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From: Finlay Gardner <Finlay.Gardner@arun.gov.uk>

Sent: 31 March 2021 13:49

To: Planning.Responses <Planning.Responses@arun.gov.uk>

Subject: FW: Growth Factors when using BRE365 Method to calculate 1 in 100 year storm event

Please attach to the application (M/20/21/DOC) as drainage details.

Finlay Gardner
Planning Officer,
Planning Department

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Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF
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www.arun.gov.uk/planning

Essential maintenance is being carried out to the planning, building control and local land charges database during the week commencing 12 April 2021.

During this time there will be no public or staff access to any records held within this database, and it will not be possible to carry out any of the following tasks via the Arun website:

- Research planning and building control history
- View any planning applications, plans, agreements, tree preservation orders or competent persons data
- Submit building control applications
- Submit planning application comments
- Report any planning compliance issues

The publicity and consultation period for all planning applications that fall over this week will be extended by a further week to ensure no one is disadvantaged.

All other aspects of planning, building control and local land charges will be limited during this week and you are strongly advised to contact the individual departments before 12 April 2021 for specific restrictions during this time.

From: Tim Murray [REDACTED]
Sent: 31 March 2021 13:39
To: Sarah Burrow <Sarah.Burrow@arun.gov.uk>
Cc: Finlay Gardner <Finlay.Gardner@arun.gov.uk>
Subject: RE: Growth Factors when using BRE365 Method to calculate 1 in 100 yearstorm event

Hi Sarah

Many Thanks for your help. Further to our conversation please find attachments which I hope cover your queries. I would be grateful if you would advise me ASAP of anything now missing.

Kind Regards

Tim Murray

Sent from [Mail](#) for Windows 10

From: Sarah Burrow
Sent: 30 March 2021 16:47
To: [REDACTED]
Subject: Growth Factors when using BRE365 Method to calculate 1 in 100 yearstorm event

Hi Tim,

As discussed, I can provide the following table (taken from the 'Design and Analysis of Urban Storm Drainage – The Wallingford Procedure, Volume 4 The Modified Rational Method' p9). These are the growth factors which we use to calculate rainfall for the 100 year storm. I hope this is useful to you going forward. You will need to add 40% to account for climate change.

Table A1: Relationship between rainfall of return period T(MT) and M5 – England and Wales (ratio Z2)

M5 Rainfall mm	M1	M2	M3	M4	M5	M10	M20	M50	M100
5	0.62	0.79	0.89	0.97	1.02	1.19	1.36	1.56	1.79
10	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.65	1.91
15	0.62	0.80	0.90	0.97	1.03	1.24	1.44	1.70	1.99
20	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.73	2.03
25	0.66	0.82	0.91	0.97	1.03	1.24	1.44	1.72	2.01
30	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.70	1.97
40	0.70	0.84	0.92	0.97	1.02	1.19	1.38	1.64	1.89
50	0.72	0.85	0.93	0.98	1.02	1.17	1.34	1.58	1.81
75	0.76	0.87	0.93	0.98	1.02	1.14	1.28	1.47	1.64
100	0.78	0.88	0.94	0.98	1.02	1.13	1.25	1.40	1.54
150	0.78	0.88	0.94	0.98	1.01	1.12	1.21	1.33	1.45
200	0.78	0.88	0.94	0.98	1.01	1.11	1.19	1.30	1.40

Kind Regards

Sarah Burrow

Engineering Assistant, Engineering Services

T: 01903 737815

E: sarah.burrow@arun.gov.uk

Current working pattern: Monday 8am-2:30pm, Tuesday 8am-5:30pm, Wednesday 8am-5pm, Thursday 8am-5:30pm, Friday 8am-11:30am.

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Installation OsmaDrain

Yard Gully

The OsmaDrain Yard Gully (4D800) comes complete with its own trap facility which allows ease of rodding via a removable rubber plug.

Also available as optional extras are a Perforated Galvanised, Mild Steel Catchment Bucket (4D815) and a Ductile Iron Grating and Frame, suitable for use in installations requiring a BS EN 124-B125 Medium Duty Loading.

Gully Connection ~ 110mm
OsmaDrain

1. Make sure that both the Gully spigot and ring seal socket are dry and clean from grit and dust.
2. Lubricate evenly around the gully spigot (NOT SOCKET) with OsmaDrain Lubricant (4D395).
3. Make sure the components to be jointed are correctly aligned.
4. Push the socket fully on to the spigot.

Installation of Yard Gully

1. When excavating the Gully pit allow an additional 100mm under the unit and 150mm around the unit.
2. Sit the Gully (4D800) on a minimum 100mm bed of suitable "as-dug" or granular material and surround it with similar material 150mm wide, up to the underside of its 110mm spigoted outlet, (See Figures 32 and 33).
3. Connect the Gully to the branch drain in the appropriate way.
4. Pour 150mm x 250mm invert of concrete around the Gully up to its lip (See Figures 32 and 33).
5. Where required insert the Galvanised, Mild Steel, Catchment Bucket (4D815). (See Figures 32).
6. Bed the Cast-iron Grating and Frame in a suitable concrete mix (See Figures 32 and 33).

Figure 32: Yard Gully installation

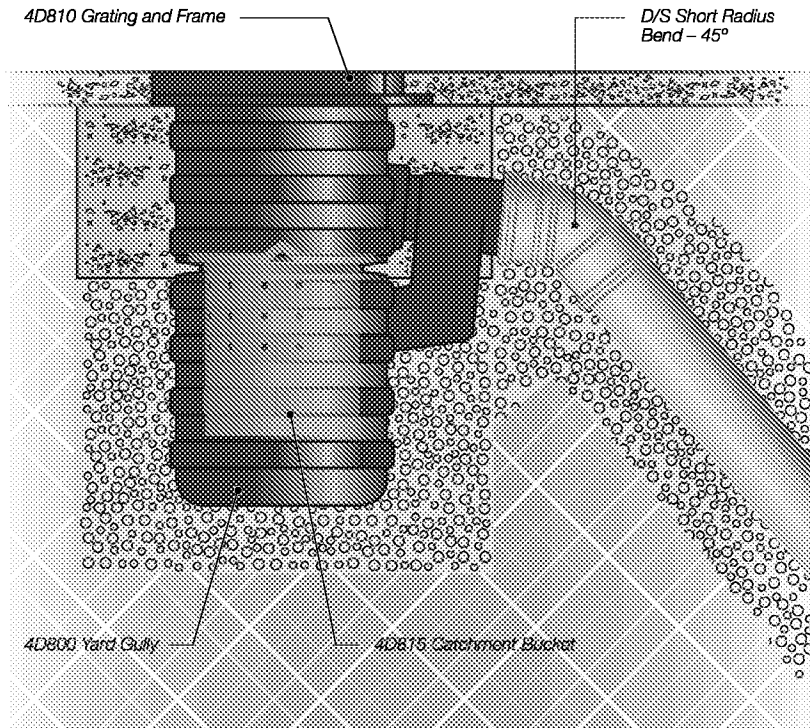
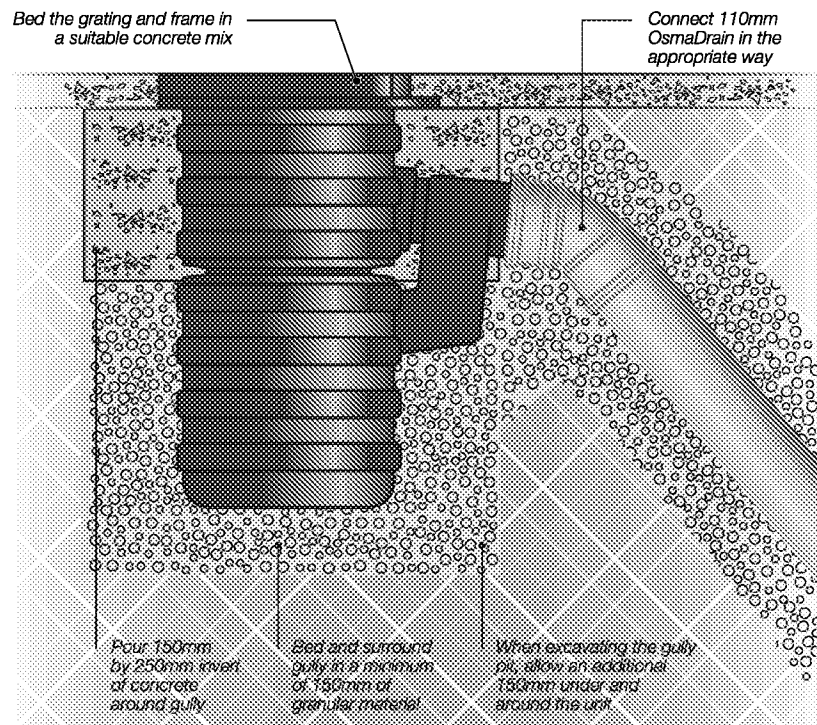


Figure 33: Yard Gully installation



WAVIN Stormwater Management

AquaCell Soakaway designed in accordance with CIRIA 156

Project & Site Details

Project Number	S19988	Produced by	Mark Henly
Client	Tim Murray	Checked by	
Site Name	8 West Drive, Middleton-on-Sea		
Location	PO22 7TS	Date	03/02/2021

Drainage Details

Area	65 m ²	Climate Change	40 %
Catchment Type	Roof	Effective Area	82 m ²
Area Reduction Factor	0.9	Additional Inflow	0.00 l/s

Discharge Parameters

Infiltration Rate	1.90E-05	Soil Type	Unknown
Factor of Safety	3	Source	Unknown
Effective Infiltration Rate	6.33E-06		
Additional Outflow*	0.00 l/s	Depth to Groundwater (m)	Unknown

*flat rate from pump only

Rainfall Data

R value		0.35		Storm Return Period				1 in 100 years	
M5-60		18		Country				England and Wales	
<u>Time</u>	<u>Z1 Value</u>	<u>y mm</u>	<u>Z2 Value</u>	<u>p mm</u>	<u>Value I</u>	<u>a</u>	<u>b</u>	<u>Storage Height</u>	<u>Time To Half -Empty</u>
5min	0.36	6.48	1.81	11.73	0.14	-38.12	0.031	0.099	1.88
10min	0.51	9.18	1.89	17.35	0.10	-28.00	0.031	0.145	2.65
15min	0.61	10.98	1.91	20.97	0.08	-22.41	0.031	0.174	3.10
30min	0.78	14.04	1.91	26.82	0.05	-14.05	0.031	0.217	3.74
1hr	1.00	18.00	1.99	35.82	0.04	-9.13	0.031	0.280	4.60
2hr	1.21	21.78	2.03	44.21	0.02	-5.34	0.031	0.323	5.13
4hr	1.53	27.54	2.01	58.36	0.01	-3.05	0.031	0.358	5.55
6hr	1.71	30.78	1.97	60.64	0.01	-2.02	0.031	0.345	5.40
10hr	2.00	36.00	1.97	70.92	0.01	-1.19	0.031	0.319	5.08
24hr	2.55	45.90	1.89	86.75	0.00	-0.23	0.031	0.121	2.26
48hr	3.00	54.00	1.81	97.74	0.00	0.21	0.031	-0.160	-3.97

Soakaway Parameters

Length	4.0 m	Width	2.0 m 3.0 m
Depth	0.4 m	Void	95 %

Results

Critical storm duration (hrs)	4hr	
Required Storage Height (m)	0.358	PASS
Half Time Empty (hrs)	5.55	PASS

AquaCell Modular Units

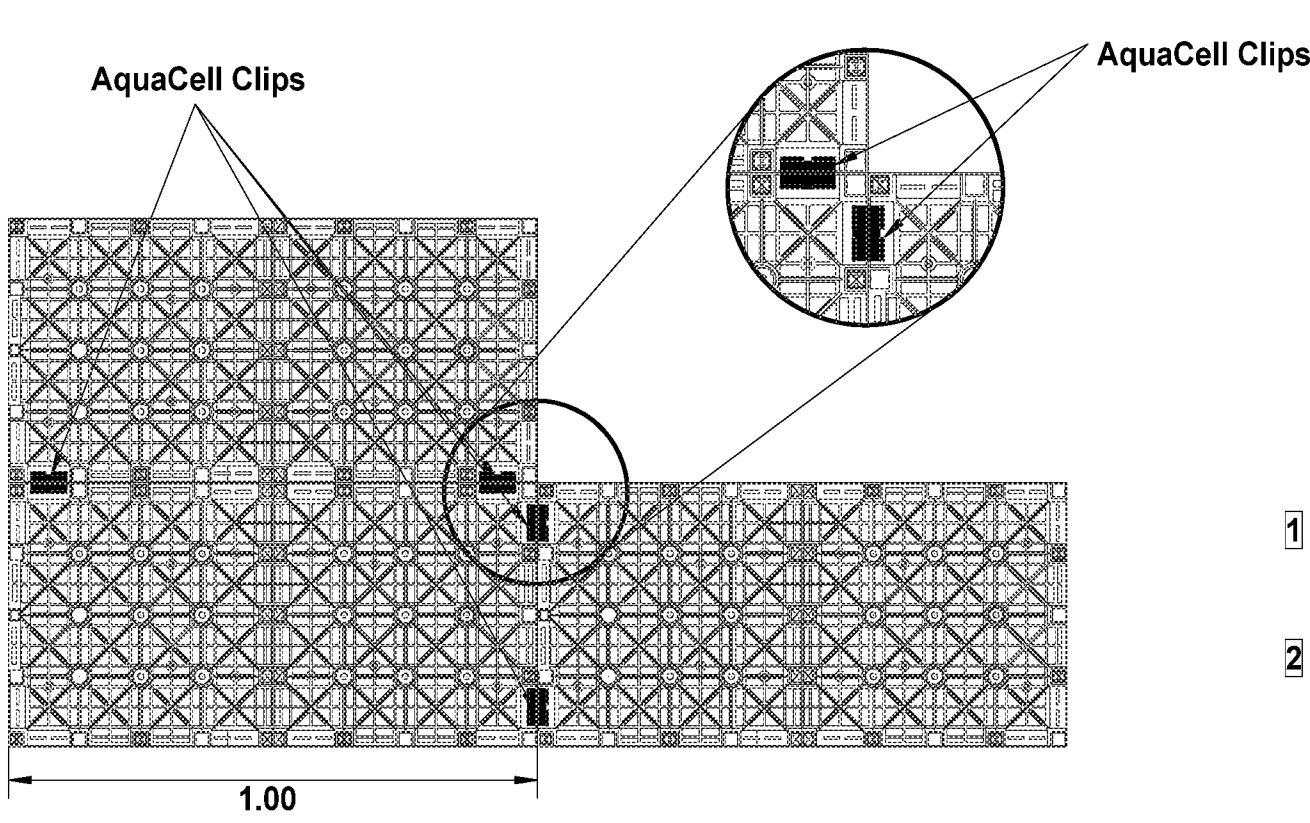
No. Units Long	4	No. Units Wide	6
No. Units Deep	1		
Total Number of Units	20 24	Unit Type	Unknown



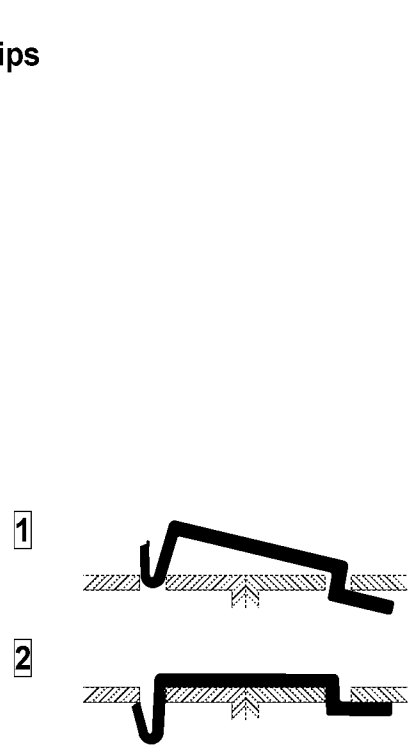
CONNECT TO BETTER

WAVIN AQUACELL

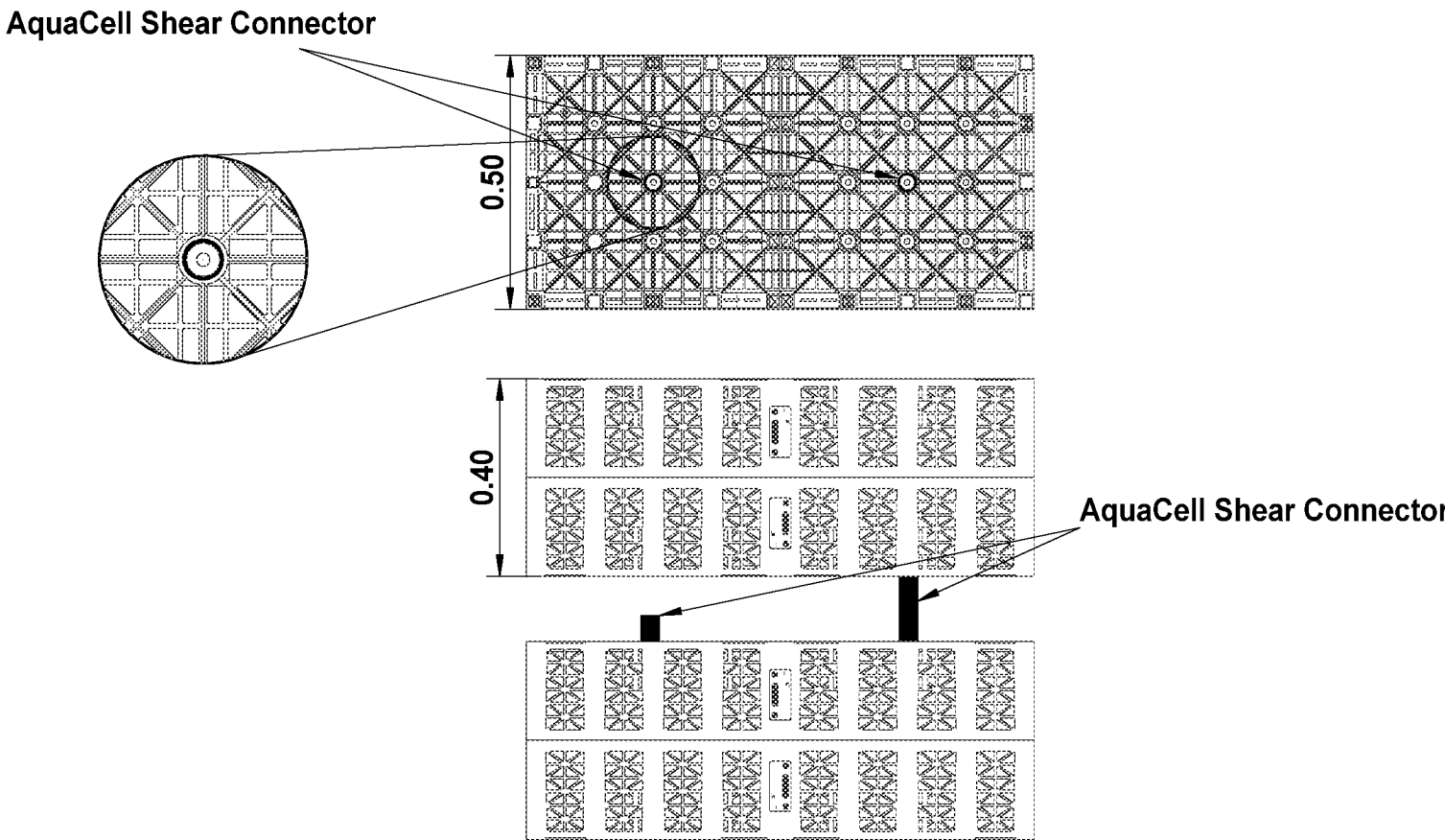
StormWater Management System



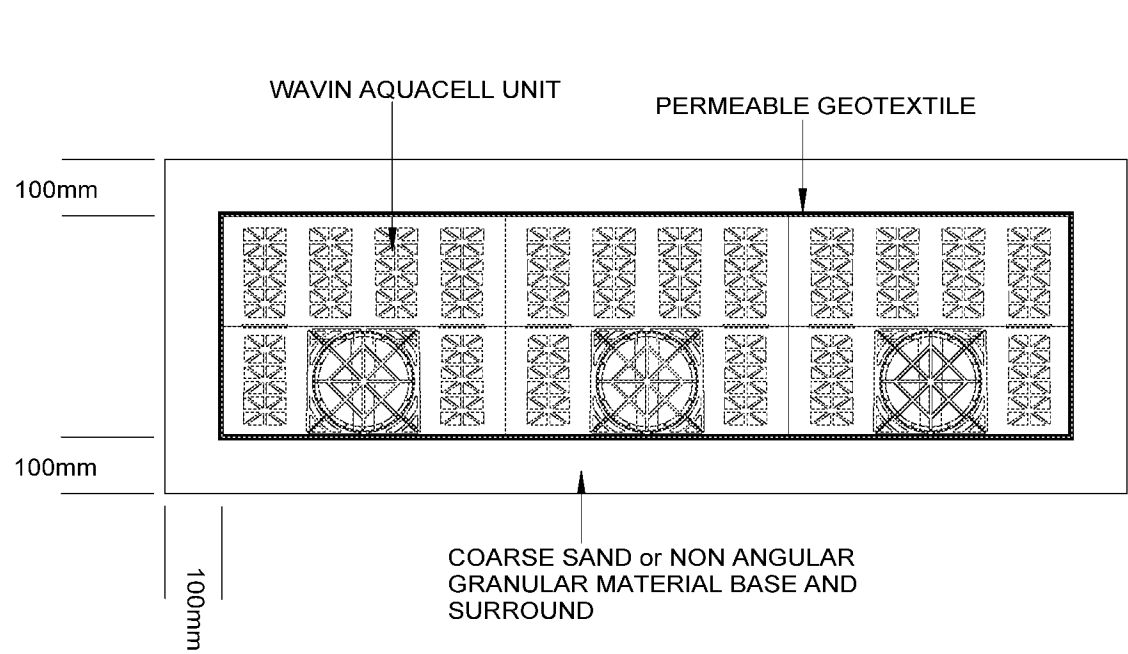
AquaCell Clip - 6LB105
For jointing the AquaCell units



AquaCell Shear Connector - 6LB105
For jointing the units in multi layer installations



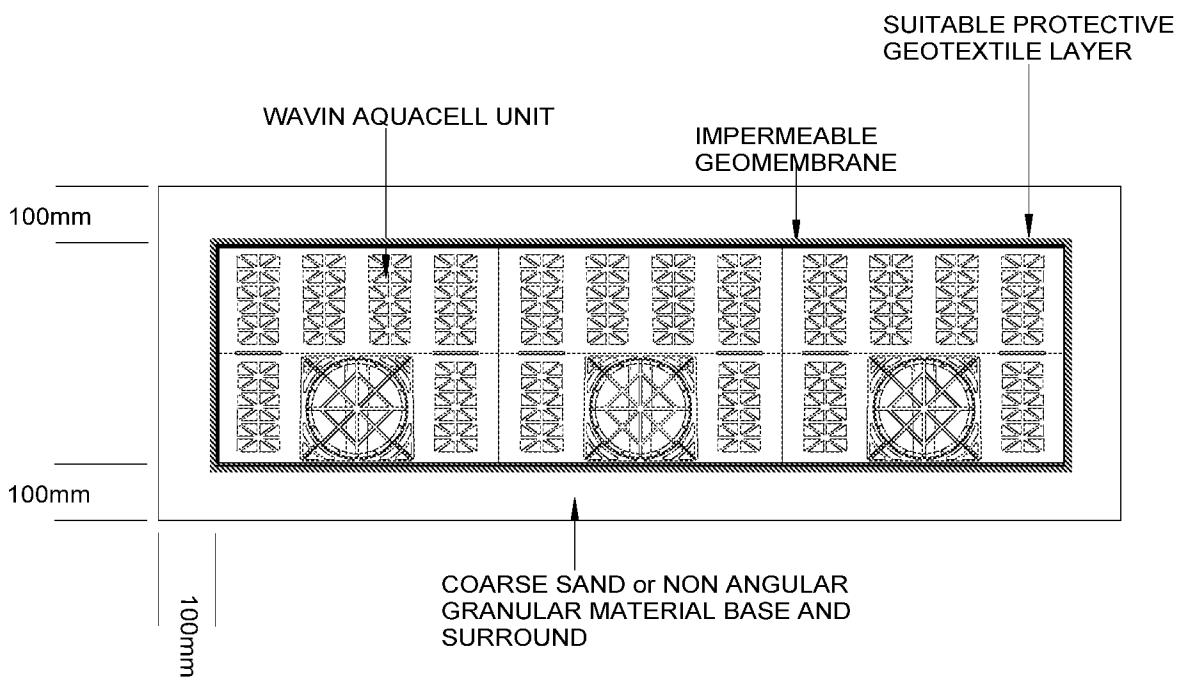
Construction Details



1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell Units.
2. Lay 100mm bed of coarse sand or non angular granular material, level and compact.
3. Lay the geotextile* over the base and up the sides of the trench.
4. Lay the AquaCell Units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the Wavin Clips and for multi layers use the Wavin Clips and the Wavin Shear Connectors.
5. Fix the Wavin Adaptors to the AquaCell Units as required and connect pipework.

6. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Wavin Silt Trap (6LB600) is installed prior to the inlet pipework - see page 10 for installation guidelines.
7. Wrap and overlap the geotextile covering the entire AquaCell structure.
8. Lay 100mm of coarse sand or non angular granular material between the trench walls and the AquaCell structure and compact.
9. Lay 100mm of coarse sand or non angular granular material over the geotextile and compact. Backfill with stone free as-dug material.
10. Rainwater from roof areas may discharge directly into the soakaway but rainwater from carparks must discharge through a catchpit manhole or a petrol interceptor.

* The geotextile should be selected according to specific site conditions, however, typically a 300g material will be suitable. Specialist advice should be sought if surrounding soil characteristics exhibit a high degree of fines/low infiltration capacity and/or there is a high risk of damage from ground contaminants.



1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell/AquaCell Lite units.
2. Lay 100mm bed of coarse sand, level and compact.
3. Lay the geotextile over the base and up the sides of the trench.
4. Lay the geomembrane on top of the geotextile over the base and up the sides of the trench.
5. Lay the AquaCell units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
6. Wrap the geomembrane around the AquaCell/AquaCell Lite structure and seal to manufacturers recommendations.*

7. Place the Flange Adaptor into position (at a point other than the pre-formed socket) and fix using self tapping screws. Drill a hole through the Flange Adaptor and connect pipework.
8. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the OSMA Silt Trap (6LB600) is installed prior to the inlet pipework – see page 14 for installation guidelines.
9. Wrap and overlap the geotextile covering the entire AquaCell/AquaCell Lite structure, to protect the geomembrane.
10. Lay 100mm of coarse sand between the trench walls and the AquaCell/AquaCell Lite units and compact.
11. Lay 100mm bed of coarse sand over the geotextile and compact. Backfill with stone free as-dug material. NB: A storage tank must be vented, and it is recommended that one vent pipe, 110mm in diameter is provided per 7,500 square metres of impermeable catchment area on a site, see page 14 for design.

* For large scale, deep installations a 1mm thick geomembrane is recommended and joints should be sealed using proprietary welding techniques. However, for shallow, domestic installations it may be suitable to use a geomembrane with taped joints. For further details contact Wavin Technical Design.

NOTE:

AquaCell Core 6LB100: Product Specification
AquaCell (Blue unit): Physical Properties

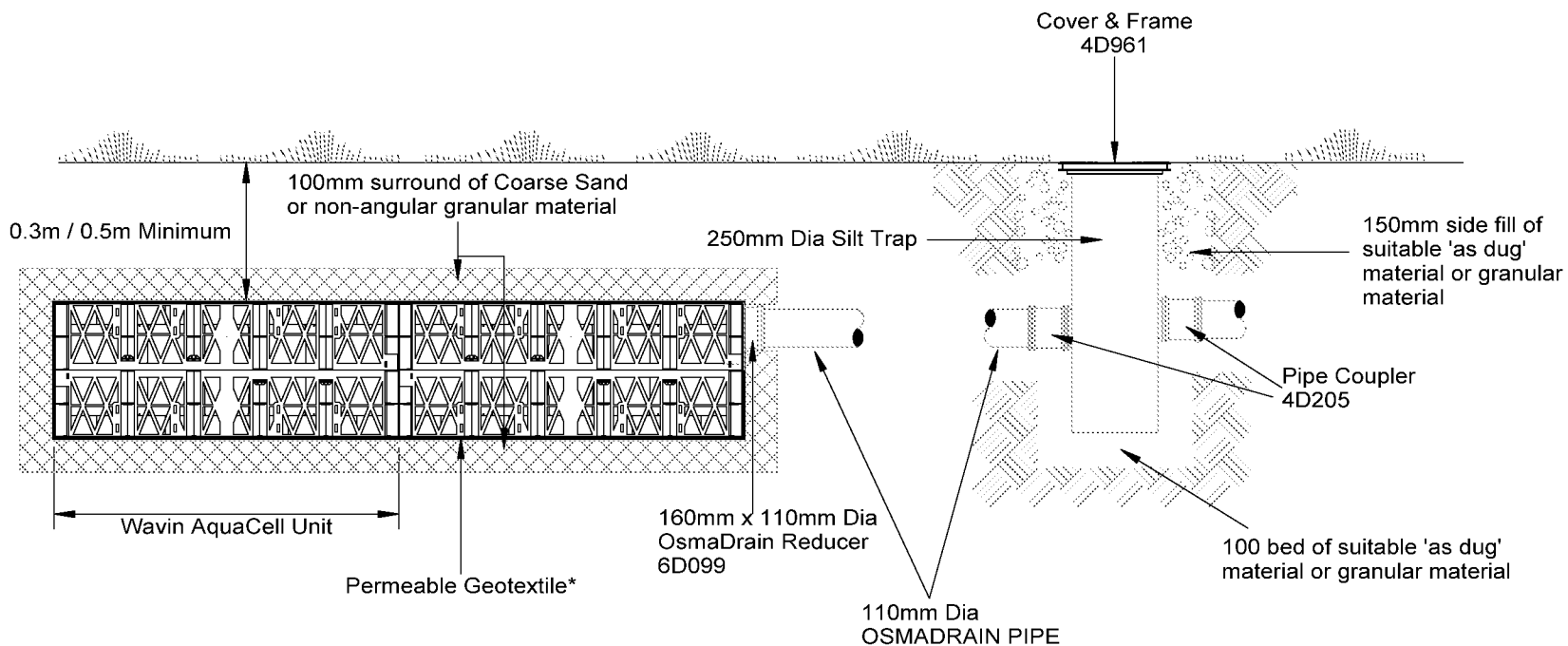
Element	Value	Unit
Nominal Unit Dimensions	1000x500x400	mm
Nominal Unit Volume	0.2	m ³
Nominal Storage Volume	0.19	m ³
Void Ratio	95	%
Ultimate compressive Strength at yield		
-Vertical loading on top face	560	kN/m ²
-Lateral loading on side face	77.5	kN/m ²
Short term deflection		
-Vertical loading on side face	1 per 97	mm per kN/m ² (applied load)
-Lateral loading on side face	1 per 7	mm per kN/m ² (applied load)
Estimated long-term deflection	0.4705	Ln (time in hours)

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Wavin Plastics Limited
Technical Design Department
Parsonage Way
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Wiltshire SN15 5PN



* The geotextile should be selected according to specific site conditions, however, typically a 300g material will be suitable. Specialist advice should be sought if surrounding soil characteristics exhibit a high degree of fines/low infiltration capacity and/or there is a high risk of damage from ground contaminants.

TITLE :

CLIENT :



Wavin Plastics Limited
Technical Design Department
Parsonage Way
Chippenham
Wiltshire SN15 5PN

DRN : S.Henly

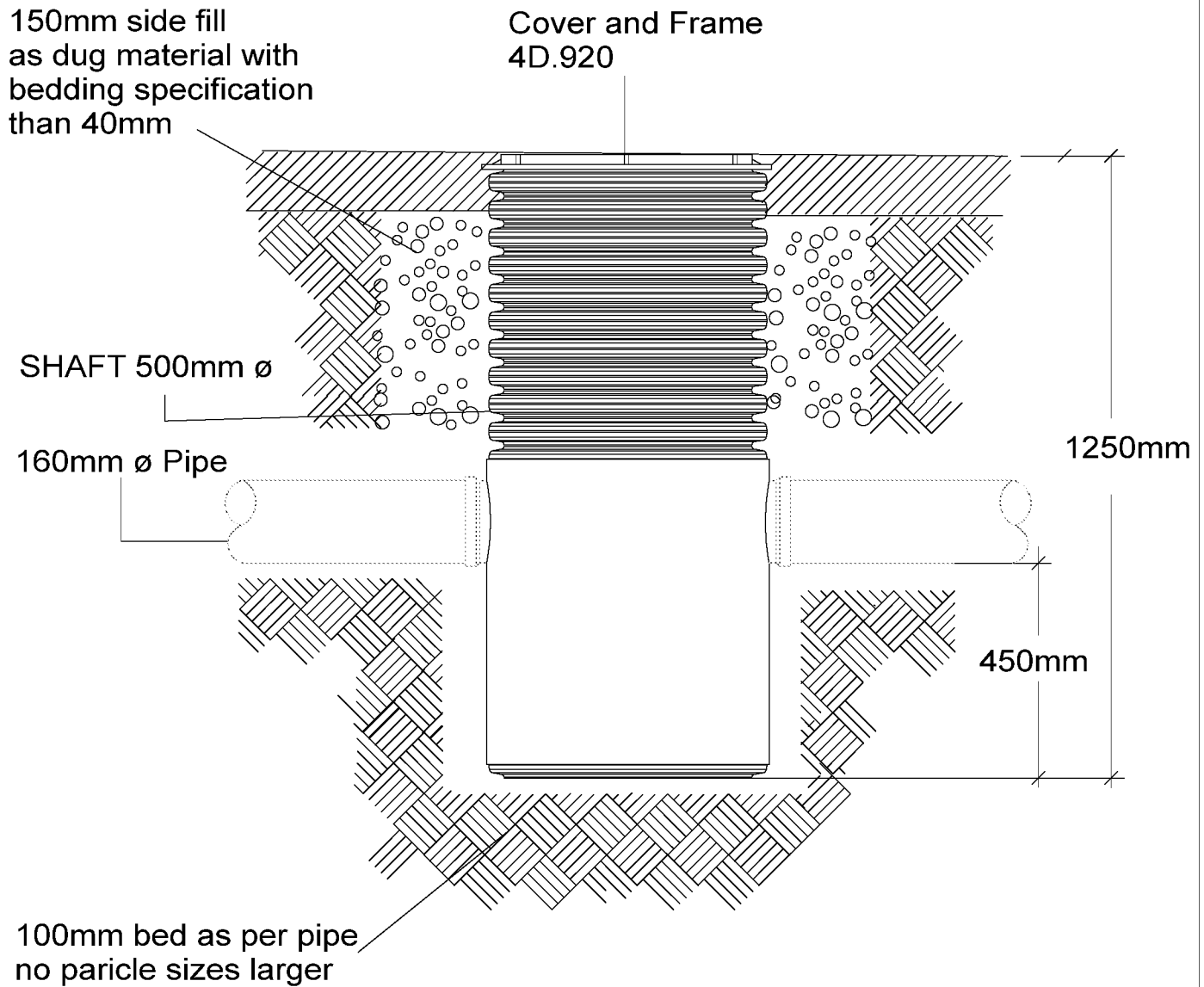
SCALE : NTS DATE : 06/04/2011

CHK :

DRG. No : Typical Soakaway Detail
With 250mm Ø Silt Trap

WAVIN AQUACELL

StormWater Management System



TITLE :

SILT TRAP

CLIENT:

DRN : AP

SCALE :

DATE :

CHK : AP

DRG. No :

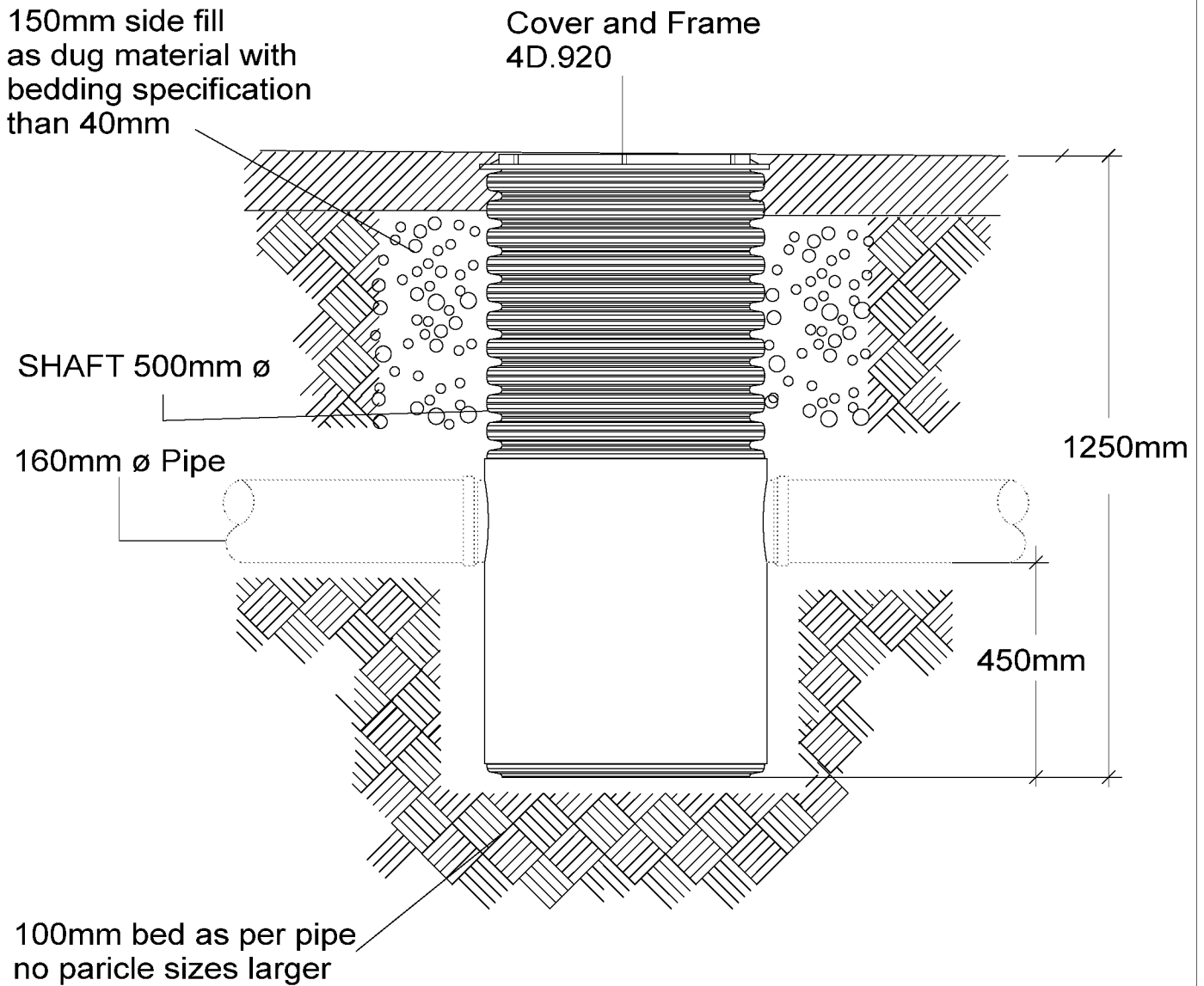
6LB600



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Technical Design Department
Parsonage Way
Chippenham
Wiltshire SN15 5PN

WAVIN AQUACELL

StormWater Management System



TITLE :

SILT TRAP

CLIENT:

DRN : AP

SCALE :

DATE :

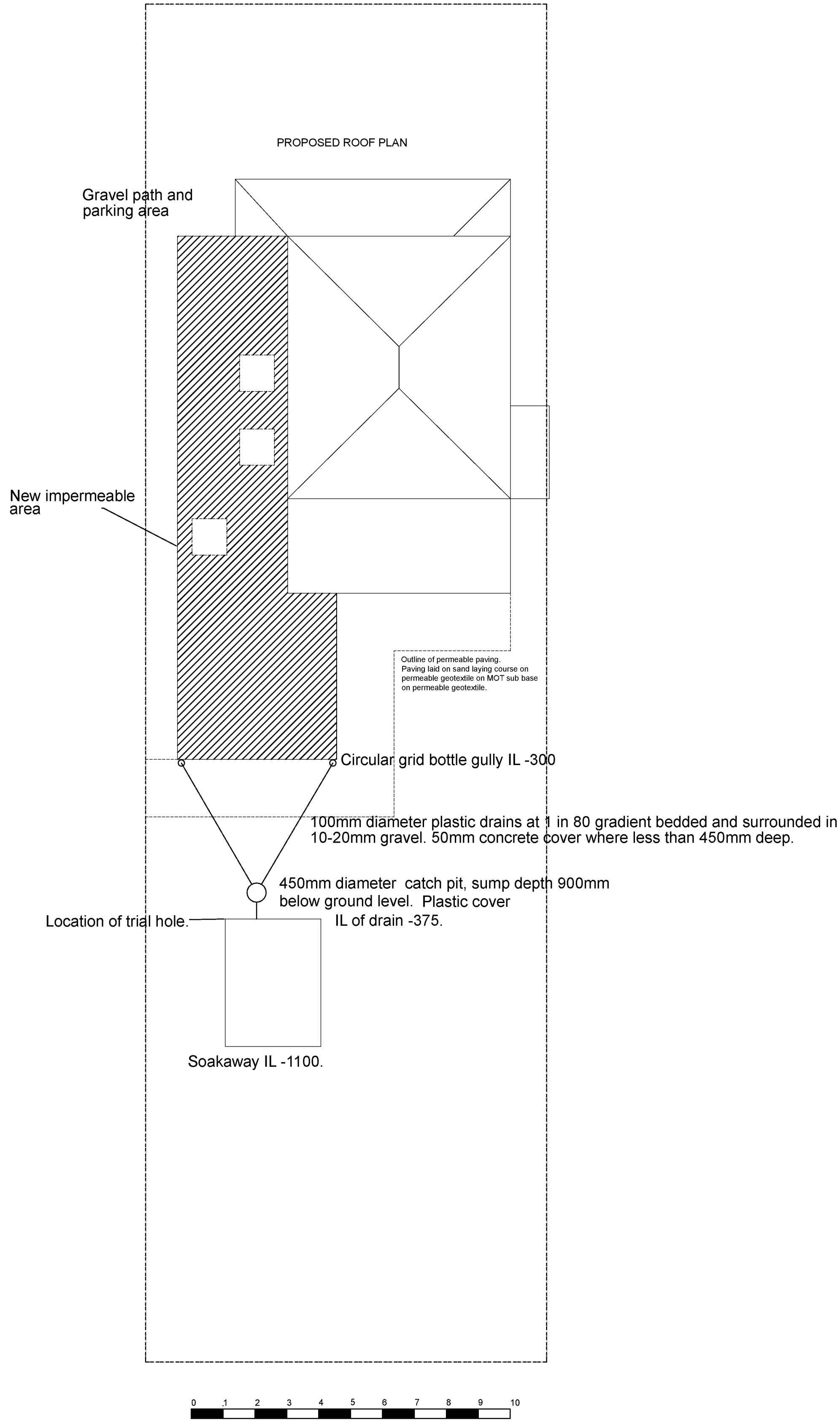
CHK : AP

DRG. No :

6LB600



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Wiltshire SN15 5PN



REVISIONS	
Notes 1. These are computerised drawings for the purposes of obtaining planning & building regulations approvals & are based on certain overall measurements. 2. Dimensions shown must not be relied upon and must be checked on site and verified prior to commencement of work. 3. Where applicable this drawing is to be read in conjunction with other consultants' drawings & calculations. 4. Do not scale from these drawings, except for planning purposes. 5. Any Work undertaken prior to Planning and Building Regulations Approval is done so entirely at the Client/Contractors own risk. © 2018 - T. Murray	
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PROJECT DETAIL 8 WEST DRIVE MIDDLETON ON SEA WEST SUSSEX PO22 7TS	
EXTENSION FOR: GARY LONGHURST	
DRAWING: SCALE	1/100
DRAWN: T. Murray	DATE: AUGUST 2018
DRAWING: 18/44/3	REVISION: