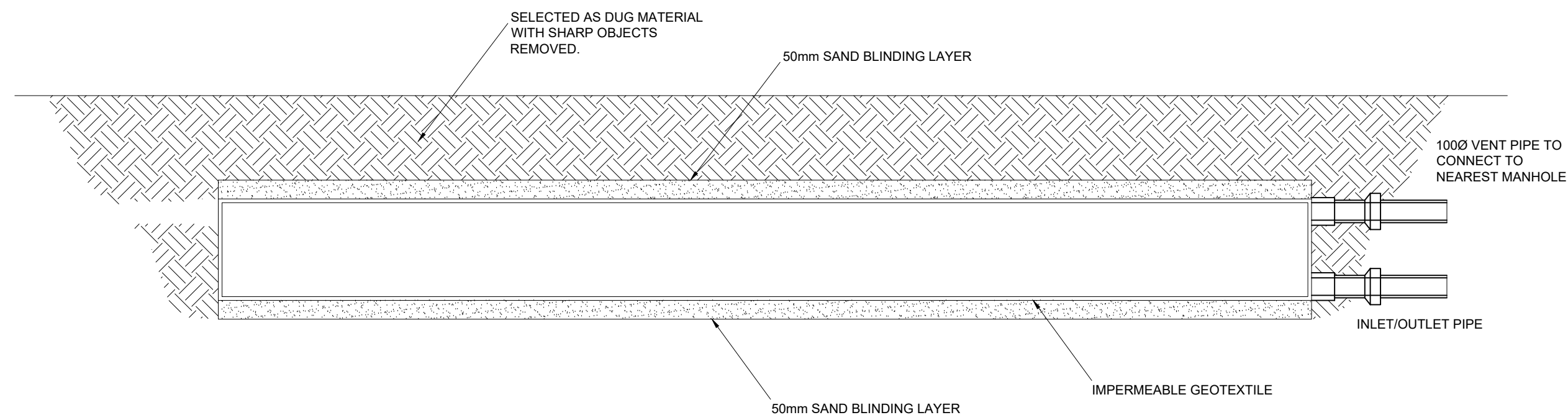
TYPICAL SECTION THROUGH
CHANNEL DRAIN
SCALE 1:25



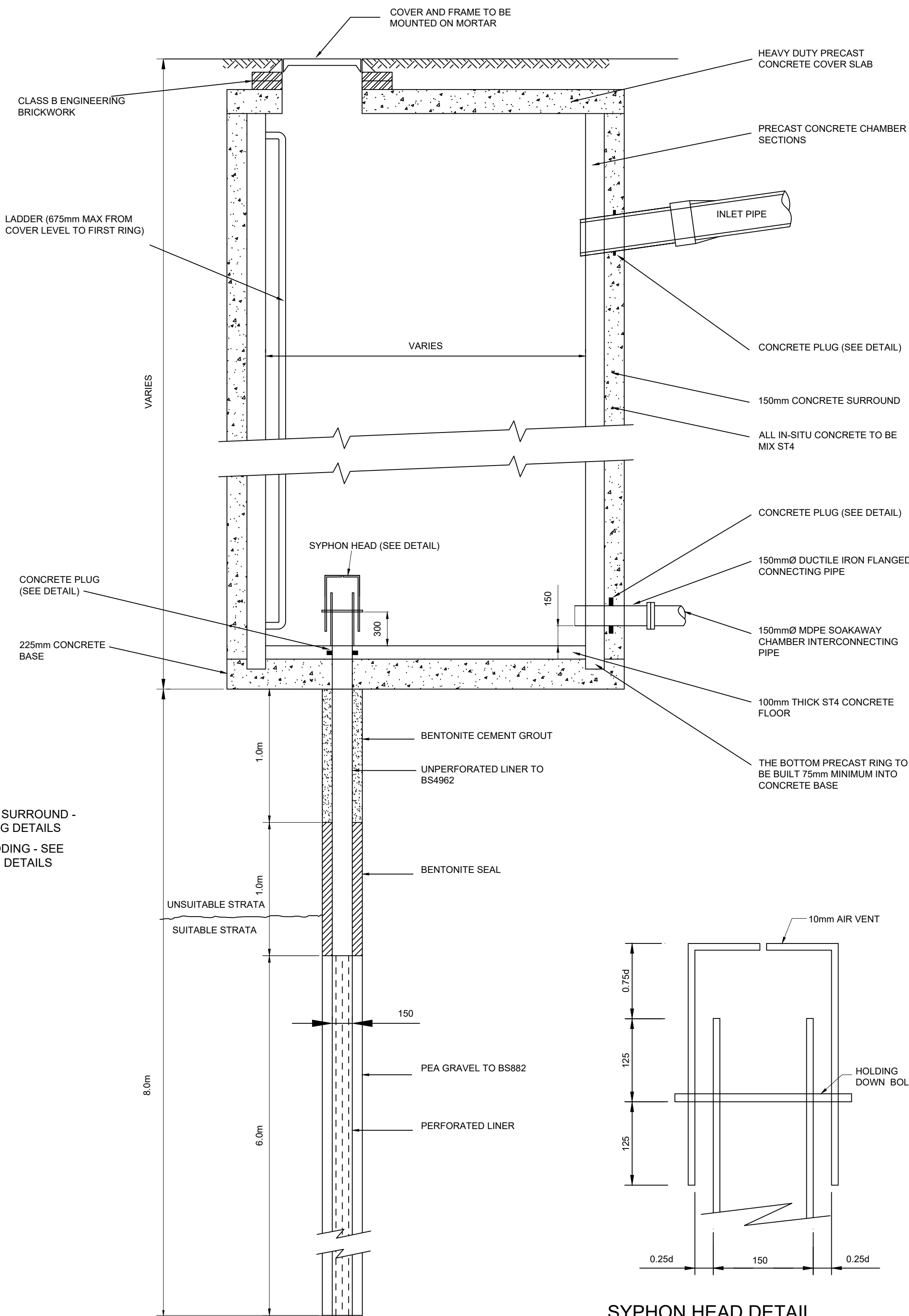
TYPICAL FLOOR GULLY DETAIL
SCALE NTS



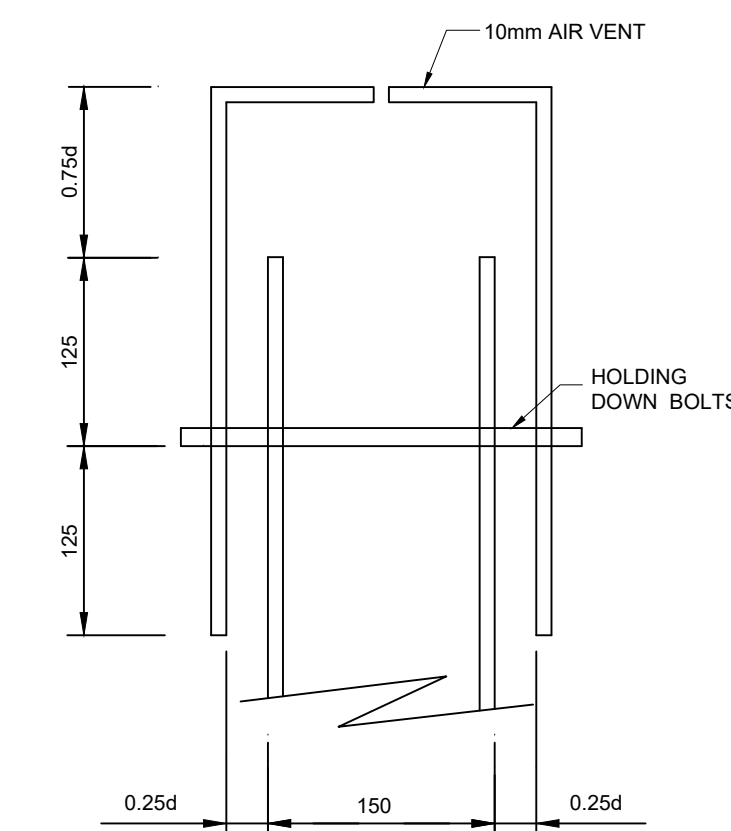
TYPICAL YARD GULLY DETAIL
SCALE 1:25



TYPICAL SECTION OF CELLULAR STORAGE TANK
SOAKAWAY
SCALE 1:25



DEEP BORE
SOAKAWAY
SCALE NTS

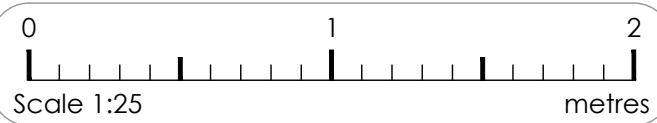


SYPHON HEAD DETAIL.

Do not scale from this drawing.

All dimensions to be checked on site prior to work commencing or preparation of working drawings, any discrepancies should be notified immediately.

This drawing is the copyright of Wilson & Partners and should not be reproduced without prior written approval. This drawing is to be read in conjunction with all relevant specifications.



T01	Tender Issue	RAC	16.01.26	MS
Rev	Comment	By	Date	Ck'd

Wilson Building Consultancy

Wilson & Partners LLP
Studio 19, Canterbury Innovation Centre
University Road, Canterbury
CT2 7FG
T: 01227 696 100
www.wilsonpartners.co.uk

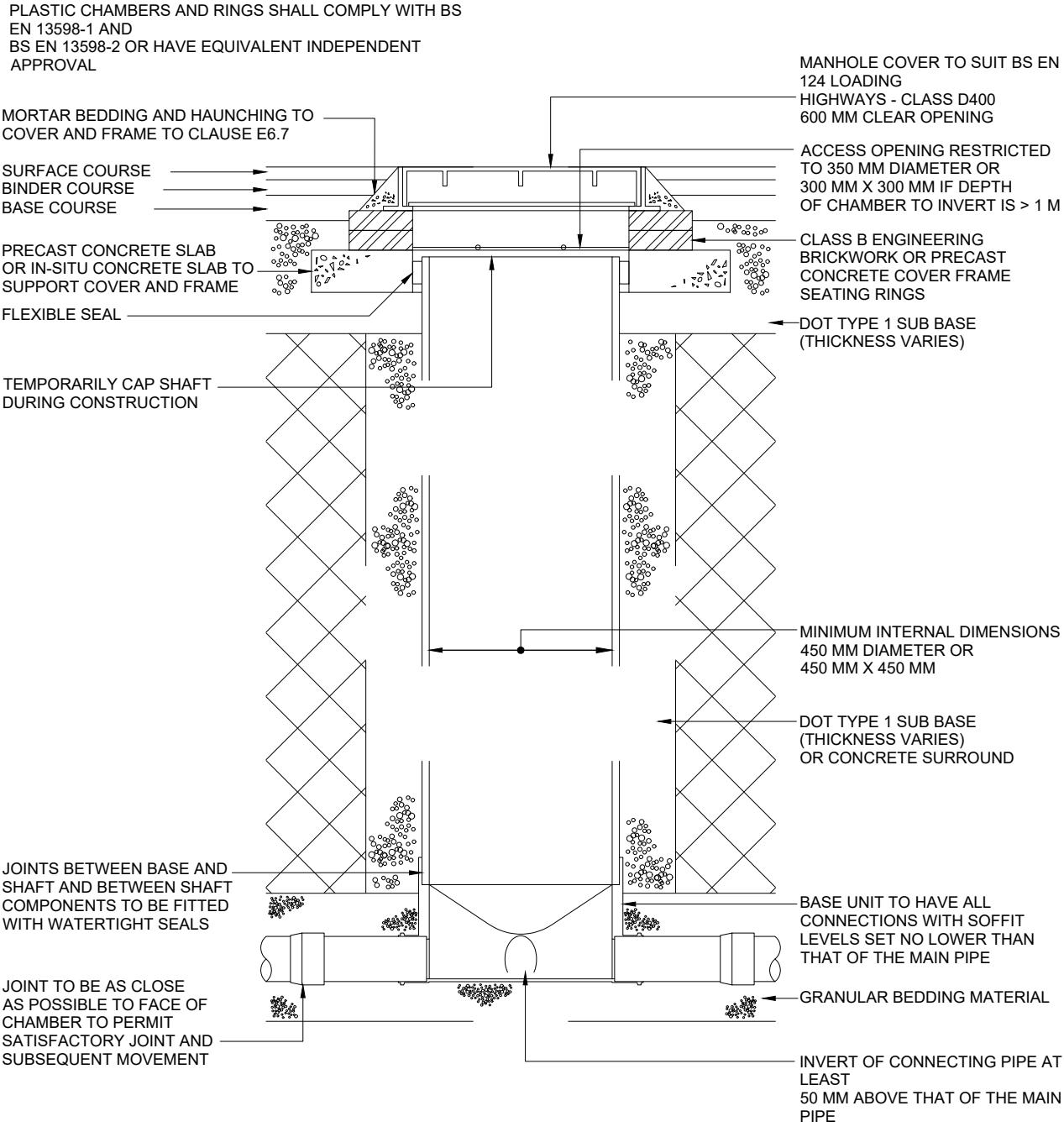
Client:

Project Title:
The Builders Yard Residential Dev
Lower Range Road, Gravesend
Kent, DA12 2QL

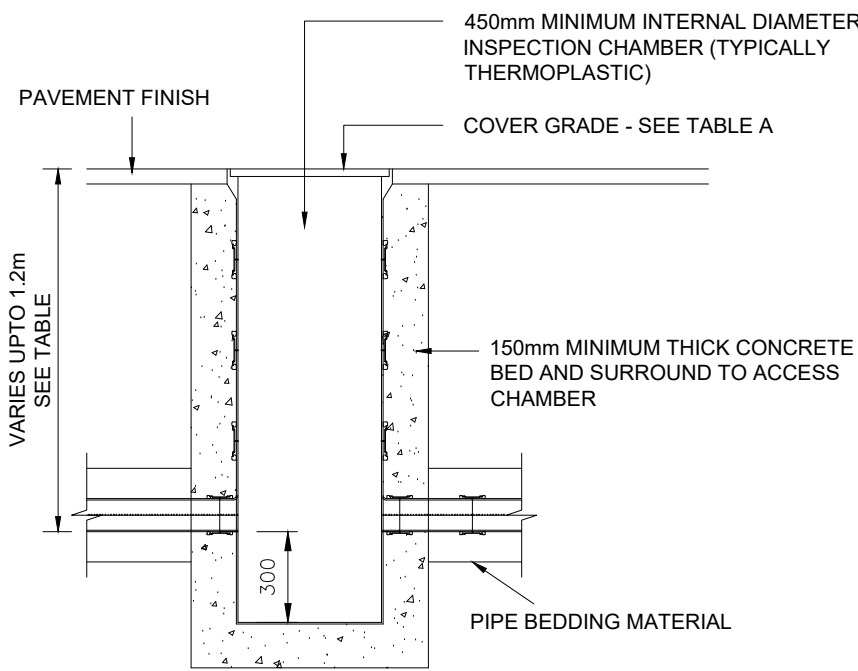
Drawing Title:
Drainage construction details
Sheet 1 of 2

Scale @A1: 1:25
WP Ref: 2580
Suitability: S0 - Initial Status

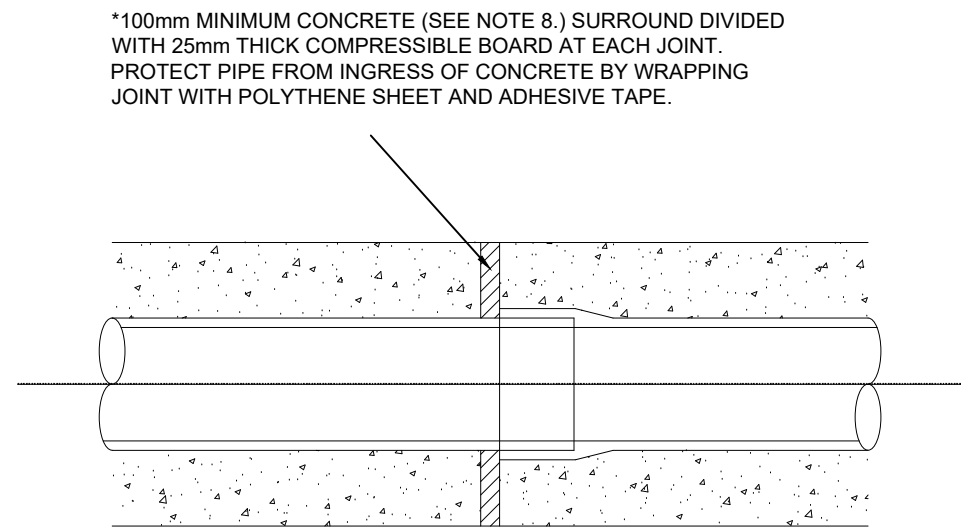
Original Issue	Drawn	Designed	Checked	Approved
16.01.26	RAC	RAC	MS	MS
Project No	Originator	Volume	Level	
2580	WP	BY	ZZ	
Type	Role	Drng No	Revision	
DR	C	3900	T01	



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

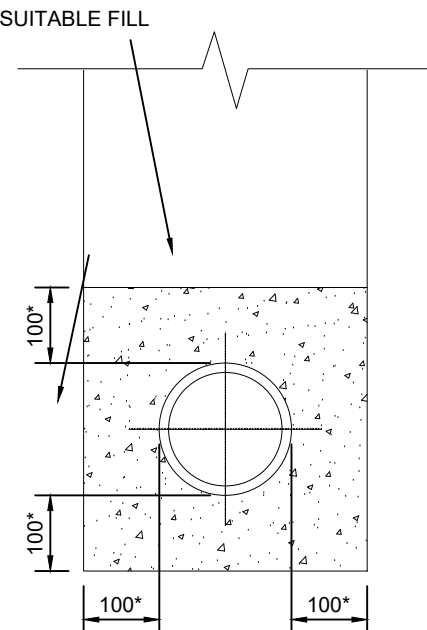


TYPICAL MEDIUM DEPTH PPIC SILT TRAP DETAIL FOR USE IN DRIVEWAYS/CAR PARKING AREAS
SCALE 1:25

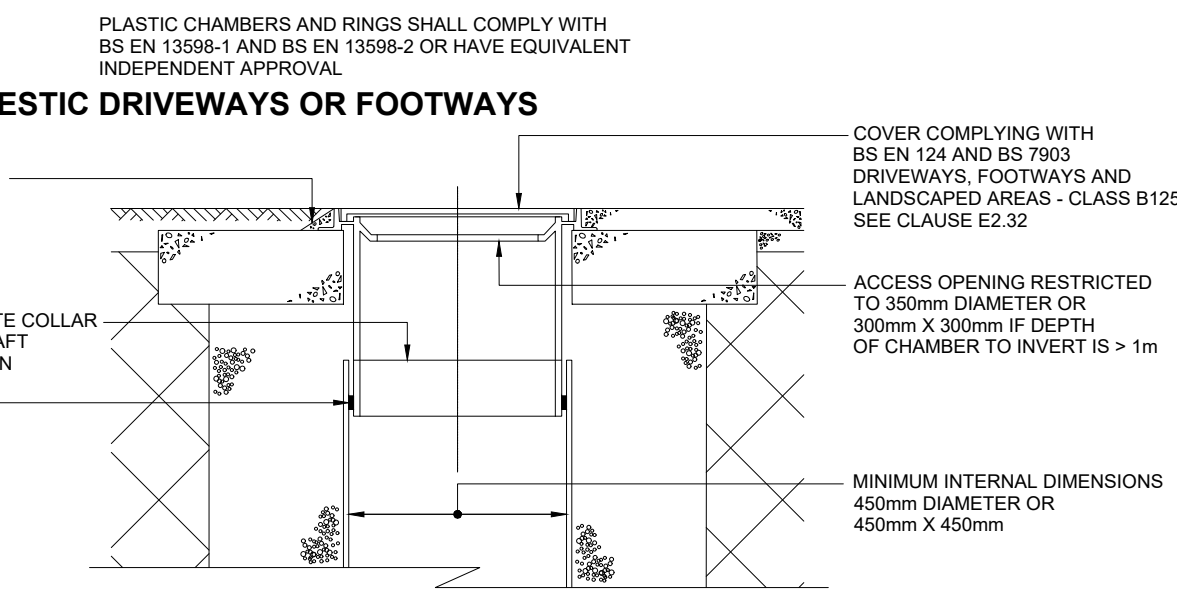


**SIDE ELEVATION
TYPE Z BEDDING (CONCRETE ENCASED PIPES) FOR PIPES WITH LESS THAN 1.2m COVER**

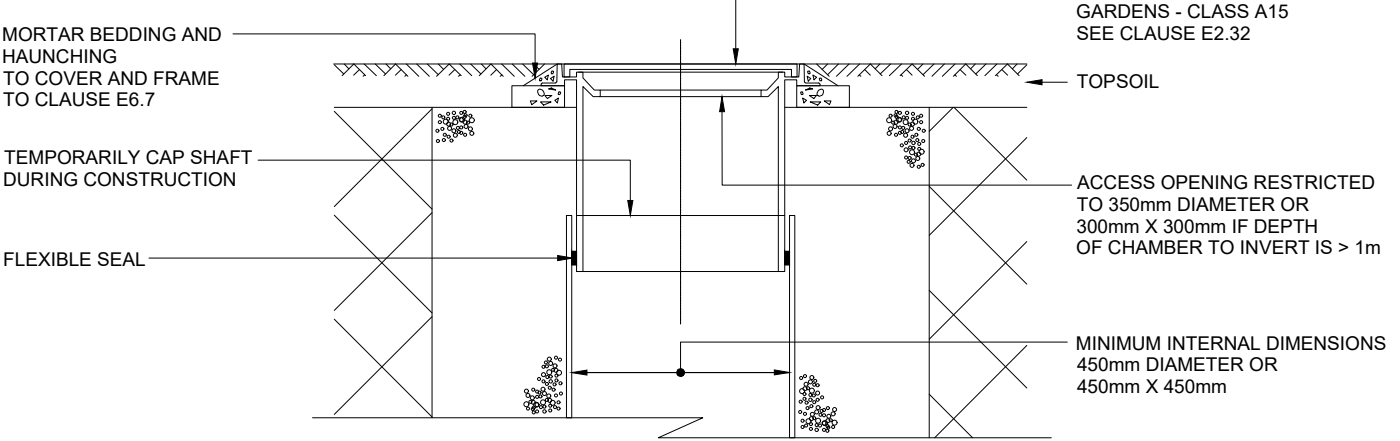
NOT TO SCALE
* FOR HEAVY DUTY/INDUSTRIAL APPLICATIONS INCLUDING MAIN ROADS OR ADOPTABLE ROADS INCREASE CONCRETE TO 150mm



CROSS SECTION



SITED IN DOMESTIC GARDENS

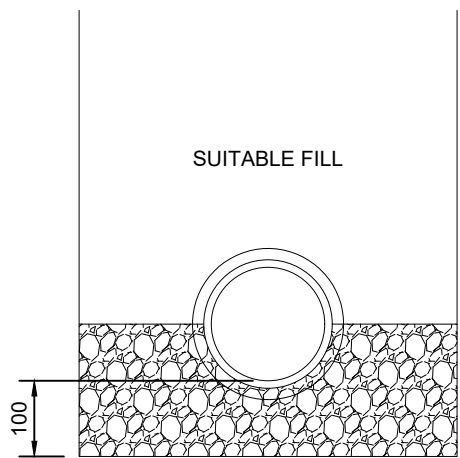


NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY THE HIGHWAY AUTHORITY CAN HAVE SPECIFIC REQUIREMENTS
ALTERNATIVE TOP DETAILS FOR LIGHT VEHICLE LOADING AND LANDSCAPED AREAS - TYPE 3
NTS

MINIMUM DIMENSIONS FOR ACCESS FITTINGS AND INSPECTION CHAMBERS					
TYPE OF ACCESS	DEPTH TO INVERT FROM COVER LEVEL (m)	MINIMUM INTERNAL DIMENSIONS ⁽¹⁾		MINIMUM CLEAR OPENING SIZE ⁽¹⁾	
		LENGTH x WIDTH (mm x mm)	CIRCULAR (mm)	LENGTH x WIDTH (mm x mm)	CIRCULAR (mm)
RODDING EYE	-	AS DRAIN BUT MINIMUM 100mm.	-	-	SAME SIZE AS PIPEWORK
ACCESS FITTING SMALL 150mm DIA. SMALL 150x100mm LARGE 225x100mm	0.6m OR LESS EXCEPT WHERE SITUATED IN A CHAMBER	150 x 100 225 x 100	150 225	150 x 100 (1) 225 x 100 (1)	SAME SIZE AS ACCESS FITTING
INSPECTION CHAMBER					
SHALLOW	0.6m OR LESS	225 x 100	190 (2)		190 (1)
MEDIUM	1.2m OR LESS	450 x 450	450	MIN 430 x 430	430
DEEP	GREATER THAN 1.2m	450 x 450	450	MAX 300 x 300 (3)	ACCESS RESTRICTED TO MAX 350 (3)

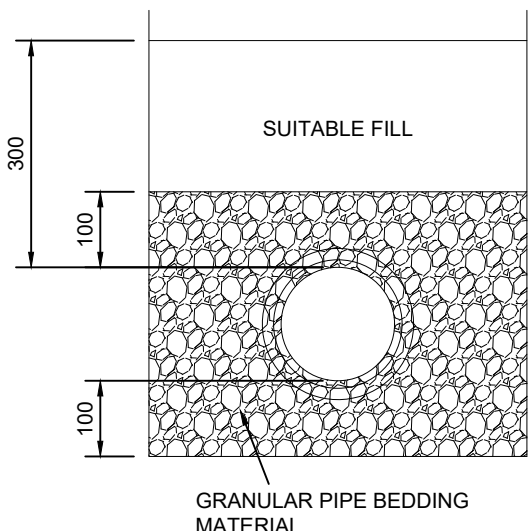
NOTES:
(1) THE CLEAR OPENING MAY BE REDUCED BY 20mm IN ORDER TO PROVIDE PROPER SUPPORT FOR THE COVER AND FRAME.
(2) DRAINS UP TO 150mm DIAMETER.
(3) A LARGER CLEAR OPENING COVER MAY BE USED IN CONJUNCTION WITH A RESTRICTED ACCESS. THE SIZE IS RESTRICTED FOR HEALTH AND SAFETY REASONS TO DETER ENTRY.

**FOR RIGID PIPES:
eg. CLAYWARE, CONC.**



CLASS B PIPE BEDDING

FOR FLEXIBLE PIPES: eg. THERMOPLASTIC



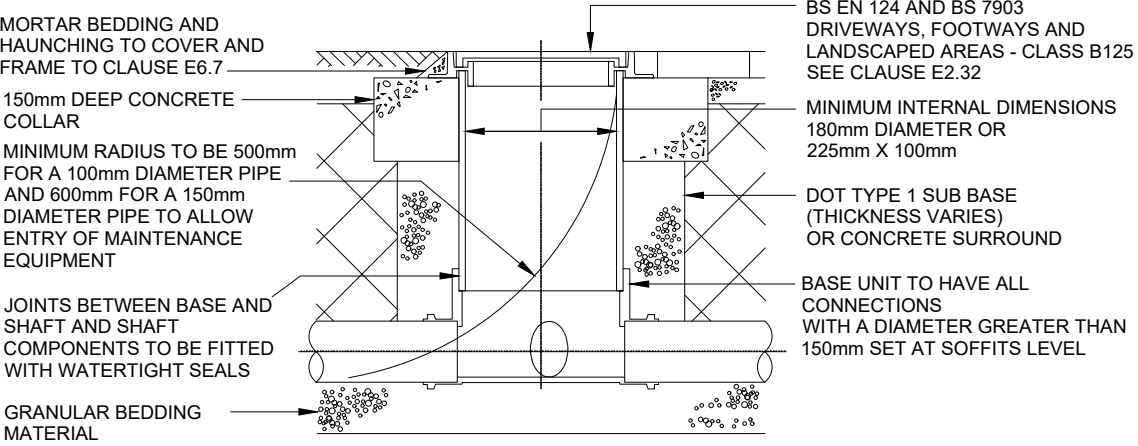
TYPE S PIPE BEDDING

TYPICAL PIPE BEDDING DETAILS

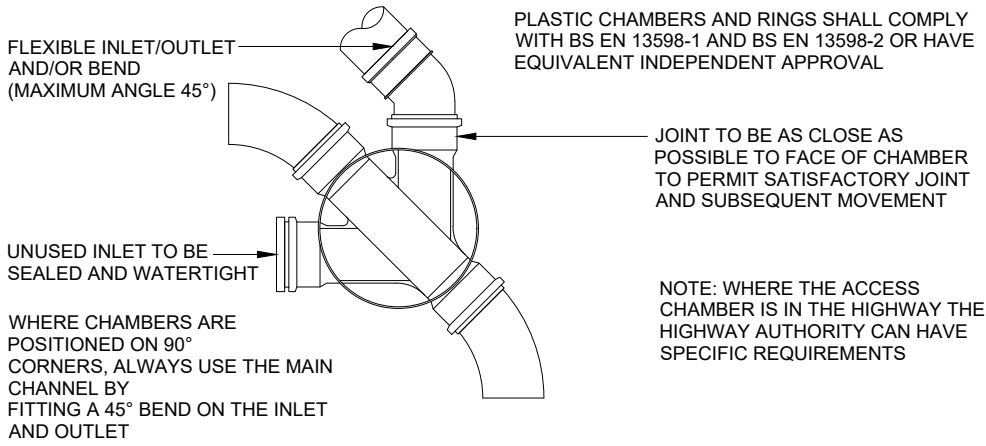
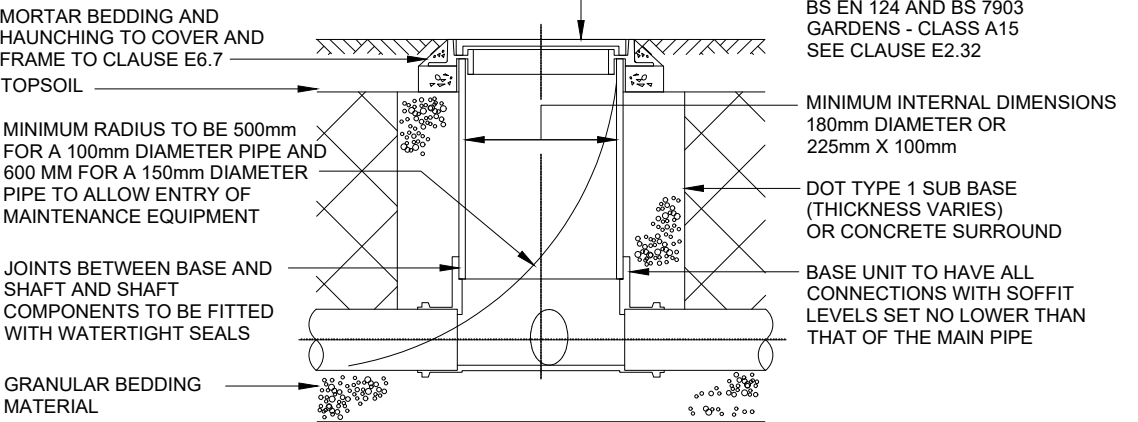
SUITABLE FILL - THE SUITABLE FILL SHALL BE SUITABLE FOR THE LOCATION AND SHALL BE CAREFULLY COMPACTED TO PROVIDE A STABLE FILL WITHOUT DAMAGING THE PIPE. FILL UNDER CAR PARKING AREAS, SHARED DRIVES AND PRIVATE ROADS SHALL BE WELL COMPACTED GRADED GRANULAR MATERIAL. FILL UNDER ADOPTABLE ROADS MAY NEED 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: 1610 Annex B Table B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO 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.

SITED IN DRIVEWAYS/PAVED AREAS



SITED IN DOMESTIC GARDENS



**TYPICAL INSPECTION CHAMBER DETAIL
TYPE 4 (FLEXIBLE MATERIAL DETAIL)**
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 2, NON-ENTRY NTS

Do not scale from this drawing.

All dimensions to be checked on site prior to work commencing or preparation of working drawings, any discrepancies should be notified immediately.

This drawing is the copyright of Wilson & Partners and should not be reproduced without prior written approval. This drawing is to be read in conjunction with all relevant specifications.



T01	Tender Issue	RAC	16.01.26	MS
Rev	Comment	By	Date	Ck'd

Wilson

Building Consultancy

Wilson & Partners LLP
Studio 19, Canterbury Innovation Centre
University Road, Canterbury
CT2 7FG
T: 01227 696 100
www.wilsonpartners.co.uk

Client:

Project Title:
The Builders Yard Residential Dev
Lower Range Road, Gravesend
Kent, DA12 2QL

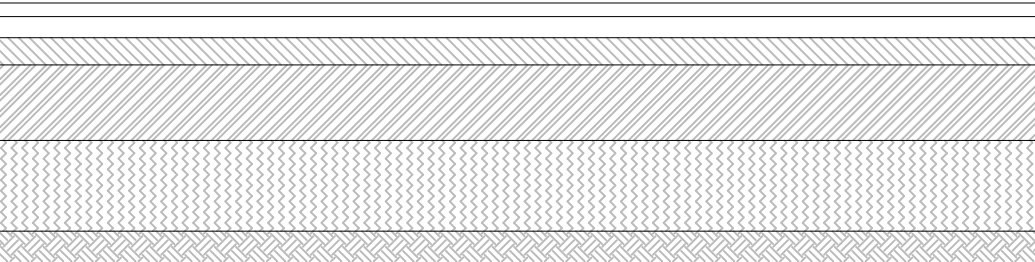
Drawing Title:
Drainage construction details
Sheet 2 of 2

Scale @A1	WP Ref	Suitability	Initial Status
1:25	2580	S0 -	

Original Issue	Drawn	Designed	Checked	Approved
16.01.26	RAC	RAC	MS	MS

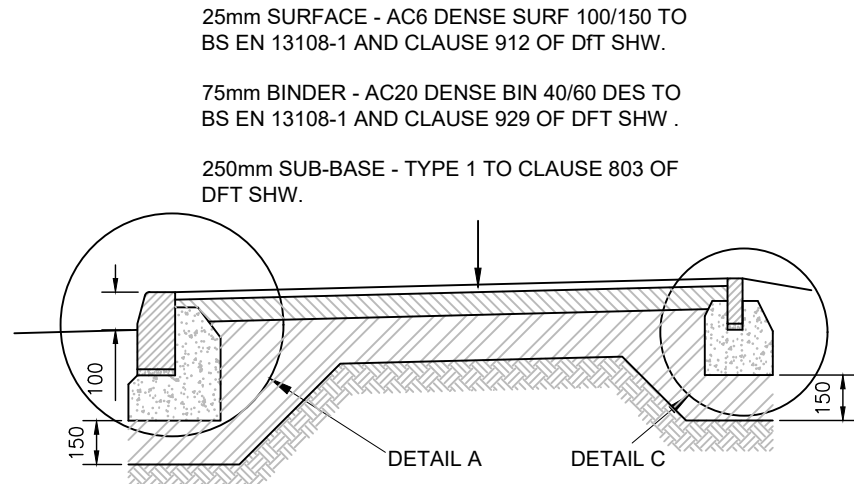
Project No	Originator	Volume	Level
2580	WP	BY	ZZ
Type	Role	Drg No	Revision
DR	C	3901	T01

SURFACE COURSE	45mm THICK - HRA 35/14 SURF PMB DES WTR2 + PCC 14/20, PSV 50 MIN, AAV 10 MAX
BINDER COURSE	70mm THICK - AC20 DENSE BIN 40/60 DES TO BS EN 13108-1 AND CLAUSE 929 OF DIT SHW
BASE	90mm THICK - AC32 DENSE BASE 40/60 DES TO BS EN 13108-1 AND CLAUSE 929 OF DIT SHW
SUB BASE	250mm THICK TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 OF DIT SHW.
CAPPING	TYPE 2 GRANULAR MATERIAL TO CLAUSE 804 OF DIT SHW. REFER TO TABLE A FOR THICKNESSES.
FORMATION	TO BE PREPARED IN ACCORDANCE WITH DIT SHW 600 SERIES

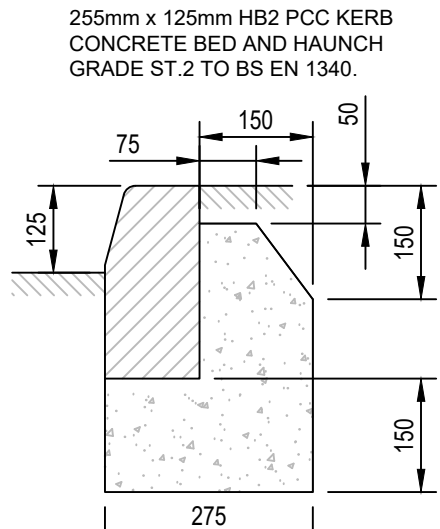


TYPICAL ASPHALT CARRIAGEWAY DETAIL
SCALE 1:25

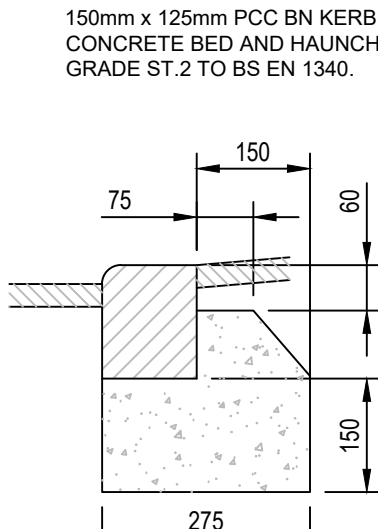
TABLE A			
SUB BASE AND CAPPING LAYERS			
CAPPING LAYER THICKNESS (SUB-BASE AND CAPPING OPTION - SUB-BASE TO BE 250mm) SHORT TERM			
CBR (%)	<2	2 to 3	3<
MIW	300*	150*	150
NOTES: 1. THE CAPPING LAYER MUST ACHIEVE A STIFFNESS MODULUS OF 60MPa WHEN MEASURED BY PORTABLE DYNAMIC PLATE AT 10M INTERVALS ALONG THE CARRIAGEWAY. 2. THE SUB-BASE MUST ACHIEVE AN IN-SITU STIFFNESS MODULUS MEASURED BY A PORTABLE DYNAMIC PLATE, OF 100MPa, MEASURED AT A RATE OF 1 TEST PER 20 LIN M OF ROAD. OTHER EQUIVALENT TESTING METHODS MAY BE CONSIDERED SUBJECT TO OUR APPROVAL. 3. A MINIMUM THICKNESS OF 450MM ROAD CONSTRUCTION IS REQUIRED TO PROVIDE FROST PROTECTION FOR THE SUBGRADE. WHERE THE CBR IS LESS THAN 3%, A NON-WOVEN GEOTEXTILE SEPARATION LAYER IS REQUIRED BETWEEN THE SUB-GRADE AND THE CAPPING LAYER/SUB-BASE.			



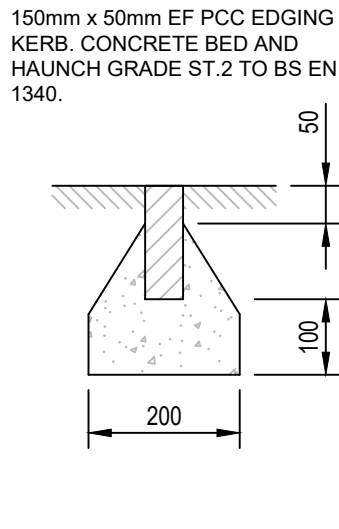
ASPHALT FOOTPATH DETAIL
SCALE 1:25



DETAIL A
SCALE 1:10

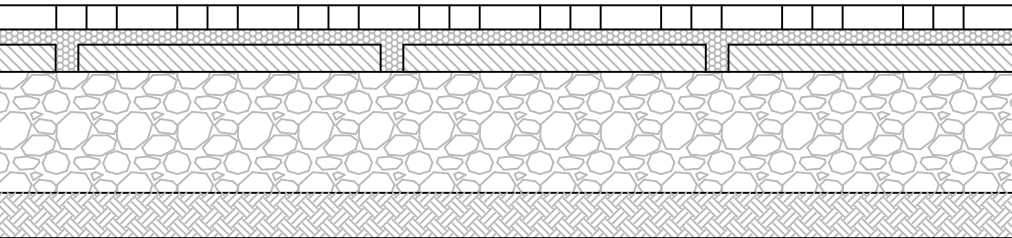


DETAIL B
SCALE 1:10

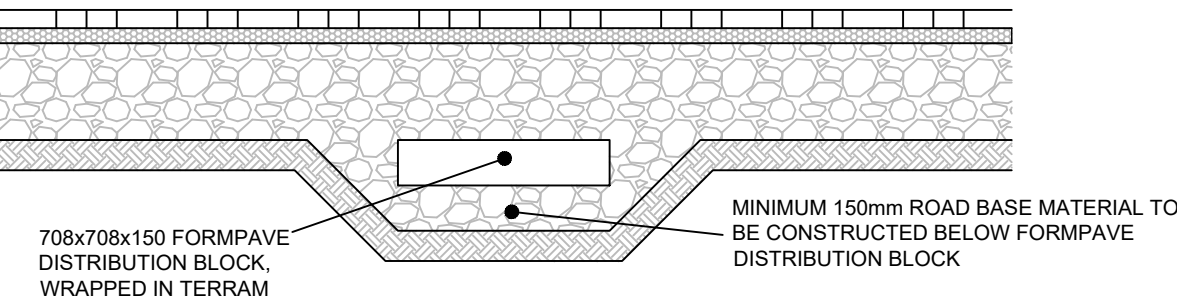


DETAIL C
SCALE 1:10

SURFACE COURSE	60mm POROUS PAVING BLOCKS LAID IN A 45° HERRINGBONE PATTERN.
LAYING COURSE	50mm THICK WASHED SINGLE SIZED 6mm AGGREGATE.
GEOTEXTILE	MARSHALL'S MT120 FILTRATION MEMBRANE.
BASECOURSE	70mm THICK AC32 DENSE BASE 40/60 DES TO BS EN 13108-1 AND CLAUSE 929 OF DIT SHW
ROAD BASE	340mm NO FINES CRUSHED ROCK OR OPEN GRADED CRUSHED GRAVEL 20-40mm ANGULAR AGGREGATE. LAID AND COMPACTED IN LAYERS NO MORE THAN 150mm THICK
GEOGRID	MARSHALL'S MT120 FILTRATION MEMBRANE.
SUBGRADE TO BE PREPARED IN ACCORDANCE WITH DIT SHW 600 SERIES TO PROVIDE A CBR VALUE OF 5%.	
75mm DRAINAGE HOLES AT 750 CENTRES TO BE DRILLED THROUGH THE DBM LAYER AND FILLED WITH WASHED 6mm AGGREGATE	



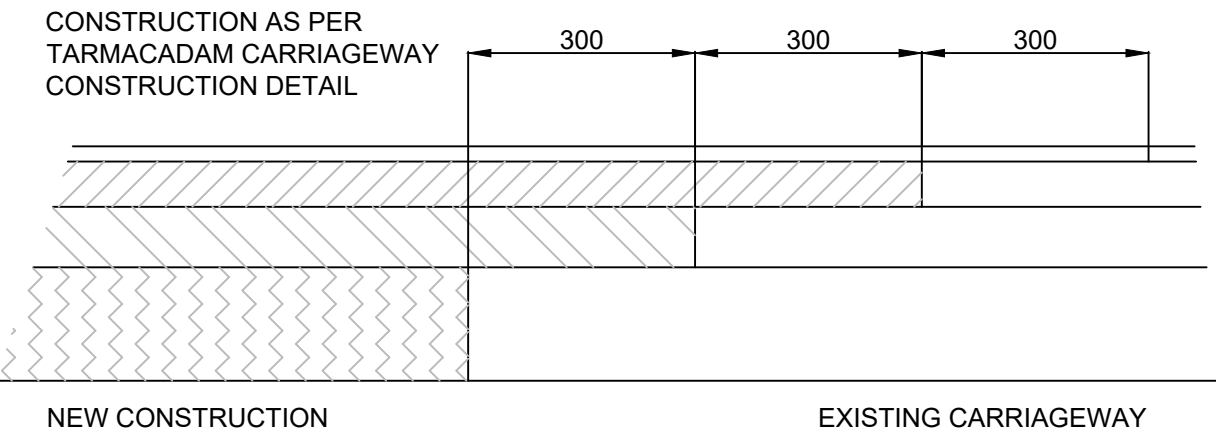
POROUS PAVED ACCESS ROAD AND DRIVE DETAIL
SCALE 1:25



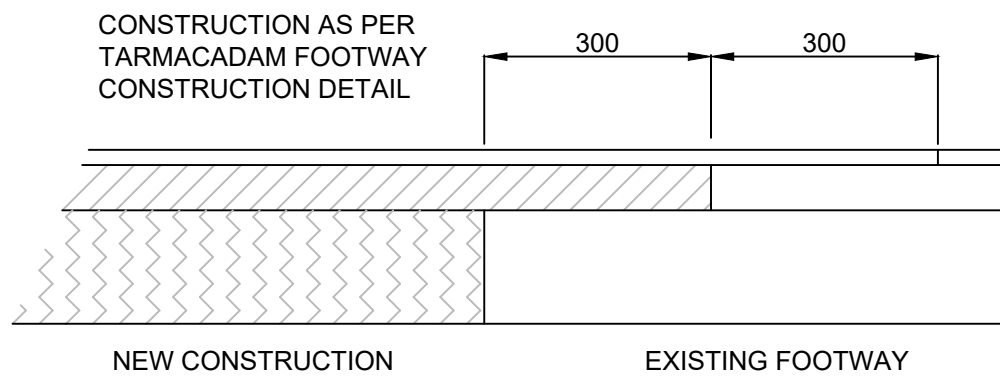
PRIVATE POROUS PAVED DRIVE DETAIL
SHOWING DISTRIBUTION TANK BELOW FORMATION
SCALE 1:25

SURFACE COURSE	40-60mm CONCRETE PAVING SLABS TO BS6717 LAID ON 30mm OF SHARP SAND (MAX 3% SILT AND CLAY BY WEIGHT, NOT MORE THAN 10% RETAINED ON 5mm SIEVE).
SUB BASE	150mm THICK - TYPE 1 TO CLAUSE 803 OF DIT SHW

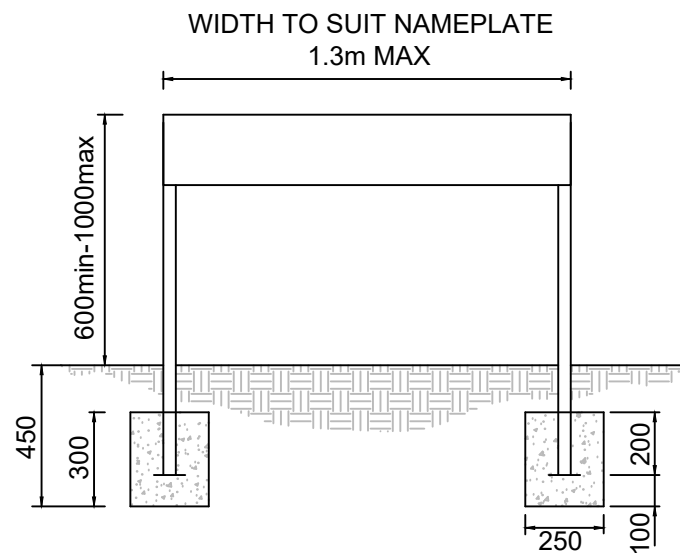
PRIVATE CONCRETE SLAB FOOTPATH DETAIL
SCALE 1:25



CARRIAGEWAY TIE-IN DETAIL
SCALE NTS



FOOTWAY TIE-IN DETAIL
SCALE NTS



MIX ST2 INDIVIDUAL CONCRETE BASE FOR EACH POST, TO CLAUSE 2602 OF THE SPECIFICATION. THE EMBEDDED SECTION OF POST IS TO BE TREATED WITH 2 COATS OF ALKALI RESISTANT BITUMINOUS PAINT.

STREET NAME PLATE

REFER TO LAYOUT DRAWINGS FOR LOCATIONS OF STREET NAME PLATES.

Do not scale from this drawing.

All dimensions to be checked on site prior to work commencing or preparation of working drawings, any discrepancies should be notified immediately.

This drawing is the copyright of Wilson & Partners and should not be reproduced without prior written approval. This drawing is to be read in conjunction with all relevant specifications.

- GENERAL
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 - THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE STATUTORY UNDERTAKERS, PRIOR TO THE COMMENCEMENT OF THE WORKS, TO ESTABLISH THE EXACT POSITION OF THEIR PLANT, WHICH SHALL BE CONFIRMED BY HAND DUG TRIAL PITS.
 - ASPHALT CONCRETE TO COMPLY WITH BS EN 13108-1 AND PD 6691-2007.
 - ALL CONCRETE AND CONCRETE PRODUCTS BELOW GROUND LEVEL SHALL BE SULPHATE RESISTING PORTLAND CEMENT CLASS GEN3 IN ACCORDANCE WITH BRE SPECIAL DIGEST 1.
 - THE AVOIDANCE AND PROTECTION OF SERVICES DURING THE WORKS IS THE RESPONSIBILITY OF THE CONTRACTOR.
 - THE CONTRACTOR IS REMINDING OF HIS OBLIGATION TO VERIFY THE ROUTE OF ALL SERVICES ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS.
 - THE CONTRACTOR SHOULD ALLOW FOR ANY NECESSARY LIAISON WITH THE STATUTORY UTILITIES DURING THE COURSE OF THE WORKS TO AVOID ANY DISRUPTION TO RETAINED SERVICES.
 - ALL FLEXIBLE CARRIAGEWAY MATERIALS SHALL BE SUPPLIED AND LAID IN ACCORDANCE WITH BS5946:2007.
 - ALL SOFT SPOTS AND VOIDS SHALL BE REMOVED PRIOR TO CONSTRUCTION AND REPLACED WITH SUITABLE FILL MATERIAL AS AGREED WITH THE ENGINEER.
 - APPROVED RESIDUAL WEED KILLER (WHICH DOES NOT CONTAIN ATRAZINE OR SIMAZINE) MUST BE APPLIED TO ALL FORMATIONS.
 - FACES BETWEEN THE EXISTING AND PROPOSED CARRIAGEWAY CONSTRUCTION SHALL BE CLEANED OF ALL LOOSE MATERIAL AND BITUMINOUS LAYERS COATED WITH AN APPROPRIATE HOT BITUMINOUS BINDER TO CL706.7 OF SHW.
 - THE CONTRACTOR IS TO UNDERTAKE IN-SITU CBR TESTING TO ESTABLISH THE ACTUAL CBR VALUES AND ADJUST THE PAVEMENT CONSTRUCTION ACCORDINGLY.
 - WHERE THE KERB BED IS LAID IN ADVANCE OF THE KERBS, A 200 x 20mm DIA. MILD STEEL DOMEL BAR WILL BE REQUIRED IN THE BACKING AT 600mm CENTRES. KERBS SHALL BE BEDDED ON 10MM THICK CEMENT MORTAR, DESIGNATION (i) TO CL2404 OF SHW.
 - KERBS SHALL BE LAID WITH DRY JOINTS AND CLOSELY BUTTED TO ADJACENT KERBS.
 - CUTTING OF KERBS SHALL BE OF MECHANICAL MEANS TO THE APPROVAL OF THE ENGINEER.
 - THE LENGTH OF ANY KERB SHALL NOT BE LESS THAN 300mm.
 - ALL KERBS AND EDGINGS SHALL COMPLY WITH BS1340:2003.

T01	Tender Issue	RAC	16.01.26	MS
Rev	Comment	By	Date	Cl'd

Wilson

Building Consultancy

Wilson & Partners LLP
Studio 19, Canterbury Innovation Centre
University Road, Canterbury
CT2 7FG
T: 01227 696 100
www.wilsonpartners.co.uk

Client:

Project Title:
The Builders Yard Residential Dev
Lower Range Road, Gravesend
Kent, DA12 2QL

Drawing Title:
External Works construction details

Scale @A1
1:25

WP Ref
2580

Suitability
S0 -

Initial Status

Tender			
Original Issue	Drawn	Designed	Checked
16.01.26	RAC	RAC	MS
Project No	Originator	Volume	Level
2580	WP	BY	ZZ
Type	Role	Drq No	Revision
DR	C	3902	T01

Appendix D

Post-development surface water calculations



WILSON AND PARTNERS LLP
9 BIRCH TREE WAY
MAIDSTONE
KENT

File: 2580-A.pfd
Network: Storm Network
RAY CLARK
19/01/2026

Page 1
BUILDERS YARD
LOWER RANGE ROAD
GRAVESEND

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SIC1	0.021	5.00	3.950	600	0.750
SIC2	0.010	5.00	3.950	600	0.900
SIC3	0.004	5.00	4.100	600	1.150
RE4	0.015	5.00	3.950	300	0.750
SIC5	0.004	5.00	3.950	600	0.850
SOAKAWAY	0.046	5.00	4.100	1200	2.600
DUMMY	0.000		4.100	150	2.650

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	SIC2	32.000	0.600	3.200	3.050	0.150	213.3	300	5.50	50.0
1.001	SIC2	SIC3	17.000	0.600	3.050	2.950	0.100	170.0	300	5.73	49.3
1.002	SIC3	SOAKAWAY	15.000	0.600	2.950	2.800	0.150	100.0	300	5.89	48.6
2.000	RE4	SIC5	21.000	0.600	3.200	3.100	0.100	210.0	300	5.32	50.0
2.001	SIC5	SOAKAWAY	9.000	0.600	3.100	2.800	0.300	30.0	300	5.38	50.0
1.003	SOAKAWAY	DUMMY	5.000	0.600	1.500	1.450	0.050	100.0	300	5.95	48.4

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	1.072	75.8	3.8	0.450	0.600	0.021	0.0	45	0.565
1.001	1.203	85.0	5.5	0.600	0.850	0.031	0.0	51	0.683
1.002	1.572	111.1	6.2	0.850	1.000	0.035	0.0	48	0.857
2.000	1.081	76.4	2.7	0.450	0.550	0.015	0.0	38	0.513
2.001	2.881	203.6	3.4	0.550	1.000	0.019	0.0	27	1.094
1.003	1.572	111.1	17.5	2.300	2.350	0.100	0.0	80	1.155

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	32.000	213.3	300	Circular	3.950	3.200	0.450	3.950	3.050	0.600
1.001	17.000	170.0	300	Circular	3.950	3.050	0.600	4.100	2.950	0.850
1.002	15.000	100.0	300	Circular	4.100	2.950	0.850	4.100	2.800	1.000
2.000	21.000	210.0	300	Circular	3.950	3.200	0.450	3.950	3.100	0.550
2.001	9.000	30.0	300	Circular	3.950	3.100	0.550	4.100	2.800	1.000
1.003	5.000	100.0	300	Circular	4.100	1.500	2.300	4.100	1.450	2.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SIC1	600	Manhole	Adoptable	SIC2	600	Manhole	Adoptable
1.001	SIC2	600	Manhole	Adoptable	SIC3	600	Manhole	Adoptable
1.002	SIC3	600	Manhole	Adoptable	SOAKAWAY	1200	Manhole	Adoptable
2.000	RE4	300	Manhole	Adoptable	SIC5	600	Manhole	Adoptable
2.001	SIC5	600	Manhole	Adoptable	SOAKAWAY	1200	Manhole	Adoptable
1.003	SOAKAWAY	1200	Manhole	Adoptable	DUMMY	150	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	3.950	0.750	600				
				0	1.000	3.200	300
SIC2	3.950	0.900	600				
				0	1.001	3.050	300
SIC3	4.100	1.150	600				
				1	1.001	2.950	300
				0	1.002	2.950	300
RE4	3.950	0.750	300				
				0	2.000	3.200	300
SIC5	3.950	0.850	600				
				1	2.000	3.100	300
				0	2.001	3.100	300
SOAKAWAY	4.100	2.600	1200				
				1	2.001	2.800	300
				2	1.002	2.800	300
				0	1.003	1.500	300
DUMMY	4.100	2.650	150				
				1	1.003	1.450	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m ³ /ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	10080	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 %)
10	0	0	0

Node SOAKAWAY Online Head/Flow Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	1.500
------------	---	--------------------------	---	------------------	-------

Head (m)	Flow (l/s)
0.001	0.000

Node SOAKAWAY Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.07560	Invert Level (m)	2.000	Borehole Diameter	0.150
Side Inf Coefficient (m/hr)	0.07560	Time to half empty (mins)	0	Borehole Depth (m)	10.000
Safety Factor	2.0	Diameter (m)	1.200	Inf Depth (m)	
Porosity	1.00	Depth (m)		Number Required	1

Node SOAKAWAY Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	3.500	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	35.000		

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	780

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	65.0	0.0	1.500	65.0	0.0	1.501	0.0	0.0

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	✓	Maximum Length (m)	100.000
Node Losses	✓	Coordinates	✓
Link Size	✓	Accuracy (m)	1.000
Minimum Diameter (mm)	150	Crossings	✓
Link Length	✓	Cover Depth	✓

Approval Settings

Minimum Cover Depth (m)		Maximum Proportional Velocity (m/s)	3.000
Maximum Cover Depth (m)	3.000	Surcharged Depth	✓
Backdrops	✓	Return Period (years)	
Minimum Backdrop Height (m)		Maximum Surcharged Depth (m)	0.100
Maximum Backdrop Height (m)	1.500	Flooding	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		Time to Half Empty	x
Maximum Full Bore Velocity (m/s)	3.000	Discharge Rates	✓
Proportional Velocity	✓	Discharge Volume	✓
Return Period (years)		100 year 360 minute (m ³)	
Minimum Proportional Velocity (m/s)	0.750		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	205.874	58.255	10 year 720 minute winter	9.351	3.729
10 year 15 minute winter	144.473	58.255	10 year 960 minute summer	11.306	2.977
10 year 30 minute summer	132.386	37.461	10 year 960 minute winter	7.489	2.977
10 year 30 minute winter	92.903	37.461	10 year 1440 minute summer	8.097	2.170
10 year 60 minute summer	87.217	23.049	10 year 1440 minute winter	5.442	2.170
10 year 60 minute winter	57.945	23.049	10 year 2160 minute summer	5.736	1.585
10 year 120 minute summer	54.398	14.376	10 year 2160 minute winter	3.952	1.585
10 year 120 minute winter	36.141	14.376	10 year 2880 minute summer	4.754	1.274
10 year 180 minute summer	41.750	10.744	10 year 2880 minute winter	3.195	1.274
10 year 180 minute winter	27.139	10.744	10 year 4320 minute summer	3.620	0.947
10 year 240 minute summer	32.878	8.689	10 year 4320 minute winter	2.384	0.947
10 year 240 minute winter	21.843	8.689	10 year 5760 minute summer	3.027	0.775
10 year 360 minute summer	24.851	6.395	10 year 5760 minute winter	1.959	0.775
10 year 360 minute winter	16.154	6.395	10 year 7200 minute summer	2.631	0.671
10 year 480 minute summer	19.373	5.120	10 year 7200 minute winter	1.698	0.671
10 year 480 minute winter	12.871	5.120	10 year 8640 minute summer	2.354	0.601
10 year 600 minute summer	15.727	4.302	10 year 8640 minute winter	1.519	0.601
10 year 600 minute winter	10.746	4.302	10 year 10080 minute summer	2.154	0.549
10 year 720 minute summer	13.915	3.729	10 year 10080 minute winter	1.390	0.549

Results for 10 year Critical Storm Duration. Lowest mass balance: 96.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SIC1	10	3.261	0.061	7.1	0.0172	0.0000	OK
15 minute summer	SIC2	11	3.122	0.072	10.4	0.0205	0.0000	OK
15 minute summer	SIC3	11	3.018	0.068	11.5	0.0192	0.0000	OK
15 minute summer	RE4	10	3.254	0.054	5.0	0.0038	0.0000	OK
15 minute summer	SIC5	10	3.137	0.037	6.2	0.0105	0.0000	OK
4320 minute winter	SOAKAWAY	4020	2.682	1.182	0.6	50.5782	0.0000	SURCHARGED
15 minute summer	DUMMY	1	1.450	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SIC1	1.000	SIC2	7.0	0.600	0.092	0.3719	
15 minute summer	SIC2	1.001	SIC3	10.2	0.817	0.120	0.2127	
15 minute summer	SIC3	1.002	SOAKAWAY	11.6	1.002	0.104	0.1734	
15 minute summer	RE4	2.000	SIC5	4.9	0.736	0.065	0.1426	
15 minute summer	SIC5	2.001	SOAKAWAY	6.2	1.274	0.030	0.0438	
4320 minute winter	SOAKAWAY	Head/Flow	DUMMY	0.0				0.0
4320 minute winter	SOAKAWAY	Infiltration		0.1				



WILSON AND PARTNERS LLP
9 BIRCH TREE WAY
MAIDSTONE
KENT

File: 2580-A.pfd
Network: Storm Network
RAY CLARK
19/01/2026

Page 1
BUILDERS YARD
LOWER RANGE ROAD
GRAVESEND

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SIC1	0.021	5.00	3.950	600	0.750
SIC2	0.010	5.00	3.950	600	0.900
SIC3	0.004	5.00	4.100	600	1.150
RE4	0.015	5.00	3.950	300	0.750
SIC5	0.004	5.00	3.950	600	0.850
SOAKAWAY	0.046	5.00	4.100	1200	2.600
DUMMY	0.000		4.100	150	2.650

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	SIC2	32.000	0.600	3.200	3.050	0.150	213.3	300	5.50	50.0
1.001	SIC2	SIC3	17.000	0.600	3.050	2.950	0.100	170.0	300	5.73	49.3
1.002	SIC3	SOAKAWAY	15.000	0.600	2.950	2.800	0.150	100.0	300	5.89	48.6
2.000	RE4	SIC5	21.000	0.600	3.200	3.100	0.100	210.0	300	5.32	50.0
2.001	SIC5	SOAKAWAY	9.000	0.600	3.100	2.800	0.300	30.0	300	5.38	50.0
1.003	SOAKAWAY	DUMMY	5.000	0.600	1.500	1.450	0.050	100.0	300	5.95	48.4

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	1.072	75.8	3.8	0.450	0.600	0.021	0.0	45	0.565
1.001	1.203	85.0	5.5	0.600	0.850	0.031	0.0	51	0.683
1.002	1.572	111.1	6.2	0.850	1.000	0.035	0.0	48	0.857
2.000	1.081	76.4	2.7	0.450	0.550	0.015	0.0	38	0.513
2.001	2.881	203.6	3.4	0.550	1.000	0.019	0.0	27	1.094
1.003	1.572	111.1	17.5	2.300	2.350	0.100	0.0	80	1.155

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	32.000	213.3	300	Circular	3.950	3.200	0.450	3.950	3.050	0.600
1.001	17.000	170.0	300	Circular	3.950	3.050	0.600	4.100	2.950	0.850
1.002	15.000	100.0	300	Circular	4.100	2.950	0.850	4.100	2.800	1.000
2.000	21.000	210.0	300	Circular	3.950	3.200	0.450	3.950	3.100	0.550
2.001	9.000	30.0	300	Circular	3.950	3.100	0.550	4.100	2.800	1.000
1.003	5.000	100.0	300	Circular	4.100	1.500	2.300	4.100	1.450	2.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SIC1	600	Manhole	Adoptable	SIC2	600	Manhole	Adoptable
1.001	SIC2	600	Manhole	Adoptable	SIC3	600	Manhole	Adoptable
1.002	SIC3	600	Manhole	Adoptable	SOAKAWAY	1200	Manhole	Adoptable
2.000	RE4	300	Manhole	Adoptable	SIC5	600	Manhole	Adoptable
2.001	SIC5	600	Manhole	Adoptable	SOAKAWAY	1200	Manhole	Adoptable
1.003	SOAKAWAY	1200	Manhole	Adoptable	DUMMY	150	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	3.950	0.750	600				
				0	1.000	3.200	300
SIC2	3.950	0.900	600				
				0	1.001	3.050	300
SIC3	4.100	1.150	600				
				1	1.001	2.950	300
				0	1.002	2.950	300
RE4	3.950	0.750	300				
				0	2.000	3.200	300
SIC5	3.950	0.850	600				
				1	2.000	3.100	300
				0	2.001	3.100	300
SOAKAWAY	4.100	2.600	1200				
				1	2.001	2.800	300
				2	1.002	2.800	300
				0	1.003	1.500	300
DUMMY	4.100	2.650	150				
				1	1.003	1.450	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m ³ /ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	10080	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 %)
2	0	0	0
30	35	0	0
100	45	0	0

Node SOAKAWAY Online Head/Flow Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	1.500
------------	---	--------------------------	---	------------------	-------

Head (m)	Flow (l/s)
0.001	0.000

Node SOAKAWAY Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.07560	Invert Level (m)	2.000	Borehole Diameter	0.150
Side Inf Coefficient (m/hr)	0.07560	Time to half empty (mins)		Borehole Depth (m)	10.000
Safety Factor	2.0	Diameter (m)	1.200	Inf Depth (m)	
Porosity	1.00	Depth (m)		Number Required	1

Node SOAKAWAY Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	3.500	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	35.000		

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	65.0	0.0	1.500	65.0	0.0	1.501	0.0	0.0

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	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	103.193	29.200
2 year 15 minute winter	72.416	29.200
2 year 30 minute summer	66.183	18.728
2 year 30 minute winter	46.444	18.728
2 year 60 minute summer	43.757	11.564
2 year 60 minute winter	29.071	11.564
2 year 120 minute summer	30.118	7.959
2 year 120 minute winter	20.010	7.959
2 year 180 minute summer	24.081	6.197
2 year 180 minute winter	15.653	6.197
2 year 240 minute summer	19.393	5.125
2 year 240 minute winter	12.884	5.125
2 year 360 minute summer	14.985	3.856
2 year 360 minute winter	9.740	3.856
2 year 480 minute summer	11.808	3.121
2 year 480 minute winter	7.845	3.121
2 year 600 minute summer	9.640	2.637
2 year 600 minute winter	6.586	2.637
2 year 720 minute summer	8.552	2.292
2 year 720 minute winter	5.747	2.292
2 year 960 minute summer	6.948	1.830
2 year 960 minute winter	4.603	1.830
2 year 1440 minute summer	4.970	1.332
2 year 1440 minute winter	3.340	1.332
2 year 2160 minute summer	3.527	0.975
2 year 2160 minute winter	2.430	0.975
2 year 2880 minute summer	2.933	0.786
2 year 2880 minute winter	1.971	0.786
2 year 4320 minute summer	2.260	0.591
2 year 4320 minute winter	1.488	0.591
2 year 5760 minute summer	1.912	0.489
2 year 5760 minute winter	1.237	0.489
2 year 7200 minute summer	1.678	0.428

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 7200 minute winter	1.083	0.428
2 year 8640 minute summer	1.515	0.387
2 year 8640 minute winter	0.978	0.387
2 year 10080 minute summer	1.398	0.357
2 year 10080 minute winter	0.902	0.357
30 year +35% CC 15 minute summer	366.003	103.566
30 year +35% CC 15 minute winter	256.844	103.566
30 year +35% CC 30 minute summer	237.561	67.222
30 year +35% CC 30 minute winter	166.710	67.222
30 year +35% CC 60 minute summer	157.386	41.593
30 year +35% CC 60 minute winter	104.564	41.593
30 year +35% CC 120 minute summer	95.365	25.202
30 year +35% CC 120 minute winter	63.358	25.202
30 year +35% CC 180 minute summer	72.606	18.684
30 year +35% CC 180 minute winter	47.195	18.684
30 year +35% CC 240 minute summer	57.023	15.070
30 year +35% CC 240 minute winter	37.885	15.070
30 year +35% CC 360 minute summer	43.085	11.087
30 year +35% CC 360 minute winter	28.006	11.087
30 year +35% CC 480 minute summer	33.741	8.917
30 year +35% CC 480 minute winter	22.417	8.917
30 year +35% CC 600 minute summer	27.535	7.532
30 year +35% CC 600 minute winter	18.814	7.532
30 year +35% CC 720 minute summer	24.486	6.562
30 year +35% CC 720 minute winter	16.456	6.562
30 year +35% CC 960 minute summer	20.069	5.285
30 year +35% CC 960 minute winter	13.294	5.285
30 year +35% CC 1440 minute summer	14.532	3.895
30 year +35% CC 1440 minute winter	9.766	3.895
30 year +35% CC 2160 minute summer	10.338	2.857
30 year +35% CC 2160 minute winter	7.123	2.857
30 year +35% CC 2880 minute summer	8.540	2.289
30 year +35% CC 2880 minute winter	5.739	2.289
30 year +35% CC 4320 minute summer	6.375	1.667
30 year +35% CC 4320 minute winter	4.198	1.667
30 year +35% CC 5760 minute summer	5.228	1.338
30 year +35% CC 5760 minute winter	3.384	1.338
30 year +35% CC 7200 minute summer	4.480	1.143
30 year +35% CC 7200 minute winter	2.892	1.143
30 year +35% CC 8640 minute summer	3.964	1.011
30 year +35% CC 8640 minute winter	2.558	1.011
30 year +35% CC 10080 minute summer	3.591	0.916
30 year +35% CC 10080 minute winter	2.318	0.916
100 year +45% CC 15 minute summer	503.809	142.560
100 year +45% CC 15 minute winter	353.550	142.560
100 year +45% CC 30 minute summer	329.642	93.277
100 year +45% CC 30 minute winter	231.328	93.277
100 year +45% CC 60 minute summer	219.993	58.138
100 year +45% CC 60 minute winter	146.158	58.138
100 year +45% CC 120 minute summer	132.000	34.884
100 year +45% CC 120 minute winter	87.697	34.884
100 year +45% CC 180 minute summer	100.560	25.878

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 180 minute winter	65.367	25.878
100 year +45% CC 240 minute summer	79.359	20.972
100 year +45% CC 240 minute winter	52.724	20.972
100 year +45% CC 360 minute summer	60.920	15.677
100 year +45% CC 360 minute winter	39.599	15.677
100 year +45% CC 480 minute summer	48.457	12.806
100 year +45% CC 480 minute winter	32.193	12.806
100 year +45% CC 600 minute summer	40.046	10.954
100 year +45% CC 600 minute winter	27.362	10.954
100 year +45% CC 720 minute summer	35.971	9.641
100 year +45% CC 720 minute winter	24.175	9.641
100 year +45% CC 960 minute summer	29.875	7.867
100 year +45% CC 960 minute winter	19.790	7.867
100 year +45% CC 1440 minute summer	21.803	5.843
100 year +45% CC 1440 minute winter	14.653	5.843
100 year +45% CC 2160 minute summer	15.455	4.271
100 year +45% CC 2160 minute winter	10.649	4.271
100 year +45% CC 2880 minute summer	12.633	3.386
100 year +45% CC 2880 minute winter	8.490	3.386
100 year +45% CC 4320 minute summer	9.174	2.399
100 year +45% CC 4320 minute winter	6.041	2.399
100 year +45% CC 5760 minute summer	7.343	1.880
100 year +45% CC 5760 minute winter	4.753	1.880
100 year +45% CC 7200 minute summer	6.154	1.570
100 year +45% CC 7200 minute winter	3.972	1.570
100 year +45% CC 8640 minute summer	5.339	1.362
100 year +45% CC 8640 minute winter	3.446	1.362
100 year +45% CC 10080 minute summer	4.755	1.213
100 year +45% CC 10080 minute winter	3.069	1.213

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SIC1	10	3.243	0.043	3.5	0.0122	0.0000	OK
15 minute summer	SIC2	11	3.101	0.051	5.1	0.0144	0.0000	OK
15 minute summer	SIC3	11	2.997	0.047	5.7	0.0134	0.0000	OK
15 minute summer	RE4	10	3.239	0.039	2.5	0.0027	0.0000	OK
15 minute summer	SIC5	10	3.127	0.027	3.2	0.0075	0.0000	OK
2160 minute winter	SOAKAWAY	1980	2.301	0.801	0.6	26.2101	0.0000	SURCHARGED
15 minute summer	DUMMY	1	1.450	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SIC1	1.000	SIC2	3.4	0.492	0.045	0.2257	
15 minute summer	SIC2	1.001	SIC3	5.1	0.679	0.060	0.1275	
15 minute summer	SIC3	1.002	SOAKAWAY	5.7	0.821	0.051	0.1041	
15 minute summer	RE4	2.000	SIC5	2.5	0.601	0.032	0.0872	
15 minute summer	SIC5	2.001	SOAKAWAY	3.1	1.044	0.015	0.0267	
2160 minute winter	SOAKAWAY	Head/Flow	DUMMY	0.0				0.0
2160 minute winter	SOAKAWAY	Infiltration		0.1				

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 95.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute winter	SIC1	9240	3.556	0.356	0.1	0.1008	0.0000	SURCHARGED
10080 minute winter	SIC2	9240	3.556	0.506	0.2	0.1432	0.0000	SURCHARGED
10080 minute winter	SIC3	9240	3.556	0.606	0.2	0.1714	0.0000	SURCHARGED
10080 minute winter	RE4	9300	3.556	0.356	0.1	0.0253	0.0000	SURCHARGED
10080 minute winter	SIC5	9300	3.556	0.456	0.1	0.1290	0.0000	SURCHARGED
10080 minute winter	SOAKAWAY	9300	3.556	2.056	0.6	100.9619	0.0000	SURCHARGED

15 minute summer DUMMY 1 1.450 0.000 0.0 0.0000 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)
10080 minute winter	SIC1	1.000	SIC2	0.1	0.193	0.001	2.2534	
10080 minute winter	SIC2	1.001	SIC3	0.2	0.272	0.002	1.1971	
10080 minute winter	SIC3	1.002	SOAKAWAY	0.2	0.326	0.002	1.0563	
10080 minute winter	RE4	2.000	SIC5	0.1	0.242	0.001	1.4788	
10080 minute winter	SIC5	2.001	SOAKAWAY	0.1	0.421	0.000	0.6338	
10080 minute winter	SOAKAWAY	Head/Flow	DUMMY	0.0				0.0
10080 minute winter	SOAKAWAY	Infiltration		0.1				

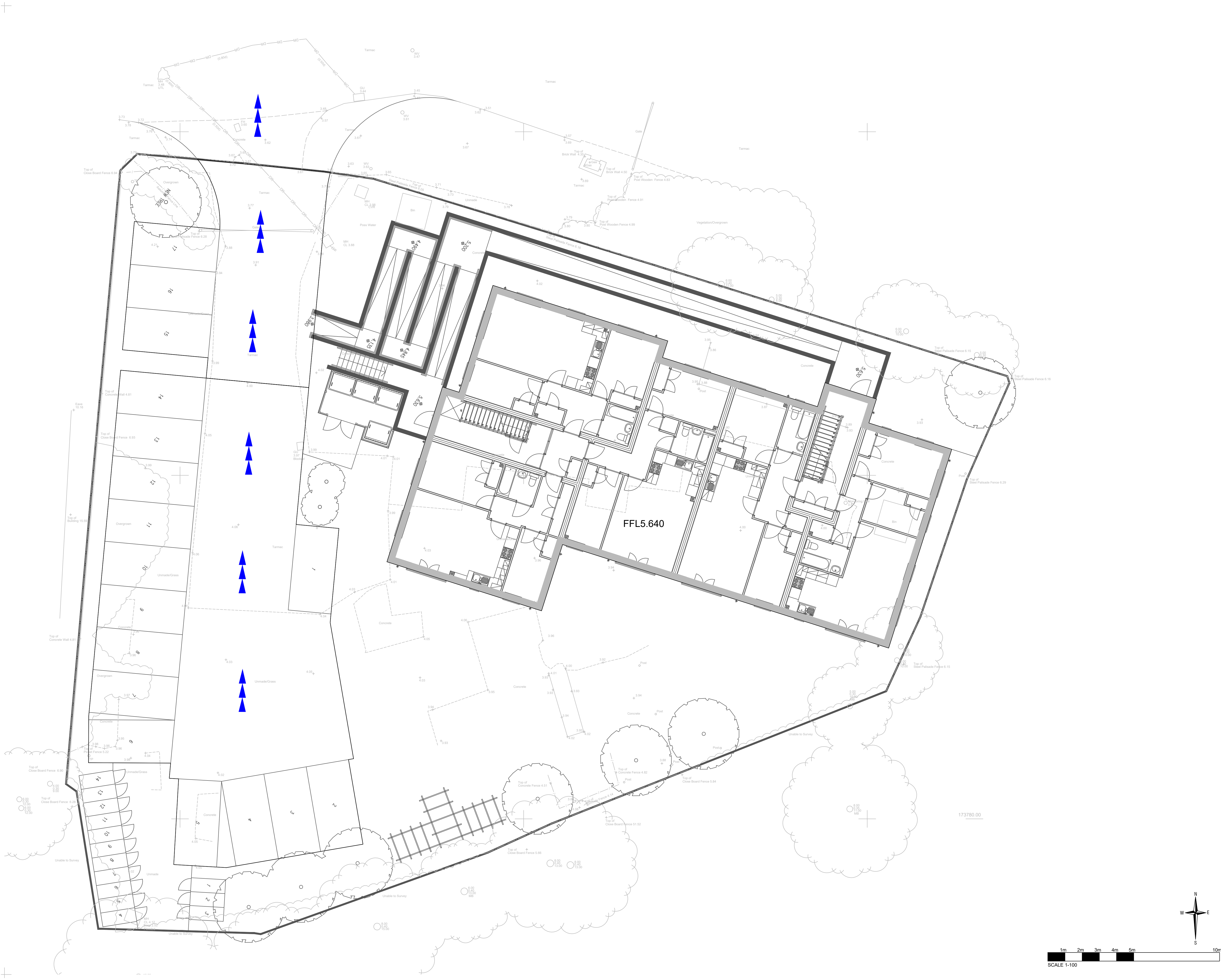
Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute winter	SIC1	4260	3.945	0.745	0.4	0.2108	0.0000	FLOOD RISK
4320 minute winter	SIC2	4260	3.945	0.895	0.6	0.2532	0.0000	FLOOD RISK
4320 minute winter	SIC3	4260	3.945	0.995	0.7	0.2815	0.0000	FLOOD RISK
4320 minute winter	RE4	4320	3.945	0.745	0.7	0.0529	0.0000	FLOOD RISK
4320 minute winter	SIC5	4320	3.945	0.845	0.5	0.2391	0.0000	FLOOD RISK
4320 minute winter	SOAKAWAY	4320	3.945	2.445	1.9	142.7069	0.0000	FLOOD RISK
15 minute summer	DUMMY	1	1.450	0.000	0.0	0.0000	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)
4320 minute winter	SIC1	1.000	SIC2	0.4	0.258	0.005	2.2534	
4320 minute winter	SIC2	1.001	SIC3	0.6	0.338	0.007	1.1971	
4320 minute winter	SIC3	1.002	SOAKAWAY	0.7	0.419	0.006	1.0563	
4320 minute winter	RE4	2.000	SIC5	-0.5	0.317	-0.006	1.4788	
4320 minute winter	SIC5	2.001	SOAKAWAY	0.4	0.527	0.002	0.6338	
4320 minute winter	SOAKAWAY	Head/Flow	DUMMY	0.0				0.0
4320 minute winter	SOAKAWAY	Infiltration		0.1				

Appendix E

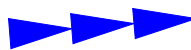
Flood exceedance plan



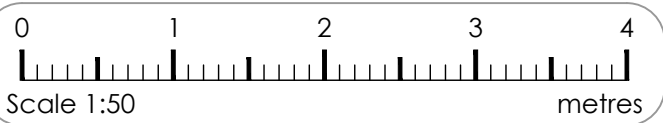
Do not scale from this drawing.

All dimensions to be checked on site prior to work commencing or preparation of working drawings, any discrepancies should be notified immediately.

This drawing is the copyright of Wilson & Partners and should not be reproduced without prior written approval. This drawing is to be read in conjunction with all relevant specifications.



EXISTING AND PROPOSED
FLOOD EXCEEDANCE ROUTE



P01	Preliminary issue	RAC	19.01.26	MS
Rev	Comment	By	Date	Ckd

Wilson

Building Consultancy

Wilson & Partners LLP
Studio 19, Canterbury Innovation Centre
University Road, Canterbury
CT2 7FG
T: 01227 696 100
www.wilsonpartners.co.uk

Client:

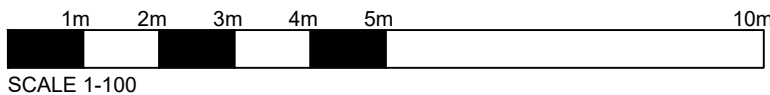
Project Title:
The Builders Yard Residential Dev
Lower Range Road, Gravesend
Kent, DA12 2QL

Drawing Title:
Flood Exceedance Plan

Scale @A1 1:100	WP Ref 2580	Suitability S7 -	suitable for AIM authorisation
--------------------	----------------	---------------------	-----------------------------------

Preliminary				
Original Issue 19.01.26	Drawn RAC	Designed RAC	Checked MS	Approved MS

Project No 2580	Originator WP	Volume BY	Level ZZ
Type DR	Role C	Drg No 3100	Revision P01



Appendix F

SUDS Operation and maintenance schedule

Operation and Maintenance Schedule - Porous 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 reduce frequency as required, based upon site-specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeabl areas as this area is most likely to collect the most sediment.
Occassional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using gylphosphate applied directly into the weeds by an applicator rather than spraying.	As required - once per year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip has occurred.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10-15 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 remdial action.	Three monthly, 48 hours after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.

Operation and Maintenance Schedule - Cellular Storage Tank		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually.
	Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	Annually.
Occassional Maintenance	Clean all gutters and downpipes. Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	As required based upon inspections.
Remedial Actions	Reconstruct cellular storage tank and/or replace or clean void fill, if performace deteriorates or failure occurs.	As required based upon inspections.
	Replacement of damaged geotextile (will require reconstruction of cellular storage tank).	As required based upon inspections.
Monitoring	Inspect catch pits and note rate of sediment accumulation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.
	Check cellular storage tank to ensure emptying is occurring.	Annually.

Operation and Maintenance Schedule - catchpit		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually
	Inspect for sediment and debris in the chamber and remove.	Six monthly
Occassional Maintenance	Inspect for sediment and debris in the chamber.	As required based upon inspections.
Remedial Actions	Replace chamber if damaged.	As required.
Monitoring	Inspect catchpit and take note of sedimentation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.

Operation and Maintenance Schedule - Soakaway		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually.
	Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	Annually.
Occassional Maintenance	Clean all gutters and downpipes. Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	As required based upon inspections.
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performace deteriorates or failure occurs.	As required based upon inspections.
	Replacement of clogged geotextile (will require reconstruction of soakaway.	As required based upon inspections.
Monitoring	Inspect catch pits and note rate of sediment accumulation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.
	Check soakaway to ensure emptying is occurring.	Annually.

