

[REDACTED]

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Save the environment - think before you print.

From: Sarah Burrow <[REDACTED]>
Sent: 03 June 2020 09:11
To: Amber Willard <[REDACTED]>
Cc: Chris Slade <[REDACTED]> Luke Honeywill <[REDACTED]> Planning.Responses
<Planning.Responses@arun.gov.uk>
Subject: FW: BN/17/20/DOC - 3 Oriel Close

Hi Amber,

The client's Engineer forwarded me a revised Drainage Layout and Calculations yesterday after I raised concerns about the infiltration rate used. On the basis of the calculations and plan attached to this e-mail (listed below) I am happy to recommend you discharge Condition 3 on application BN/92/19/HH.

Relevant Documents:

C1375_100_P1_SW Drainage Layout
SW_Network_1_A

Kind Regards

Sarah Burrow
Engineering Assistant, Engineers



Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF
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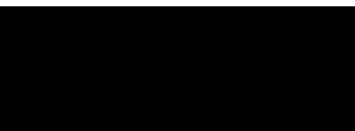
From: Chris Slade <[REDACTED]>
Sent: 02 June 2020 15:40
To: Sarah Burrow <[REDACTED]>
Cc: Luke Honeywill <[REDACTED]>
Subject: RE: BN/17/20/DOC - 3 Oriel Close

Hi Sarah

Many thanks for looking at this so quickly. Please find revised drawing and calcs attached.

Kind regards

Chris Slade **FIHE**
CGS Civils Ltd



Drainage Design | SuDS | Flood Risk Assessments | Highways | External Works

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

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From: Sarah Burrow <[REDACTED]>
Sent: 02 June 2020 10:21
To: Chris Slade <[REDACTED]>
Subject: RE: BN/17/20/DOC - 3 Oriel Close

Hi Chris,

As discussed I think you are going to have to use a more conservative infiltration rate for the calculations which will result in a larger soakaway.

The original application states

“Dispersal rate from on site percolation testing
300x300 pit, 320 mins to drop 150mm 0.014M³/M²/h” [sic]

On this basis I'd assume the infiltration rate to be 3.89 x 10⁻⁶m/s. However I questioned this rate at the time as the date of testing was not supplied, nor was it clear the depth of the pit or number of fills. I would have expected a factor of safety of three to be applied to this rate if the further information could not be supplied. Given the potentially very high groundwater and the ambiguity on the site the additional capacity is necessary.

The drainage layout and details otherwise are fine. If you can get a design in today I will assess again to get a response to Amber tomorrow morning.

Kind Regards

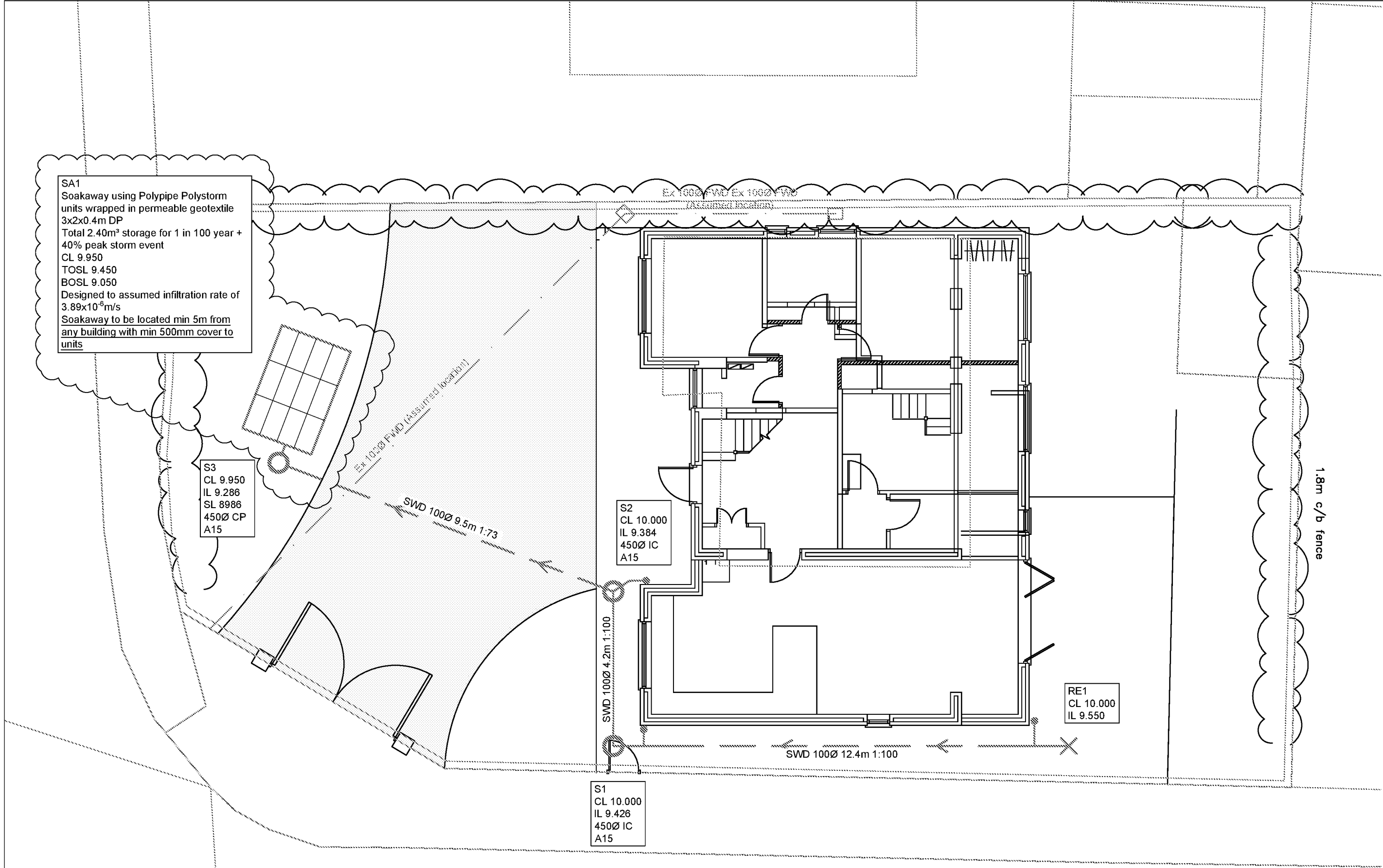
Sarah Burrow
Engineering Assistant, Engineers



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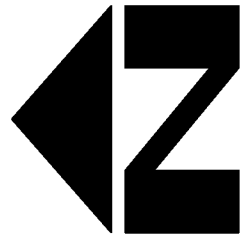
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DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
RWP POSITIONS



DRAINAGE LEGEND (1:100)

EXISTING FEATURES

Existing foul water sewer/drain and manhole

PROPOSED FEATURES

Rainwater pipe

Rodding eye

Storm water sewer/drain

Storm water inspection chamber (4500)

Gravel Driveway as per architect specification

1000 4.5m 1:100

Z BED

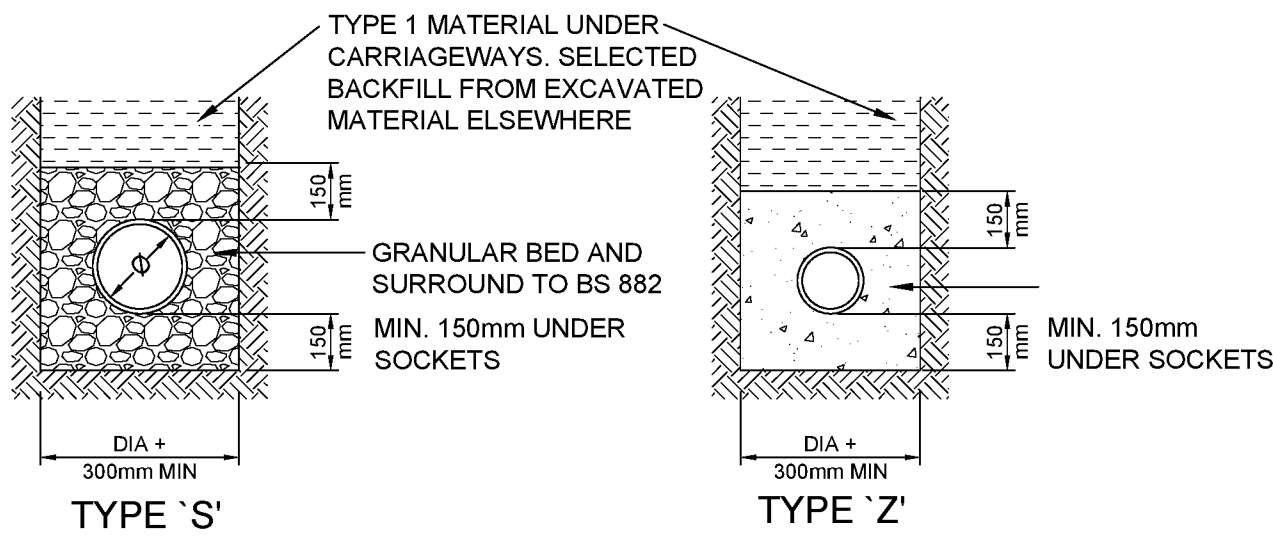
PIPE INFO - DIAMETER, LENGTH, GRADIENT, BEDDING TYPE

ABBREVIATIONS

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

STANDARD DRAINAGE NOTES

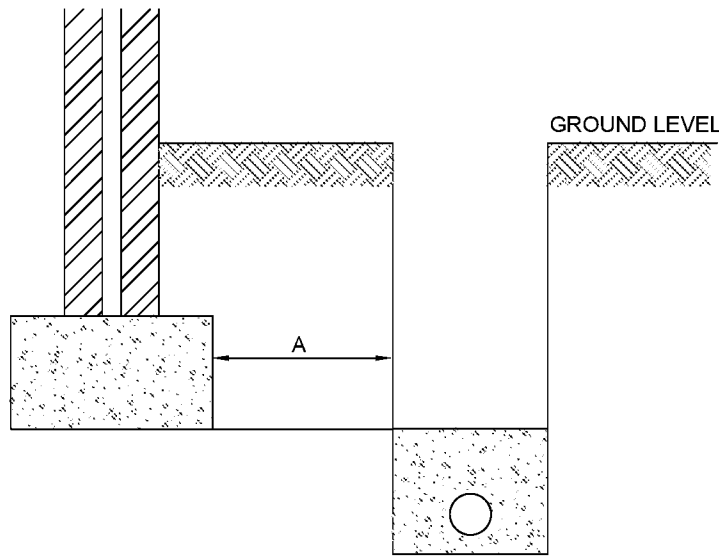
- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS,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



DRAINAGE WITH MORE THAN 600mm COVER - LANDSCAPED
900mm COVER - ROADS
(UNLESS BEDDING TYPE IS STATED ON THE DRAINAGE PLANS OR SPECIFICATION)

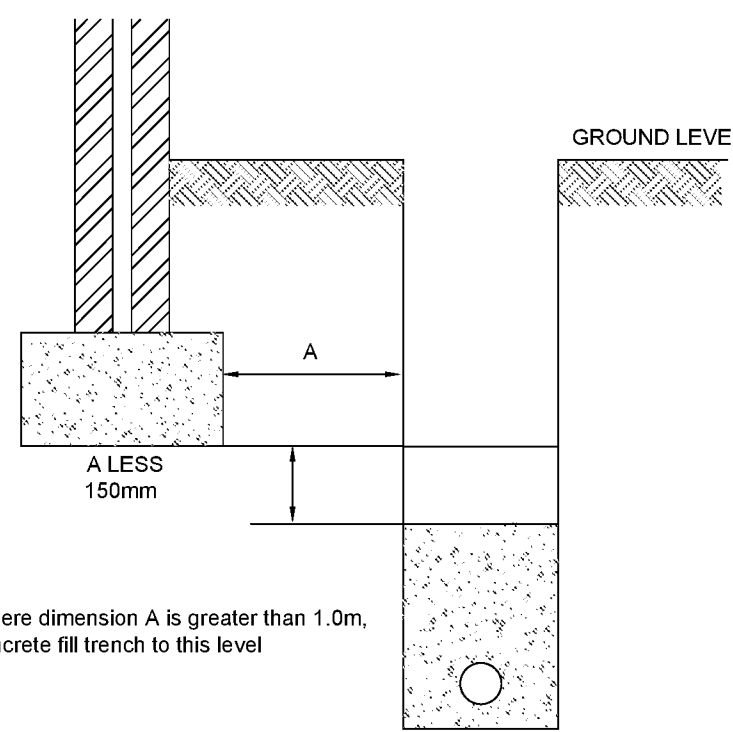
DRAINAGE WITH LESS THAN 600mm COVER - LANDSCAPED
900mm COVER - ROADS
(UNLESS BEDDING TYPE IS STATED ON THE DRAINAGE PLANS OR SPECIFICATION)

PIPE BEDDING DETAILS IN
PRIVATE AREAS



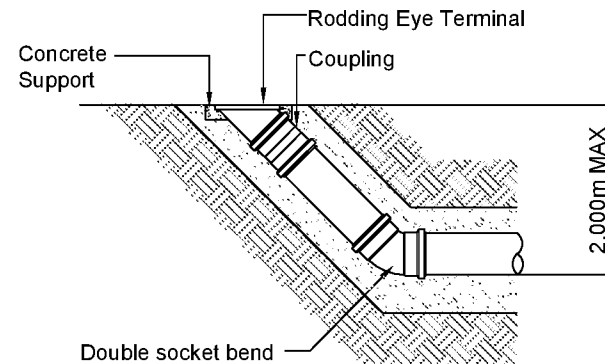
Where dimension A is less than 1.0m, concrete fill trench to level of underside of foundations.

PIPES NEAR BUILDINGS

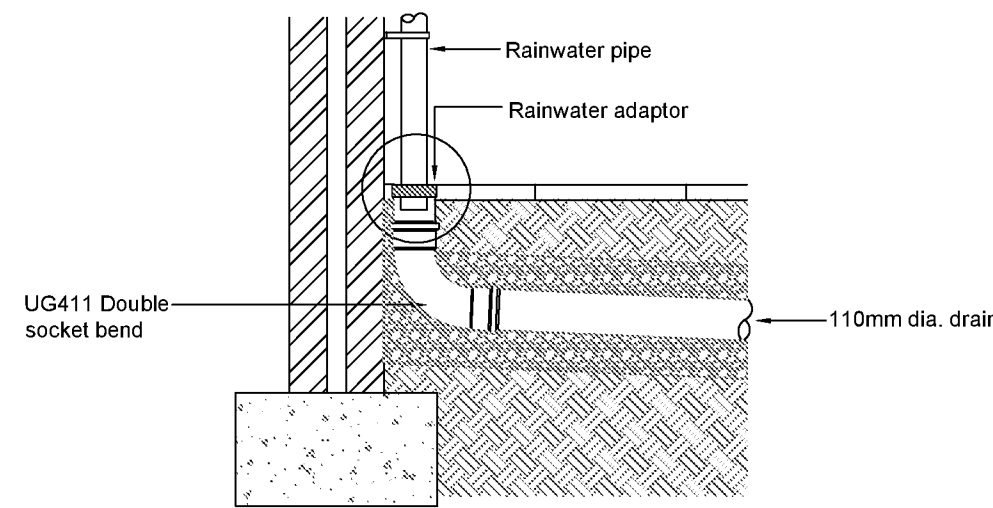


Where dimension A is greater than 1.0m, concrete fill trench to this level

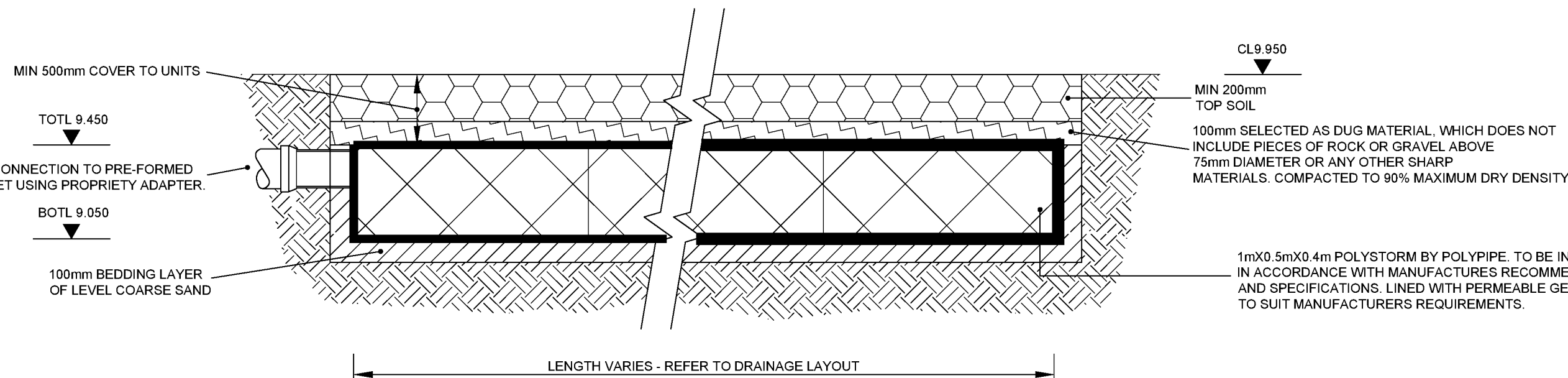
PIPES NEAR BUILDINGS



Rodding eye detail

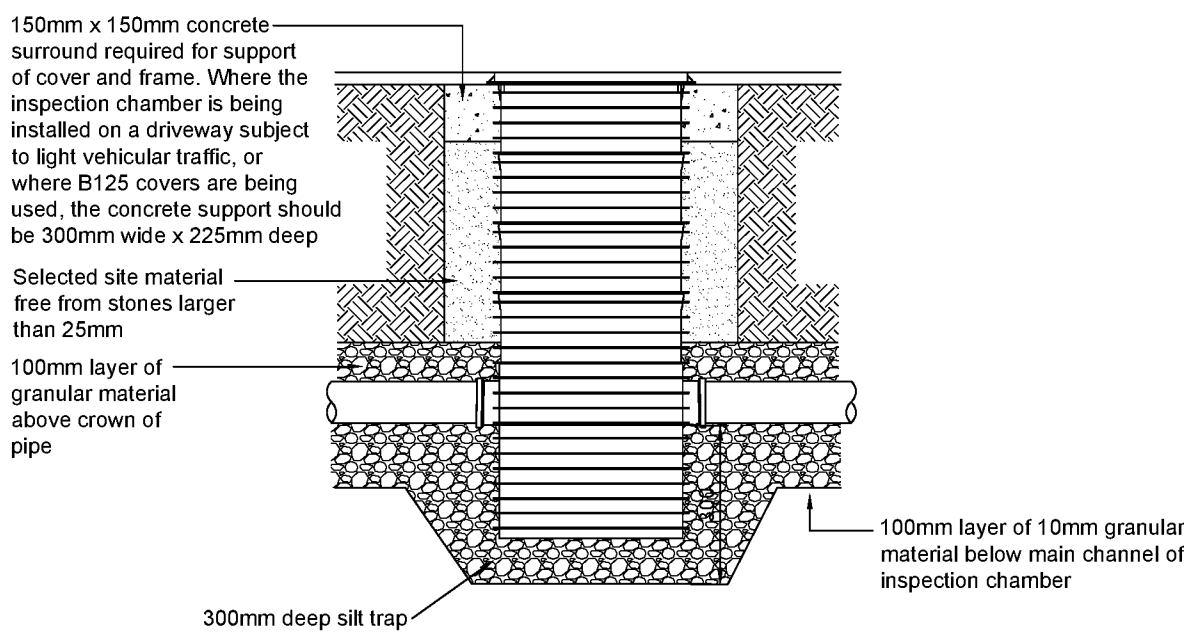


Rainwater pipe connection

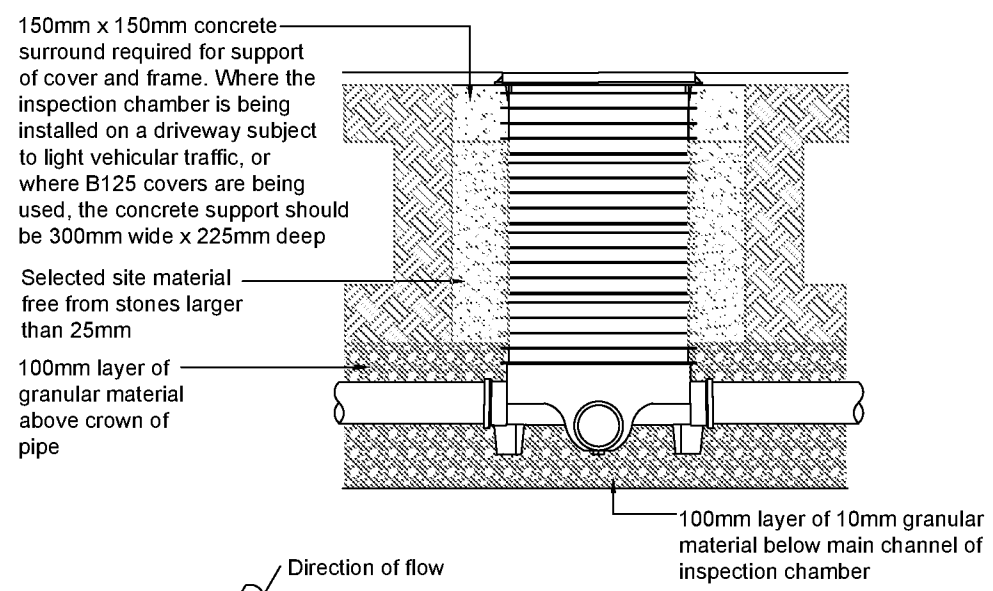


TRENCH SOAKAWAY USING POLYSTORM GEOMODULAR UNITS
LANDSCAPED AREAS ONLY

ALL STORAGE TANK DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS, METHOD STATEMENTS AND RECOMMENDATIONS OF POLYPIPE



450mmØ POLYPIPE BASIC
SILT TRAP DETAIL



- In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change of direction for the drainage system, short radius bends of 11¼°, 15°, 30° and 45° can be used in the inlet and outlet to achieve the required angle.
- Side inlet branch connections enter the inspection chamber approx. 55mm above the invert of the main channel.
- 320mm dia. chambers are supplied with 2no. blanking plugs for the side inlets and 460mm dia. chambers are supplied with 3no. blanking plugs.

450mmØ INSPECTION
CHAMBER DETAIL

PRELIMINARY

P1	02.06.20	REVISED TO SUIT ARUN DC COMMENTS	CS	CS	CS
P-	27.05.20	PRELIMINARY ISSUE	LH	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP

 Consulting Civil Engineers					
CLIENT MR JAMES TAYLOR					
ARCHITECT CRITCHLEY ARCHITECTURE AND DESIGN LTD					
JOB TITLE 3 ORIEL CLOSE BARNHAM					
DRAWING TITLE SURFACE WATER DRAINAGE LAYOUT					
DRAWN	LH	ENGINEER	CS	CHECKED	APPROVED
DATE	MAY 2020		SCALE @ A1		1:100
JOB No.	C1375	STATUS	P	DRAWING No.	100
				REV	P1

Design Settings

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

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE1		5.00	10.000	100	87.357	-225.770	0.450
S1	0.003	5.00	10.000	450	74.969	-225.770	0.574
S2	0.001	5.00	10.000	450	74.969	-221.568	0.616
S3			9.950	450	65.862	-218.065	0.700

Links (Input)

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)
1.001	RE1	S1	12.388	0.600	9.550	9.426	0.124	100.0	100	5.27	50.0
1.002	S1	S2	4.202	0.600	9.426	9.384	0.042	100.0	100	5.36	50.0
2001	S2	S3	9.757	0.600	9.384	9.250	0.134	72.8	100	5.54	50.0

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)
1.001	12.388	100.0	100	Circular	10.000	9.550	0.450	10.000	9.426	0.474
1.002	4.202	100.0	100	Circular	10.000	9.426	0.474	10.000	9.384	0.516
2001	9.757	72.8	100	Circular	10.000	9.384	0.516	9.950	9.250	0.600

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	RE1	100	Manhole	Adoptable	S1	450	Manhole	Adoptable
1.002	S1	450	Manhole	Adoptable	S2	450	Manhole	Adoptable
2001	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
RE1	87.357	-225.770	10.000	0.450	100		0	1.001	9.550	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	74.969	-225.770	10.000	0.574	450		1	1.001	9.426 100
							0	1.002	9.426 100
S2	74.969	-221.568	10.000	0.616	450		1	1.002	9.384 100
							0	2001	9.384 100
S3	65.862	-218.065	9.950	0.700	450		1	2001	9.250 100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node S3 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	9.050	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.01400	Time to half empty (mins)	7329	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	3.000	Number Required	1
Porosity	0.95	Pit Length (m)	2.000		

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	1	9.550	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S1	11	9.455	0.029	1.0	0.0076	0.0000	OK
15 minute winter	S2	11	9.414	0.030	1.3	0.0057	0.0000	OK
120 minute winter	S3	130	9.261	0.011	0.4	1.2070	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	RE1	1.001	S1	0.0	0.000	0.000	0.0112
15 minute winter	S1	1.002	S2	1.0	0.525	0.166	0.0080
15 minute winter	S2	2001	S3	1.3	0.678	0.183	0.0187
120 minute winter	S3	Infiltration		0.0			

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 95.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	1	9.550	0.000	0.0	0.0000	0.0000	OK
360 minute winter	S1	296	9.482	0.056	0.3	0.0149	0.0000	OK
360 minute winter	S2	296	9.482	0.098	0.4	0.0188	0.0000	OK
360 minute winter	S3	296	9.482	0.232	0.4	2.3198	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	RE1	1.001	S1	0.0	0.000	0.000	0.0179
360 minute winter	S1	1.002	S2	0.3	0.379	0.050	0.0259
360 minute winter	S2	2001	S3	0.4	0.479	0.056	0.0762
360 minute winter	S3	Infiltration		0.0			