

Technical Note - Discharge of Surface Water Management Planning Conditions



The Civil Engineering Practice
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Project	Reptune, Yapton
Project Number	23262

By Martin Kempshall CEng MICE

Date 13 May 2020

1 Introduction

- 1.1 This Technical Note has been produced in support of Discharging of Condition 4 of Planning Permission Y/22/19/PL comprising demolition of existing redundant garage building and erection of 1 No. dwelling and associated works at the Garage Premises, Main Road, Yapton, BN18 0EA.
- 1.2 This Technical Note is to be read in conjunction with all planning, architectural and other reports that accompany the Planning Application for the proposed development.
- 1.3 The proposed development will incorporate a sustainable drainage system which will discharge all surface water via infiltration to ground using permeable paving with subbase attenuation.

2 Condition 4

- 2.1 Condition 4 of Outline Planning Application Y/22/19/PL states:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.



Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a precommencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.

3 Design Parameters for Discharge of Condition 4

3.1 Summary of Surface Water Management and Design

- 3.1.1 The following design criteria has been set to ensure compliance with the principles of the design will be based upon *Arun District Council Supplementary Requirements for Surface Water Drainage Proposals*.
- 3.1.2 Infiltration to ground is proposed in accordance with the Drainage Hierarchy of preference set out in approved Document H of the Building Regulations and CIRIA C753.
- 3.1.3 The system is designed to attenuate all storm water events up to and including the critical 1:100 year storm with a 20% allowance for Climate Change. The designing for exceedance event of 1:100 year plus 40% allowance for Climate Change has been accommodated within the attenuation system to ensure that all surface water is retained on site during this event.
- 3.1.4 Requirements of Table 26.2 of CIRIA SuDS Manual have been achieved to ensure water quality requirements are achieved throughout the site.
- 3.1.5 The design has been based upon tested infiltration rates at two trial pits completed by Land Science in February 2020 with an average rate for Trail Pit 1 (TP201) yielding an average rate of 5.63×10^{-3} m/s and an average rate of 1.97×10^{-5} m/s recorded for Trail Pit 2 (TP202).
- 3.1.6 For the purpose of our design calculations we have used the lesser rate of 1.97×10^{-5} m/s.
- 3.1.7 The existing neighbouring right way of way will be retained and drained as existing.

3.2 Detailed Surface Water Drainage Design

- 3.2.1 All surface water is to be collected and discharged via an infiltration blanket beneath a permeable paved surface.
- 3.2.2 The drainage has been designed to accommodate and discharge all surface water to ground for all the impermeable areas of the site via infiltration blanket. The infiltration blanket comprises permeable paving, which for surface water storage, requires a minimum 240mm depth of voided subbase beneath the permeable paving. However,

the depth of the construction will be determined by the CBR value of the underlying ground condition found onsite by the contractor.

3.2.3 A copy of Drawing 101 showing the proposed drainage layout is located at the rear of this Technical Note.

3.2.4 A copy of the Microdrainage Calculations for the surface water network and attenuation system is located at the rear of this Technical Note.

3.3 General Site Ground Conditions

3.3.1 The Ashdown Site Investigation report of July 2019 identifies made ground generally comprising gravelly clay, which was encountered to depths of between 0.30m and 3.10m. The gravel fraction comprised variable quantities of flint, brick and concrete.

3.3.2 Beneath the made ground, the investigation encountered slightly sandy gravelly clay soils persisting to the full depths of the trial pits, and to depths of between 2.30m and 4.50m below ground level in the boreholes.

3.4 Winter Groundwater Monitoring

3.4.1 Land Science Limited undertook groundwater monitoring from 24 October 2019 to 18 February 2020 and identified a maximum groundwater level of approximately 1.50 metres below existing ground levels.

3.4.2 A full copy of Land Science Limited's Report is located at the rear of this Technical Note.

3.5 Surface Water Quality

3.5.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is low.

3.5.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated, and any pollution risk adequately managed prior to discharge.

3.5.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those determined as of most relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads	Low	0.5	0.4	0.4

Table 2: Pollution Hazard Indices

3.5.4 Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components is lowered by 50% due to reduced performance associated with primary treatment.

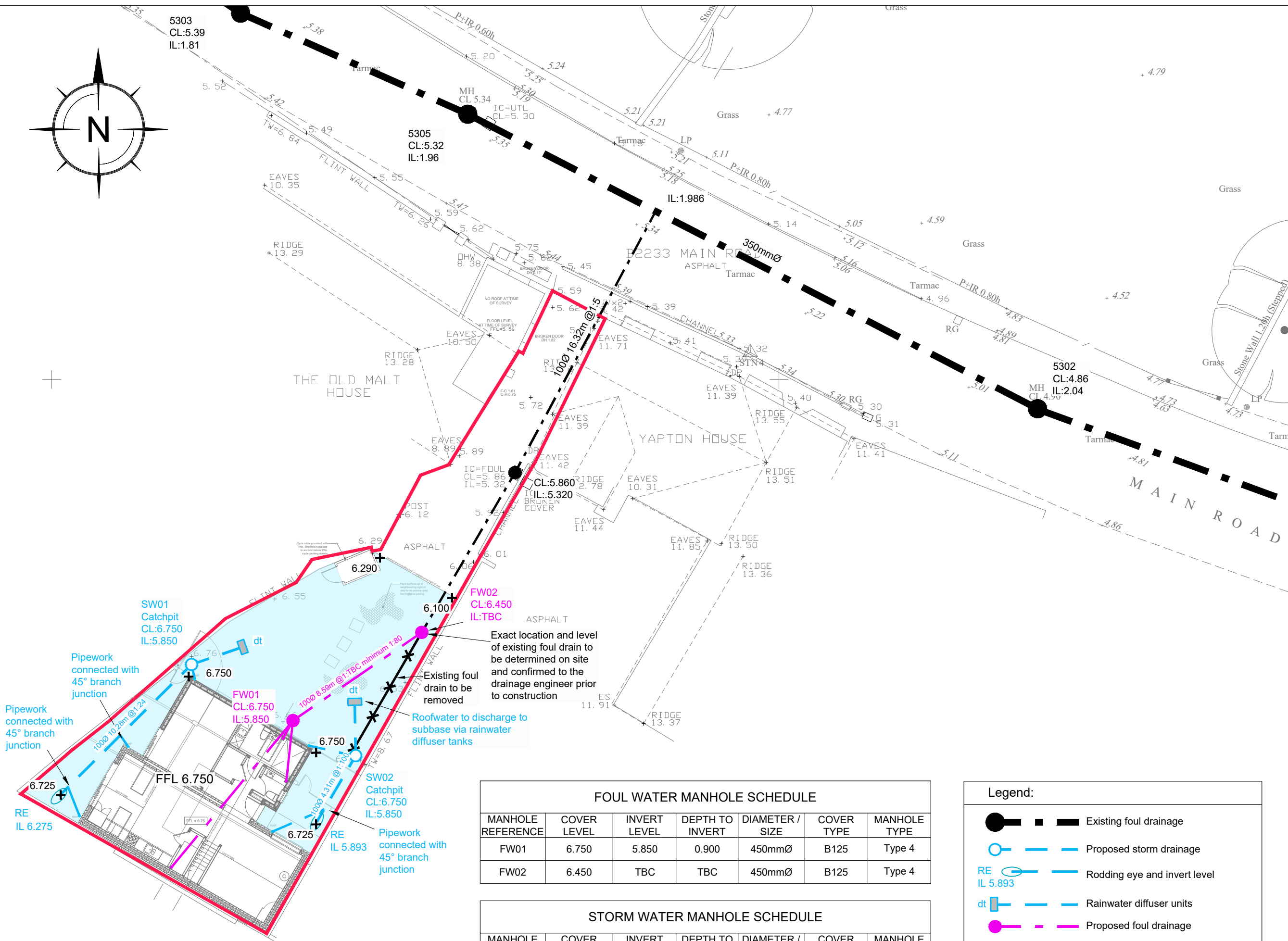
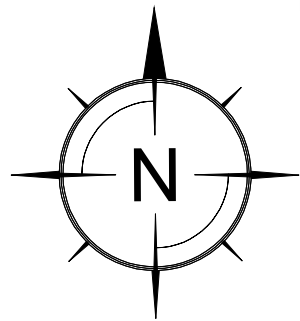
SuDS Type	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7

Table 3: Pollution Mitigation Indices

3.5.5 The proposed use of permeable paving will meet the target treatment level required for runoff with very low to low risk of pollution hazard thus demonstrating that the surface water drainage system for the site can be designed to adequately mitigate against the risk of pollution.

4 Documents appended

- Drawing 101 B - Proposed Drainage Strategy Plan
- Drawing 501 A - Construction Details
- Microdrainage Calculations for Climate Change adjusted 1 in 100 year event
- Land Science Limited's Report Extracts



FOUL WATER MANHOLE SCHEDULE						
MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	DIAMETER / SIZE	COVER TYPE	MANHOLE TYPE
FW01	6.750	5.850	0.900	450mmØ	B125	Type 4
FW02	6.450	TBC	TBC	450mmØ	B125	Type 4

STORM WATER MANHOLE SCHEDULE						
MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	DIAMETER / SIZE	COVER TYPE	MANHOLE TYPE
SW1	6.750	5.850	0.900	450mmØ	B125	Catchpit
SW2	6.750	5.850	0.900	450mmØ	B125	Catchpit

Legend:

Existing foul drainage

Proposed storm drainage

RE IL 5.893 Rodding eye and invert level

dt Rainwater diffuser units

Proposed foul drainage

Extent of permeable paving surface with voided subbase beneath for stormwater attenuation.

Proposed finished level.
For formation level, reduce by 565mm

- GENERAL NOTES:
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.
- DRAINAGE NOTES:
1. All adoptable pipes, bends and junctions shall be vitrified clay to BS EN 295-1, with flexible joints and kitemark certified.

2. All Adoptable sewers shall be in strict accordance with the 7th edition of Sewers For Adoption. Unless otherwise stated adoptable sewers shall be 150mm diameter and shall be laid in a class S bedding. Where the depth to soffit is less than 1.2m under a public highway or 0.9m elsewhere the pipe shall be laid with a class Z bedding.

3. All private building drainage shall be constructed in strict accordance with BS EN 752:2008. Unless otherwise specified building drainage shall be 100mm diameter and shall be laid at a minimum gradient of 1 in 40 for foul drains and 1 in 80 for surface water drains. All building drains shall be laid in class B bedding unless otherwise specified.

4. Where a pipe is within 1m of a foundation the trench shall be filled with class GEN 3 concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN 3 concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases the pipe shall be bedded and surrounded in 150mm thick class GEN 3 concrete.

5. Where pipes, external to the structures, have a depth to soffit from ground level of less than 450mm they shall have a class GEN 3 concrete encasement (150mm thick). In all other cases the pipes shall be bedded and surrounded with 100mm thick granular material.

6. In any circumstances where pipes are bedded and surrounded in concrete flexible joints should be provided. Compressible boards (fibreglass or polystyrene) shall be provided at a maximum of 8m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 18mm for pipes up to 450mm nominal diameter and 38mm for pipes over 450mm nominal diameter.

7. All svps shall have rodding access plates fitted at their bases (ground floor level).

8. Where existing pipes are to be abandoned they shall be dug out together with any abandoned manholes.

9. Any discrepancy between the drawing and site should be reported immediately to the Engineer.

10. All manhole and chamber sizes are given as a minimum to meet the 7th edition of Sewers For Adoption

11. Ground levels of surrounding land to be confirmed onsite

C	12.05.2020	MJP	Updated to suit comments	MK
B	04.03.2020	NS	Surface Water Drainage and FFL Updated	MK
A	03.03.2020	MJP	Foul to existing run moved	MK
REV	DATE	INT	DESCRIPTION	CHK

Issue Status FOR PLANNING

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CLIENT

Mr Pete Mountford

PROJECT

Repture

Yapton

West Sussex

TITLE

Proposed Layout

Drainage Strategy Plan

DRAWN

M Pacifico

DATE

Nov 2019

PROJECT NO.

2326

ENGINEER

M Kempshall

CHECKED

SRM

REV

101

SCALE

1:200 @ A3

ARUN DISTRICT COUNCIL Y12920DOC

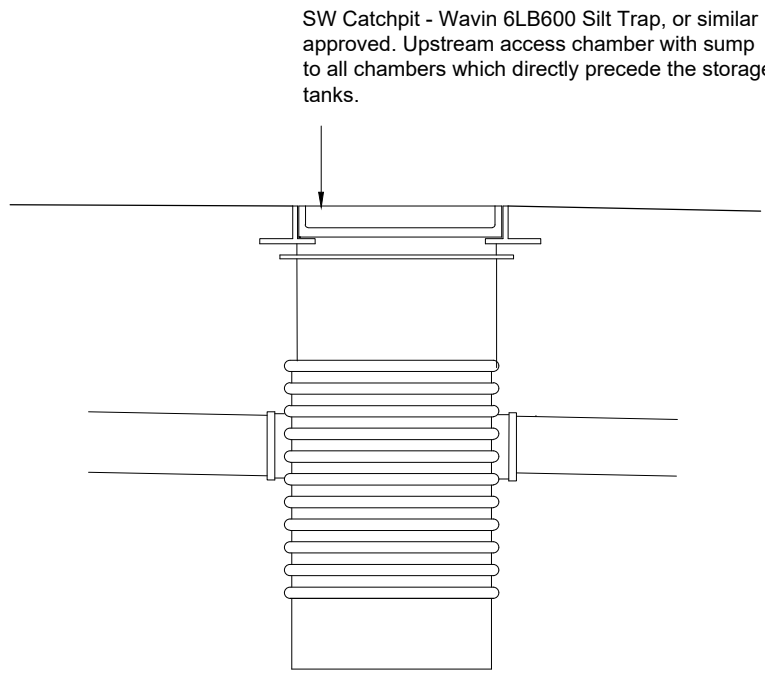
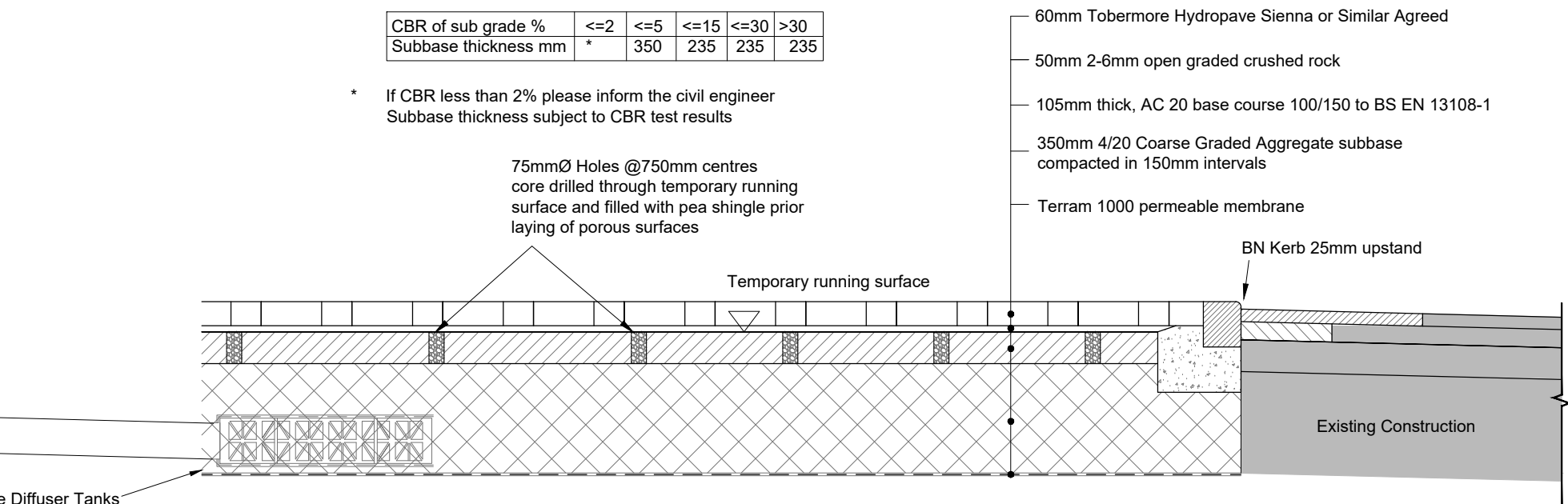
DESIGN BASED ON ASSUMED CBR OF BETWEEN 2-5%
CONTRACTOR TO UNDERTAKE CBR TESTS ON SITE.
RESULTS TO BE DISCUSSED WITH CEP ENGINEER TO
REVIEW DESIGN

CBR of sub grade %	<=2	<=5	<=15	<=30	>30
Subbase thickness mm	350	235	235	235	235

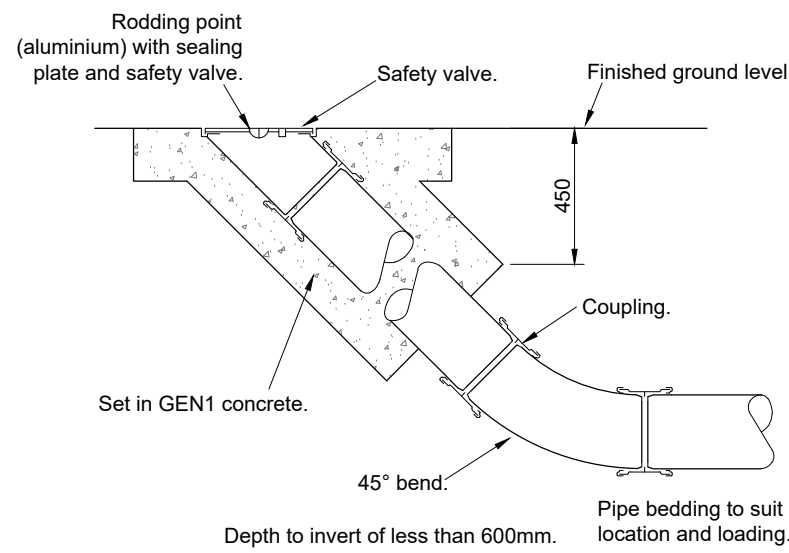
If CBR less than 2% please inform the civil engineer
Subbase thickness subject to CBR test results

75mmØ Holes @750mm centres
core drilled through temporary running
surface and filled with pea shingle prior
laying of porous surfaces

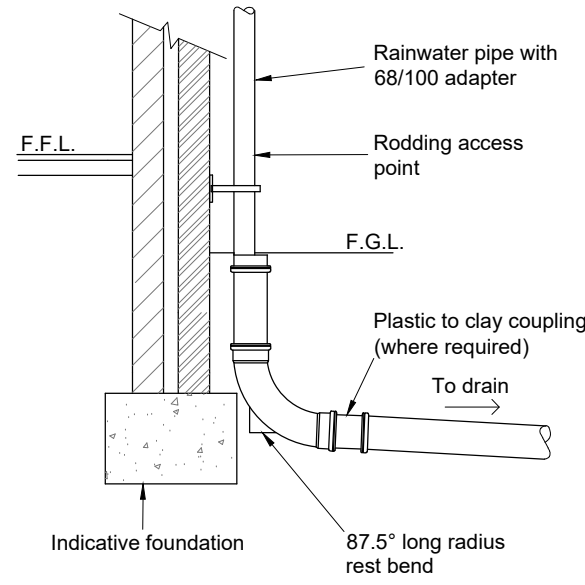
PERMEABLE BLOCK PAVING DRIVEWAY DETAIL (Scale 1:20)



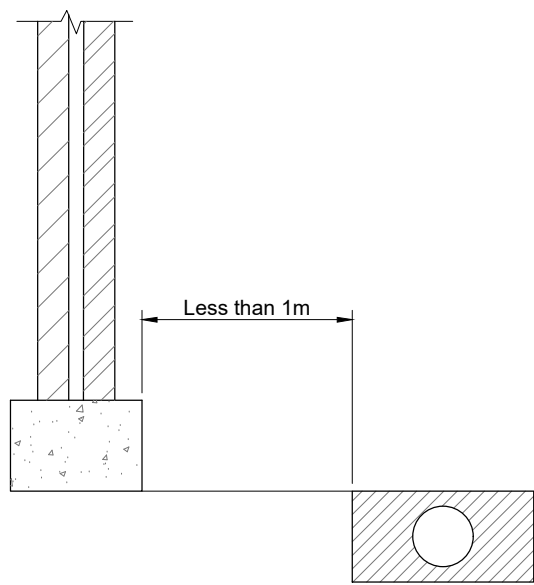
CATCHPIT CHAMBER (Scale 1:20)



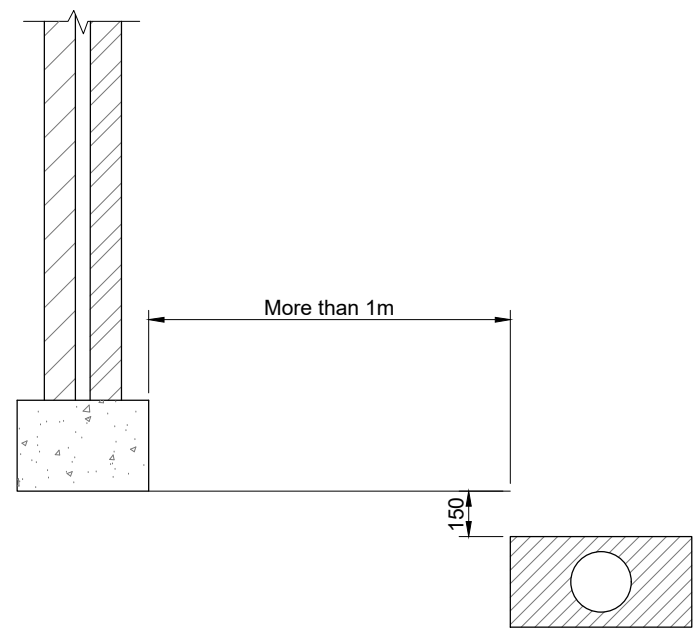
DETAIL OF RODDING EYE (Scale 1:25)



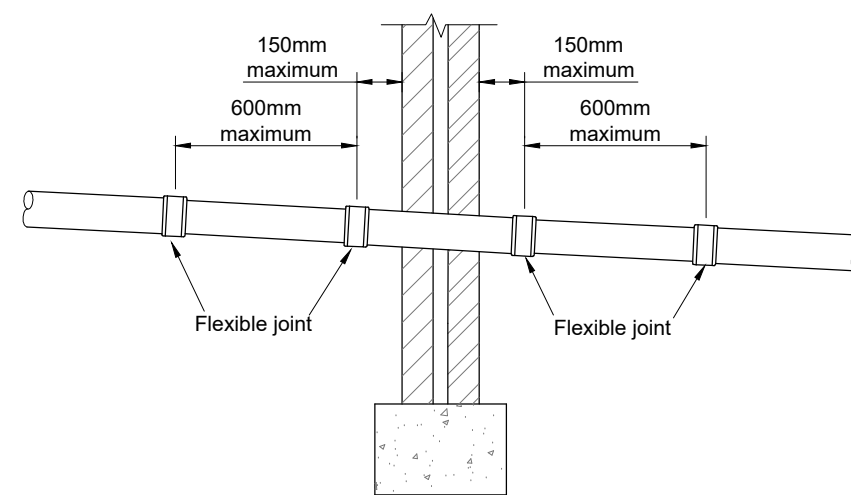
TYPICAL RAINWATER PIPE DETAIL (Scale 1:25)



PIPEWORK NEAR FOUNDATIONS (Scale 1:25)



PIPEWORK NEAR FOUNDATIONS (Scale 1:25)

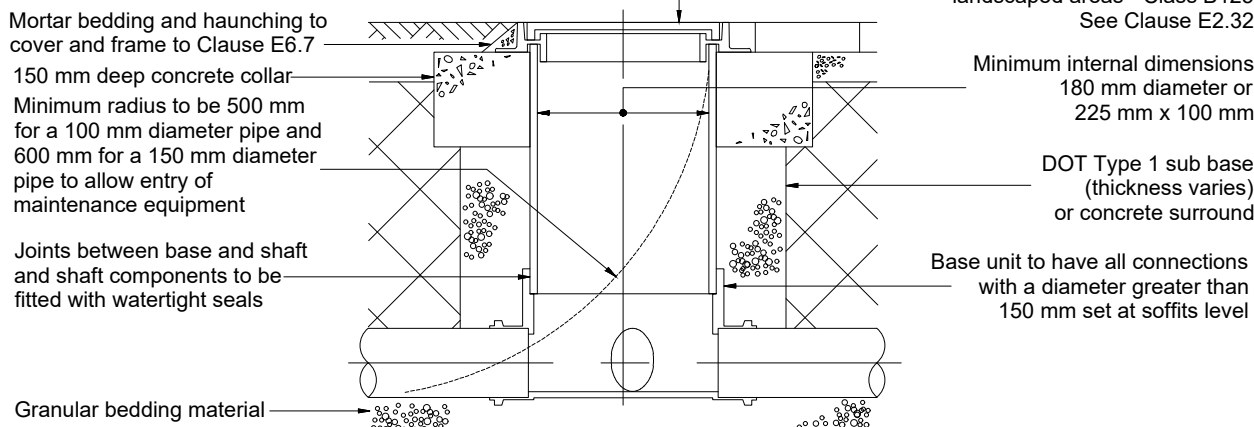


PIPEWORK THROUGH SUBSTRATE WALLS (Scale 1:25)

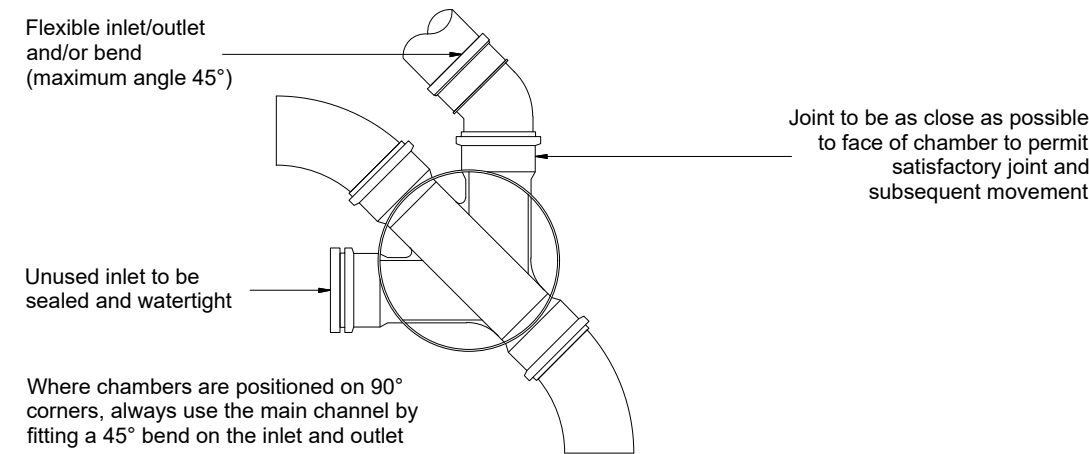
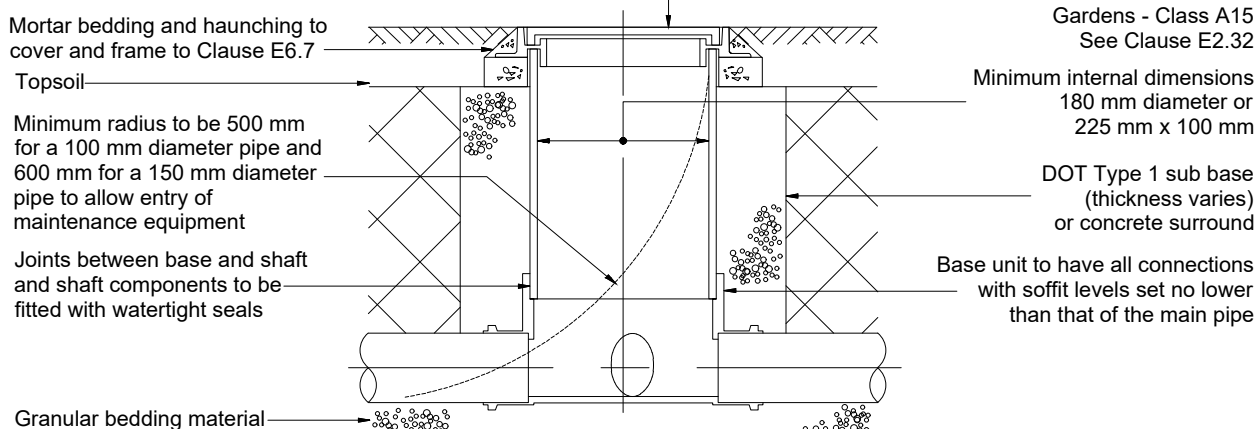
FIGURE B.21 TYPICAL INSPECTION CHAMBER DETAIL - TYPE 4 (Flexible material detail) Maximum depth from cover level to soffit of pipe 2 m, non-entry

Plastic chambers and rings shall comply with BS EN 13598-1 and
BS EN 13598-2 or have equivalent independent approval

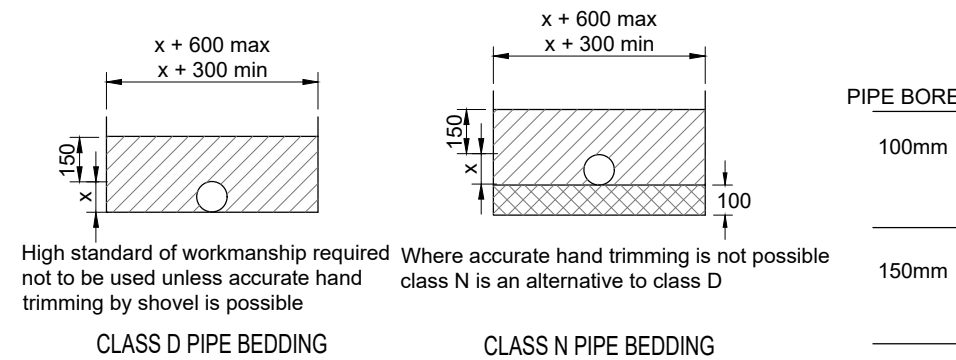
Sited in driveways/paved areas



Sited in domestic gardens

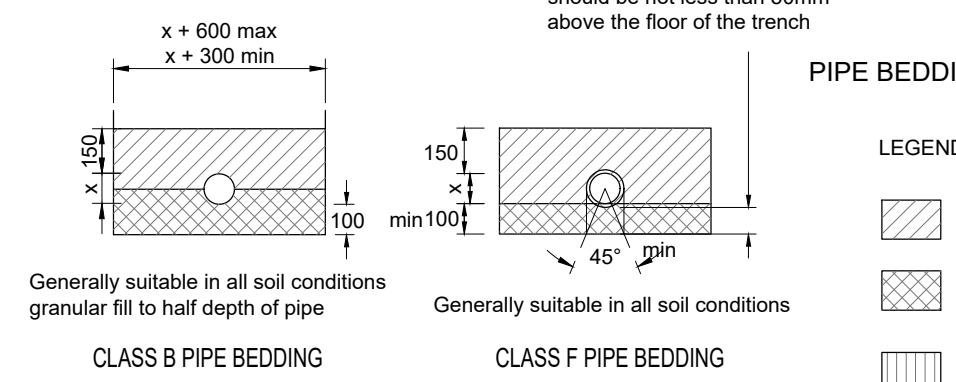


Note: Where the access chamber is in the highway the
Highway Authority can have specific requirements
Not to scale



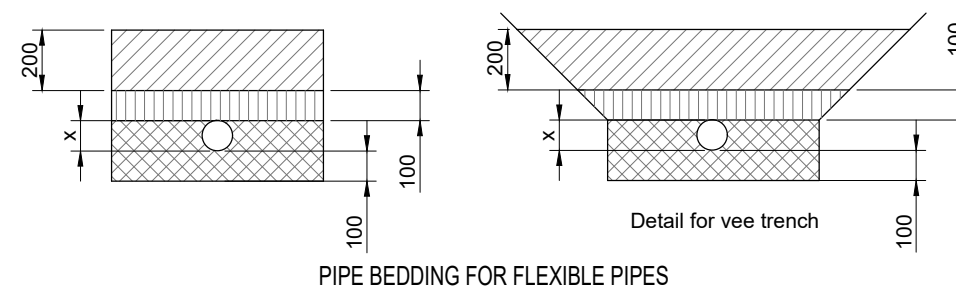
CLASS D PIPE BEDDING

CLASS N PIPE BEDDING



CLASS B PIPE BEDDING

CLASS F PIPE BEDDING



PIPE BEDDING FOR FLEXIBLE PIPES

PIPE BEDDING DETAILS (NON ADOPTABLE DRAINS) (Not To Scale)

PIPE BORE	BEDDING CLASS	Fields and gardens		Light traffic roads		Heavy traffic roads	
		MIN	MAX	MIN	MAX	MIN	MAX
100mm	D or N	0.4	4.2	0.7	4.1	0.7	3.7
	F	0.3	5.8	0.5	5.8	0.5	5.5
	B	0.3	7.4	0.4	7.4	0.4	7.2
150mm	D or N	0.6	2.7	1.1	2.5	--	--
	F	0.6	3.9	0.7	3.8	0.7	3.3
	B	0.6	5.0	0.6	5.0	0.6	4.6
225mm	D or N	--	--	--	--	--	--
	F	0.6	2.5	1.2	2.1	--	--
	B	0.6	3.3	0.8	3.2	0.9	2.4

PIPE BEDDING FOR RIGID APPLIES (NON ADOPTIVE DRAINS)

LEGEND:

- Selected fill: free from stones larger than 40mm, lumps of clay over 100mm, timber frozen material and vegetable matter
- Granular material: should conform to BS 882:1983 table 4 or BS8301:1985 Appendix D. Compaction fraction > 0.3 for class N > 0.2 for class F and B.
- Selected fill or granular fill free from stones larger than 40mm
- 'x' - Denotes external pipe diameter.

GENERAL NOTES:

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- This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
- The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
- Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

DRAINAGE NOTES:

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- All Adoptable sewers shall be in strict accordance with the 7th edition of Sewers For Adoption. Unless otherwise stated adoptable sewers shall be 150mm diameter and shall be laid in a class S bedding. Where the depth to soffit is less than 1.2m under a public highway or 0.9m elsewhere the pipe shall be laid with a class Z bedding.
- All private building drainage shall be constructed in strict accordance with BS EN 752:2008. Unless otherwise specified building drainage shall be 100mm diameter and shall be laid at a minimum gradient of 1 in 40 for foul drains and 1 in 80 for surface water drains. All building drains shall be laid in class B bedding unless otherwise specified.
- Where a pipe is within 1m of a foundation the trench shall be filled with class GEN 3 concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN 3 concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases the pipe shall be bedded and surrounded in 150mm thick class GEN 3 concrete.
- Where pipes, external to the structures, have a depth to soffit from ground level of less than 450mm they shall have a class GEN 3 concrete encasement (150mm thick). In all other cases the pipes shall be bedded and surrounded with 100mm thick granular material.
- In any circumstances where pipes are bedded and surrounded in concrete flexible joints should be provided. Compressible boards (fibreglass or polystyrene) shall be provided at a maximum of 8m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 18mm for pipes up to 450mm nominal diameter and 36mm for pipes over 450mm nominal diameter.
- All svps shall have rodding access plates fitted at their bases (ground floor level).
- Where existing pipes are to be abandoned they shall be dug out together with any abandoned manholes.
- Any discrepancy between the drawing and site should be reported immediately to the Engineer.
- All manhole and chamber sizes are given as a minimum to meet the 7th edition of Sewers For Adoption
- Subbase depth based on CBR value >=2%. Contractor to undertake CBR tests on site. Results to be discussed with CEP engineer to review design.
- Coarse graded aggregate (4/20) is to comply with the requirements of BS EN 7533-13: 2009

B	12.05.2020	MJP	Updated to Local Authority Comments	MK
A	05.03.2020	NS	Updated to Client Comments	MK
REV	DATE	INT	DESCRIPTION	CHK

FOR PLANNING



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CLIENT		Mr Pete Mountford	
PROJECT		Reptune Yapton West Sussex	
TITLE		Construction Details	
DRAWN	DATE	PROJECT NO.	
N Shields	Dec 2019	23262	
ENGINEER	CHECKED	DWG NO.	REV.
M Kempshall	SRM	501	B
SCALE	As Shown @ A1		

The Civil Engineering Practice					Page 1																																																																																																																																																																																																																			
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 48 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>6.443</td><td>0.153</td><td>1.8</td><td>6.2</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>6.479</td><td>0.189</td><td>1.8</td><td>7.6</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>6.498</td><td>0.208</td><td>1.8</td><td>8.4</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>6.496</td><td>0.206</td><td>1.8</td><td>8.3</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>6.480</td><td>0.190</td><td>1.8</td><td>7.7</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>6.461</td><td>0.171</td><td>1.8</td><td>6.9</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>6.426</td><td>0.136</td><td>1.8</td><td>5.5</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>6.396</td><td>0.106</td><td>1.8</td><td>4.3</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>6.372</td><td>0.082</td><td>1.8</td><td>3.3</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>6.355</td><td>0.065</td><td>1.8</td><td>2.6</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>6.338</td><td>0.048</td><td>1.7</td><td>1.9</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>6.326</td><td>0.036</td><td>1.3</td><td>1.5</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>6.317</td><td>0.027</td><td>1.0</td><td>1.1</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>6.312</td><td>0.022</td><td>0.8</td><td>0.9</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>6.306</td><td>0.016</td><td>0.6</td><td>0.6</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>6.303</td><td>0.013</td><td>0.5</td><td>0.5</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>6.301</td><td>0.011</td><td>0.4</td><td>0.4</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>6.299</td><td>0.009</td><td>0.3</td><td>0.4</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>6.298</td><td>0.008</td><td>0.3</td><td>0.3</td><td>O K</td></tr><tr><td>15 min Winter</td><td>6.465</td><td>0.175</td><td>1.8</td><td>7.1</td><td>Flood Risk</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>124.343</td><td>0.0</td><td>17</td></tr><tr><td>30 min Summer</td><td>83.917</td><td>0.0</td><td>30</td></tr><tr><td>60 min Summer</td><td>54.074</td><td>0.0</td><td>48</td></tr><tr><td>120 min Summer</td><td>33.635</td><td>0.0</td><td>82</td></tr><tr><td>180 min Summer</td><td>25.091</td><td>0.0</td><td>116</td></tr><tr><td>240 min Summer</td><td>20.228</td><td>0.0</td><td>150</td></tr><tr><td>360 min Summer</td><td>14.907</td><td>0.0</td><td>214</td></tr><tr><td>480 min Summer</td><td>11.995</td><td>0.0</td><td>274</td></tr><tr><td>600 min Summer</td><td>10.125</td><td>0.0</td><td>332</td></tr><tr><td>720 min Summer</td><td>8.810</td><td>0.0</td><td>386</td></tr><tr><td>960 min Summer</td><td>7.068</td><td>0.0</td><td>494</td></tr><tr><td>1440 min Summer</td><td>5.171</td><td>0.0</td><td>736</td></tr><tr><td>2160 min Summer</td><td>3.774</td><td>0.0</td><td>1100</td></tr><tr><td>2880 min Summer</td><td>3.015</td><td>0.0</td><td>1468</td></tr><tr><td>4320 min Summer</td><td>2.192</td><td>0.0</td><td>2196</td></tr><tr><td>5760 min Summer</td><td>1.746</td><td>0.0</td><td>2864</td></tr><tr><td>7200 min Summer</td><td>1.464</td><td>0.0</td><td>3608</td></tr><tr><td>8640 min Summer</td><td>1.268</td><td>0.0</td><td>4264</td></tr><tr><td>10080 min Summer</td><td>1.124</td><td>0.0</td><td>5080</td></tr><tr><td>15 min Winter</td><td>124.343</td><td>0.0</td><td>17</td></tr></tbody></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	6.443	0.153	1.8	6.2	Flood Risk	30 min Summer	6.479	0.189	1.8	7.6	Flood Risk	60 min Summer	6.498	0.208	1.8	8.4	Flood Risk	120 min Summer	6.496	0.206	1.8	8.3	Flood Risk	180 min Summer	6.480	0.190	1.8	7.7	Flood Risk	240 min Summer	6.461	0.171	1.8	6.9	Flood Risk	360 min Summer	6.426	0.136	1.8	5.5	Flood Risk	480 min Summer	6.396	0.106	1.8	4.3	Flood Risk	600 min Summer	6.372	0.082	1.8	3.3	Flood Risk	720 min Summer	6.355	0.065	1.8	2.6	Flood Risk	960 min Summer	6.338	0.048	1.7	1.9	Flood Risk	1440 min Summer	6.326	0.036	1.3	1.5	Flood Risk	2160 min Summer	6.317	0.027	1.0	1.1	Flood Risk	2880 min Summer	6.312	0.022	0.8	0.9	Flood Risk	4320 min Summer	6.306	0.016	0.6	0.6	Flood Risk	5760 min Summer	6.303	0.013	0.5	0.5	Flood Risk	7200 min Summer	6.301	0.011	0.4	0.4	Flood Risk	8640 min Summer	6.299	0.009	0.3	0.4	O K	10080 min 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The Civil Engineering Practice					Page 2	
11 Tungsten Building George Street Fishersgate BN41 1RA			Reptune Yapton Storage Calculations			
Date 05/03/2020 File 1 in 100 Plus 40.SRCX			Designed by MK Checked by			
Innovyze			Source Control 2019.1			
Summary of Results for 100 year Return Period (+40%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	6.508	0.218	1.8	8.8	Flood Risk	
60 min Winter	6.529	0.239	1.8	9.7	Flood Risk	
120 min Winter	6.522	0.232	1.8	9.4	Flood Risk	
180 min Winter	6.497	0.207	1.8	8.3	Flood Risk	
240 min Winter	6.467	0.177	1.8	7.1	Flood Risk	
360 min Winter	6.412	0.122	1.8	4.9	Flood Risk	
480 min Winter	6.369	0.079	1.8	3.2	Flood Risk	
600 min Winter	6.342	0.052	1.8	2.1	Flood Risk	
720 min Winter	6.335	0.045	1.6	1.8	Flood Risk	
960 min Winter	6.327	0.037	1.3	1.5	Flood Risk	
1440 min Winter	6.317	0.027	1.0	1.1	Flood Risk	
2160 min Winter	6.310	0.020	0.7	0.8	Flood Risk	
2880 min Winter	6.306	0.016	0.6	0.6	Flood Risk	
4320 min Winter	6.302	0.012	0.4	0.5	Flood Risk	
5760 min Winter	6.299	0.009	0.3	0.4	O K	
7200 min Winter	6.298	0.008	0.3	0.3	O K	
8640 min Winter	6.297	0.007	0.2	0.3	O K	
10080 min Winter	6.296	0.006	0.2	0.2	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	83.917	0.0	30			
60 min Winter	54.074	0.0	54			
120 min Winter	33.635	0.0	90			
180 min Winter	25.091	0.0	128			
240 min Winter	20.228	0.0	162			
360 min Winter	14.907	0.0	226			
480 min Winter	11.995	0.0	282			
600 min Winter	10.125	0.0	324			
720 min Winter	8.810	0.0	376			
960 min Winter	7.068	0.0	494			
1440 min Winter	5.171	0.0	734			
2160 min Winter	3.774	0.0	1104			
2880 min Winter	3.015	0.0	1472			
4320 min Winter	2.192	0.0	2244			
5760 min Winter	1.746	0.0	2904			
7200 min Winter	1.464	0.0	3560			
8640 min Winter	1.268	0.0	4384			
10080 min Winter	1.124	0.0	5168			
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The Civil Engineering Practice		Page 3
11 Tungsten Building George Street Fishersgate BN41 1RA	Reptune Yapton Storage Calculations	
Date 05/03/2020 File 1 in 100 Plus 40.SRCX	Designed by MK Checked by	
Innovyze		Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.100	Shortest Storm (mins)	15
Ratio R	0.342	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area
From:	To: (ha)
0	4 0.032

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The Civil Engineering Practice		Page 4																
11 Tungsten Building George Street Fishersgate BN41 1RA	Reptune Yapton Storage Calculations																	
Date 05/03/2020 File 1 in 100 Plus 40.SRCX	Designed by MK Checked by																	
Innovyze Source Control 2019.1																		
<u>Model Details</u> Storage is Online Cover Level (m) 6.600 <u>Infiltration Blanket Structure</u> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.07200</td> <td>Diameter/Width (m)</td> <td>11.6</td> </tr> <tr> <td>Safety Factor</td> <td>1.5</td> <td>Length (m)</td> <td>11.6</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>0.240</td> </tr> <tr> <td>Invert Level (m)</td> <td>6.290</td> <td></td> <td></td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.07200	Diameter/Width (m)	11.6	Safety Factor	1.5	Length (m)	11.6	Porosity	0.30	Cap Volume Depth (m)	0.240	Invert Level (m)	6.290		
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©1982-2019 Innovyze																		



	Title: Site Location			Reference: LS 4653
	Project: Former Reprune Garage, Yapton			Figure: 1
	Client: Peter Mountford			Date: 21/02/2020
	Prepared by: AC	Checked by: ET	Version: 01	Sheet: 1 of 1



Title: Exploratory Hole Location Plan

Project: Former Reptune Garage, Main Road, Yapton, West Sussex, BN18 0EA

Client: Peter Mountford

Reference: LS 4653

Figure: 2

Date: 21/2020

Prepared by: MM

Checked by: AC

Version: 01

TP201



Locations are indicative. Not to scale.

	TITLE:	Site Photographs	REF:	LS 4653	PREPARED:	AC
	PROJECT:	Former Reptune Garage, Main Road, Yapton, West Sussex	FIGURE:	N/A	CHECKED:	ET
	CLIENT:	Mr Peter Mountford	DATE:	21/02/2020	VERSION	V1

WWW.LANDSCIENCE.CO.UK

0345 604 6494

UNIT 10, 19 ALBERT DRIVE BURGESS HILL, WEST SUSSEX, RH15 9TN

TP202

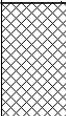


TITLE:	Site Photographs	REF:	LS 4653	PREPARED:	AC
PROJECT:	Former Reptune Garage, Main Road, Yapton, West Sussex	FIGURE:	N/A	CHECKED:	ET
CLIENT:	Mr Peter Mountford	DATE:	21/02/2020	VERSION	V1

WWW.LANDSCIENCE.CO.UK

0345 604 6494

UNIT 10, 19 ALBERT DRIVE BURGESS HILL, WEST SUSSEX, RH15 9TN

Machine : Hand Excavated Method : Trial Pit		Dimensions		Ground Level (mOD)		Client Mr Peter Mountford		Job Number LS4653	
		Location		Dates 18/02/2020		Engineer The Civil Engineering Practice		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					(0.10)	Asphalt. (HARDSTANDING)			
					0.10	Loose dark brown sandy slightly clayey GRAVEL of brick and concrete. (MADE GROUND)			
					(0.40)				
					0.50	Abandoned at 0.50m			
No image available					Remarks				
					Scale (approx) 1:25		Logged By SP		Figure No. LS4653.TP201

Machine : Hand Excavated

Method : Trial Pit

Dimensions

Ground Level (mOD)

Client

Mr Peter Mountford

**Job
Number**
LS4653

Location

Dates

18/02/2020

Engineer

The Civil Engineering Practice

Sheet
1/1

[illegible]

No image available

Remarks

Scale (approx)

1:25

Logged By

SP

Figure No.

LS4653.TP202

Site : Former Reptune Garage, Main Road, Yapton, West Sussex

Client : Peter Mountford

Engineer : The Civil Engineering Practice (CEP)

Job Number
LS4913

Sheet
1 / 2

Location	Date	Level	Location
TP201	18/02/2020		

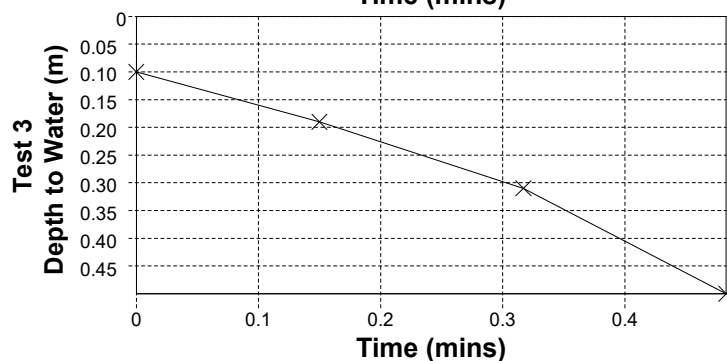
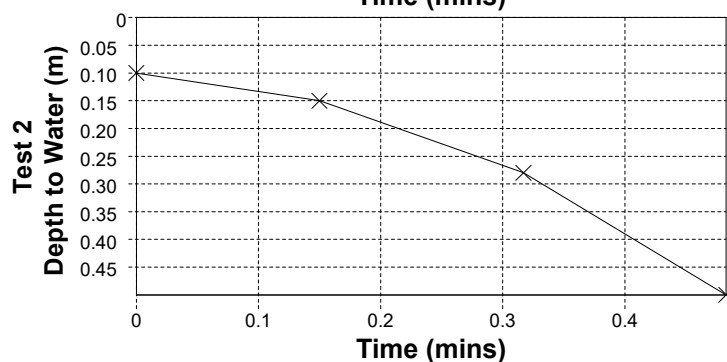
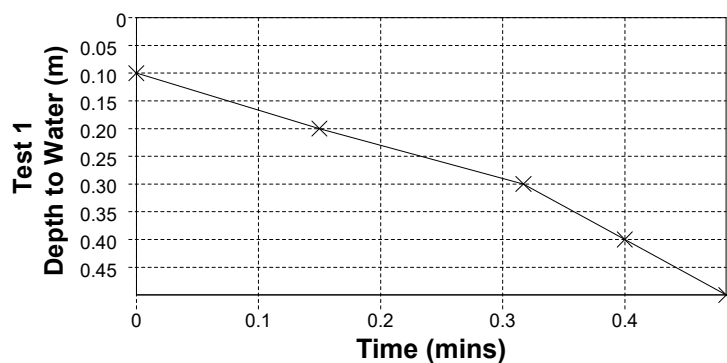
Pit Width (m)	0.50
Pit Depth (m)	0.50
Pit Length (m)	0.50

Soil type at test level	
Groundwater	
Drain discharge depth	0.1
Sidewall stability	
Stone filled or open pit	Open Pit

	1	2	3
Effective depth (m)	0.40	0.40	0.40
Volume outflowing between 75% & 25% (m3)	0.05	0.05	0.05
Mean surface area through which outflow occurs (m2)	0.65	0.65	0.65
Time for outflow between 75% & 25% (min)	0.25	0.20	0.24
SOIL INFILTRATION RATE (ms-1), f	5.13E-3	6.41E-3	5.34E-3

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
0	0.10	0.10	0.10
0.15	0.20	0.15	0.19
0.317	0.30	0.28	0.31
0.4	0.40		
0.483	0.50	0.50	0.50



Site : Former Reptune Garage, Main Road, Yapton, West Sussex

Client : Peter Mountford

Engineer : The Civil Engineering Practice (CEP)

Job Number
LS4913

Sheet
2 / 2

Location	Date	Level	Location
TP202	18/02/2020		

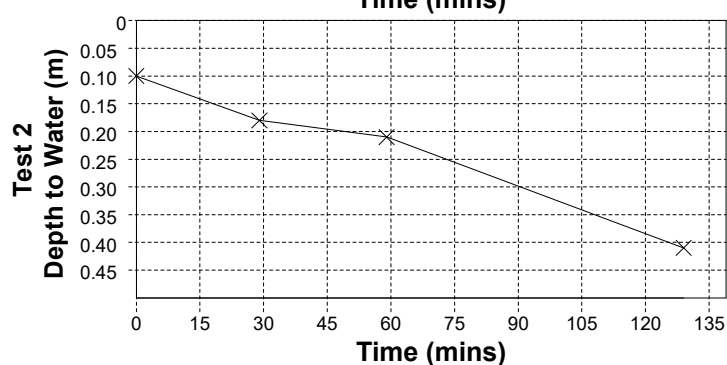
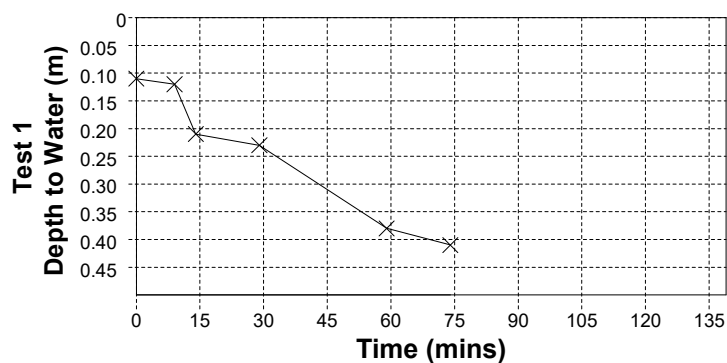
Pit Width (m)	0.50
Pit Depth (m)	0.50
Pit Length (m)	0.50

Soil type at test level	
Groundwater	
Drain discharge depth	0.1
Sidewall stability	
Stone filled or open pit	

	1	2
Effective depth (m)	0.39	0.40
Volume outflowing between 75% & 25% (m3)	0.05	0.05
Mean surface area through which outflow occurs (m2)	0.64	0.65
Time for outflow between 75% & 25% (min)	56.39	76.50
SOIL INFILTRATION RATE (ms-1), f	2.25E-5	1.68E-5

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2
0	0.11	0.10
9	0.12	
14	0.21	
29	0.23	0.18
59	0.38	0.21
74	0.41	
129		0.41



Former Reptune Garage
24th October 2019 to 18th February 2020

