

Discharge of Condition Drainage Technical Note



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

Project	Bonhams Field, Yapton
Project Number	23018

By Martin Kempshall CEng MICE

Date 26 February 2021

1 Introduction

- 1.1 This Drainage Technical Note has been undertaken in accordance with the National Planning Policy Framework on behalf of Seaward Properties Limited in support of conditions 12, 14 and 16 of Outline Planning Permission Y/1/17/OUT for the construction of 56 residential dwellings with associated access roads, car parking and landscaping on the northeast side of the B2233 Yapton Road, Yapton, West Sussex.
- 1.2 The proposed development will incorporate a sustainable drainage system which will discharge surface water by infiltration to ground via an infiltration blanket and provide sufficient onsite storage for all storm return periods up to and including the 1:100 year rainfall event with a 40% allowance for climate change.
- 1.3 Foul drainage will be discharged by gravity to the existing public foul sewer located beneath the B2233 Yapton Road to the southwest of the site.
- 1.4 A suitable maintenance plan will be implemented by the developer to ensure that maintenance of the foul and surface water drainage systems in shared ownership is passed on to a suitably qualified Management Company appointed by the Developer on behalf of the Residents.



ISO
9001 : 2008
REGISTERED
Cert No. 14127180

2 Development Proposals

2.1 Description

- 2.1.1 The construction of 56 residential dwellings with associated access roads, car parking and landscaping.

2.2 Detailed Surface Water Drainage Design.

- 2.2.1 Based on the site investigation and infiltration testing undertaken in full accordance with BRE365 a system for discharge of surface water by infiltration to ground has been designed.

- 2.2.2 The impermeable areas for the site are as follows:

- 5,000m² roof area
- 7,385m² parking, private drives and highways

- 2.2.3 The total impermeable area of the site is 12,385m².

- 2.2.4 Sufficient storage is provided to accommodate both the 1:100 year storm event with an additional 40% allowance to account for the predicted effects of future climate change.

- 2.2.5 All surface water runoff from the roofs, private access roads, driveways and parking areas will be discharged via rainwater diffuser units into voided subbase infiltration blankets located beneath the onsite roads and driveways.

- 2.2.6 All rainwater diffuser units will be located more than 5 metres away from buildings, have upstream catchpits to reduce the potential for siltation and will discharge at a minimum of 50mm above the subbase formation level in accordance with Figure 20.24 from Section 20.10 of CIRIA Report C753 The SuDS Manual.

- 2.2.7 The drainage system comprises eight catchments. The design infiltration rate uses the lowest test result from soakage testing completed in December 2020. Where a catchment contains multiple test locations the lowest infiltration test result has been used throughout the catchment presenting a worst case scenario.

- 2.2.8 The infiltration test rates for each catchment are as follows:

Catchment	Test Location Used	Test Infiltration Rate
A	TP07	5.78 x 10 ⁻⁶ m/s
B	TP07	5.78 x 10 ⁻⁶ m/s
C	TP07	5.78 x 10 ⁻⁶ m/s
D	TP09	2.51 x 10 ⁻⁶ m/s
E	TP05	2.37 x 10 ⁻⁶ m/s
F	TP04	1.26 x 10 ⁻⁶ m/s
G	TP01	2.09 x 10 ⁻⁶ m/s
H	TP02	1.72 x 10 ⁻⁶ m/s

Table 1: Infiltration Rates from Testing

2.2.9 Surface water storage requirements for each catchment are summarise below:

Catchment	Impermeable Area of Catchment (m ²)	Area of Permeable Paving / Voided Subbase (m ²)	Minimum Voided Subbase Thickness (mm)	Minimum Storage in Voided Subbase (m ³)
A	105	105	221	6.4
B	290	157	415	19.7
C	430	241	435	28.8
D	4,050	2,460	419	307.5
E	2,310	1,690	346	170.4
F	1,900	972	580	209
G	1,400	784	392	93.8
H	1,910	980	680	204

Table 2: Summary of surface water storage

2.2.10 A Factor of Safety of 4 has been used within all calculations at the request of the Local Planning Authority's Drainage Consultee.

2.2.11 Assumed CBR values of 2%-5% require a minimum voided subbase thickness of 450mm which will be provided beneath all parking areas, access roads and driveways. Catchment F will have a minimum 580mm deep voided subbase and Catchment H 680mm to ensure sufficient surface water attenuation is achieved.

2.2.12 The half drain times for each catchment are as follows:

Catchment	1 in 10 year + 40% CC Storm (mins)	1 in 100 year + 40% CC Storm (mins)
A		779
B		779
C		779
D		960
E		1372
F	1410	2934
G		1293
H	960	2733

Table 3: Storage Half Drain Times

2.2.13 In agreement with the Local Planning Authority's Drainage Consultee where the half drain time for the 1:100 year storm event with an additional 40% climate change allowance is more than 24 hours the 1:10 year storm event with an additional 40% climate change allowance can be used.

2.2.14 Groundwater monitoring completed in Winter 2019-2020 identified groundwater levels of between 0.95mbgl to 1.77mbgl below existing ground levels confirming that an unsaturated zone will exist between the base of the surface water infiltration storage blankets and the maximum recorded groundwater level.

2.2.15 Section 278 works have been approved by West Sussex County Council Highways for the entrance to the site which is to discharge surface water from this area via highway gullies to the existing highway drainage located beneath the southern section of B2233 Main Road as agreed by West Sussex County Council Highways.

2.2.16 Proposed site drainage layout, maintenance plans and Causeway Flow calculations are located at the rear of this document.

2.3 Foul Water Drainage

2.3.1 The anticipated peak foul water discharge from the site is 2.6l/s in accordance with Sewers for Adoption requirements.

2.3.2 Foul drainage will be discharged by gravity to the existing public foul sewer located beneath the B2233 Yapton Road to the southwest of the site.

2.3.3 Sewerage undertakers have an obligation to upgrade the existing networks if a connection to an equivalent or larger sized public sewer is technically achievable

2.3.4 The new connection to the public foul sewer has obtained Section 106 Approval of the Water Industry Act 1991.

2.3.5 A copy of the Section 106 Approval is located at the rear of this document.

2.4 Water Quality

2.4.1 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 very low to low.

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

2.4.3 Table 26.2 in Chapter 26 of CIRIA Report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of 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 < 300 traffic movements a day	Low	0.5	0.4	0.4

Table 4: Pollution Hazard Indices

2.4.4 As identified within Table 26.3 in Chapter 26 of CIRIA Report C753 The SuDS Manual permeable paving will meet the target treatment level required for runoff with very low to medium level of pollution hazard thus demonstrating that the surface water drainage system for the site has been designed to adequately mitigate against the risk of pollution. An extract from Table 26.3 of CIRIA Report C753 The SuDS Manual is shown below:

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

Table 5: Pollution Mitigation Indices

2.4.5 A drainage maintenance manual and ownership plan are located at the rear of this document.

2.5 Risk to Others

2.5.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing treatment, attenuation and storage which will minimise runoff leaving the site during times of heavy rain.

2.5.2 Surface water runoff from the site will be reduced by up to 7.7l/s compared to existing greenfield runoff for the 1:100 year storm. All surface water from the developed areas is being contained within the site boundary and discharged to ground for all storms up to the 1:100 year event with a 40% allowance for climate change.

2.5.3 Allowance has been made for a 40% increase in rainfall intensities which accords with the latest figures published by the Environment Agency and in accordance with the requirements under the National Planning Policy Framework and Arun District Council guidance documents.

2.5.4 The proposed drainage system will incorporate sufficient treatment prior to final discharge thus mitigating the risk of pollution from the site.

2.5.5 The risk of surface water flooding to others due to the development proposals is reduced and the resultant risk is negligible.

2.5.6 Sewerage undertakers have an obligation to upgrade the existing networks if a connection to an equivalent or larger sized public sewer is technically achievable.

2.5.7 The residual risk of sewer flooding from this development for the foreseeable future is therefore negligible.

3 Maintenance During Construction

- 3.1 Once appointed the Contractor will prepare a site specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532 'Control of Water Pollution from Construction Sites' provides further guidance on this.
- 3.2 Should hardstanding areas be constructed prior to the completion of the proposed surface water scheme any overland flow will be temporarily channelled into localised soakaways wherever viable. Appropriate water quality mitigation in accordance with CIRIA Report C532 will be provided. This approach allows for surface water to be attenuated and sediments captured during the construction phase.
- 3.3 The permeable subbase layer will be constructed and then covered with a sacrificial layer of geotextile overlaid by 100mm thick compacted voided stone or similarly approved hardcore for use as a temporary road surface. The sacrificial stone and geotextile will be removed and discarded at the end of the main construction period prior to the laying course and paver surface being laid.
- 3.4 The Contractor will maintain the proposed drainage system during construction and until the site is handed over to the private Management Company.

4 Conclusions

- 4.1 The geology of the area is suitable to provide an infiltration drainage system.
- 4.2 Calculations confirm that surface water runoff generated by the proposed development can be discharged to ground via a voided subbase infiltration blanket located beneath the roads and driveways sized with sufficient depth to accommodate a 1:100 year storm event with an additional 40% to account for the predicted effects of future climate change.
- 4.3 Water quality improvement will be provided to mitigate against any risk to any receiving waterbody.
- 4.4 Foul drainage will be discharged by gravity to the existing public foul sewer located beneath the B2233 Yapton Road to the southwest of the site.
- 4.5 Upon completion the maintenance of the shared drainage systems incorporating the below highway infiltration drainage blanket and shared foul drainage infrastructure will be passed on to a suitably qualified Management Company appointed by the Developer on behalf of the Residents.
- 4.6 In the event that the Management Company becomes unable to discharge its duties within two years of first occupation the Developer will endeavour to appoint an alternative on behalf of the Residents.
- 4.7 The requirements of Planning Condition 12, 14 and 16 of Outline Planning Permission granted by Arun District Council under Application Y/1/17/OUT have been met.

5 Appended Documents

Drawing 01 – Site Location Plan

Drawing 02 – Existing Site Layout Plan

Drawing 03 – Proposed Site Layout Plan

Drawing 04 – Proposed Impermeable Areas Plan

Drawing 05 – Stormwater Exceedance Flow Route Plan

Drawing 1210 – Proposed Drainage Layout and Levels Plan

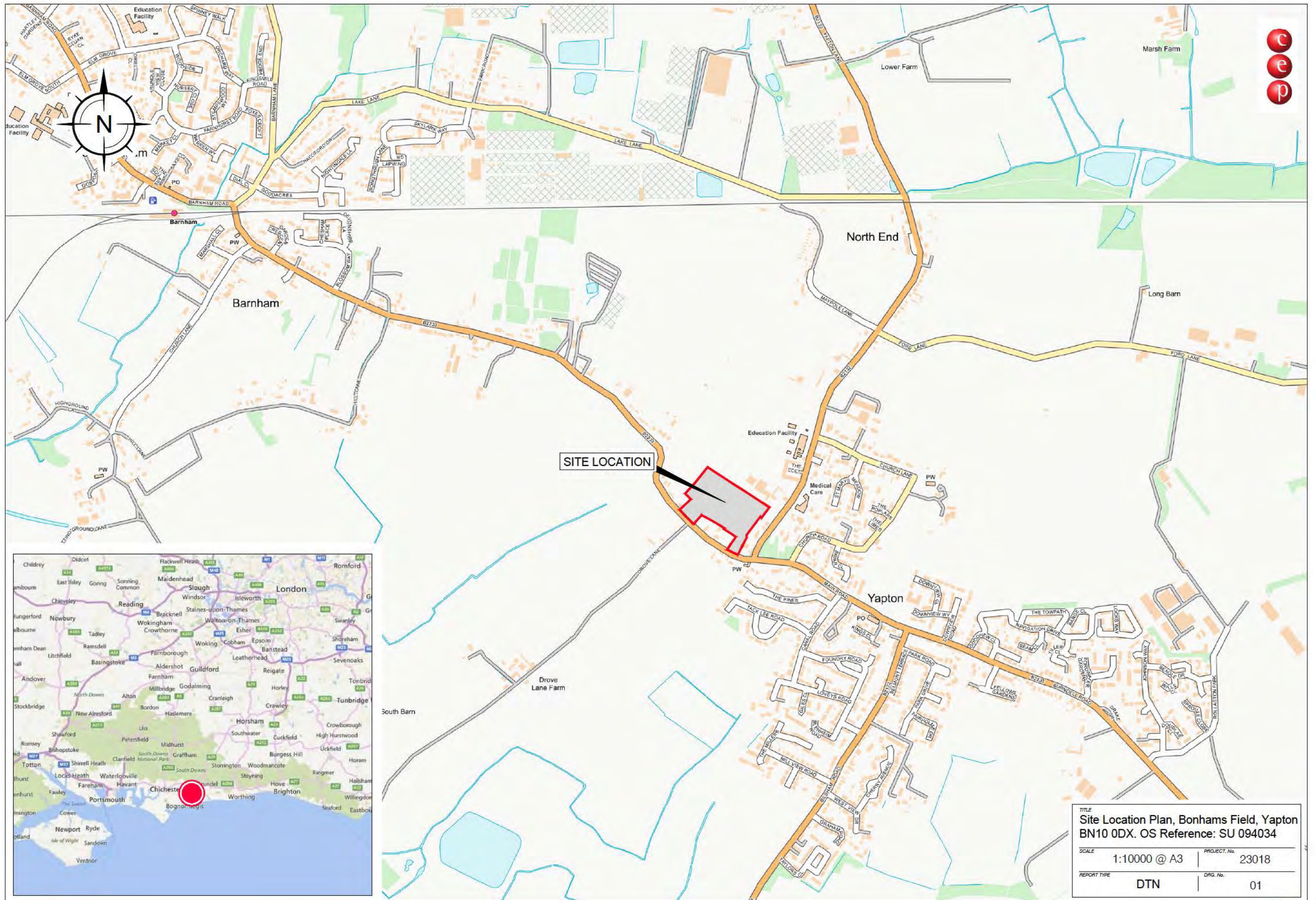
Drawing 1501 – Construction Details

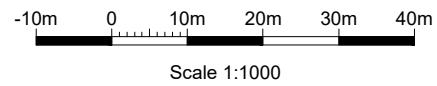
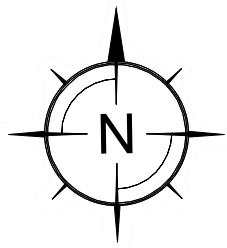
Drawing 2001 – Drainage Maintenance Plan

Southern Water Sewer Records and S106 Approval

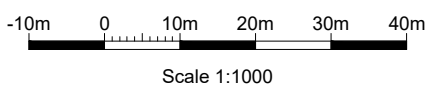
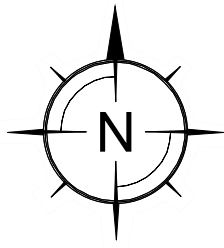
Site Investigation Extracts

Causeway Flow Calculations



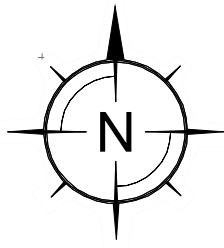


TITLE Existing Site Layout Plan	
SCALE 1:1000 @ A3	PROJECT No. 23018
REPORT TYPE DTN	DRG. No. 02



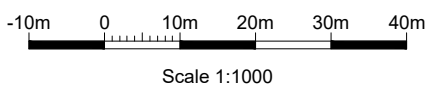
TITLE Proposed Site Layout Plan			
SCALE 1:1000 @ A3		PROJECT No. 23018	
REPORT TYPE DTN		DRG. No. 03	



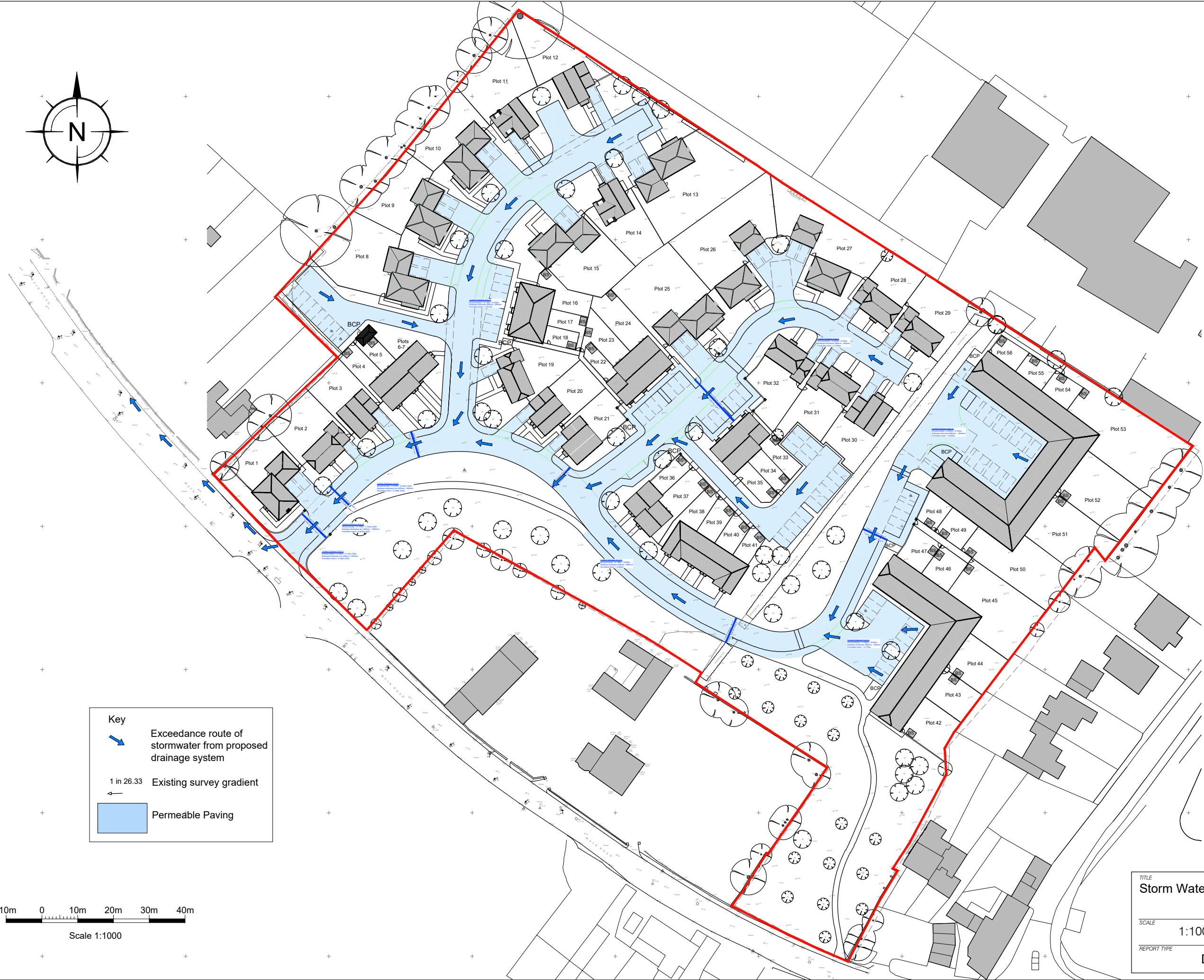


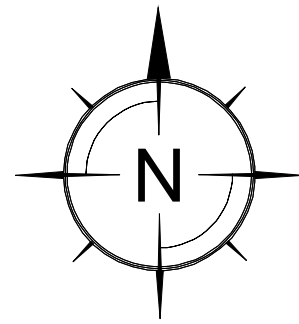
Key

- Exceedance route of stormwater from proposed drainage system
- 1 in 26.33 Existing survey gradient
- Permeable Paving



TITLE Storm Water Exceedance Route Plan			
SCALE	1:1000 @ A3	PROJECT No.	23018
REPORT TYPE	DTN	DRG. No.	05 B





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 in accordance with the current version of 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 the current version of BS EN 752:2017. 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 3m 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.
7. All syps 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

Legend:	
	Site Boundary
	Existing Foul Sewers
	Adoptable Type 2 Foul Water Manhole and lateral connection from proposed site
	Private Type 2 Foul Water Manhole
	Private Type 4 / 3 Foul Water Inspection Chamber
	Private Type 4 or catchpit Storm Water Inspection Chamber
	Private Storm Water Rodding Eye
	Distribution tanks to voided subbase
	Area of voided subbase for storm water storage
	Type 1 Concrete baffles in voided subbase. Baffle separates areas.

J	17.02.2021	MJP	Subbase thickness to Area F & H	MK
I	02.02.2021	MJP	Subbase thickness to catchments F, G & H	MK
I	05.01.2021	MJP	Subbase depths and baffle updated	MK
G	22.12.2020	MJP	Minor amendments to subbase depths	MK
F	11.09.2020	MJP	Diffusers moved 5m from buildings	MK
E	03.09.2020	MJP	Updated to WSCC comments. Highway drain added	MK
D	26.06.20	PJR	Voided subbase formation levels added. Cover and invert levels added. Drainage revised.	MK
C	17.06.19	MJP	Gullies removed from roads	SRM
B	17.06.19	AJD	Site layout updated	SRM
A	06.06.19	MJP	Plots 26 and 27 updated	SRM
REV	DATE	INT	DESCRIPTION	CHK

Issue Status FOR APPROVAL

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT

Seaward Properties Limited

PROJECT

Bonhams Field, Main Road, Yapton

TITLE

Site Layout
Proposed Drainage Plan

DRAWN

M Pacifico

DATE

May 2019

ENGINEER

S Magowan

CHECKED

SRM

SCALE

1:500 @ A1 / 1:1000 @ A3

PROJECT NO.

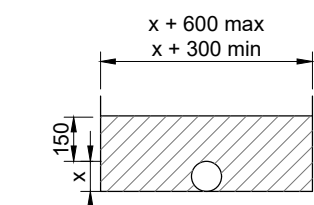
23018

DWG No.

1210

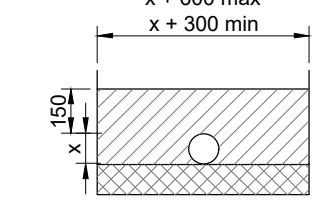
REV

J



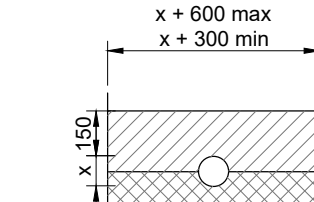
CLASS D PIPE BEDDING

High standard of workmanship required not to be used unless accurate hand trimming by shovel is possible



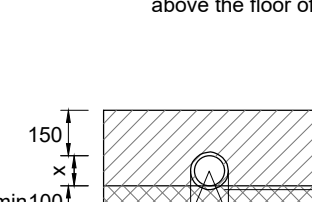
CLASS N PIPE BEDDING

Where accurate hand trimming is not possible class N is an alternative to class D



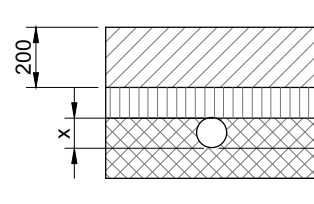
CLASS B PIPE BEDDING

Generally suitable in all soil conditions granular fill to half depth of pipe

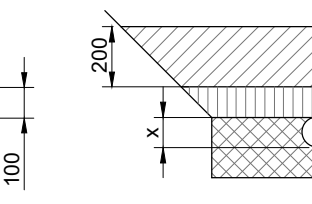


CLASS F PIPE BEDDING

Generally suitable in all soil conditions



PIPE BEDDING FOR FLEXIBLE PIPES



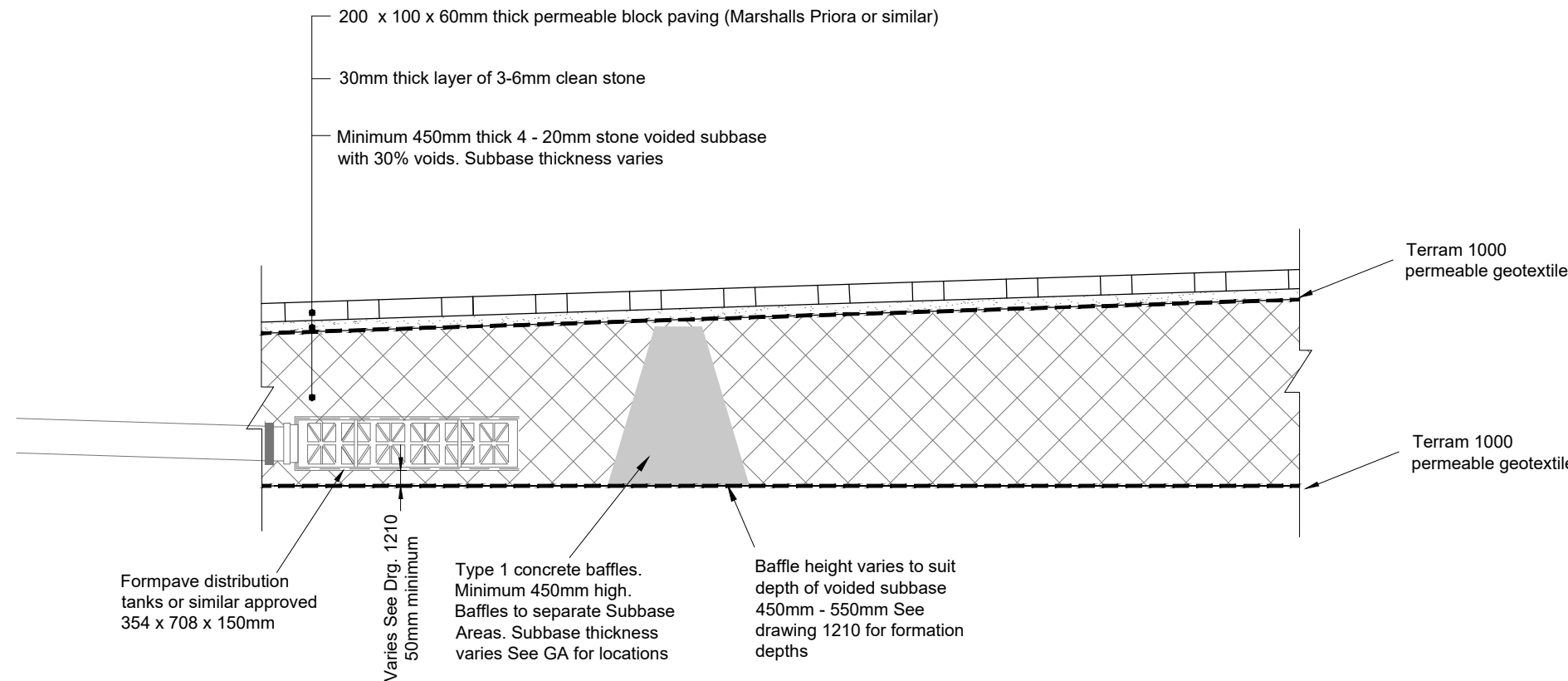
PIPE BEDDING DETAILS
(NON ADOPTABLE DRAINS)
(Not To Scale)

LEGEND:

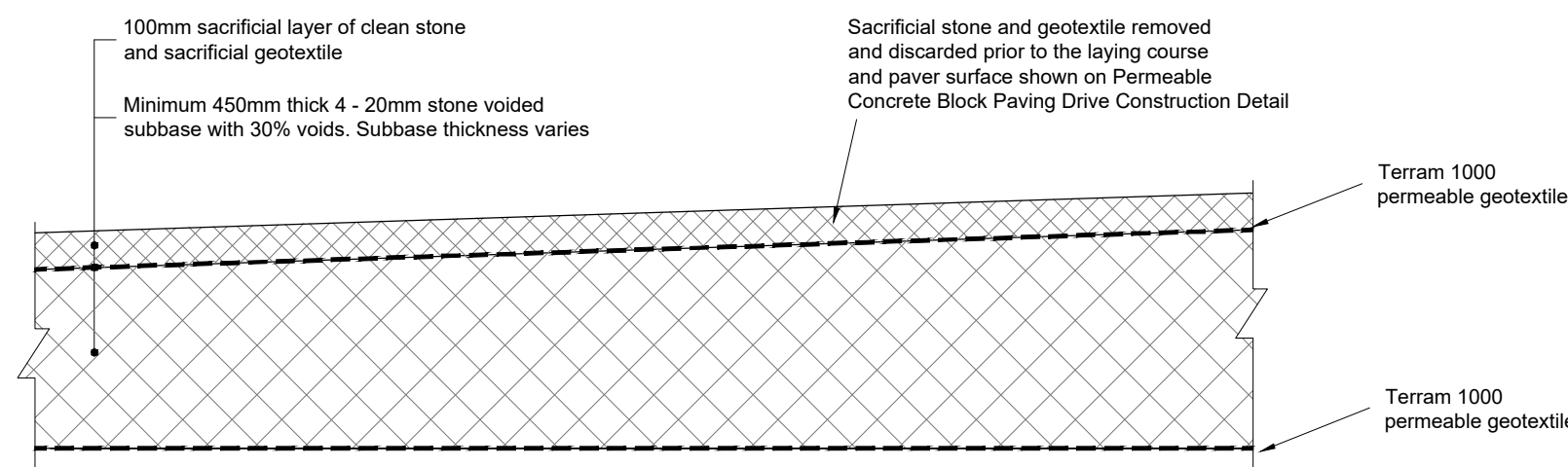
- Selected fill: free from stones larger than 40mm, lumps of clay over 100mm, timber frozen material and vegetable matter
- Granular material: should conform to BS 882:1983 table 4 or BS8301:1985 Appendix D. Compaction fraction > 0.3 for class N > 0.2 for class F and B.
- Selected fill or granular fill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

PIPE BORE	BEDDING CLASS	Fields and gardens				Light traffic roads		Heavy traffic roads	
		MIN	MAX	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		

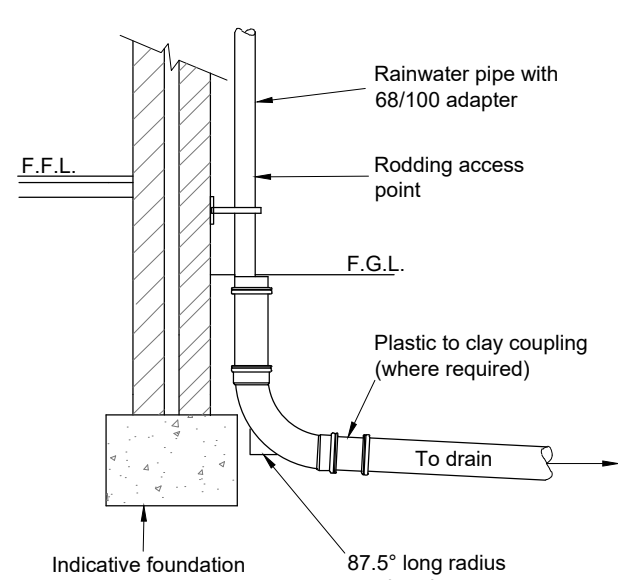
PIPE BEDDING FOR RIGID APPLIES (NON ADOPTIVE DRAINS)



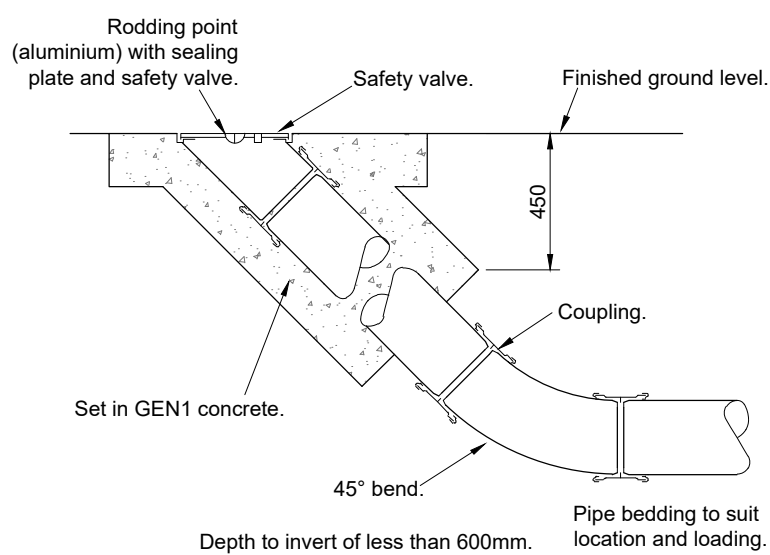
PERMEABLE CONCRETE BLOCK PAVING
CARRIAGEWAY & DRIVE CONSTRUCTION DETAIL
Scale 1:20



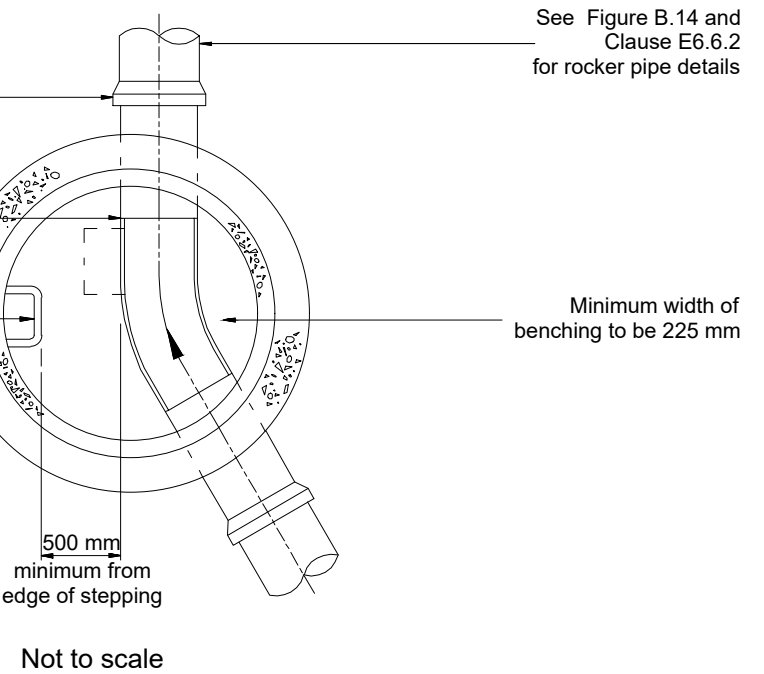
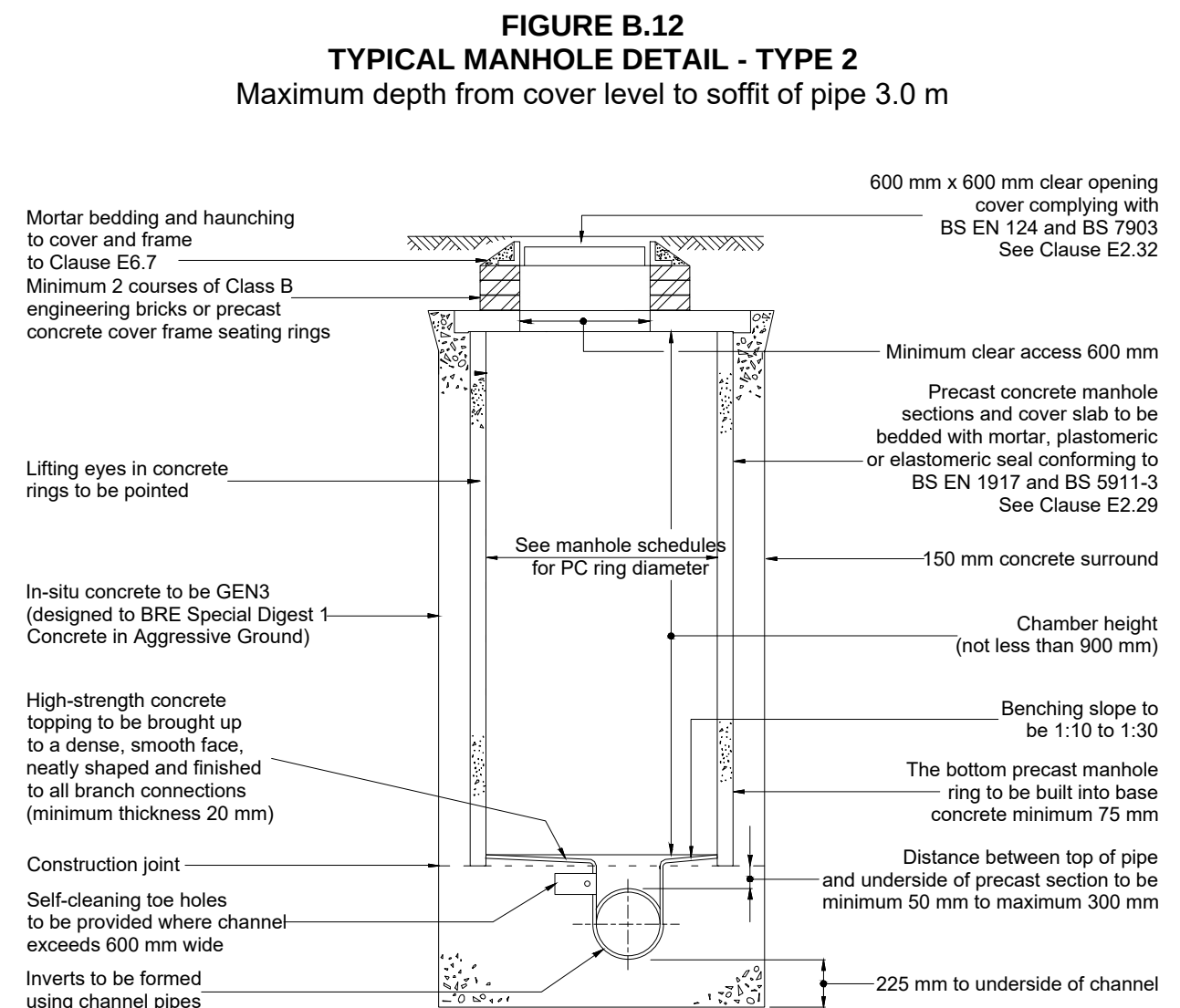
VOIDED SUBBASE PROTECTION DURING CONSTRUCTION
Scale 1:20



TYPICAL RAINWATER PIPE DETAIL
(Scale 1:25)

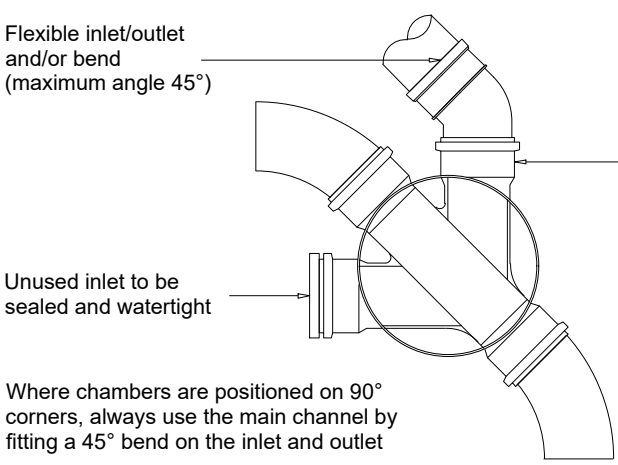
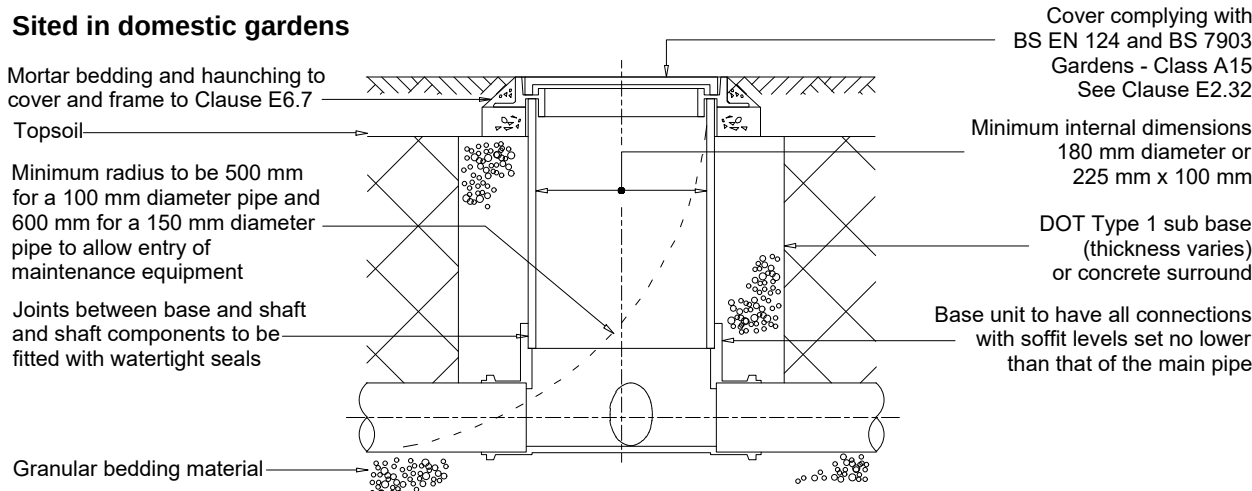
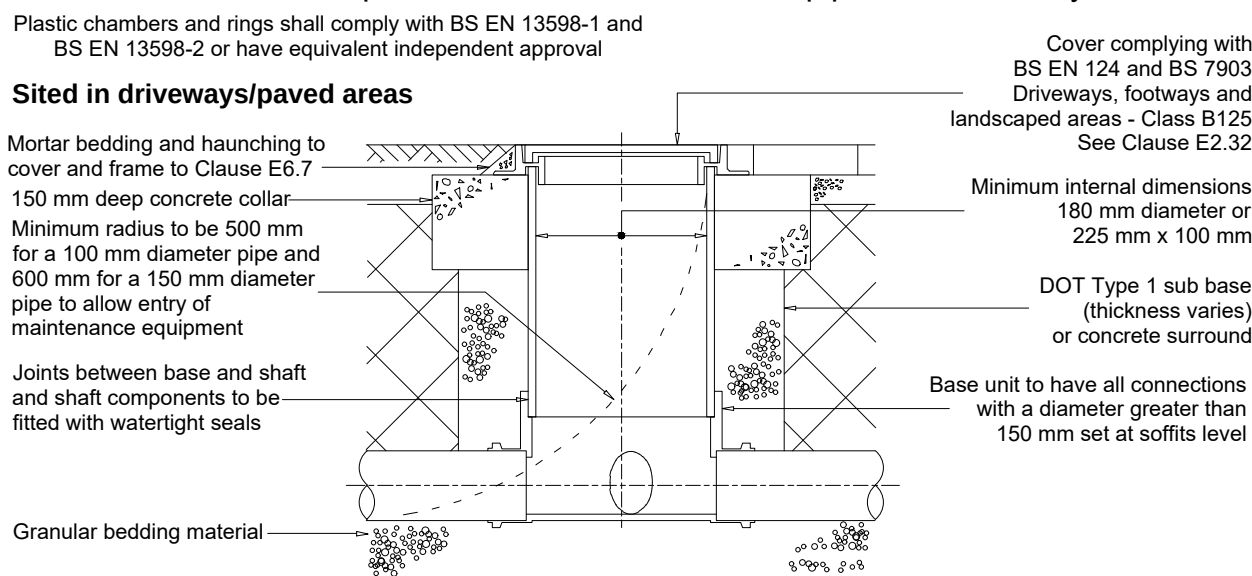


DETAIL OF RODDING EYE
(Scale 1:25)



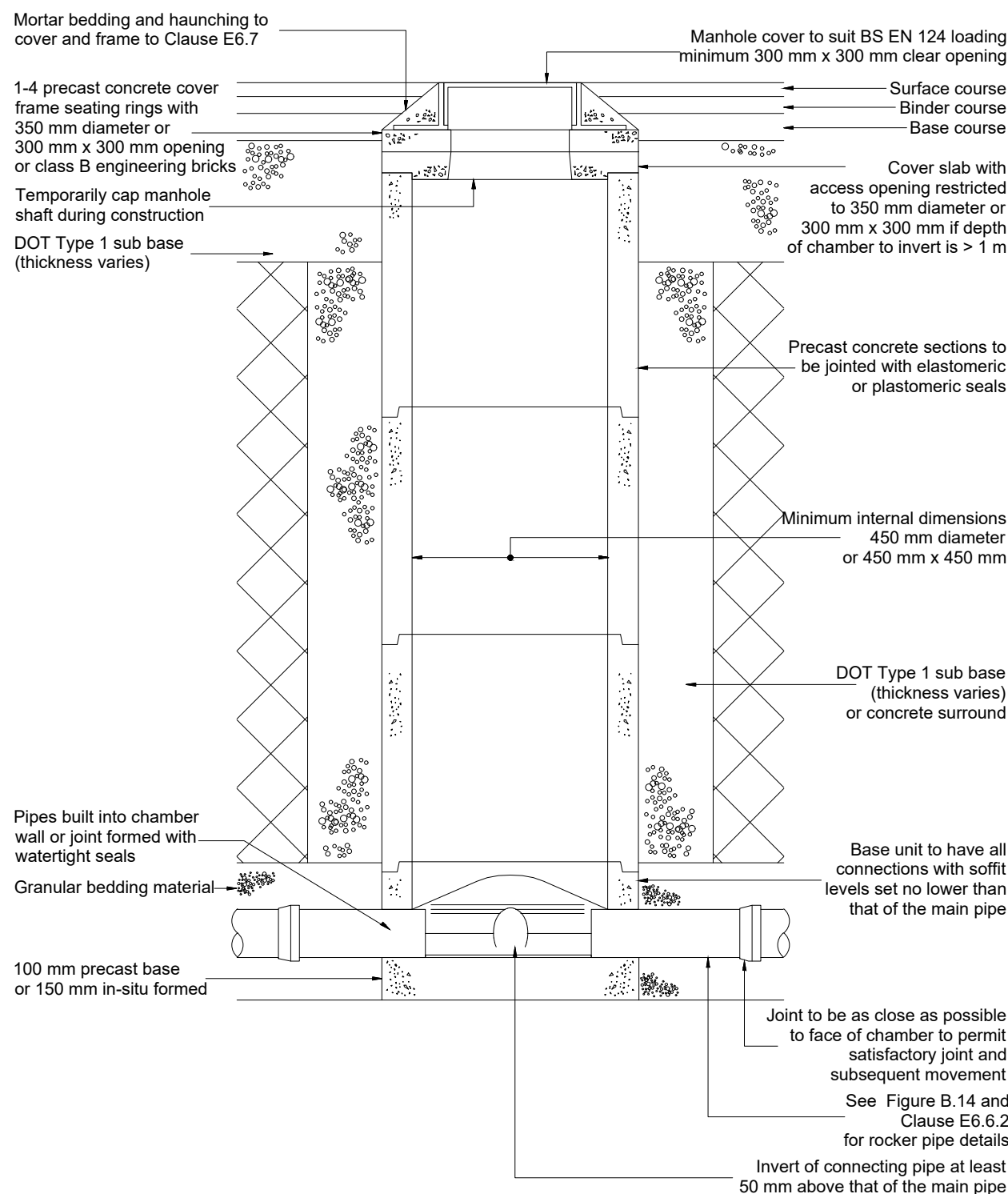
CATCHPIT CHAMBER
(Scale 1:20)

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



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

FIGURE B.18
TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3 (Rigid material detail)
Maximum depth from cover level to soffit of pipe in areas subject to vehicle loading 3 m, non-entry



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

GENERAL NOTES:

- 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.
- 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:

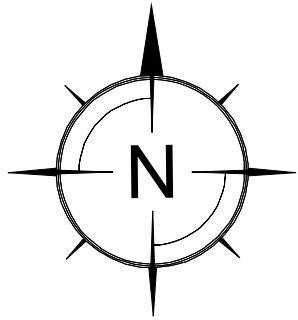
- All adoptable pipes, bends and junctions shall be vitrified clay in accordance with the current version of BS EN 295-1, with flexible joints and kitemark certified.
- All Adoptable sewers shall be in strict accordance with the 7th edition of Sewers For Adoption. Unless otherwise stated adoptable sewers 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 in accordance with the current version of BS EN 752:2017. 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 (fibrecard 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

D	17.02.2021	MJP	50mm bedding shown to diffuser tanks	MP
C	02.02.2021	MJP	Subbase protection detail added	MP
B	05.01.2021	MJP	Baffle and subbase details updated	MP
A	26.06.2020	PJR	Details updated.	MP
REV	DATE	INT	DESCRIPTION	CHK

Issue Status FOR APPROVAL

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT	Seaward Properties Limited				
PROJECT	Bonhams Field, Main Road, Yapton				
TITLE	Construction Details				
DRAWN	M Pacifico	DATE	May 2019	PROJECT NO.	23018
ENGINEER	S Magowan	CHECKED	SRM	DWG. No.	REV
SCALE	As Shown @ A1			1501	D



- 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 in accordance with the current version of 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 the current version of BS EN 752:2017. 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 (fibresorb or polystyrene) shall be provided at a maximum of 3m 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.
 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

Storm Drainage Maintenance Legend:

To be maintained by the homeowner

- Private Type 4 Storm Water Inspection Chamber
- Private Storm Water Rodding Eye

To be maintained by estates management Company

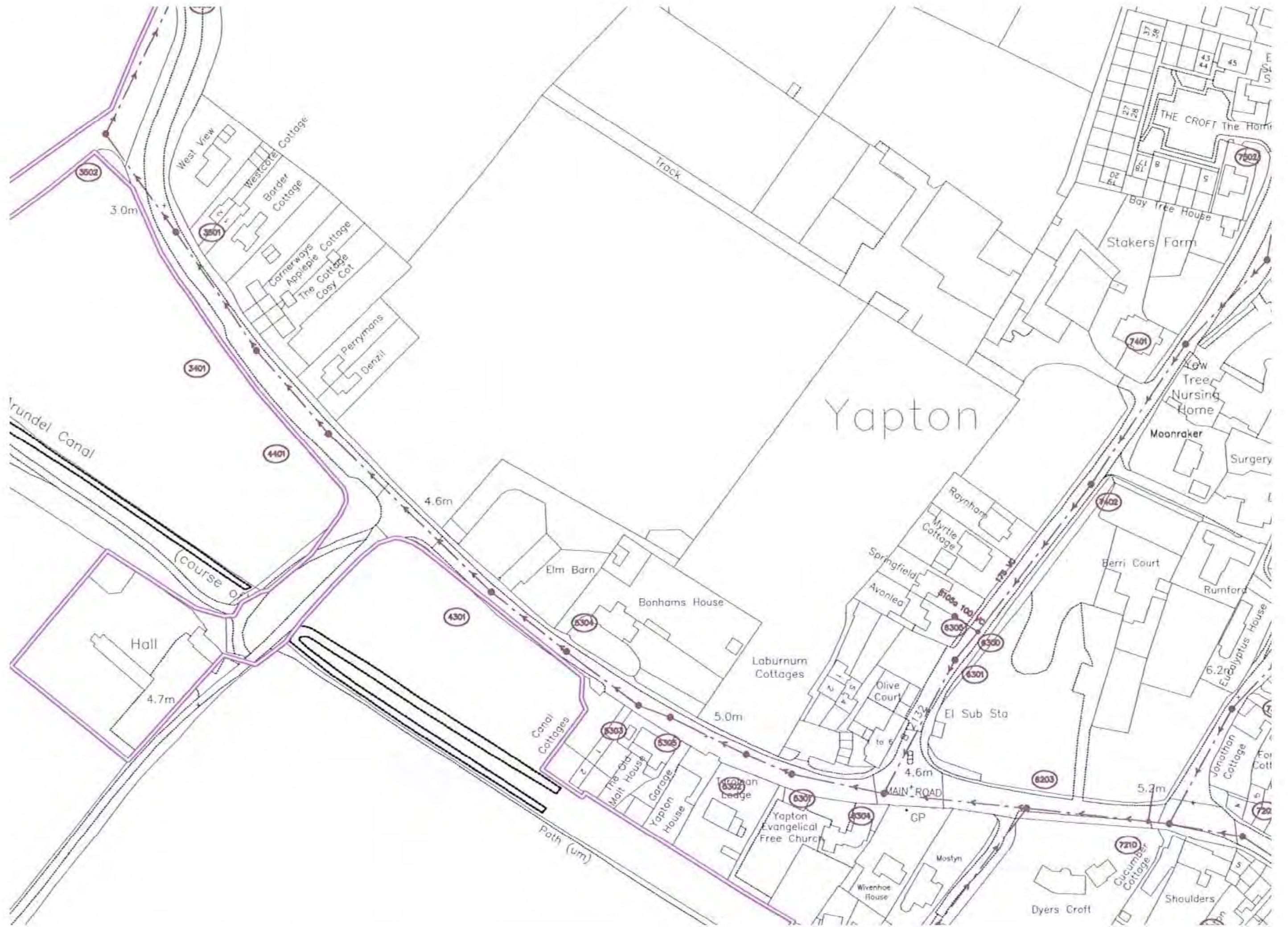
- Type 4 Storm Water Inspection Chamber
- Property boundary
- Distribution Tanks to Subbase
- Permeable Drives under private ownership. Subject to legal covenant
- Impermeable Roads and Drives under private ownership

17.02.2021	MJP	Subbase thickness to Area F & H	MK	
02.02.2021	MJP	Subbase thickness to catchments F, G & H	MK	
05.01.2021	MJP	Subbase depths and baffles updated	MK	
22.12.2020	MJP	Minor amendments to subbase depths	MK	
REV	DATE	INT	DESCRIPTION	CHK

Issue Status **FOR APPROVAL**

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT Seaward Properties Limited	
PROJECT Bonhams Field, Main Road, Yapton	
TITLE Site Layout Proposed Drainage Ownership Plan	
DRAWN P Reynolds	DATE May 2020
ENGINEER S Magowan	CHECKED SRM
SCALE 1:500 @ A1 / :1000 @ A3	PROJECT NO. 23018
	DWG NO. 2001
	REV. D



Node	Cover	Invert	Size	Material	Shape		Node	Cover	Invert	Size	Material	Shape
0001X	8.32	6.31	150	VC	CIRC	*	9101X	6.61	3.01	350	PF	CIRC
0001X	5.9	4.02	175	VC	CIRC	*	9102X	3.22	-0.06	350	PF	CIRC
0001X	6.06	3.61	225	VC	CIRC	*	9301X	5.53	4.18	175	VC	CIRC
0002X	5.83	3.49	225	VC	CIRC	*	9302X	5.56	4.18	175	VC	CIRC
0002X	6.96	4.79	150	VC	CIRC	*	9303X	5.54	4.08	175	VC	CIRC
0002X	5.93	3.76	175	VC	CIRC	*	9402X	6.999	5.79	150	VC	CIRC
0003X			150	VC	CIRC		9502X	6.938	5.057	150	VC	CIRC
0004X			150	VC	CIRC		9505X	7.037		150	VC	CIRC
0101X	6.13	2.98	350	PF	CIRC		9601X	6.25	3.98	175	VC	CIRC
0301X	5.67	4.49	175	VC	CIRC		9603X	6.298		175	VC	CIRC
0401X	5.92	4.58	150	VC	CIRC		9801X	6.27	4.77	175	VC	CIRC
0402X	5.8	5.03	150	VC	CIRC		9901X	6.27	4.85	175	VC	CIRC
0403X	6.32	5.24	150	VC	CIRC		9902X	6.13	4.56	175	VC	CIRC
0404X	6.46	5.42	150	VC	CIRC							
0405X	6.55	5.38	150	VC	CIRC							
0406X	6.72	5.55	150	VC	CIRC							
0407X	7.03	5.69	150	VC	CIRC							
0408X	6.82	5.6	150	VC	CIRC							
0501X	5.89	4.78	175	VC	CIRC							
0502X	5.86	4.41	175	VC	CIRC							
0503X	5.99		175	VC	CIRC							
0504X	6.05	4.53	175	VC	CIRC							
0801X	5.38	3.83	175	VC	CIRC	*						
0801X	6.25	4.12	225	VC	CIRC	*						
0802X	7.44	4.75	175	VC	CIRC	*						
0802X	4.67	3.24	175	VC	CIRC	*						
0803X	7.4	4.64	175	VC	CIRC							
0804X	7.47	4.43	175	VC	CIRC							
0901X	6.53	3.91	225	VC	CIRC	*						
0901X	5.39	3.49	150	VC	CIRC	*						
0902X	6.5	3.9	225	VC	CIRC							
0903X	6.23	3.79	225	VC	CIRC							
1001X	5.78	4.38	150	VC	CIRC	*						
1001X	5.73	3.46	350	PF	CIRC	*						
1002X	6.88	3.85	150	VC	CIRC							
1003X	6.53	3.87	175	VC	CIRC							
1004X	7.13	6.1	150	VC	CIRC							
1005X	6.414	3.974	150	VC	CIRC							
1006X	6.06	4.145	150	VC	CIRC							
1007X	6.96	4.445	150	VC	CIRC							
1101X	6.908	4.753	150	VC	CIRC	*						
1101X	5.91	3.61	175	VC	CIRC	*						
1102X			150	VC	CIRC							
1103X	6.887	4.987	150	VC	CIRC							
1104X			150	VC	CIRC							
1105X			150	VC	CIRC							
1201X			150	VC	CIRC							
1401X	6.39	5.24	175	VC	CIRC							
1501X	6.45	4.65	175	VC	CIRC							
1502X	6.39	4.58	175	VC	CIRC							
1701X	5.34	2.61	175	VC	CIRC							
1801X	4.84	3	175	VC	CIRC							
1802X	7.14	5	175	VC	CIRC							
1800X			175	VC	CIRC							
1901X	7.23	6.16	150	VC	CIRC							
1902X	7.12	5.95	150	VC	CIRC							
1903X	7.31	5.78	150	VC	CIRC							
1904X	7.11	5.92	150	VC	CIRC							
2001X	6.59	4.81	175	VC	CIRC							
2002X	6.82	4.02	175	VC	CIRC							
2003X	6.78		175	VC	CIRC							
2101X	6.5	5.36	175	VC	CIRC							
2102X	6.092	4.332	150	VC	CIRC							
2103X		4.551	150	VC	CIRC							
2104X	6.684	4.669	150	VC	CIRC							
2105X			150	VC	CIRC							
2106X			150	VC	CIRC							
2402X			150	VC	CIRC							
2405X	6.453	5.647	UNK	UNK	CIRC							
2601X	4.42	2.1	175	VC	CIRC							
2701X	4.91	2.31	175	VC	CIRC							
2801X	7.02	5.74	150	VC	CIRC							
2802X	6.67	5.54	175	VC	CIRC							
2803X	7.06	5.33	175	VC	CIRC							
2901X	6.91	6.02	150	VC	CIRC							
2902X	6.99	5.88	150	VC	CIRC							
3001X	7.06	4.28	175	VC	CIRC							
3002X	6.98	4.99	150	VC	CIRC							
3003X	6.92	5.15	150	VC	CIRC							
3005X	7.02		150	VC	CIRC							
3006X			UNK	UNK	CIRC							
3007X			UNK	UNK	CIRC							
3008X			UNK	UNK	CIRC							
3401X	3.95	1.25	350	PF	CIRC							
3501X	3.02	1.08	350	PF	CIRC							
3502X	2.58	0.9	350	PF	CIRC							
3601X	3.96	2.11	175	VC	CIRC							
3602X	3.14	0.74	350	PF	CIRC							
3604X	3.19	0.86	150	VC	CIRC							
3605Y	3.15		225	VC	CIRC	*						
3605X	3.15		225	VC	CIRC	*						
3606X	3.42		150	VC	CIRC							
360PX	3.42	3.41	300	BAC	CIRC							
3701X	5	3.44	150	VC	CIRC							
3901X	7.06	4.38	175	VC	CIRC							
4301X	4.78	1.72	350	PF	CIRC							
4401X	4.49	1.27	350	PF	CIRC							
4601X	4.46	2.99	150	VC	CIRC							
4901X	6.58	4.6	175	VC	CIRC							
5101X	6.35	2.81	150	VC	CIRC							
5102X	6.42	3.06	150	VC	CIRC							
5301X	4.63	2.12	350	PF	CIRC							
5302X	4.86	2.04	350	PF	CIRC							
5303X	5.39	1.81	350	PF	CIRC							
5304X	5.33	1.81	350	PF	CIRC							
5305X	5.32	1.96	350	PF	CIRC							



Mr Martin Kempshall
The Civil Engineering Practice
Unit 11
Tungsten Building
George Street
Fishersgate
West Sussex
BN41 1RA

Your ref

Our ref
DS_CPS-119665

Date
23 September 2020

Contact
Tel 0330 303 0119

Dear Mr Kempshall,

Application to Connect to the Public Sewerage System - Section 106 Water Industry Act 1991.
Location: Bonhams Field, Main Road, Yapton, Arundel, West Sussex, BN18 0DX.

We refer to your application to connect to the public foul sewer at the above location. We are pleased to advise that your proposal, as shown on your drawing 1211 Revision B dated 03/09/2020, is approved subject to:

This review is for the purpose of approval to permit communication to be made to the public sewer, under Section 106 of the Water Industry Act 1991. **It is to the means and mode of construction only.**

S106 approval does not confirm that public sewer network capacity is available for the proposed development. The availability of capacity may be assessed through the Pre-development enquiry process.

This letter should not be considered as approval by Southern Water to the discharge of any relevant Planning Conditions relating to drainage. This is a separate matter which will be reviewed under a consultation from the Planning Authority.

If connection is to be made through land under the ownership of other Parties, then you are advised to obtain the Landowners consent before carrying out any works.

In approving this application, it is assumed that you have obtained any necessary Building Regulations Approval and /or Highway Authority Road Opening License.

This approval is given based on the information provided in support of this application and the assumption of the final discharge point being to the public foul sewer. If this is different, then this approval becomes invalid.

Southern Water, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX
southernwater.co.uk

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing BN13 3NX Registered in England No. 2366670

If as noted above, there is any change in the approved connection point, then you must provide us with revised drawings and details and obtain our approval for the changes prior to the connection being made.

Please note that surface water must not communicate with the public foul sewers.

Connection to a new manhole and the arrangement of pipe junctions within any manholes should be in accordance with the current edition of Sewers for Adoption and Southern Water's guidance documentation.

We refer you to Southern Water Health and Safety Advisory that can be viewed in the Developer and Builders section of the Southern Water website as the link below:

southernwater.co.uk/developing-building/health-and-safety

This approval is given on the basis that you will review this Advisory and take the necessary actions concerning Health and Safety.

Please contact Mick Vince our Assistant Adoption Manager for this area on 07803 259227 giving at least two full working days' notice, for a mutually convenient date and time for the inspection of the works to be arranged.

Yours sincerely,



Ashley Marshman
Head of Business Channels
Business Channels

Soakage Letter Report

CLIENT	Seaward Properties Limited			
SITE ADDRESS	Bonhams Field, Yapton, West Sussex BN18 0ED			
REPORT REFERENCE	GWPR4019. The terms and conditions of this report are shown within Appendix A.			
ENGINEER	Darina Jurovskaja, BSc (Hons) MSc			
INVESTIGATION LOCATIONS AND SCOPE OF WORKS	Site works were undertaken between the 14 th and 19 th December 2020 and comprised the machine excavation of 9No. Trial Pits (TP1A – TP9A) to depths of between 0.69 – 0.78m bgl. Soakage testing was undertaken within all nine trial pits. A trial hole location plan can be seen within Figure 1 and the trial hole logs can be viewed within Appendix B.			
GROUND CONDITIONS ENCOUNTERED	Summary of Strata Encountered (TP1A – TP9A)			
	Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
	TOPSOIL (all trial holes): Light greyish brown slightly gravelly silty CLAY. Gravel is fine, sub-rounded flint.	GL	0.25 – 0.30	0.25 – 0.30
	UNDIFFERENTIATED RIVER TERRACE DEPOSITS (all trial holes): Orangish brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	0.25 – 0.30	>0.69 – >0.78	>0.41 – >0.51
Logs can be seen within Appendix B.				
GROUNDWATER	No groundwater was noted during the site investigation. Roots/rootlets were noted to the base of all trial pits (0.69 – 0.78m bgl). A tabulated summary of the depth of root penetration within all trial holes can be viewed below.			

ROOTS

Depth of Roots Within Trial Holes	
Trial Hole	Root Depth (m bgl)
TP1A	0.70
TP2A	0.71
TP3A	0.78
TP4A	0.71
TP5A	0.76
TP6A	0.70
TP7A	0.69
TP8A	0.74
TP9A	0.70

It should be noted that roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

INFILTRATION RATE	9No. Soakage tests in accordance BRE365 were undertaken within all trial holes at depths of between 0.69 – 0.78m bgl within the cohesive soils of the Undifferentiated River Terrace Deposits. In accordance with principles of BRE Digest 365, the soakage testing requires the introduction of water into the trial pit on three consecutive occasions. However, it was considered appropriate to undertake 4No. tests in each trial pit. This was achieved within all trial pits (TP1 – TP9). The results of the soakage tests can be seen tabular overleaf.
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Soakage Tests in accordance with BRE365					
Test Details	Test No.	Starting Depth Level (m)	Final Water Level (m bgl)	Time Taken (mins)	Infiltration Rate (m/s)
TP1A/0.70m bgl	1	0.22	Dry	1317*	2.414x10 ⁻⁶
	2	0.19	Dry	1293*	3.095x10 ⁻⁶
	3	0.14	0.60	1421	2.092x10 ⁻⁶
	4	0.17	0.66	1381	2.20x10 ⁻⁶
TP2A/0.71m bgl	1	0.18	Dry	1322*	2.495x10 ⁻⁶
	2	0.15	Dry	1301*	2.704x10 ⁻⁶
	3	0.14	0.60	1434	2.089x10 ⁻⁶
	4	0.09	0.56	1520	1.72x10 ⁻⁶
TP3A/0.78m bgl	1	0.33	Dry	1205*	3.823x10 ⁻⁶
	2	0.21	Dry	1333*	3.417x10 ⁻⁶
	3	0.24	Dry	1308*	2.91x10 ⁻⁶
	4	0.17	Dry	1372*	4.89x10 ⁻⁶
TP4A/0.71m bgl	1	0.30	Dry	1150*	2.475x10 ⁻⁶
	2	0.25	0.58	1391	1.264x10 ⁻⁶
	3	0.17	0.58	1436	1.71x10 ⁻⁶
	4	0.11	0.57	1334	1.80x10 ⁻⁶
TP5A/0.76m bgl	1	0.27	Dry	1176*	2.865x10 ⁻⁶
	2	0.14	Dry	1262*	2.805x10 ⁻⁶
	3	0.24	Dry	1343*	2.37x10 ⁻⁶
	4	0.11	Dry	1339*	2.61x10 ⁻⁶
TP6A/0.70m bgl	1	0.11	Dry	1210*	2.794x10 ⁻⁶
	2	0.23	Dry	1283*	2.439x10 ⁻⁶
	3	0.09	Dry	1280*	2.593x10 ⁻⁶
	4	0.04	Dry	1347*	2.705x10 ⁻⁶
TP7A/0.69m bgl	1	0.29	Dry	180	1.509x10 ⁻⁵
	2	0.10	Dry	1236*	1.088x10 ⁻⁵
	3	0.20	Dry	1375*	7.16x10 ⁻⁶
	4	0.10	Dry	1294*	5.78x10 ⁻⁶
TP8A/0.74m bgl	1	0.27	Dry	1045*	2.529x10 ⁻⁶
	2	0.12	Dry	1243*	2.867x10 ⁻⁶
	3	0.21	Dry	1367*	2.52x10 ⁻⁶
	4	0.08	Dry	1299*	2.85x10 ⁻⁶
TP9A/0.70m bgl	1	0.29	Dry	1063*	2.509x10 ⁻⁶
	2	0.27	Dry	1247	2.605x10 ⁻⁶
	3	0.22	Dry	1360*	2.97x10 ⁻⁶
	4	0.20	Dry	1314*	2.92x10 ⁻⁶

*It should be noted that some trial pits drained overnight and the final measurements were taken in the morning, indicating that the infiltration rate could be faster.

A study of the aquifer maps on the DEFRA website revealed the site to be located on a **Secondary (A) Aquifer** comprising the superficial Undifferentiated River Terrace Deposits and a **Principal Aquifer** comprising the bedrock deposits of the Undifferentiated Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation And Portsdown Chalk Formation.

Examination of the Defra records showed that the site did **not** fall within a Groundwater Source Protection Zone as classified in the Policy and Practice for the Protection of Groundwater.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources.

The relevant guidance should be followed regarding any potential stability issues that may arise due to the chalk geology, with respect to proposed buildings and the use of soakaways.

Please feel free to contact us should you have any queries regarding the information enclosed within this letter report. The following figures and appendices complete this report.

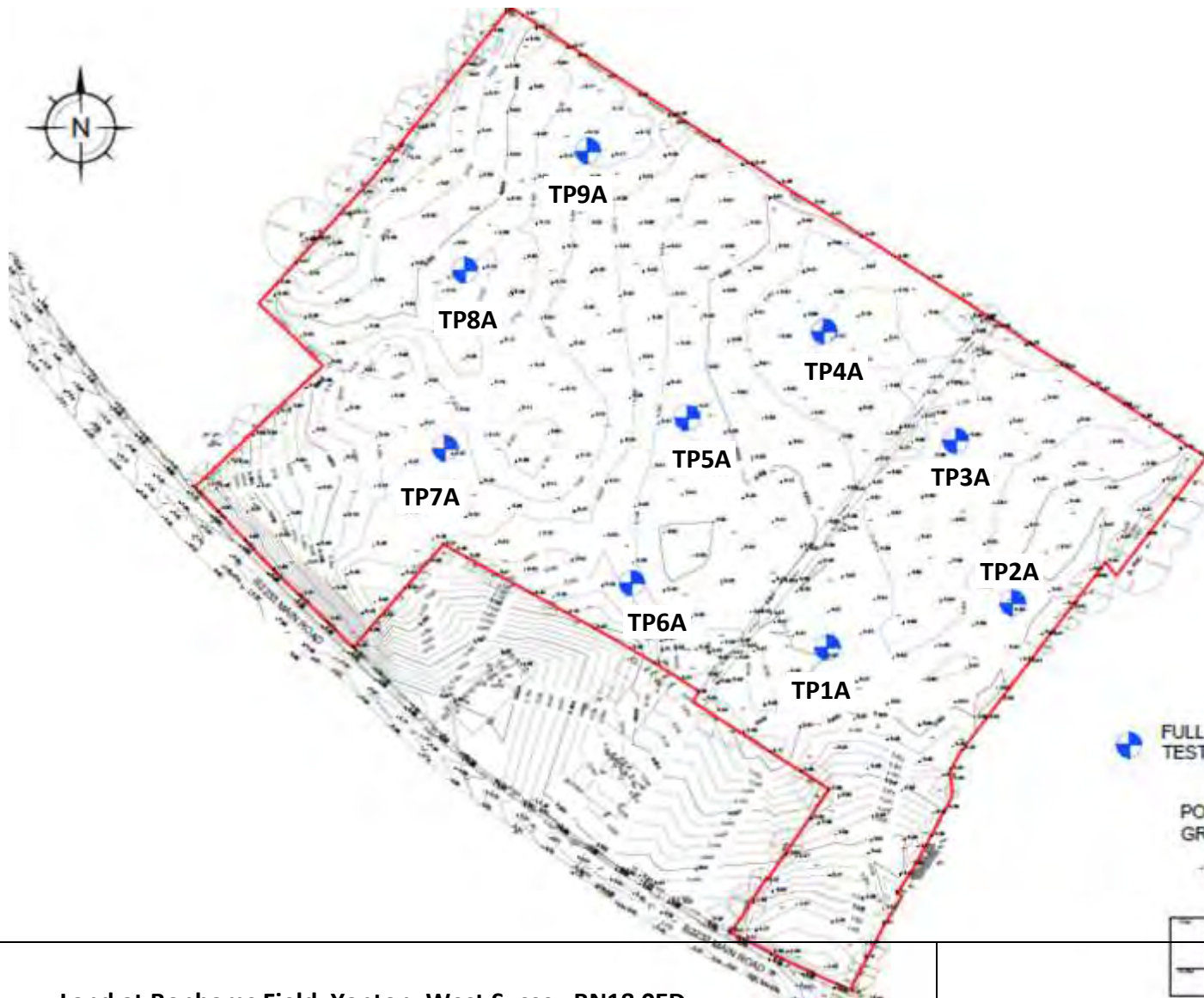
Yours sincerely

A handwritten signature in black ink, appearing to read 'D Jurovskaja', with a stylized flourish at the end.

Darina Jurovskaja BSc. (Hons), MSc
Senior Engineer

For and on behalf of Ground and Water Limited

Figure 1	Trial Hole Location Plan
Appendix A	Terms and Conditions
Appendix B	Trial Hole Logs



Project:

Land at Bonhams Field, Yapton, West Sussex BN18 0ED

Client:

Seaward Properties Limited

Date:

December 2020

Trial Hole Location Plan

Ref:

GWPR4019

Figure 1

ground&water

Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP1A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.70			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.700m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
--	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP2A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

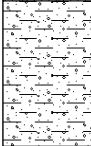
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.71			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.710m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
--	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP3A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.78			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. Rare black streaks noted throughout. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.780m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP4A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.71			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.710m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP5A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.76			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.760m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP6A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint and chalk fragments.	
					0.70			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.700m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.						
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP7A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.69			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.690m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP8A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.74			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.740m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.							
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Trial Pit Log

Project Name: Bonhams Field, Yapton		Client: Seaward Properties Limited		Date: 14/12/2020	
Location: West Sussex BN18 0ED		Contractor:			
Project No. : GWPR4019		Crew Name:		Equipment:	
Location Number TP9A	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine, sub-angular to sub-rounded flint.	
					0.70			Brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine, angular to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)	
								End of Borehole at 0.700m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Roots/rootlets noted to the base of the trial pit. No groundwater noted.	
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TP1

Site	
Test number	1
Date	
Depth (m)	0.700
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.220
Effective base	0.700
Effective depth	0.480

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.220	25%	0.340	
0.50	0.220			
1.00	0.230	75%	0.580	
2.00	0.230			
3.00	0.230			
4.00	0.230	$V_{75>25} (m^3)$	0.1728	
5.00	0.240	$A_{50} (M^2)$	1.704	
10.00	0.240	T_{25}	200	From Graph
20.00	0.250	T_{75}	900	From Graph
30.00	0.260	T	700	
60.00	0.270			
90.00	0.280			
120.00	0.300			
150.00	0.310			
180.00	0.330	f=	0.00014487 m/min	
210.00	0.350	f=	2.4145E-06 m/sec	
240.00	0.360			
270.00	0.370			
300.00	0.390			
330	0.400			
360	0.420			
1317	0.700			

Site	
Test number	2
Date	
Depth (m)	0.700
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.190
Effective base	0.700
Effective depth	0.510

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.190	25%	0.318	
0.50	0.190			
1.00	0.190	75%	0.573	
2.00	0.190			
3.00	0.190			
4.00	0.190	$V_{75>25} (m^3)$	0.1836	
5.00	0.190	$A_{50} (M^2)$	1.7655	
10.00	0.190	T_{25}	440	From Graph
20.00	0.190	T_{75}	1000	From Graph
30.00	0.190	T	560	
60.00	0.200			
90.00	0.200			
120.00	0.210			
150.00	0.210			
180.00	0.220	f=	0.0001857 m/min	
210.00	0.230	f=	3.095E-06 m/sec	
240.00	0.240			
270.00	0.260			
300.00	0.260			
330	0.270			
1293	0.700			

Site	
Test number	3
Date	
Depth (m)	0.700
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.140
Effective base	0.700
Effective depth	0.560

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.140	25%	0.280	
0.50	0.140			
1.00	0.140	75%	0.560	
2.00	0.140			
3.00	0.140			
4.00	0.140	$V_{75>25} (m^3)$	0.2016	
5.00	0.140	$A_{50} (M^2)$	1.868	
10.00	0.140	T_{25}	400	From Graph
20.00	0.140	T_{75}	1260	From Graph
30.00	0.140	T	860	
60.00	0.150			
90.00	0.160			
120.00	0.170			
150.00	0.180			
180.00	0.190	f=	0.0001255 m/min	
210.00	0.200	f=	2.092E-06 m/sec	
240.00	0.220			
270.00	0.240			
300.00	0.260			
330	0.270			
360	0.270			
390	0.280			
1359	0.590			
1421.00	0.600			

TP2

Site	
Test number	1
Date	
Depth (m)	0.710
Length (m)	1.510
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.180
Effective base	0.710
Effective depth	0.530

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.180	25%	0.313	
0.50	0.180			
1.00	0.180	75%	0.578	
2.00	0.180			
3.00	0.180			
4.00	0.180	$V_{75>25} (m^3)$	0.1800675	
5.00	0.180	$A_{50} (M^2)$	1.7183	
10.00	0.180	T_{25}	240	From Graph
20.00	0.180	T_{75}	940	From Graph
30.00	0.190	T	700	
60.00	0.210			
90.00	0.220			
120.00	0.240			
150.00	0.260			
180.00	0.280	f=	0.00014971 m/min	
210.00	0.300	f=	2.4951E-06 m/sec	
240.00	0.310			
270.00	0.330			
300.00	0.350			
330	0.360			
360	0.380			
1322	0.710			

Site	
Test number	2
Date	
Depth (m)	0.710
Length (m)	1.510
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.150
Effective base	0.710
Effective depth	0.560

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.150	25%	0.290	
0.50	0.150			
1.00	0.150	75%	0.570	
2.00	0.150			
3.00	0.150			
4.00	0.150	$V_{75>25} (m^3)$	0.19026	
5.00	0.150	$A_{50} (M^2)$	1.7771	
10.00	0.160	T_{25}	280	From Graph
20.00	0.160	T_{75}	940	From Graph
30.00	0.160	T	660	
60.00	0.170			
90.00	0.190			
120.00	0.210			
150.00	0.220			
180.00	0.240	f=	0.00016222 m/min	
210.00	0.260	f=	2.7036E-06 m/sec	
240.00	0.270			
270.00	0.290			
300.00	0.310			
330	0.330			
1301	0.710			

Site	
Test number	3
Date	
Depth (m)	0.710
Length (m)	1.510
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.140
Effective base	0.710
Effective depth	0.570

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.140	25%	0.283	
0.50	0.140			
1.00	0.140	75%	0.568	
2.00	0.140			
3.00	0.140			
4.00	0.140	$V_{75>25} (m^3)$	0.1936575	
5.00	0.140	$A_{50} (M^2)$	1.7967	
10.00	0.140	T_{25}	440	From Graph
20.00	0.140	T_{75}	1300	From Graph
30.00	0.140	T	860	
60.00	0.150			
90.00	0.160			
120.00	0.170			
150.00	0.180			
180.00	0.190	f=	0.0001253 m/min	
210.00	0.200	f=	2.089E-06 m/sec	
240.00	0.220			
270.00	0.230			
300.00	0.240			
330	0.250			
360	0.270			
390	0.270			
1373	0.590			
1434.00	0.600			

TP3

Site	Yapton
Test number	1
Date	
Depth (m)	0.780
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.330
Effective base	0.780
Effective depth	0.450

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.330	25%	0.443
0.50	0.340		
1.00	0.340	75%	0.668
2.00	0.340		
3.00	0.350		
4.00	0.350	$V_{75>25} (m^3)$	0.162
5.00	0.350	$A_{50} (M^2)$	1.6425
10.00	0.350	T_{25}	90
20.00	0.370	T_{75}	520
32.00	0.390	T	430
60.00	0.410		
120.00	0.480		
150.00	0.510		
180.00	0.550		
210.00	0.580	f=	0.00022937 m/min
240.00	0.610	f=	3.8229E-06 m/sec
270.00	0.630		
1205.00	0.780		

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.780
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.210
Effective base	0.780
Effective depth	0.570

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.210	25%	0.353
0.50	0.210		
1.00	0.220	75%	0.638
2.00	0.220		
3.00	0.220		
4.00	0.220	$V_{75>25} (m^3)$	0.2052
5.00	0.230	$A_{50} (M^2)$	1.8885
10.00	0.230	T_{25}	150
15.00	0.230	T_{75}	680
20.00	0.240	T	530
30.00	0.240		
60.00	0.270		
90.00	0.310		
120.00	0.330		
150.00	0.350	f=	0.00020501 m/min
180.00	0.380	f=	3.4169E-06 m/sec
210.00	0.410		
240.00	0.440		
270.00	0.470		
300.00	0.490		
330.00	0.520		
360.00	0.560		
390.00	0.570		
1333.00	0.780		

Site	3
Test number	
Date	
Depth (m)	0.780
Length (m)	1.600
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.240
Effective base	0.780
Effective depth	0.540

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.240	25%	0.375
0.50	0.240		
1.00	0.240	75%	0.645
2.00	0.240		
3.00	0.240		
4.00	0.250	$V_{75>25} (m^3)$	0.1944
5.00	0.250	$A_{50} (M^2)$	1.827
10.00	0.250	T_{25}	150
20.00	0.260	T_{75}	760
30.00	0.280	T	610
60.00	0.300		
90.00	0.330		
120.00	0.350		
150.00	0.380		
180.00	0.410	f=	0.0001744 m/min
210.00	0.450	f=	2.907E-06 m/sec
240.00	0.470		
270.00	0.500		
300.00	0.520		
330	0.540		
1308	0.780		

TP4

Site	Yapton
Test number	1
Date	
Depth (m)	0.710
Length (m)	1.670
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.300
Effective base	0.710
Effective depth	0.410

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.300	25%	0.403	
0.50	0.300			
1.00	0.300	75%	0.608	
2.00	0.300			
3.00	0.300			
4.00	0.300	$V_{75>25}$ (m ³)	0.1540575	
5.00	0.300	A_{50} (M ²)	1.6207	
6.00	0.300	T_{25}	180	From Graph
7.00	0.300	T_{75}	820	From Graph
8.00	0.300	T	640	
9.00	0.300			
10.00	0.300			
20.00	0.310			
60.00	0.340			
90.00	0.350	$f=$	0.00014853 m/min	
120.00	0.370	$f=$	2.4754E-06 m/sec	
150.00	0.380			
180.00	0.400			
210.00	0.420			
1150.00	0.710			

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.710
Length (m)	1.670
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.250
Effective base	0.710
Effective depth	0.460

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.250	25%	0.365	
0.50	0.250			
1.00	0.250	75%	0.595	
2.00	0.250			
3.00	0.250			
4.00	0.250	$V_{75>25}$ (m ³)	0.172845	
5.00	0.250	A_{50} (M ²)	1.7267	
10.00	0.250	T_{25}	120	From Graph
20.00	0.260	T_{75}	1440	From Graph
30.00	0.260	T	1320	
60.00	0.270			
90.00	0.290			
120.00	0.300			
150.00	0.300			
180.00	0.310	$f=$	7.5834E-05 m/min	
210.00	0.330	$f=$	1.2639E-06 m/sec	
240.00	0.330			
270.00	0.340			
300.00	0.350			
330.00	0.360			
1293.00	0.560			
1391.00	0.580			

Site	3
Test number	3
Date	
Depth (m)	0.710
Length (m)	1.670
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.170
Effective base	0.710
Effective depth	0.540

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.170	25%	0.305	
0.50	0.170			
1.00	0.170	75%	0.575	
2.00	0.170			
3.00	0.170			
4.00	0.170	$V_{75>25}$ (m ³)	0.202905	
5.00	0.170	A_{50} (M ²)	1.8963	
10.00	0.180	T_{25}	360	From Graph
20.00	0.180	T_{75}	1400	From Graph
30.00	0.190	T	1040	
60.00	0.200			
90.00	0.210			
120.00	0.220			
150.00	0.230			
180.00	0.240	$f=$	0.0001029 m/min	
210.00	0.250	$f=$	1.71E-06 m/sec	
240.00	0.270			
270.00	0.280			
300.00	0.290			
330	0.300			
360	0.300			
1347	0.560			
1436	0.580			

TP5

Site	Yapton
Test number	1
Date	
Depth (m)	0.760
Length (m)	1.500
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.270
Effective base	0.760
Effective depth	0.490

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.270	25%	0.393
0.50	0.270		
1.00	0.280	75%	0.638
2.00	0.280		
3.00	0.280		
4.00	0.280	$V_{75>25} (m^3)$	0.165375
5.00	0.290	$A_{50} (M^2)$	1.6305
6.00	0.290	T_{25}	130
7.00	0.290	T_{75}	720
8.00	0.290	T	590
9.00	0.290		
10.00	0.290		
20.00	0.310		
30.00	0.320		
60.00	0.350	f=	0.00017191 m/min
120.00	0.380	f=	2.8651E-06 m/sec
150.00	0.440		
180.00	0.460		
210.00	0.480		
240.00	0.510		
1176.00	0.760		

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.760
Length (m)	1.500
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.140
Effective base	0.760
Effective depth	0.620

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.140	25%	0.295
0.50	0.140		
1.00	0.150	75%	0.605
2.00	0.150		
3.00	0.150		
4.00	0.160	$V_{75>25} (m^3)$	0.20925
5.00	0.160	$A_{50} (M^2)$	1.884
10.00	0.170	T_{25}	150
20.00	0.180	T_{75}	810
30.00	0.190	T	660
60.00	0.220		
90.00	0.240		
120.00	0.270		
150.00	0.300		
180.00	0.340	f=	0.00016828 m/min
210.00	0.350	f=	2.8047E-06 m/sec
240.00	0.360		
270.00	0.390		
300.00	0.420		
1262.00	0.760		

Site	3
Test number	
Date	
Depth (m)	0.760
Length (m)	1.500
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.240
Effective base	0.760
Effective depth	0.520

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)		
0	0.240	25%	0.370
0.50	0.240		
1.00	0.240	75%	0.630
2.00	0.240		
3.00	0.250		
4.00	0.250	$V_{75>25} (m^3)$	0.1755
5.00	0.250	$A_{50} (M^2)$	1.689
10.00	0.250	T_{25}	150
20.00	0.260	T_{75}	880
30.00	0.260	T	730
60.00	0.280		
90.00	0.320		
120.00	0.330		
150.00	0.350		
180.00	0.370	f=	0.0001423 m/min
210.00	0.390	f=	2.372E-06 m/sec
240.00	0.410		
270.00	0.430		
300.00	0.450		
330	0.470		
360	0.480		
1343	0.760		

TP6

Site	Yapton
Test number	1
Date	
Depth (m)	0.700
Length (m)	1.660
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.110
Effective base	0.700
Effective depth	0.590

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.110	25%	0.258	
0.50	0.130			
1.00	0.130	75%	0.553	
2.00	0.130			
3.00	0.130			
4.00	0.130	$V_{75>25}$ (m ³)	0.220365	
5.00	0.130	A_{50} (M ²)	1.9919	
10.00	0.130	T_{25}	200	From Graph
20.00	0.130	T_{75}	860	From Graph
30.00	0.130	T	660	
60.00	0.140			
120.00	0.200			
150.00	0.220			
180.00	0.250			
210.00	0.270	f=	0.00016762 m/min	
240.00	0.290	f=	2.7937E-06 m/sec	
270.00	0.310			
1210.00	0.700			

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.700
Length (m)	1.660
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.230
Effective base	0.700
Effective depth	0.470

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.230	25%	0.348	
0.50	0.230			
1.00	0.230	75%	0.583	
2.00	0.230			
3.00	0.230			
4.00	0.240	$V_{75>25}$ (m ³)	0.175545	
5.00	0.240	A_{50} (M ²)	1.7387	
10.00	0.240	T_{25}	210	From Graph
20.00	0.250	T_{75}	900	From Graph
30.00	0.250	T	690	
60.00	0.270			
90.00	0.280			
120.00	0.300			
150.00	0.310			
180.00	0.320	f=	0.00014632 m/min	
210.00	0.350	f=	2.4387E-06 m/sec	
240.00	0.360			
270.00	0.370			
300.00	0.390			
330.00	0.400			
1283.00	0.700			

Site	3
Test number	3
Date	
Depth (m)	0.700
Length (m)	1.660
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.090
Effective base	0.700
Effective depth	0.610

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.090	25%	0.243	
0.50	0.090			
1.00	0.090	75%	0.548	
2.00	0.090			
3.00	0.090			
4.00	0.090	$V_{75>25}$ (m ³)	0.227835	
5.00	0.100	A_{50} (M ²)	2.0341	
10.00	0.100	T_{25}	180	From Graph
20.00	0.110	T_{75}	900	From Graph
30.00	0.120	T	720	
60.00	0.140			
90.00	0.160			
120.00	0.190			
150.00	0.210			
180.00	0.240	f=	0.0001556 m/min	
210.00	0.260	f=	2.593E-06 m/sec	
240.00	0.280			
270.00	0.290			
300.00	0.310			
1280	0.700			

TP7

Site	Yapton
Test number	1
Date	
Depth (m)	0.690
Length (m)	1.700
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.290
Effective base	0.690
Effective depth	0.400

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.290	25%	0.390	
0.50	0.290			
1.00	0.290	75%	0.590	
2.00	0.300			
3.00	0.300			
4.00	0.310	$V_{75>25}$ (m ³)	0.153	
5.00	0.320	A_{50} (M ²)	1.625	
10.00	0.340	T_{25}	26	From Graph
20.00	0.380	T_{75}	130	From Graph
30.00	0.400	T	104	
60.00	0.480			
120.00	0.570			
150.00	0.630			
165.00	0.670			
180.00	0.690	f=	0.00090533 m/min	
		f=	1.5089E-05 m/sec	

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.690
Length (m)	1.700
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.100
Effective base	0.690
Effective depth	0.590

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.100	25%	0.248	
0.50	0.100			
1.00	0.110	75%	0.543	
2.00	0.110			
3.00	0.120			
4.00	0.120	$V_{75>25}$ (m ³)	0.225675	
5.00	0.130	A_{50} (M ²)	2.0335	
10.00	0.150	T_{25}	70	From Graph
20.00	0.150	T_{75}	240	From Graph
30.00	0.160	T	170	
60.00	0.220			
90.00	0.290			
120.00	0.360			
150.00	0.400			
180.00	0.440	f=	0.00065282 m/min	
210.00	0.490	f=	1.088E-05 m/sec	
240.00	0.540			
270.00	0.580			
300.00	0.640			
1236.00	0.720			

Site	3
Test number	3
Date	
Depth (m)	0.690
Length (m)	1.700
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.200
Effective base	0.690
Effective depth	0.490

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.200	25%	0.323	
0.50	0.200			
1.00	0.200	75%	0.568	
2.00	0.200			
3.00	0.210			
4.00	0.210	$V_{75>25}$ (m ³)	0.187425	
5.00	0.210	A_{50} (M ²)	1.8185	
10.00	0.220	T_{25}	90	From Graph
20.00	0.230	T_{75}	330	From Graph
30.00	0.240	T	240	
60.00	0.270			
90.00	0.320			
120.00	0.340			
150.00	0.380			
180.00	0.420	f=	0.0004294 m/min	
210.00	0.450	f=	7.157E-06 m/sec	
240.00	0.490			
270.00	0.520			
300.00	0.540			
	330			
	360			
	390			
	1375			

TP8

Site	Yapton
Test number	1
Date	
Depth (m)	0.740
Length (m)	1.760
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.270
Effective base	0.740
Effective depth	0.470

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.270	25%	0.388	
0.50	0.280			
1.00	0.280	75%	0.623	
2.00	0.290			
3.00	0.290			
4.00	0.290	$V_{75>25}$ (m ³)	0.18612	
5.00	0.300	A_{50} (M ²)	1.8307	
6.00	0.300	T_{25}	50	From Graph
7.00	0.300	T_{75}	720	From Graph
8.00	0.300	T	670	
9.00	0.300			
10.00	0.300			
20.00	0.320			
30.00	0.330			
60.00	0.360	f=	0.00015174 m/min	
90.00	0.390	f=	2.529E-06 m/sec	
120.00	0.410			
1045.00	0.740			

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.740
Length (m)	1.760
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.120
Effective base	0.740
Effective depth	0.620

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.120	25%	0.275	
0.50	0.120			
1.00	0.120	75%	0.585	
2.00	0.120			
3.00	0.120			
4.00	0.120	$V_{75>25}$ (m ³)	0.24552	
5.00	0.130	A_{50} (M ²)	2.1622	
10.00	0.130	T_{25}	200	From Graph
20.00	0.140	T_{75}	860	From Graph
30.00	0.140	T	660	
60.00	0.170			
90.00	0.190			
120.00	0.220			
150.00	0.240			
180.00	0.260	f=	0.00017205 m/min	
210.00	0.290	f=	2.8674E-06 m/sec	
240.00	0.320			
270.00	0.330			
300.00	0.350			
1243.00	0.740			

Site	
Test number	4
Date	
Depth (m)	0.740
Length (m)	1.760
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.080
Effective base	0.740
Effective depth	0.660

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.080	25%	0.245	
0.50	0.080			
1.00	0.080	75%	0.575	
2.00	0.080			
3.00	0.090			
4.00	0.090	$V_{75>25}$ (m ³)	0.26136	
5.00	0.100	A_{50} (M ²)	2.2506	
10.00	0.100	T_{25}	260	From Graph
20.00	0.100	T_{75}	940	From Graph
30.00	0.100	T	680	
60.00	0.110			
90.00	0.130			
120.00	0.150			
150.00	0.170			
180.00	0.190	f=	0.0001708 m/min	
210.00	0.230	f=	2.846E-06 m/sec	
240.00	0.240			
270.00	0.250			
300.00	0.270			
330	0.290			
1299	0.740			

TP9

Site	Yapton
Test number	1
Date	
Depth (m)	0.700
Length (m)	1.890
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.290
Effective base	0.700
Effective depth	0.410

DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.290	25%	0.393	
0.50	0.290			
1.00	0.290	75%	0.598	
2.00	0.290			
3.00	0.290			
4.00	0.290	$V_{75>25}$ (m ³)	0.1743525	
5.00	0.300	A_{50} (M ²)	1.8099	
6.00	0.300	T_{25}	100	From Graph
7.00	0.300	T_{75}	740	From Graph
8.00	0.300	T	640	
9.00	0.300			
10.00	0.300			
20.00	0.310			
30.00	0.320			
60.00	0.370	f=	0.00015052 m/min	
90.00	0.380	f=	2.5087E-06 m/sec	
120.00	0.410			
1063.00	0.700			

Site	Yapton
Test number	2.000
Date	
Depth (m)	0.700
Length (m)	1.890
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.270
Effective base	0.700
Effective depth	0.430

DON'T CHANGE FORMULAS (IN RED)

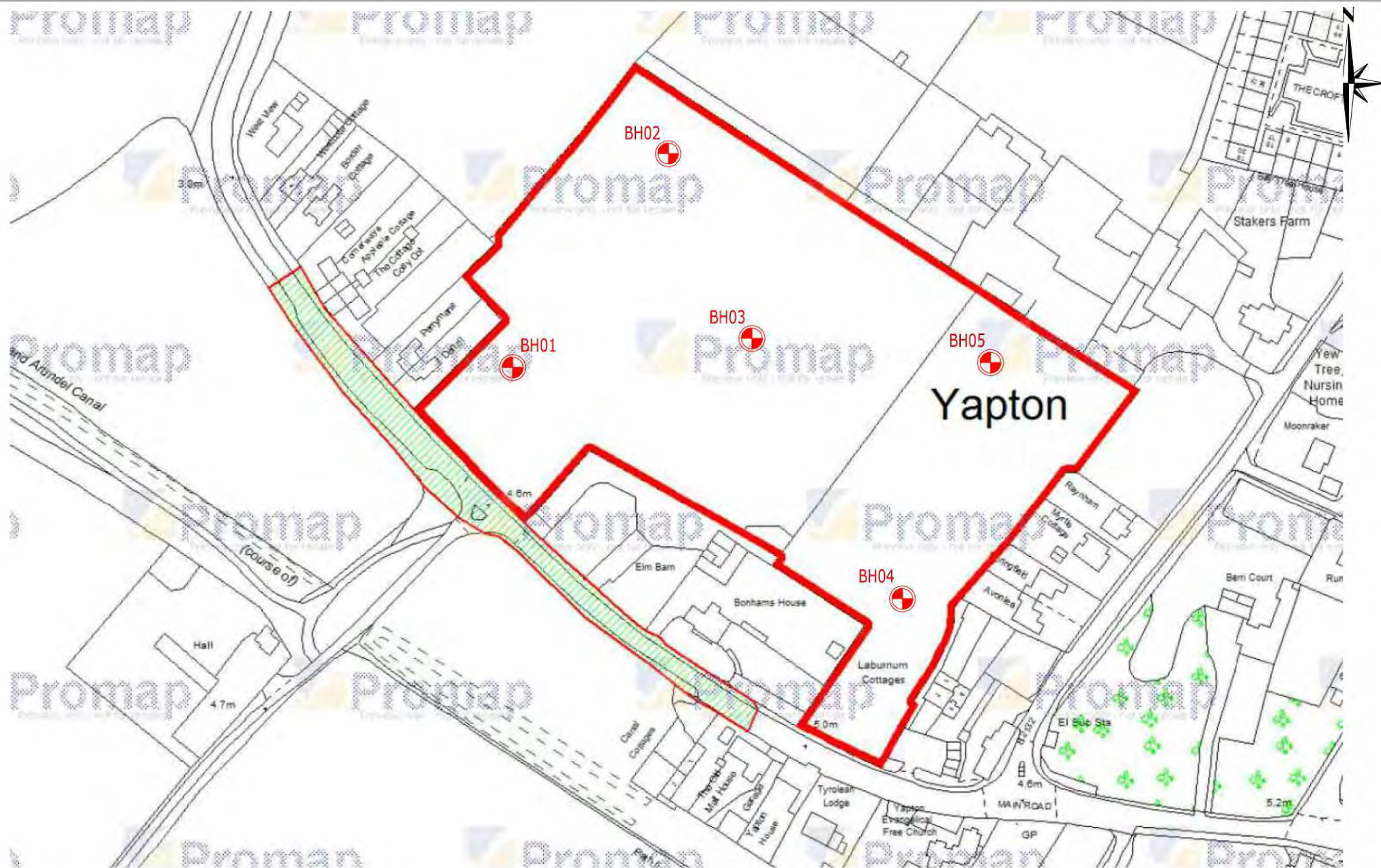
Time (mins)	Water Depth (m)			
0	0.270	25%	0.378	
0.50	0.270			
1.00	0.270	75%	0.593	
2.00	0.270			
3.00	0.270			
4.00	0.270	$V_{75>25}$ (m ³)	0.1828575	
5.00	0.270	A_{50} (M ²)	1.8567	
10.00	0.280	T_{25}	150	From Graph
20.00	0.290	T_{75}	780	From Graph
30.00	0.300	T	630	
60.00	0.320			
90.00	0.340			
120.00	0.360			
150.00	0.380			
180.00	0.410	f=	0.00015633 m/min	
210.00	0.430	f=	2.6054E-06 m/sec	
240.00	0.450			
270.00	0.470			
300.00	0.490			
1247.00	0.700			

Site	4
Test number	
Date	
Depth (m)	0.700
Length (m)	1.890
Width (m)	0.450

Calculation of Effective depth	
Top of test	0.200
Effective base	0.700
Effective depth	0.500

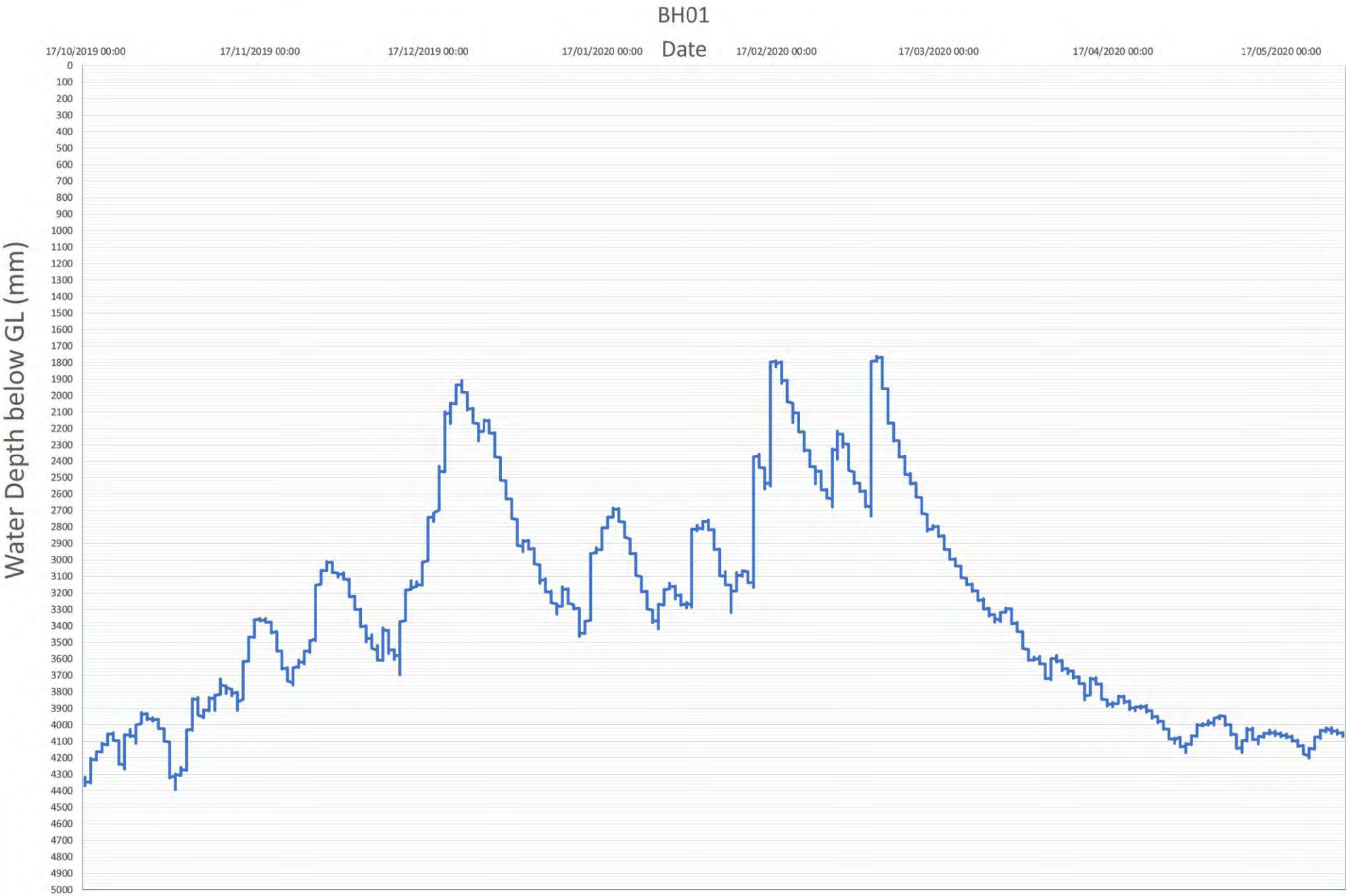
DON'T CHANGE FORMULAS (IN RED)

Time (mins)	Water Depth (m)			
0	0.200	25%	0.325	
0.50	0.200			
1.00	0.200	75%	0.575	
2.00	0.200			
3.00	0.200			
4.00	0.200	$V_{75>25}$ (m ³)	0.212625	
5.00	0.210	A_{50} (M ²)	2.0205	
10.00	0.210	T_{25}	140	From Graph
20.00	0.220	T_{75}	740	From Graph
30.00	0.240	T	600	
60.00	0.260			
90.00	0.280			
120.00	0.310			
150.00	0.350			
180.00	0.370	f=	0.0001754 m/min	
210.00	0.390	f=	2.923E-06 m/sec	
240.00	0.420			
270.00	0.440			
300.00	0.460			
330	0.480			
360	0.490			
1314	0.700			



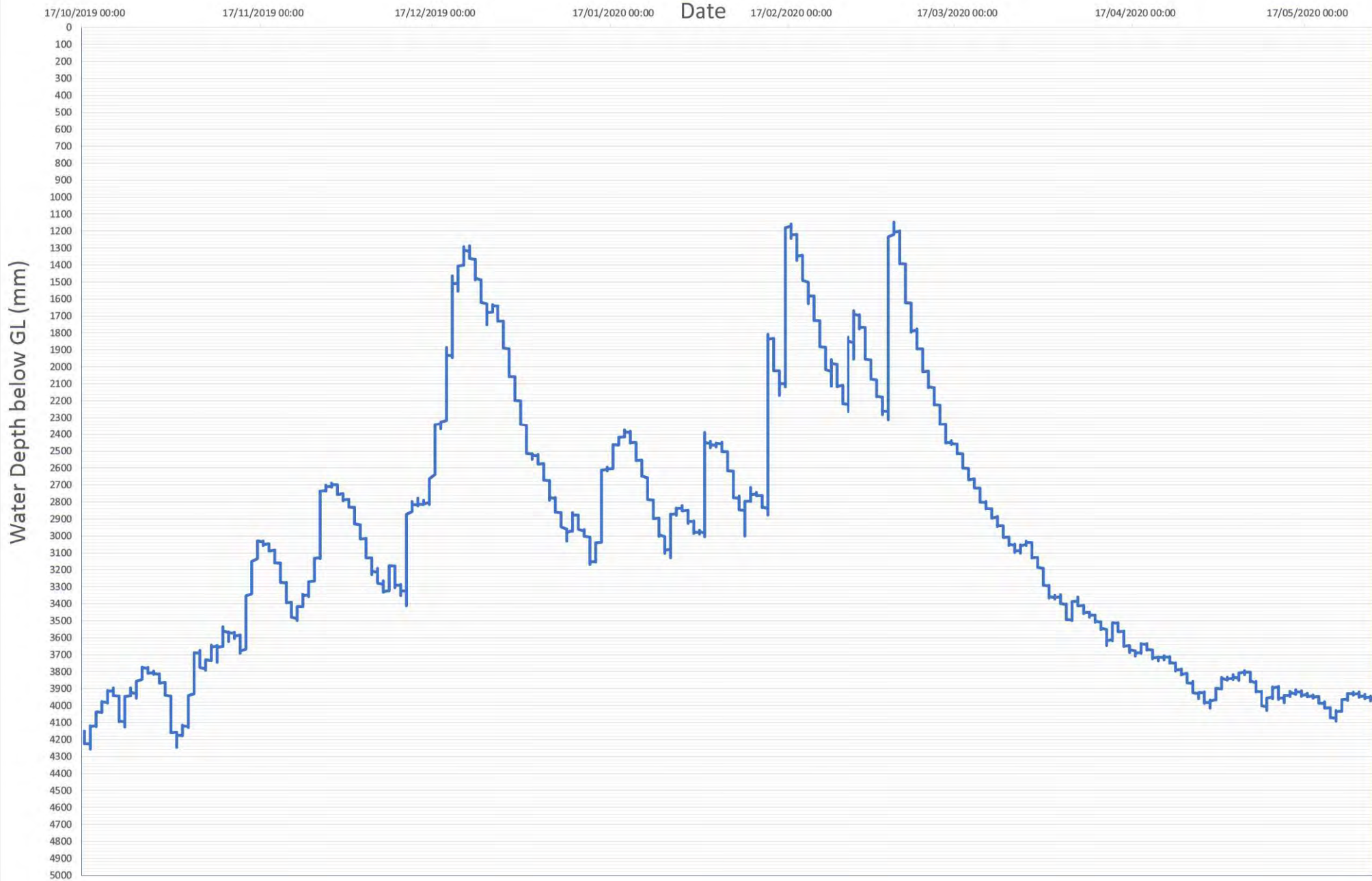
TEC Exploratory Hole with Installation Location:





BH02

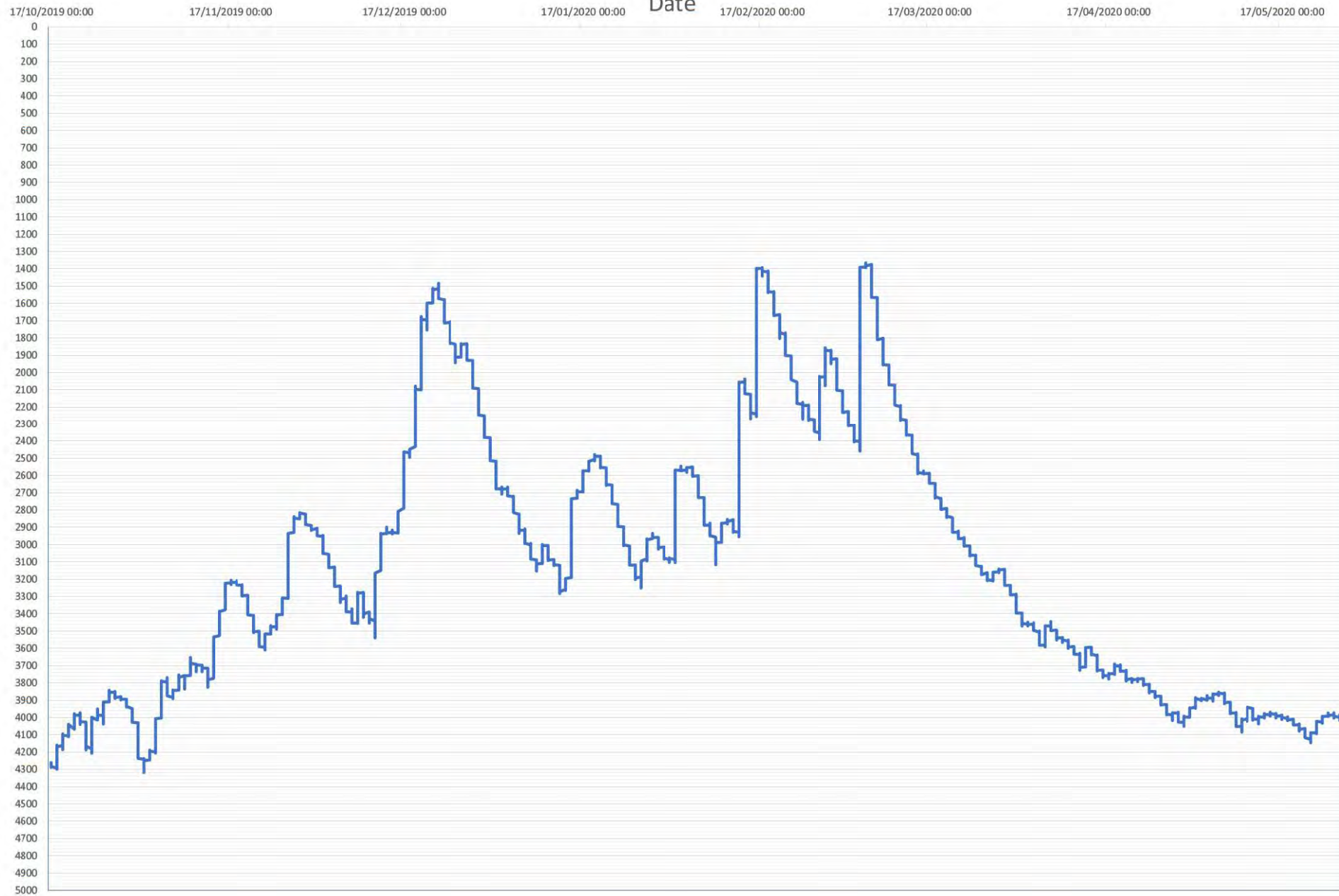
Date



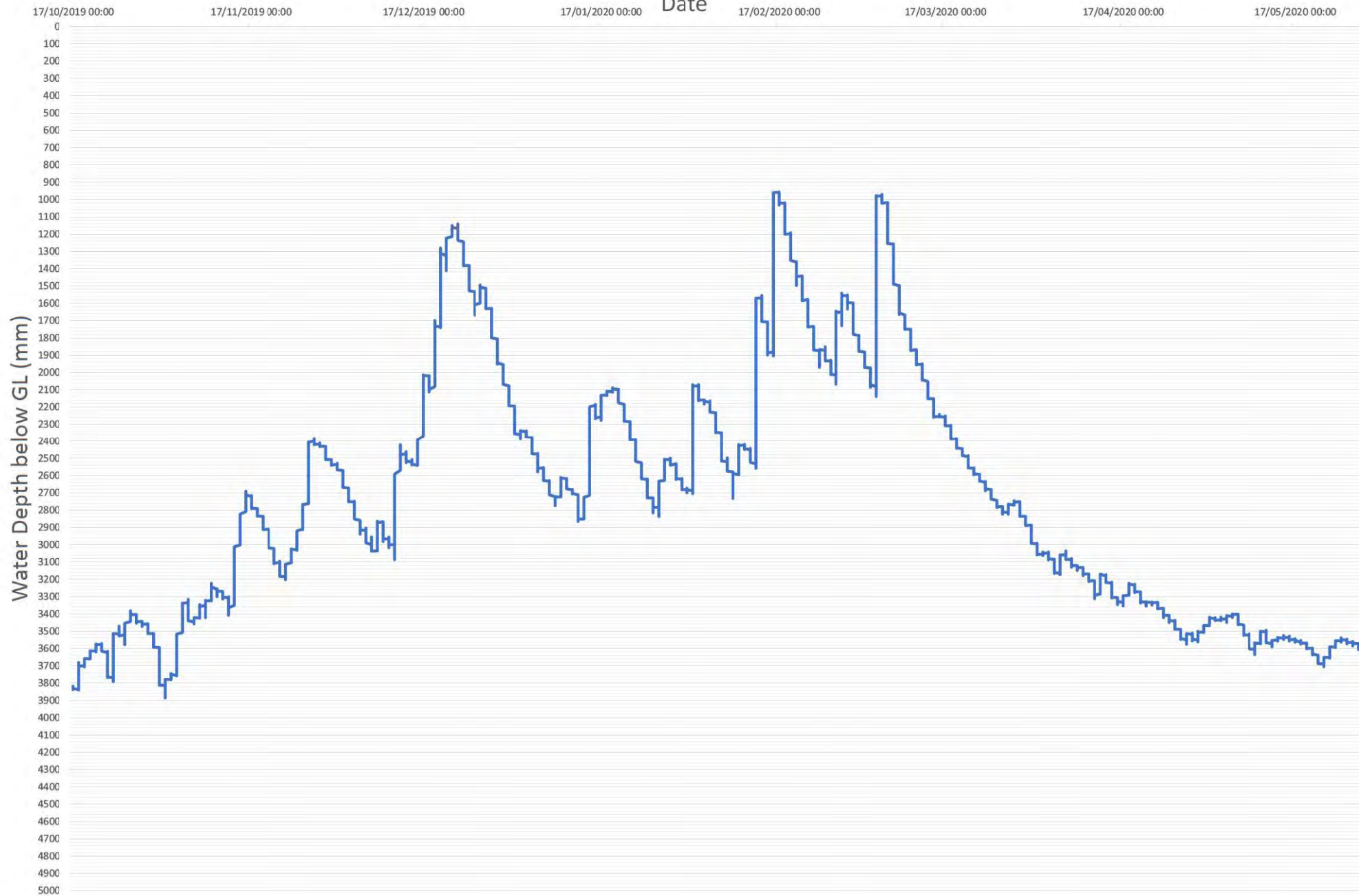
BH03

Date

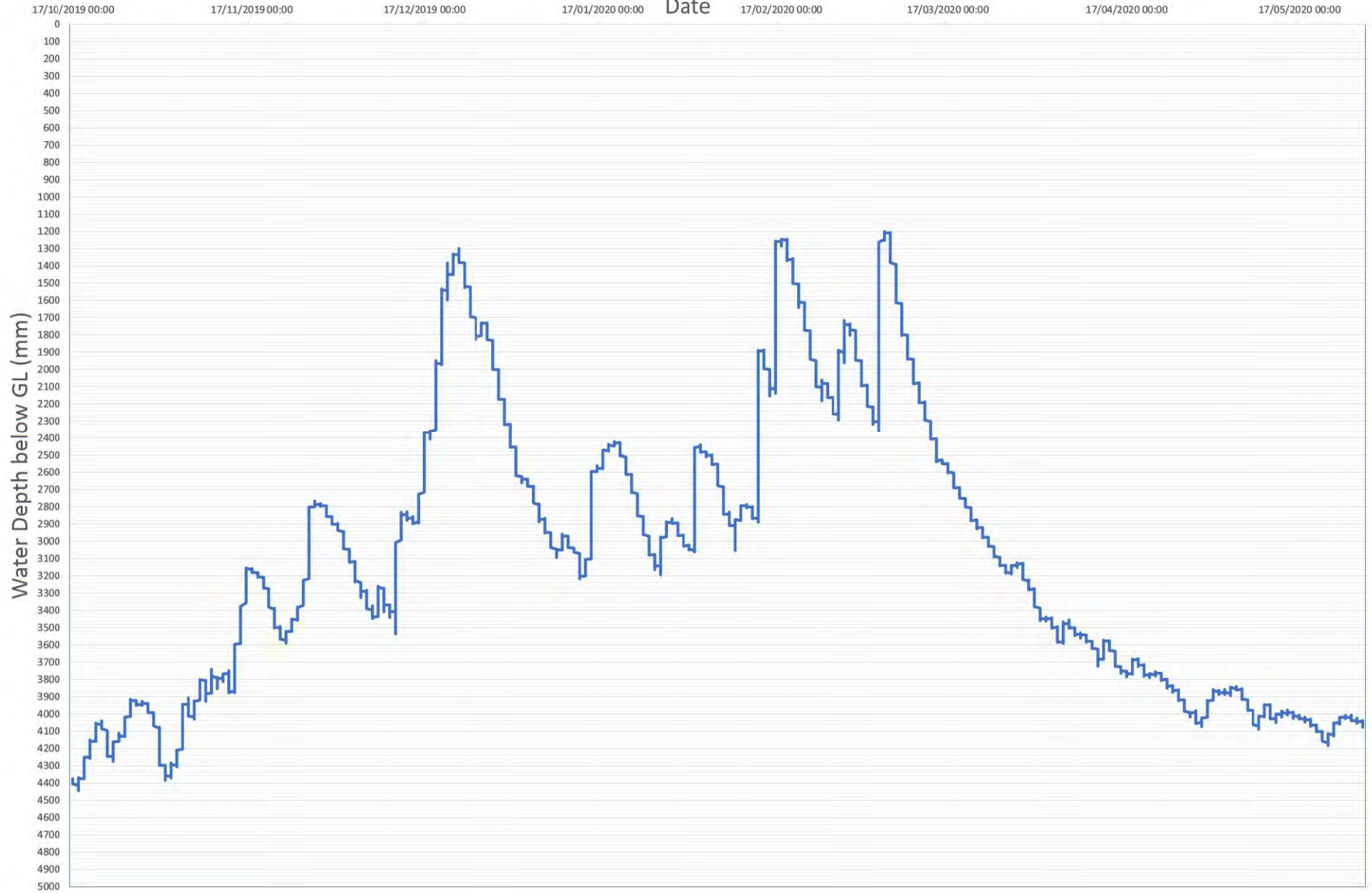
Water Depth below GL (mm)



BH04
Date



BH05 Date



Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment A	0.011	5.00	5.175	0	0	0.765

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment A Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.02080	Invert Level (m)	4.410	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	779	Depth (m)	0.450
Safety Factor	4.0	Width (m)	6.000	Inf Depth (m)	0.450
Porosity	0.30	Length (m)	16.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Catchment A	152	4.494	0.084	0.8	2.4128	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute winter	Catchment A	Infiltration	0.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Catchment A	176	4.523	0.113	1.0	3.2495	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute winter	Catchment A	Infiltration	0.1

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Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment A	232	4.558	0.148	1.0	4.2745	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment A	Infiltration	0.1

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Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Catchment A	180	4.592	0.182	1.5	5.2753	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute winter	Catchment A	Infiltration	0.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Catchment A	344	4.631	0.221	1.0	6.3947	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
360 minute winter	Catchment A	Infiltration	0.1

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment B	0.031	5.00	5.725	0	0	1.165

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment B Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.02080	Invert Level (m)	4.560	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	779	Depth (m)	0.450
Safety Factor	4.0	Width (m)	6.000	Inf Depth (m)	0.450
Porosity	0.30	Length (m)	26.200		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment B	232	4.724	0.164	1.8	7.7455	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment B	Infiltration	0.2

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Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Catchment B	344	4.776	0.216	1.6	10.2459	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
360 minute winter	Catchment B	Infiltration	0.2

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Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment B	240	4.838	0.278	2.7	13.1644	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment B	Infiltration	0.2

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Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment B	240	4.902	0.342	3.3	16.2231	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment B	Infiltration	0.2

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment B	472	4.975	0.415	2.2	19.7351	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment B	Infiltration	0.2

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment C	0.046	5.00	6.225	0	0	1.105

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment C Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.02080	Invert Level (m)	5.120	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	779	Depth (m)	0.450
Safety Factor	4.0	Width (m)	10.000	Inf Depth (m)	0.450
Porosity	0.30	Length (m)	24.100		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment C	236	5.301	0.181	2.6	11.3800	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment C	Infiltration	0.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
240 minute winter	Catchment C	236	5.355	0.235	3.3	14.9841	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment C	Infiltration	0.3

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Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment C	236	5.417	0.297	4.1	19.2283	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment C	Infiltration	0.3

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Catchment C	240	5.485	0.365	4.9	23.9536	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
240 minute winter	Catchment C	Infiltration	0.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Catchment C	352	5.554	0.434	4.1	28.8708	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
360 minute winter	Catchment C	Infiltration	0.3

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment D	0.421	5.00	6.150	0	0	0.540

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment D Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00900	Invert Level (m)	5.610	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	960	Depth (m)	0.450
Safety Factor	4.0	Width (m)	20.000	Inf Depth (m)	0.450
Porosity	0.30	Length (m)	123.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

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Results for 10 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment D	464	5.788	0.178	14.0	127.1835	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment D	Infiltration	1.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment D	472	5.835	0.225	17.2	162.3861	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment D	Infiltration	1.5

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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	Catchment D	585	5.895	0.285	17.5	206.9235	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
600 minute winter	Catchment D	Infiltration	1.5

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
720 minute winter	Catchment D	705	5.961	0.351	18.1	256.4470	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment D	Infiltration	1.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Catchment D	705	6.029	0.419	21.2	307.5213	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment D	Infiltration	1.5

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment E	0.238	5.00	6.250	0	0	0.625

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment E Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00853	Invert Level (m)	5.625	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1372	Depth (m)	0.450
Safety Factor	4.0	Width (m)	20.000	Inf Depth (m)	0.450
Porosity	0.30	Length (m)	84.500		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

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Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	Catchment E	464	5.772	0.147	7.9	70.1129	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment E	Infiltration	1.0

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Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	Catchment E	464	5.811	0.186	9.7	89.6955	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment E	Infiltration	1.0

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Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment E	472	5.861	0.236	12.0	114.6277	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	Catchment E	Infiltration	1.0

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Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
720 minute winter	Catchment E	705	5.914	0.289	10.3	141.5529	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment E	Infiltration	1.0

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
720 minute winter	Catchment E	705	5.971	0.346	12.0	170.3652	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment E	Infiltration	1.0

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment F	0.199	5.00	6.450	0	0	0.670

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
10	40	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment F Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00454	Invert Level (m)	5.780	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	2934	Depth (m)	0.580
Safety Factor	4.0	Width (m)	20.000	Inf Depth (m)	0.580
Porosity	0.30	Length (m)	60.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 180 minute winter	30.558	12.098
10 year 15 minute winter	155.003	62.501	10 year 240 minute summer	36.987	9.774
10 year 30 minute summer	145.414	41.147	10 year 240 minute winter	24.573	9.774
10 year 30 minute winter	102.045	41.147	10 year 360 minute summer	27.781	7.149
10 year 60 minute summer	98.379	25.999	10 year 360 minute winter	18.058	7.149
10 year 60 minute winter	65.361	25.999	10 year 480 minute summer	21.524	5.688
10 year 120 minute summer	61.202	16.174	10 year 480 minute winter	14.300	5.688
10 year 120 minute winter	40.661	16.174	10 year 600 minute summer	17.376	4.753
10 year 180 minute summer	47.011	12.098	10 year 600 minute winter	11.872	4.753

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 720 minute summer	15.295	4.099	30 year 480 minute summer	26.397	6.976
10 year 720 minute winter	10.279	4.099	30 year 480 minute winter	17.537	6.976
10 year 960 minute summer	12.313	3.242	30 year 600 minute summer	21.235	5.808
10 year 960 minute winter	8.156	3.242	30 year 600 minute winter	14.509	5.808
10 year 1440 minute summer	8.709	2.334	30 year 720 minute summer	18.642	4.996
10 year 1440 minute winter	5.853	2.334	30 year 720 minute winter	12.528	4.996
10 year 2160 minute summer	6.130	1.694	30 year 960 minute summer	14.944	3.935
10 year 2160 minute winter	4.224	1.694	30 year 960 minute winter	9.899	3.935
10 year 2880 minute summer	5.079	1.361	30 year 1440 minute summer	10.510	2.817
10 year 2880 minute winter	3.414	1.361	30 year 1440 minute winter	7.064	2.817
10 year +40% CC 15 minute summer	309.232	87.502	30 year 2160 minute summer	7.352	2.032
10 year +40% CC 15 minute winter	217.005	87.502	30 year 2160 minute winter	5.066	2.032
10 year +40% CC 30 minute summer	203.580	57.606	30 year 2880 minute summer	6.059	1.624
10 year +40% CC 30 minute winter	142.863	57.606	30 year 2880 minute winter	4.072	1.624
10 year +40% CC 60 minute summer	137.730	36.398	100 year 15 minute summer	355.826	100.686
10 year +40% CC 60 minute winter	91.505	36.398	100 year 15 minute winter	249.702	100.686
10 year +40% CC 120 minute summer	85.683	22.644	100 year 30 minute summer	238.700	67.544
10 year +40% CC 120 minute winter	56.926	22.644	100 year 30 minute winter	167.509	67.544
10 year +40% CC 180 minute summer	65.815	16.937	100 year 60 minute summer	164.404	43.447
10 year +40% CC 180 minute winter	42.782	16.937	100 year 60 minute winter	109.226	43.447
10 year +40% CC 240 minute summer	51.781	13.684	100 year 120 minute summer	97.631	25.801
10 year +40% CC 240 minute winter	34.402	13.684	100 year 120 minute winter	64.864	25.801
10 year +40% CC 360 minute summer	38.893	10.009	100 year 180 minute summer	73.484	18.910
10 year +40% CC 360 minute winter	25.282	10.009	100 year 180 minute winter	47.767	18.910
10 year +40% CC 480 minute summer	30.134	7.963	100 year 240 minute summer	57.113	15.093
10 year +40% CC 480 minute winter	20.020	7.963	100 year 240 minute winter	37.944	15.093
10 year +40% CC 600 minute summer	24.327	6.654	100 year 360 minute summer	42.257	10.874
10 year +40% CC 600 minute winter	16.621	6.654	100 year 360 minute winter	27.468	10.874
10 year +40% CC 720 minute summer	21.413	5.739	100 year 480 minute summer	32.498	8.588
10 year +40% CC 720 minute winter	14.391	5.739	100 year 480 minute winter	21.591	8.588
10 year +40% CC 960 minute summer	17.238	4.539	100 year 600 minute summer	26.108	7.141
10 year +40% CC 960 minute winter	11.418	4.539	100 year 600 minute winter	17.839	7.141
10 year +40% CC 1440 minute summer	12.192	3.268	100 year 720 minute summer	22.898	6.137
10 year +40% CC 1440 minute winter	8.194	3.268	100 year 720 minute winter	15.389	6.137
10 year +40% CC 2160 minute summer	8.583	2.372	100 year 960 minute summer	18.325	4.825
10 year +40% CC 2160 minute winter	5.914	2.372	100 year 960 minute winter	12.139	4.825
10 year +40% CC 2880 minute summer	7.111	1.906	100 year 1440 minute summer	12.848	3.443
10 year +40% CC 2880 minute winter	4.779	1.906	100 year 1440 minute winter	8.635	3.443
30 year 15 minute summer	284.029	80.370	100 year 2160 minute summer	8.941	2.471
30 year 15 minute winter	199.318	80.370	100 year 2160 minute winter	6.161	2.471
30 year 30 minute summer	189.140	53.520	100 year 2880 minute summer	7.332	1.965
30 year 30 minute winter	132.730	53.520	100 year 2880 minute winter	4.927	1.965
30 year 60 minute summer	128.866	34.055	100 year +20% CC 15 minute summer	426.991	120.824
30 year 60 minute winter	85.615	34.055	100 year +20% CC 15 minute winter	299.643	120.824
30 year 120 minute summer	77.870	20.579	100 year +20% CC 30 minute summer	286.440	81.053
30 year 120 minute winter	51.735	20.579	100 year +20% CC 30 minute winter	201.010	81.053
30 year 180 minute summer	59.035	15.192	100 year +20% CC 60 minute summer	197.285	52.137
30 year 180 minute winter	38.374	15.192	100 year +20% CC 60 minute winter	131.071	52.137
30 year 240 minute summer	46.072	12.175	100 year +20% CC 120 minute summer	117.157	30.961
30 year 240 minute winter	30.609	12.175	100 year +20% CC 120 minute winter	77.836	30.961
30 year 360 minute summer	34.251	8.814	100 year +20% CC 180 minute summer	88.181	22.692
30 year 360 minute winter	22.264	8.814	100 year +20% CC 180 minute winter	57.320	22.692

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +20% CC 240 minute summer	68.535	18.112	100 year +40% CC 60 minute winter	152.917	60.826
100 year +20% CC 240 minute winter	45.533	18.112	100 year +40% CC 120 minute summer	136.683	36.121
100 year +20% CC 360 minute summer	50.709	13.049	100 year +40% CC 120 minute winter	90.809	36.121
100 year +20% CC 360 minute winter	32.962	13.049	100 year +40% CC 180 minute summer	102.878	26.474
100 year +20% CC 480 minute summer	38.997	10.306	100 year +40% CC 180 minute winter	66.873	26.474
100 year +20% CC 480 minute winter	25.909	10.306	100 year +40% CC 240 minute summer	79.958	21.130
100 year +20% CC 600 minute summer	31.330	8.569	100 year +40% CC 240 minute winter	53.122	21.130
100 year +20% CC 600 minute winter	21.406	8.569	100 year +40% CC 360 minute summer	59.160	15.224
100 year +20% CC 720 minute summer	27.477	7.364	100 year +40% CC 360 minute winter	38.456	15.224
100 year +20% CC 720 minute winter	18.467	7.364	100 year +40% CC 480 minute summer	45.497	12.023
100 year +20% CC 960 minute summer	21.990	5.791	100 year +40% CC 480 minute winter	30.227	12.023
100 year +20% CC 960 minute winter	14.567	5.791	100 year +40% CC 600 minute summer	36.551	9.998
100 year +20% CC 1440 minute summer	15.418	4.132	100 year +40% CC 600 minute winter	24.974	9.998
100 year +20% CC 1440 minute winter	10.362	4.132	100 year +40% CC 720 minute summer	32.057	8.592
100 year +20% CC 2160 minute summer	10.729	2.965	100 year +40% CC 720 minute winter	21.544	8.592
100 year +20% CC 2160 minute winter	7.393	2.965	100 year +40% CC 960 minute summer	25.655	6.756
100 year +20% CC 2880 minute summer	8.798	2.358	100 year +40% CC 960 minute winter	16.995	6.756
100 year +20% CC 2880 minute winter	5.913	2.358	100 year +40% CC 1440 minute summer	17.988	4.821
100 year +40% CC 15 minute summer	498.156	140.961	100 year +40% CC 1440 minute winter	12.089	4.821
100 year +40% CC 15 minute winter	349.583	140.961	100 year +40% CC 2160 minute summer	12.517	3.459
100 year +40% CC 30 minute summer	334.180	94.561	100 year +40% CC 2160 minute winter	8.625	3.459
100 year +40% CC 30 minute winter	234.512	94.561	100 year +40% CC 2880 minute summer	10.264	2.751
100 year +40% CC 60 minute summer	230.166	60.826	100 year +40% CC 2880 minute winter	6.898	2.751

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment F	930	5.976	0.196	3.8	70.4592	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment F	Infiltration	0.4

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Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Catchment F	1410	6.070	0.290	3.8	105.2083	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	Catchment F	Infiltration	0.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment F	945	6.024	0.244	4.6	88.2173	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment F	Infiltration	0.4

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Catchment F	1410	6.088	0.308	4.0	111.5456	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	Catchment F	Infiltration	0.4

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Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Catchment F	1410	6.161	0.381	4.8	138.4034	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	Catchment F	Infiltration	0.4

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
2880 minute winter	Catchment F	2820	6.240	0.460	3.2	167.1480	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
2880 minute winter	Catchment F	Infiltration	0.4

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Width (mm)	Depth (m)
Catchment G	0.147	5.00	6.340	0	0	0.570

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment G Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00752	Invert Level (m)	5.770	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1293	Depth (m)	0.480
Safety Factor	4.0	Width (m)	20.000	Inf Depth (m)	0.480
Porosity	0.30	Length (m)	39.200		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
30 year 15 minute summer	284.029	80.370	100 year +20% CC 15 minute winter	299.643	120.824
30 year 15 minute winter	199.318	80.370	100 year +20% CC 30 minute summer	286.440	81.053
30 year 30 minute summer	189.140	53.520	100 year +20% CC 30 minute winter	201.010	81.053
30 year 30 minute winter	132.730	53.520	100 year +20% CC 60 minute summer	197.285	52.137
30 year 60 minute summer	128.866	34.055	100 year +20% CC 60 minute winter	131.071	52.137
30 year 60 minute winter	85.615	34.055	100 year +20% CC 120 minute summer	117.157	30.961
30 year 120 minute summer	77.870	20.579	100 year +20% CC 120 minute winter	77.836	30.961
30 year 120 minute winter	51.735	20.579	100 year +20% CC 180 minute summer	88.181	22.692
30 year 180 minute summer	59.035	15.192	100 year +20% CC 180 minute winter	57.320	22.692
30 year 180 minute winter	38.374	15.192	100 year +20% CC 240 minute summer	68.535	18.112
30 year 240 minute summer	46.072	12.175	100 year +20% CC 240 minute winter	45.533	18.112
30 year 240 minute winter	30.609	12.175	100 year +20% CC 360 minute summer	50.709	13.049
30 year 360 minute summer	34.251	8.814	100 year +20% CC 360 minute winter	32.962	13.049
30 year 360 minute winter	22.264	8.814	100 year +20% CC 480 minute summer	38.997	10.306
30 year 480 minute summer	26.397	6.976	100 year +20% CC 480 minute winter	25.909	10.306
30 year 480 minute winter	17.537	6.976	100 year +20% CC 600 minute summer	31.330	8.569
30 year 600 minute summer	21.235	5.808	100 year +20% CC 600 minute winter	21.406	8.569
30 year 600 minute winter	14.509	5.808	100 year +20% CC 720 minute summer	27.477	7.364
30 year 720 minute summer	18.642	4.996	100 year +20% CC 720 minute winter	18.467	7.364
30 year 720 minute winter	12.528	4.996	100 year +20% CC 960 minute summer	21.990	5.791
30 year 960 minute summer	14.944	3.935	100 year +20% CC 960 minute winter	14.567	5.791
30 year 960 minute winter	9.899	3.935	100 year +20% CC 1440 minute summer	15.418	4.132
30 year 1440 minute summer	10.510	2.817	100 year +20% CC 1440 minute winter	10.362	4.132
30 year 1440 minute winter	7.064	2.817	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

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Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	Catchment G	585	5.970	0.200	4.1	47.6408	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
600 minute winter	Catchment G	Infiltration	0.4

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Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Catchment G	705	6.023	0.253	4.3	60.3735	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment G	Infiltration	0.4

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Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Catchment G	705	6.090	0.320	5.3	76.5093	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	Catchment G	Infiltration	0.4

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Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment G	945	6.168	0.398	5.0	95.1979	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment G	Infiltration	0.4

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
960 minute winter	Catchment G	945	6.242	0.472	5.8	113.0698	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment G	Infiltration	0.4

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	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)	Depth (m)
Catchment H	0.201	5.00	6.425	0.770

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
10	40	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Node Catchment H Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00619	Invert Level (m)	5.655	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	2733	Depth (m)	0.680
Safety Factor	4.0	Width (m)	20.000	Inf Depth (m)	0.680
Porosity	0.30	Length (m)	50.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 15 minute summer	220.880	62.501	10 year 240 minute winter	24.573	9.774
10 year 15 minute winter	155.003	62.501	10 year 360 minute summer	27.781	7.149
10 year 30 minute summer	145.414	41.147	10 year 360 minute winter	18.058	7.149
10 year 30 minute winter	102.045	41.147	10 year 480 minute summer	21.524	5.688
10 year 60 minute summer	98.379	25.999	10 year 480 minute winter	14.300	5.688
10 year 60 minute winter	65.361	25.999	10 year 600 minute summer	17.376	4.753
10 year 120 minute summer	61.202	16.174	10 year 600 minute winter	11.872	4.753
10 year 120 minute winter	40.661	16.174	10 year 720 minute summer	15.295	4.099
10 year 180 minute summer	47.011	12.098	10 year 720 minute winter	10.279	4.099
10 year 180 minute winter	30.558	12.098	10 year 960 minute summer	12.313	3.242
10 year 240 minute summer	36.987	9.774	10 year 960 minute winter	8.156	3.242

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 1440 minute summer	8.709	2.334	100 year 1440 minute winter	8.635	3.443
10 year 1440 minute winter	5.853	2.334	100 year +20% CC 15 minute summer	426.991	120.824
10 year +40% CC 15 minute summer	309.232	87.502	100 year +20% CC 15 minute winter	299.643	120.824
10 year +40% CC 15 minute winter	217.005	87.502	100 year +20% CC 30 minute summer	286.440	81.053
10 year +40% CC 30 minute summer	203.580	57.606	100 year +20% CC 30 minute winter	201.010	81.053
10 year +40% CC 30 minute winter	142.863	57.606	100 year +20% CC 60 minute summer	197.285	52.137
10 year +40% CC 60 minute summer	137.730	36.398	100 year +20% CC 60 minute winter	131.071	52.137
10 year +40% CC 60 minute winter	91.505	36.398	100 year +20% CC 120 minute summer	117.157	30.961
10 year +40% CC 120 minute summer	85.683	22.644	100 year +20% CC 120 minute winter	77.836	30.961
10 year +40% CC 120 minute winter	56.926	22.644	100 year +20% CC 180 minute summer	88.181	22.692
10 year +40% CC 180 minute summer	65.815	16.937	100 year +20% CC 180 minute winter	57.320	22.692
10 year +40% CC 180 minute winter	42.782	16.937	100 year +20% CC 240 minute summer	68.535	18.112
10 year +40% CC 240 minute summer	51.781	13.684	100 year +20% CC 240 minute winter	45.533	18.112
10 year +40% CC 240 minute winter	34.402	13.684	100 year +20% CC 360 minute summer	50.709	13.049
10 year +40% CC 360 minute summer	38.893	10.009	100 year +20% CC 360 minute winter	32.962	13.049
10 year +40% CC 360 minute winter	25.282	10.009	100 year +20% CC 480 minute summer	38.997	10.306
10 year +40% CC 480 minute summer	30.134	7.963	100 year +20% CC 480 minute winter	25.909	10.306
10 year +40% CC 480 minute winter	20.020	7.963	100 year +20% CC 600 minute summer	31.330	8.569
10 year +40% CC 600 minute summer	24.327	6.654	100 year +20% CC 600 minute winter	21.406	8.569
10 year +40% CC 600 minute winter	16.621	6.654	100 year +20% CC 720 minute summer	27.477	7.364
10 year +40% CC 720 minute summer	21.413	5.739	100 year +20% CC 720 minute winter	18.467	7.364
10 year +40% CC 720 minute winter	14.391	5.739	100 year +20% CC 960 minute summer	21.990	5.791
10 year +40% CC 960 minute summer	17.238	4.539	100 year +20% CC 960 minute winter	14.567	5.791
10 year +40% CC 960 minute winter	11.418	4.539	100 year +20% CC 1440 minute summer	15.418	4.132
10 year +40% CC 1440 minute summer	12.192	3.268	100 year +20% CC 1440 minute winter	10.362	4.132
10 year +40% CC 1440 minute winter	8.194	3.268	100 year +40% CC 15 minute summer	498.156	140.961
100 year 15 minute summer	355.826	100.686	100 year +40% CC 15 minute winter	349.583	140.961
100 year 15 minute winter	249.702	100.686	100 year +40% CC 30 minute summer	334.180	94.561
100 year 30 minute summer	238.700	67.544	100 year +40% CC 30 minute winter	234.512	94.561
100 year 30 minute winter	167.509	67.544	100 year +40% CC 60 minute summer	230.166	60.826
100 year 60 minute summer	164.404	43.447	100 year +40% CC 60 minute winter	152.917	60.826
100 year 60 minute winter	109.226	43.447	100 year +40% CC 120 minute summer	136.683	36.121
100 year 120 minute summer	97.631	25.801	100 year +40% CC 120 minute winter	90.809	36.121
100 year 120 minute winter	64.864	25.801	100 year +40% CC 180 minute summer	102.878	26.474
100 year 180 minute summer	73.484	18.910	100 year +40% CC 180 minute winter	66.873	26.474
100 year 180 minute winter	47.767	18.910	100 year +40% CC 240 minute summer	79.958	21.130
100 year 240 minute summer	57.113	15.093	100 year +40% CC 240 minute winter	53.122	21.130
100 year 240 minute winter	37.944	15.093	100 year +40% CC 360 minute summer	59.160	15.224
100 year 360 minute summer	42.257	10.874	100 year +40% CC 360 minute winter	38.456	15.224
100 year 360 minute winter	27.468	10.874	100 year +40% CC 480 minute summer	45.497	12.023
100 year 480 minute summer	32.498	8.588	100 year +40% CC 480 minute winter	30.227	12.023
100 year 480 minute winter	21.591	8.588	100 year +40% CC 600 minute summer	36.551	9.998
100 year 600 minute summer	26.108	7.141	100 year +40% CC 600 minute winter	24.974	9.998
100 year 600 minute winter	17.839	7.141	100 year +40% CC 720 minute summer	32.057	8.592
100 year 720 minute summer	22.898	6.137	100 year +40% CC 720 minute winter	21.544	8.592
100 year 720 minute winter	15.389	6.137	100 year +40% CC 960 minute summer	25.655	6.756
100 year 960 minute summer	18.325	4.825	100 year +40% CC 960 minute winter	16.995	6.756
100 year 960 minute winter	12.139	4.825	100 year +40% CC 1440 minute summer	17.988	4.821
100 year 1440 minute summer	12.848	3.443	100 year +40% CC 1440 minute winter	12.089	4.821

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment H	930	5.882	0.227	3.8	68.5589	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment H	Infiltration	0.4

Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment H	945	5.994	0.339	5.4	102.6872	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment H	Infiltration	0.4

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Catchment H	945	6.016	0.361	5.7	109.4781	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
960 minute winter	Catchment H	Infiltration	0.4

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Catchment H	1410	6.104	0.449	4.9	136.4230	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	Catchment H	Infiltration	0.4

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Catchment H	1410	6.192	0.537	5.7	163.1095	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	Catchment H	Infiltration	0.4