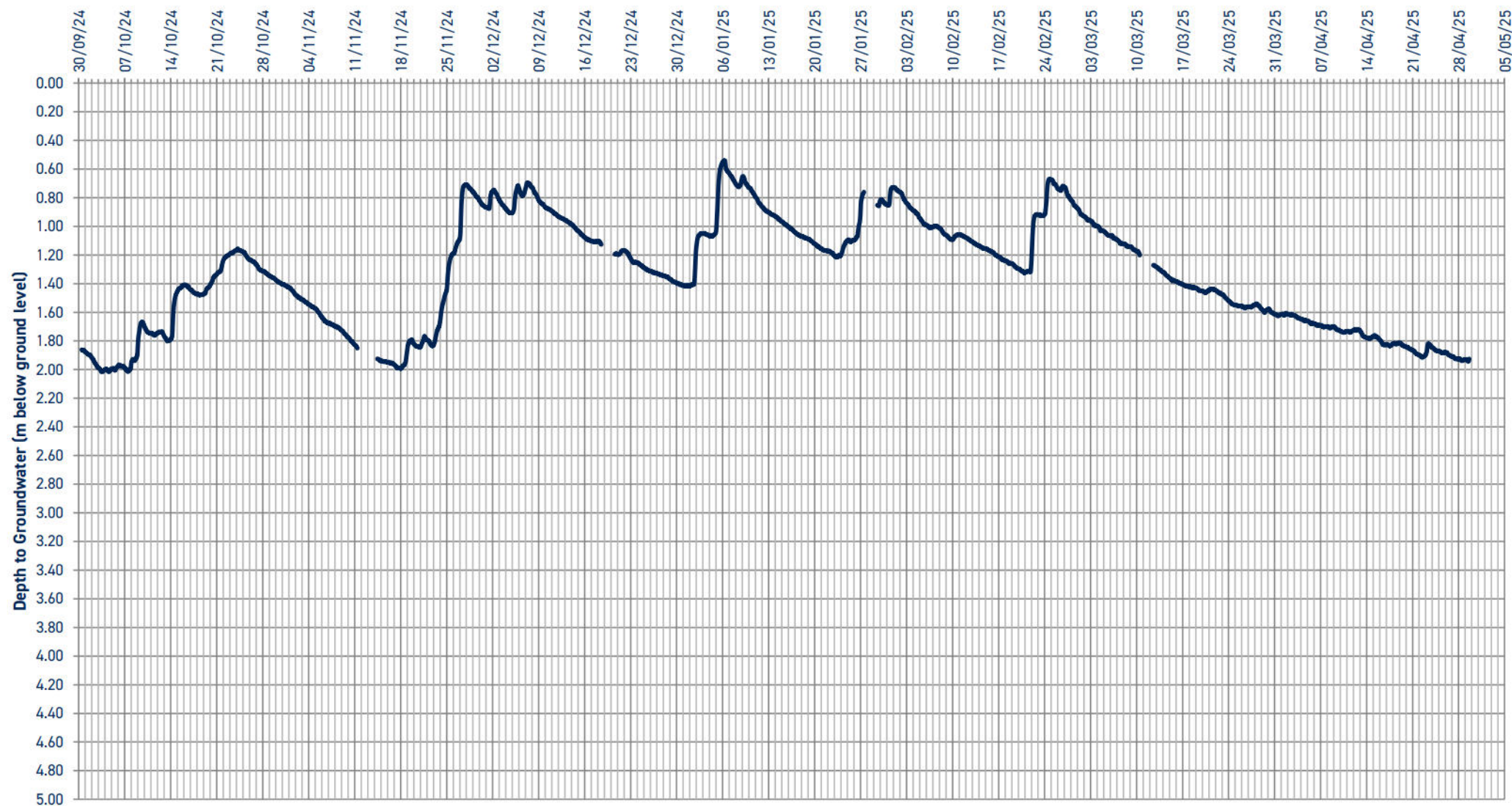


Site: Sunnyside, Yapton Road, Barnham, West Sussex

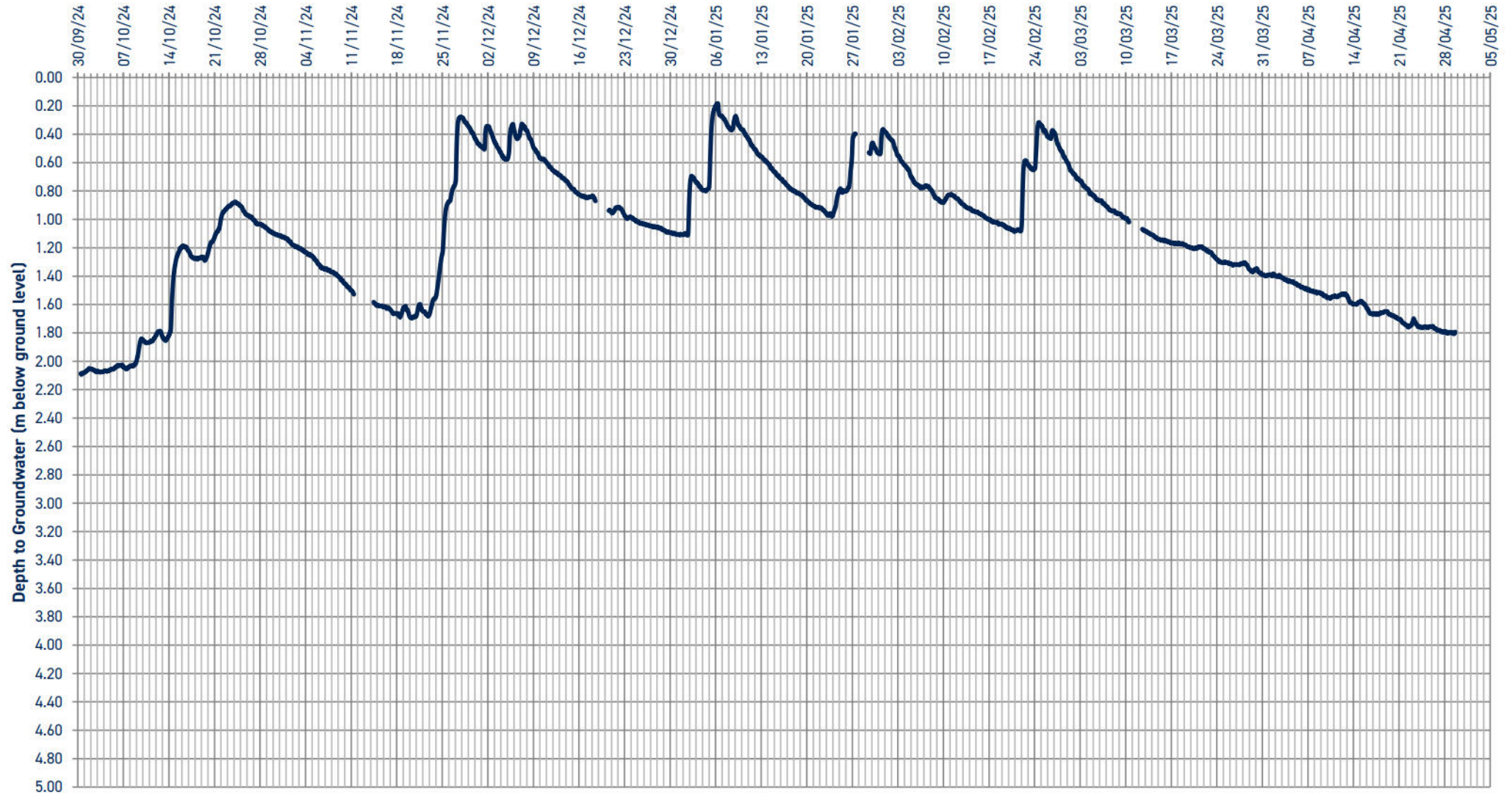
Project Ref: P16815



BH02

Site: Sunnyside, Yapton Road, Barnham, West Sussex

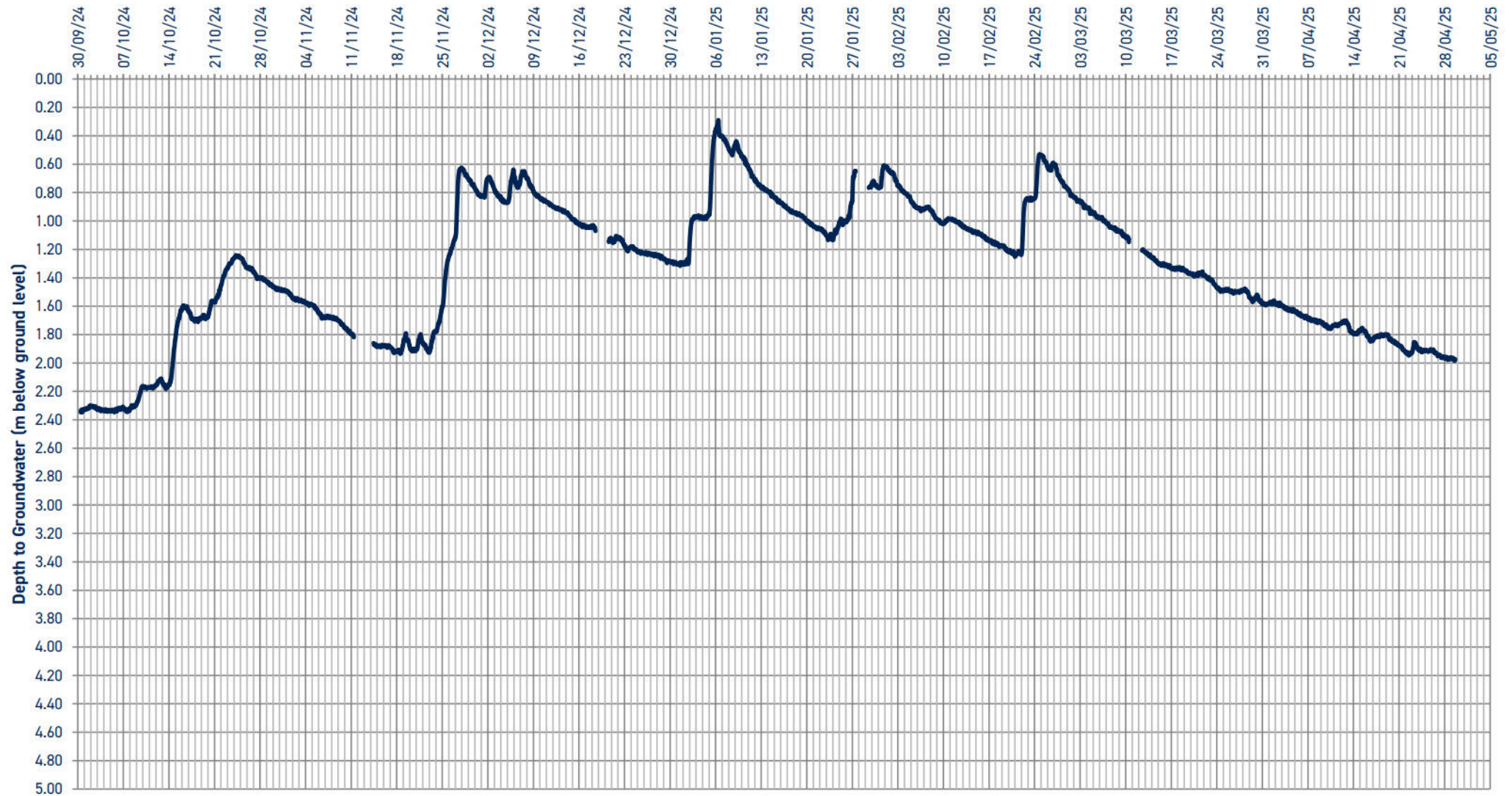
Project Ref: P16815



BH03

Site: Sunnyside, Yapton Road, Barnham, West Sussex

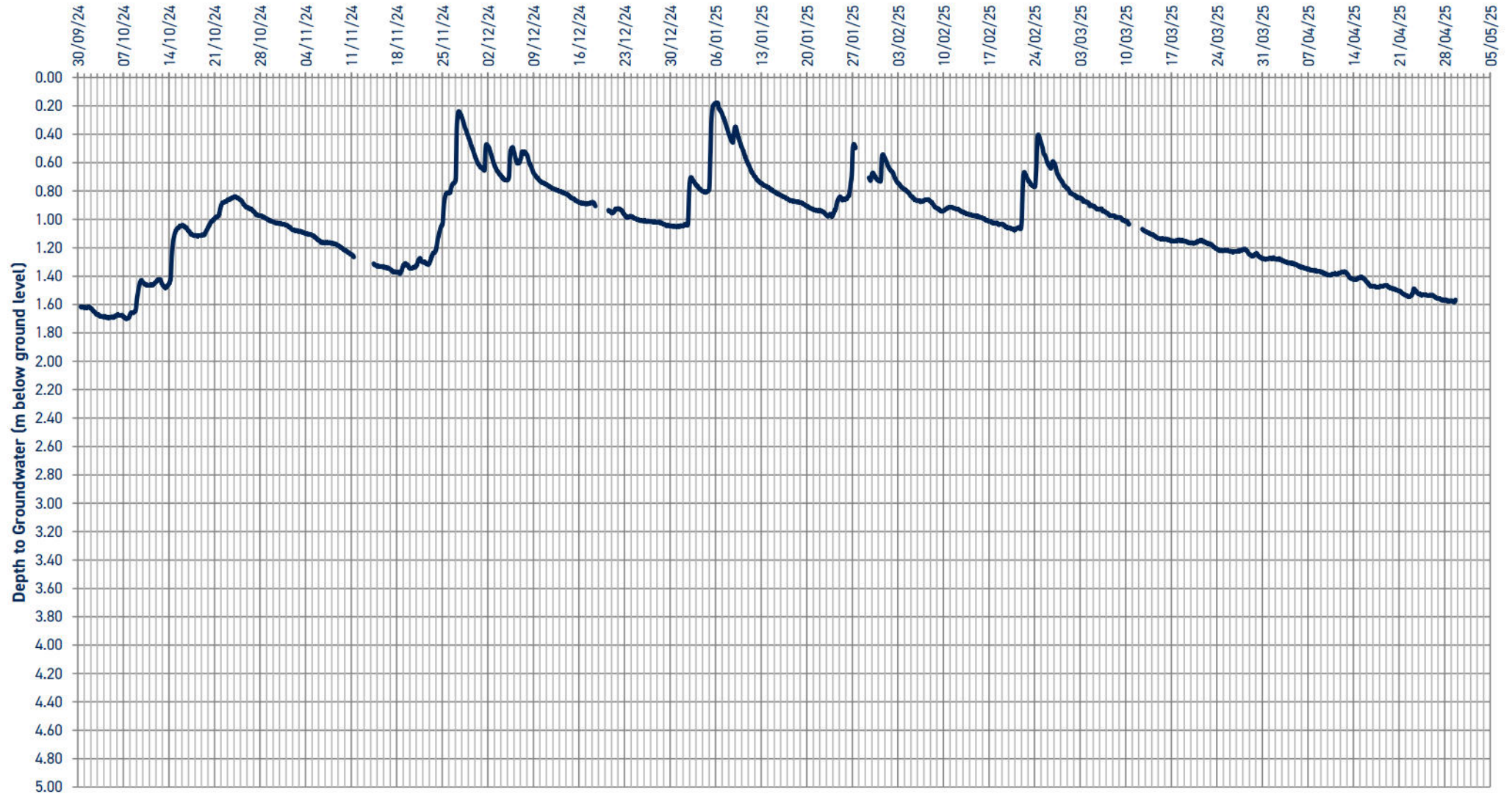
Project Ref: P16815



BH04

Site: Sunnyside, Yapton Road, Barnham, West Sussex

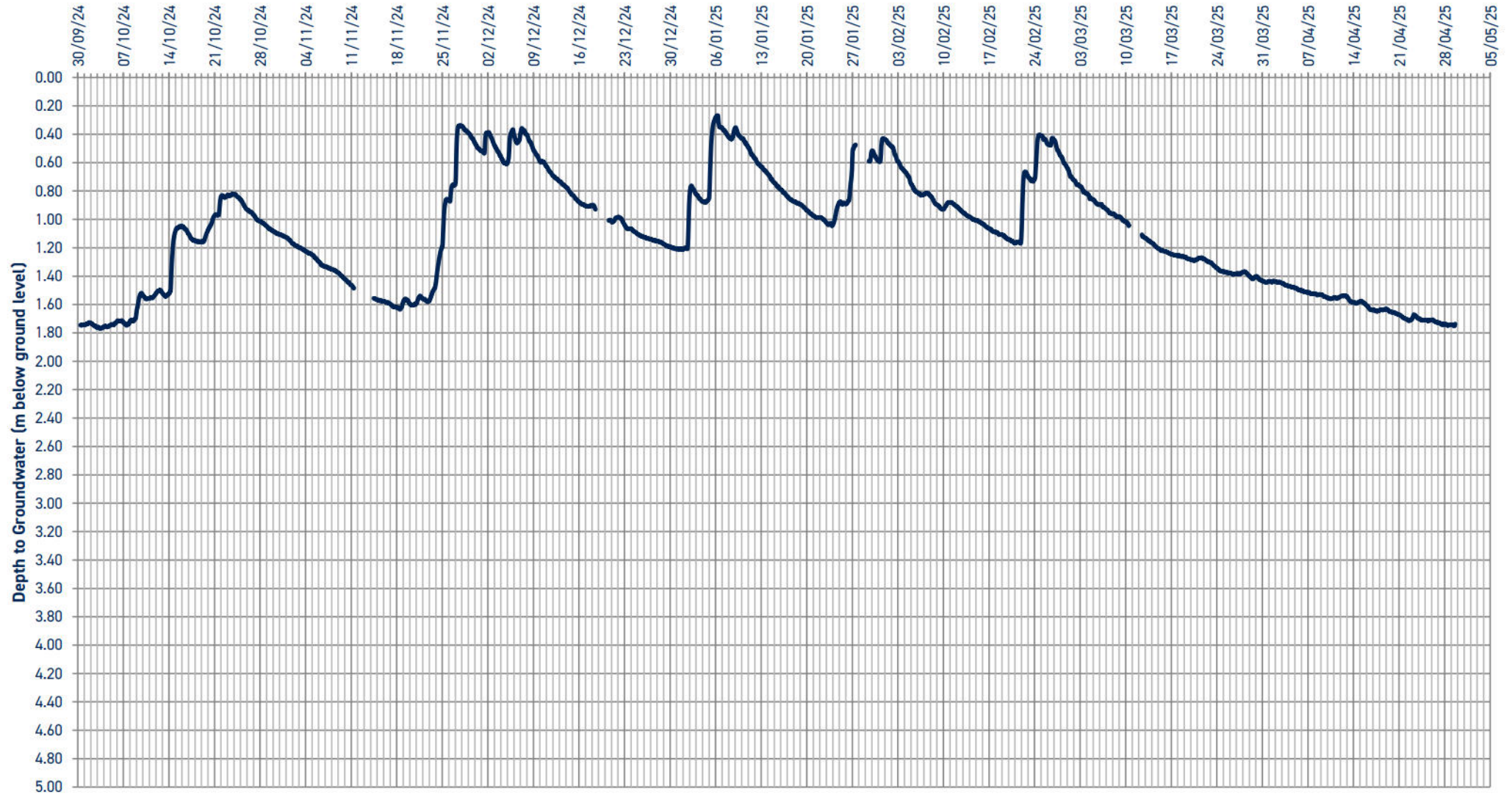
Project Ref: P16815



BH05

Site: Sunnyside, Yapton Road, Barnham, West Sussex

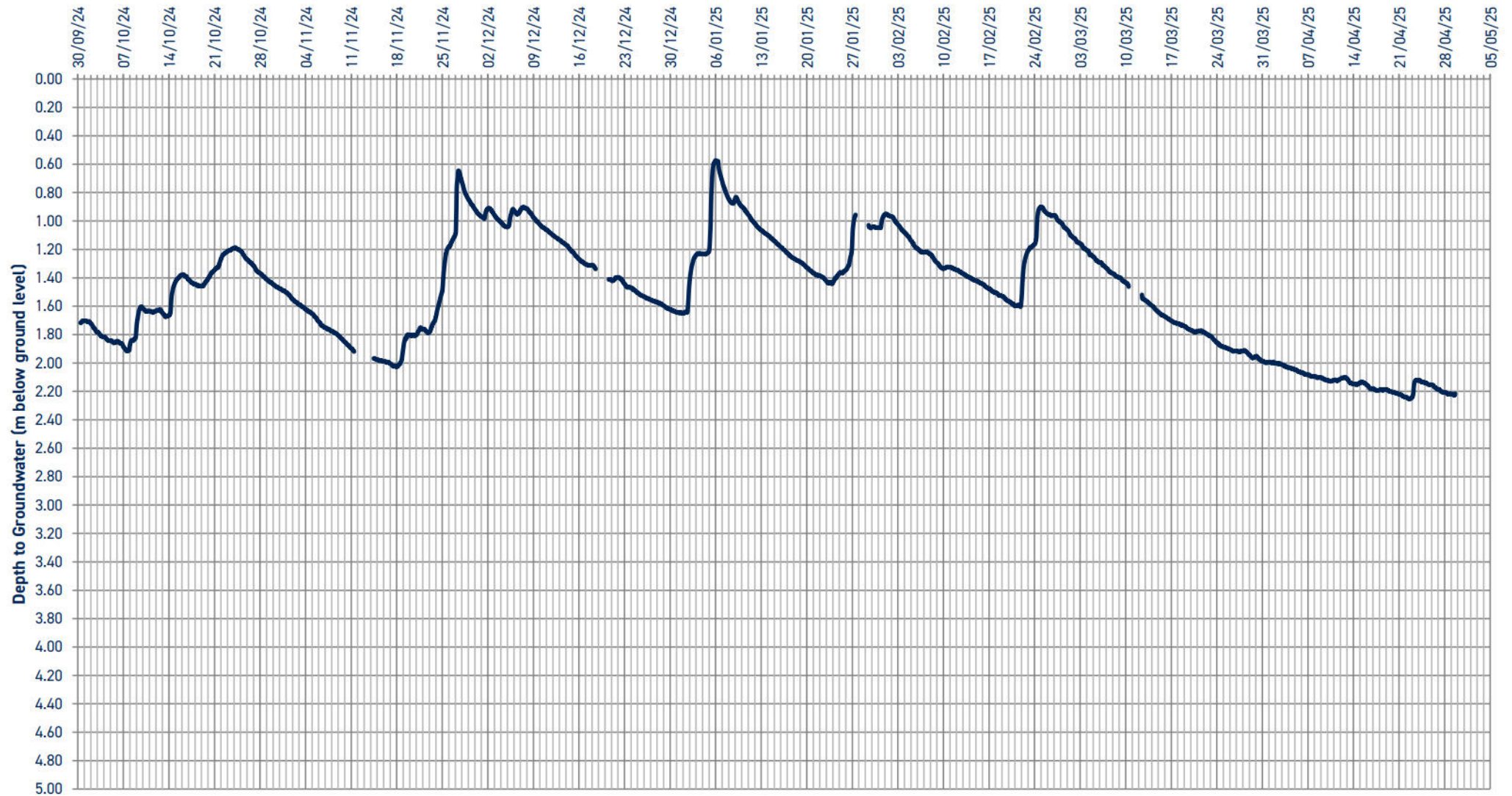
Project Ref: P16815



BH06

Site: Sunnyside, Yapton Road, Barnham, West Sussex

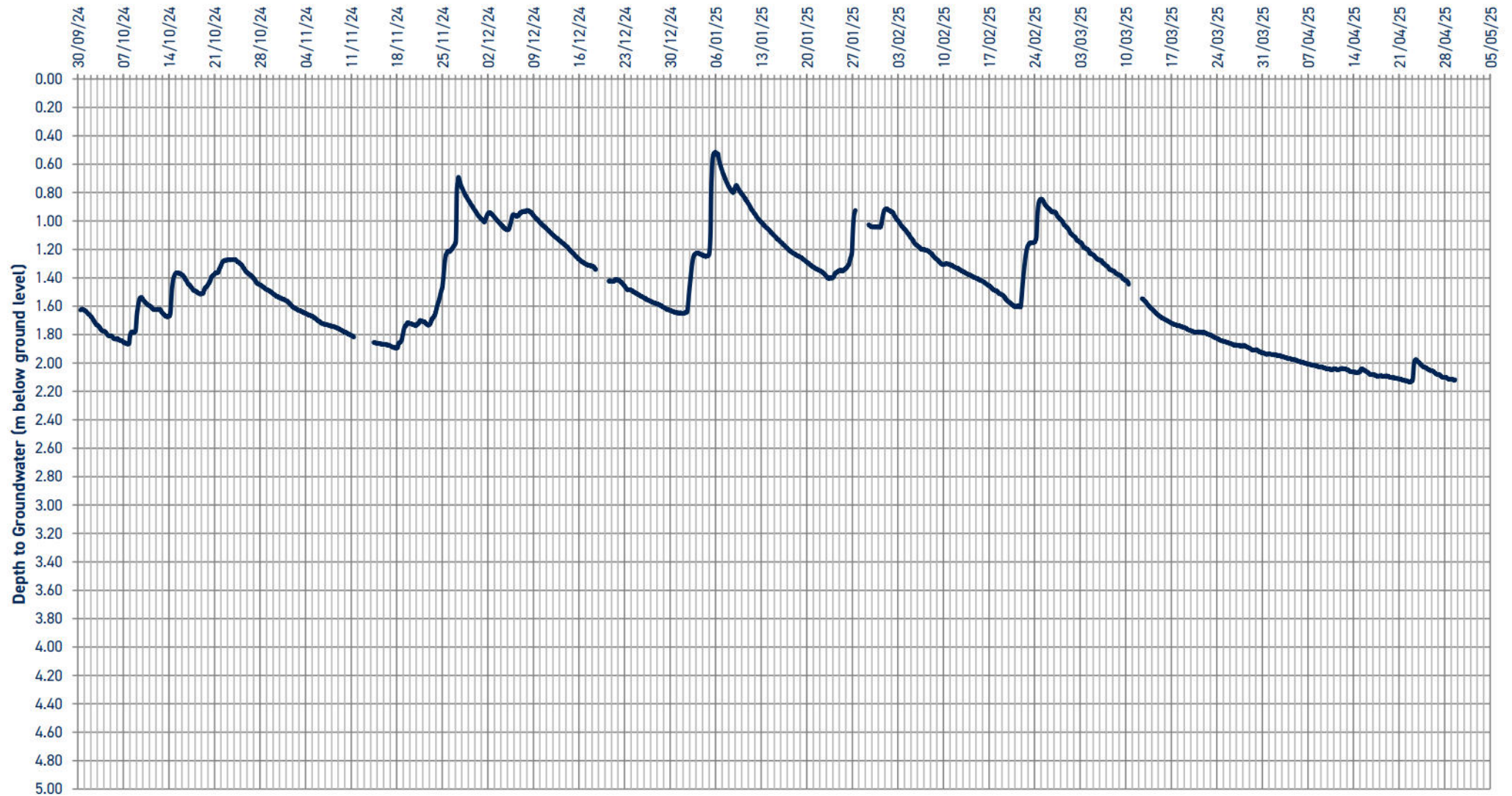
Project Ref: P16815



BH07

Site: Sunnyside, Yapton Road, Barnham, West Sussex

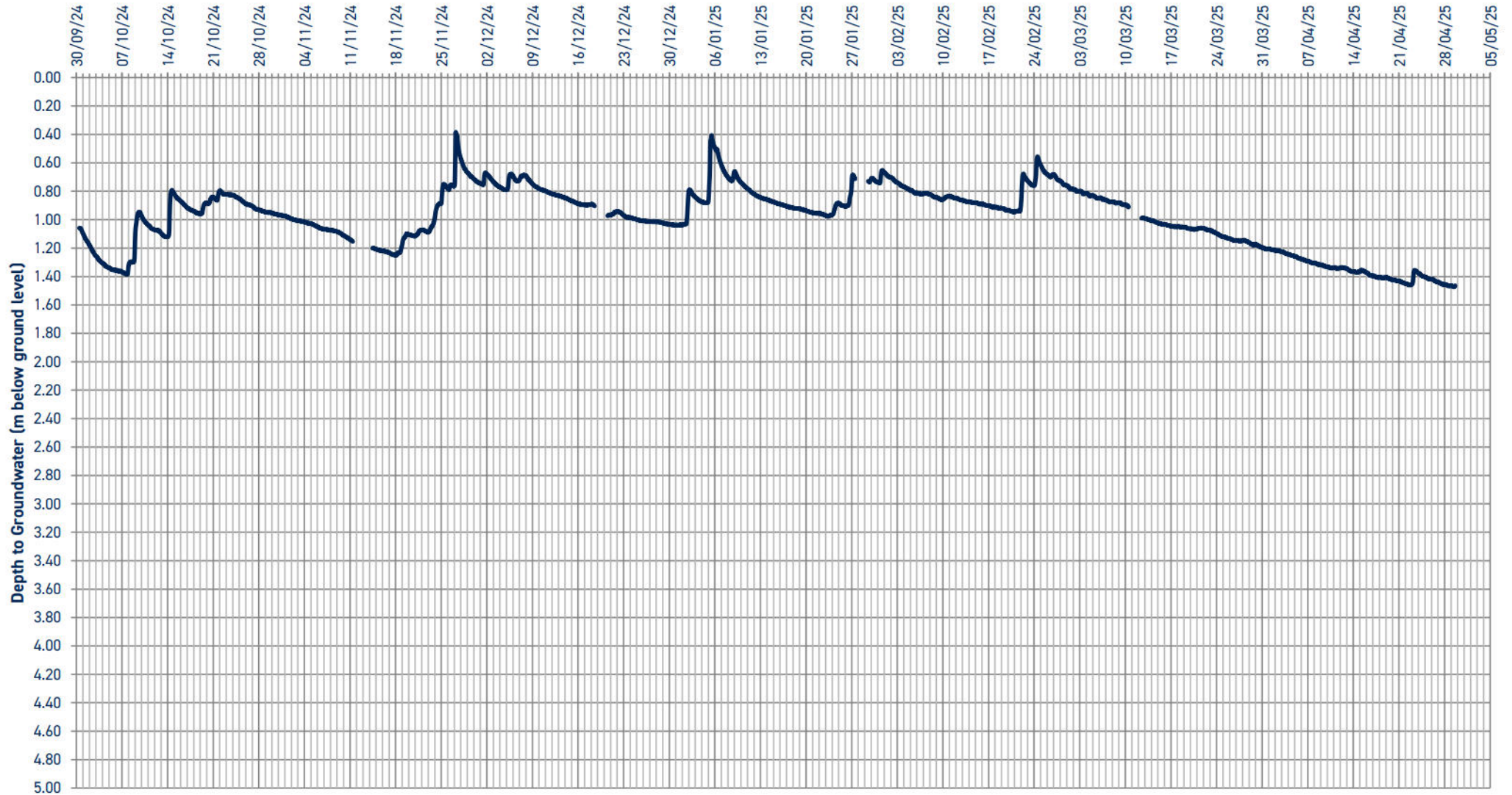
Project Ref: P16815



BH08

Site: Sunnyside, Yapton Road, Barnham, West Sussex

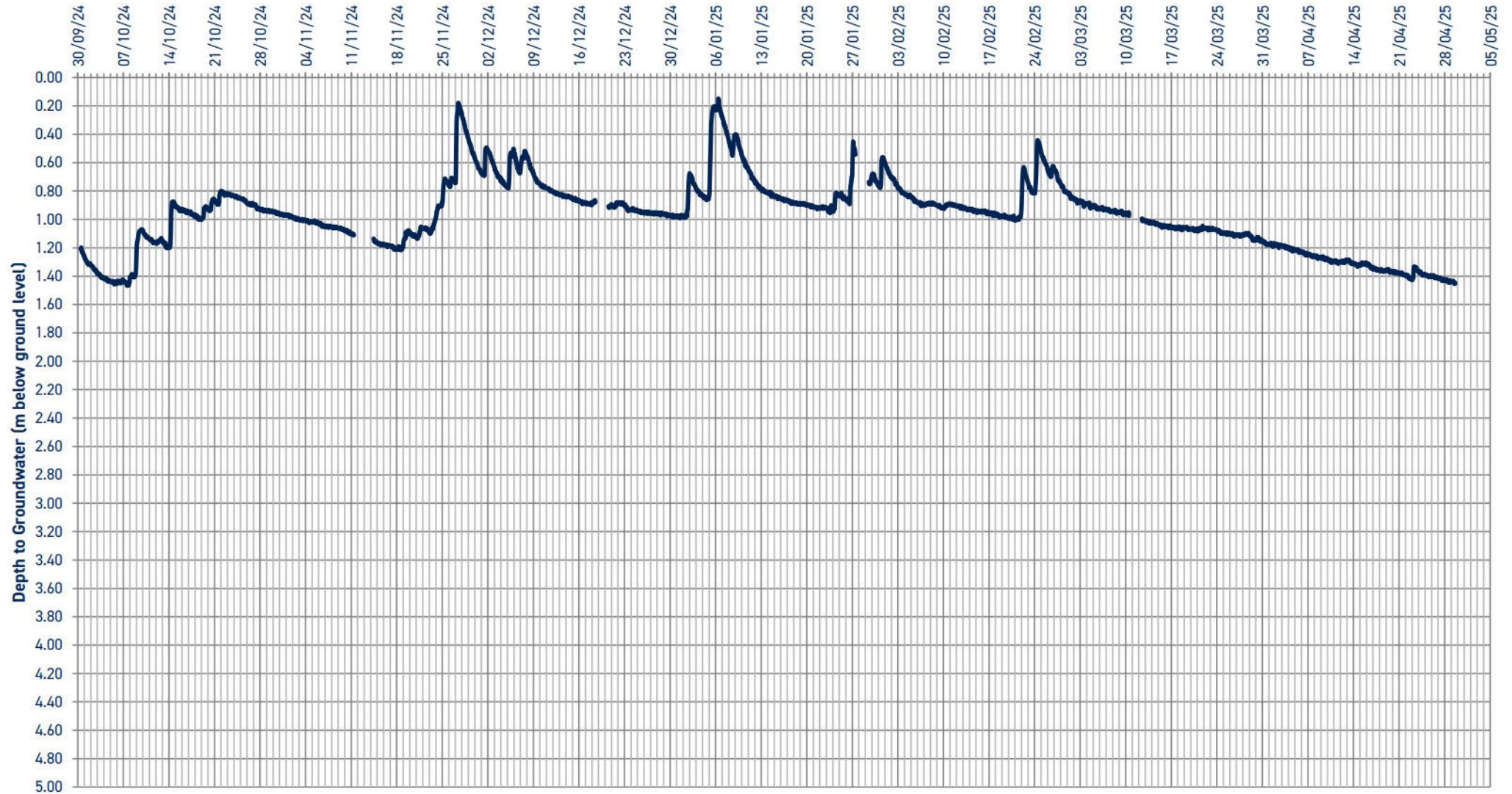
Project Ref: P16815



BH09

Site: Sunnyside, Yapton Road, Barnham, West Sussex

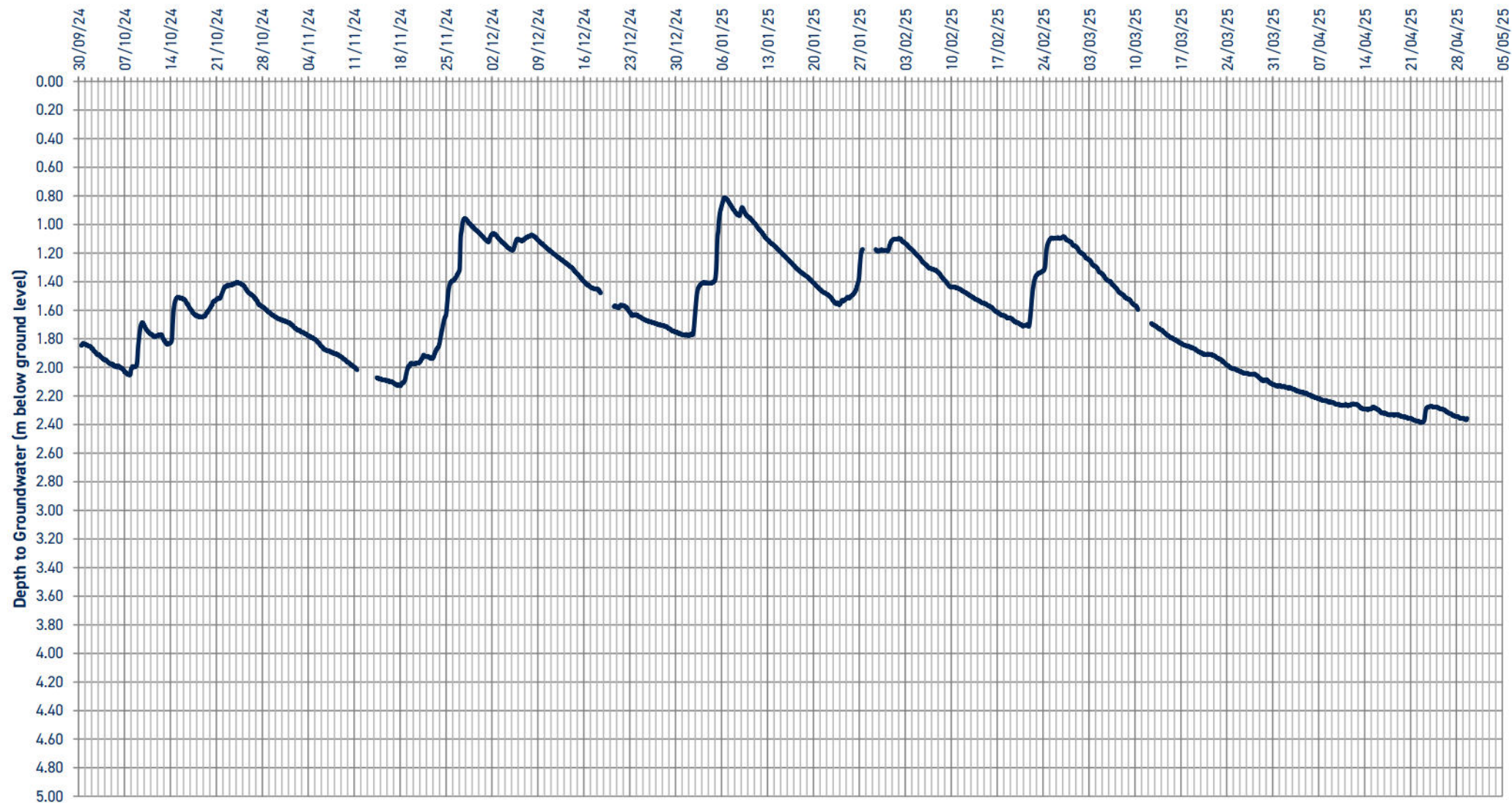
Project Ref: P16815



BH10

Site: Sunnyside, Yapton Road, Barnham, West Sussex

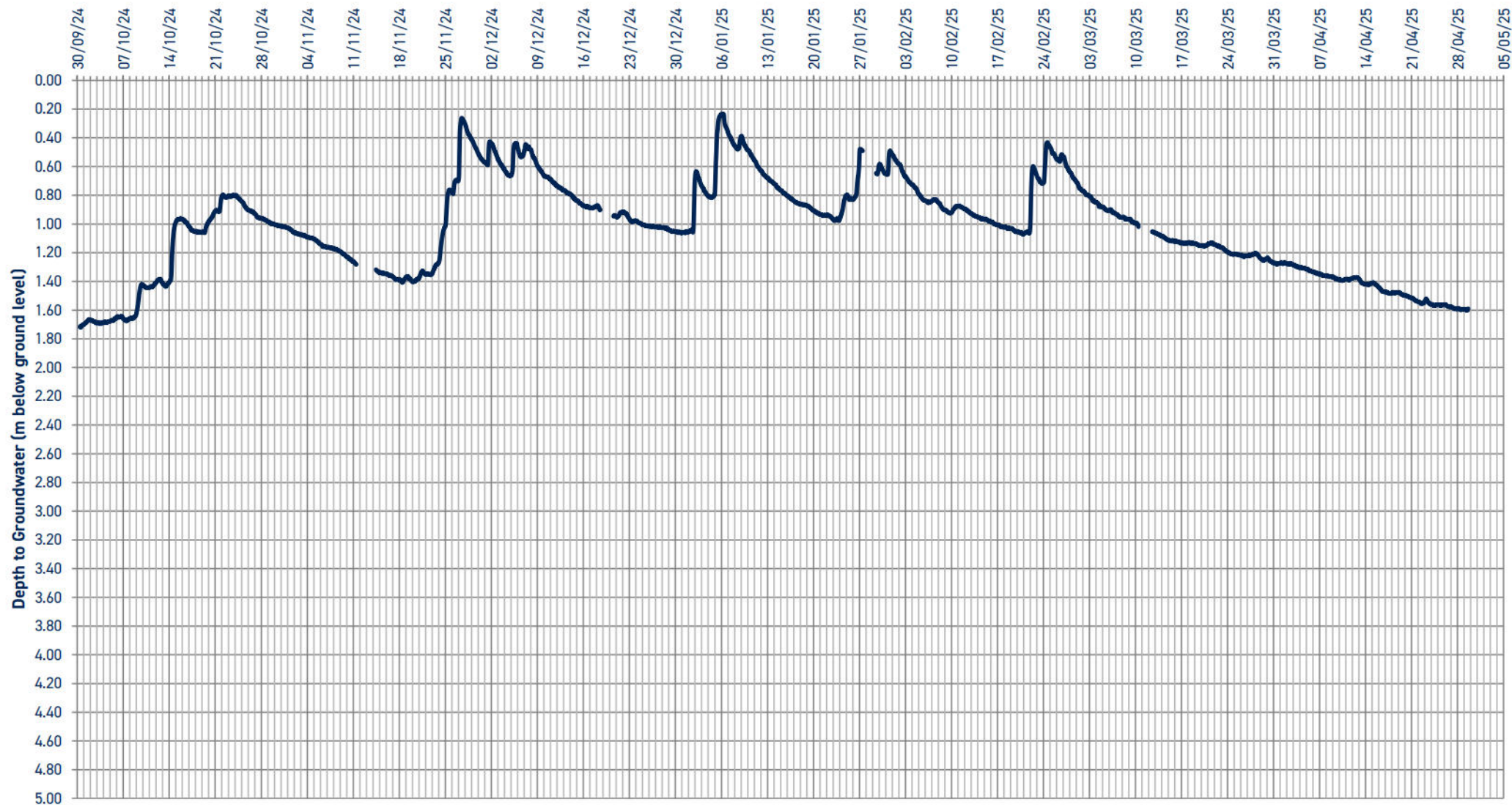
Project Ref: P16815



BHA1

Site: Sunnyside, Yapton Road, Barnham, West Sussex

Project Ref: P16815



BHA2

Explanatory Notes

Symbols and abbreviations on Exploratory Hole Records

Samples

- U 'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
- Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
- D Disturbed Sample
- R Root Sample
- B Bulk Disturbed Sample
- W Water Sample
- ES Environmental Suite (on older records may be referenced J T)

In Situ Testing

- S Standard penetration test (SPT): Using the split spoon sampler.
- C Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
- V Shear Vane Test: Undrained shear strength (cohesion) (kN/m²) shown within the Vane/Pen Test and N Value column.
- H Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m²) shown within the Vane/Pen Test and N Value column.
- P Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

- CP Cable Percussion Borehole
- RC Rotary Cored Borehole
- WLS Dynamic Sampler Borehole using windowless sampler tubes
- WS Dynamic Sampler Borehole using window sampler tubes
- TP Trial Pit excavated using mechanic excavator
- HDP Trial Pit excavated using hand tools

Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

In Situ Strength Testing

Standard penetration testing (SPT) carried out in accordance with BS EN ISO 22476-3:2005.

Continuous dynamic probe testing conducted using a super heavy DPSH-B (As defined by BS EN ISO 22476-2:2005) probing geometry. The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

Perth penetrometer tests carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained shear strength determinations made in-situ using a Geonor hand shear vane or a hand penetrometer.

Testing to determine the in-situ California Bearing Ratio (CBR) of soils conducted at shallow depths using a hand-held Transport Research Laboratory (TRL) cone penetrometer.

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D	Site Name: Sunnyside, Yapton Road, Barnham, West Sussex						
	Job Number: P16815						
	Start Date: 25/09/2024			Borehole Number: BH01			
	End Date: 25/09/2024						
						Sheet 1 of 1	
Samples and In Situ Testing							
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth	Stratum Description
						0.00	Topsoil over,
						0.30	MADE GROUND: Dark brown silty clay with rare subangular to subrounded fine to coarse gravel of charcoal-like material.
							Light brown silty CLAY with frequent black staining. (River Terrace Deposits)
						1.80	Orange brown gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse flint. (River Terrace Deposits)
						2.30	Light brown clayey SAND. (River Terrace Deposits)
							becoming slightly gravelly (flint) below 4.00m depth.
						4.85	Dark grey CLAY. (London Clay Formation)
						5.00	End of borehole at 5.00m
Remarks Groundwater: Groundwater recorded at 1.82m depth on completion of borehole. Stability: Borehole collapsed to 3.80m depth on completion. Notes: Standpipe installed to 3.80m depth; 3.80m to 1.80m slotted pipe with gravel surround; 1.80m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.							Excavation Method: WLS
							Borehole Diameter: Various
							Made By: GRD

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D	Site Name: Sunnyside, Yapton Road, Barnham, West Sussex						
	Job Number: P16815						
	Start Date: 24/09/2024			Borehole Number: BH02	Sheet 1 of 1		
	End Date: 24/09/2024						
Samples and In Situ Testing							
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth	Stratum Description
						0.00	Topsoil over,
						0.30	MADE GROUND: Brown slightly sandy silty clay with rare gravel of ash-like material and brick.
							Orange brown and brown slightly gravelly slightly sandy silty CLAY with occasional iron staining. Gravel is subangular to subrounded fine flint. (River Terrace Deposits)
						3.00	Brown and orange brown SAND. (River Terrace Deposits)
						5.00	End of borehole at 5.00m
Remarks							Excavation Method: WLS
Groundwater: Groundwater recorded at 2.30m depth on completion of borehole.							Borehole Diameter: Various
Stability: Borehole unstable below 3.00m depth.							Made By: TM
Notes: Standpipe installed to 4.30m depth; 4.30m to 2.30m slotted pipe with gravel surround; 2.30m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.							



Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

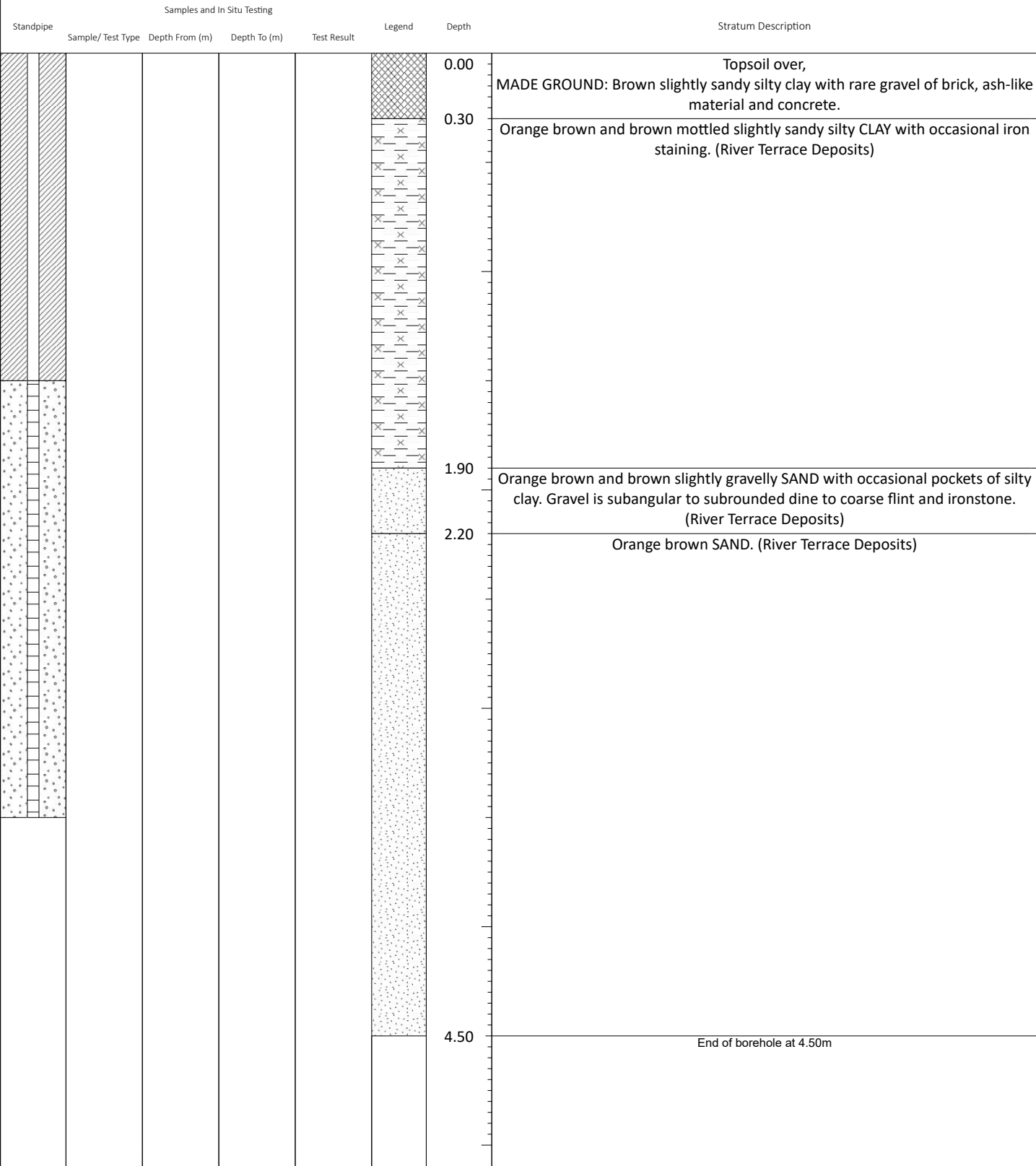
Job Number: P16815

Start Date: 24/09/2024

End Date: 24/09/2024

Borehole Number: BH04

Sheet 1 of 1



Remarks

Groundwater: Groundwater recorded at 3.00m depth on completion of borehole.

Stability: Borehole cased to 3.00m depth.
Borehole collapsed to 3.50m depth on completion.

Notes: Standpipe installed to 3.50m depth; 3.50m to 1.50m slotted pipe with gravel surround; 1.50m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

Excavation Method: WLS

Borehole Diameter: Various

Made By: TM



Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

Job Number: P16815

Start Date: 24/09/2024

End Date: 24/09/2024

Borehole Number: BH05

Sheet 1 of 1

Samples and In Situ Testing					Legend	Depth	Stratum Description
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
						0.00	Topsoil, MADE GROUND: Brown silty clay with rare subangular to subrounded fine to medium gravel of flint, brick and ash-like material.
						0.50	Orange brown and brown slightly gravelly slightly sandy silty CLAY with occasional iron staining. Gravel is subangular to subrounded fine to coarse flint and ironstone. (River Terrace Deposits)
						1.50	Orange brown SAND. (River Terrace Deposits)
						3.50	End of borehole at 3.50m

Remarks

Groundwater: Groundwater recorded at 1.80m depth on completion of borehole.

Stability: Borehole unstable below 2.20m depth on completion.

Notes: Standpipe installed to 3.50m depth; 3.50m to 1.50m slotted pipe with gravel surround; 1.50m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

Excavation Method: WLS

Borehole Diameter: Various

Made By: TM



Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

Job Number: P16815

Start Date: 25/09/2024

End Date: 25/09/2024

Borehole Number: BH06

Sheet 1 of 2

Samples and In Situ Testing					Legend	Depth	Stratum Description
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
						0.00	Topsoil.
						0.20	Light brown and yellow brown mottled silty CLAY with occasional black speckling and staining. (River Terrace Deposits)
							becoming light brown, yellow brown and orange brown below 1.60m depth.
						2.00	Orange brown and brown gravelly slightly sandy CLAY with frequent black staining. Gravel is subangular to subrounded fine flint. (River Terrace Deposits)
						2.70	Orange brown slightly gravelly SAND. Gravel is subangular to subrounded fine flint. (River Terrace Deposits)
						2.90	Light brown medium to coarse SAND. (River Terrace Deposits)
							becoming slightly gravelly (subangular to subrounded fine to medium flint) below 4.90m depth.
						4.95	
						5.00	Continued on next sheet

Remarks

Groundwater: Groundwater recorded at 2.35m depth on completion of borehole.

Stability: Borehole collapsed to 4.70m depth on completion.

Notes: Standpipe installed to 4.70m depth; 4.70m to 1.70m slotted pipe with gravel surround; 1.70m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

Excavation Method: WLS

Borehole Diameter: Various

Made By: GRD

Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

Job Number: P16815

Start Date: 25/09/2024

End Date: 25/09/2024

Borehole Number: BH06

Sheet 2 of 2

[illegible]

Remarks

Groundwater: Groundwater recorded at 2.35m depth on completion of borehole.

Stability: Borehole collapsed to 4.70m depth on completion.

Notes: Standpipe installed to 4.70m depth; 4.70m to 1.70m slotted pipe with gravel surround; 1.70m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

Excavation Method: WLS

Borehole Diameter: Various

Made By: GRD

End Date: 25/09/2024

Sheet 1 of 1

Remarks Groundwater: Groundwater recorded at 2.10m depth on completion of borehole. Stability: Borehole collapsed to 4.00m depth on completion. Notes: Standpipe installed to 4.00m depth; 4.00m to 2.00m slotted pipe with gravel surround; 2.00m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.	Excavation Method: WLS
	Borehole Diameter: Various
	Made By: GRD



Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

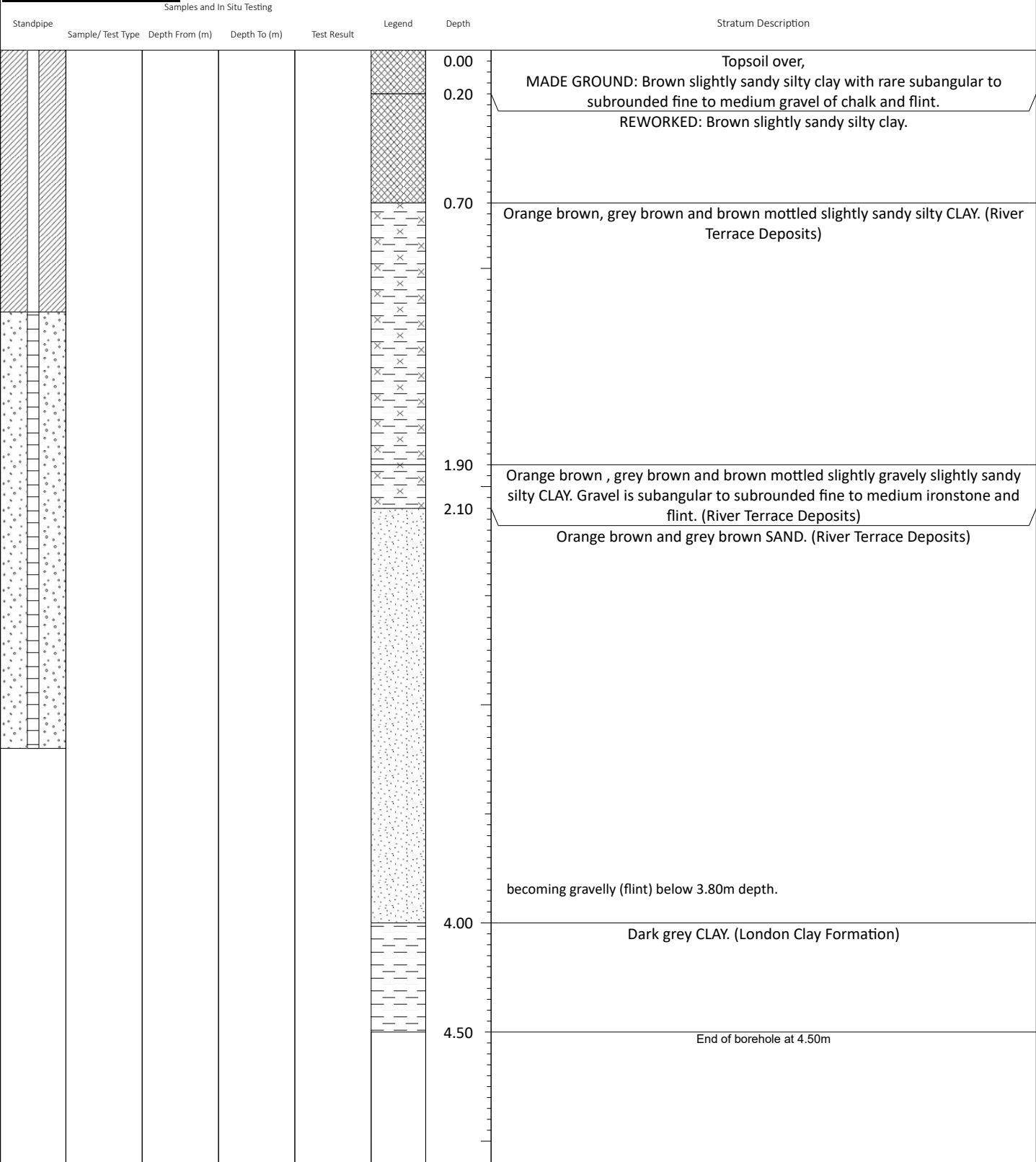
Job Number: P16815

Start Date: 25/09/2024

End Date: 25/09/2024

Borehole Number: BH08

Sheet 1 of 1



Remarks

Groundwater: Groundwater recorded at 2.00m depth on completion of borehole.

Stability: Borehole cased to 3.00m depth.
Borehole collapsed to 3.20m depth on completion.

Notes: Standpipe installed to 3.20m depth; 3.20m to 1.20m slotted pipe with gravel surround; 1.20m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

Excavation Method: WLS

Borehole Diameter: Various

Made By: TM



Site Name: Sunnyside, Yapton Road, Barnham, West Sussex

Job Number: P16815

Start Date: 25/09/2024

End Date: 25/09/2024

Borehole Number: BH09

Sheet 1 of 1

Samples and In Situ Testing					Legend	Depth	Stratum Description
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
						0.00	Topsoil over,
						0.20	MADE GROUND: Dark brown and brown slightly gravelly slightly sandy silty clay. Gravel is subangular to subrounded fine to coarse flint with rare brick, ash-like material and concrete.
							MADE GROUND: Brown slightly sandy silty clay with rare gravel of brick and ash-like material.
						0.70	Yellow brown, orange brown and brown mottled slightly sandy silty CLAY with occasional iron staining. (River Terrace Deposits)
							becoming slightly gravelly (flint) between 1.00m and 1.30m depth.
						1.80	Orange brown, brown and grey brown SAND. (River Terrace Deposits)
						4.30	End of borehole at 4.30m

Remarks

Groundwater: Groundwater recorded at 1.70m depth on completion of borehole.

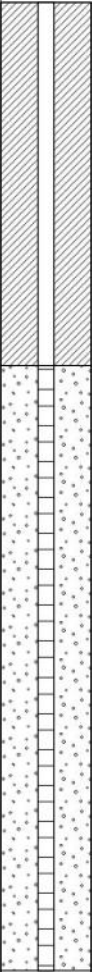
Stability: Borehole unstable below 2.00m depth.

Notes: Standpipe installed to 3.30m depth; 3.30m to 1.30m slotted pipe with gravel surround; 1.30m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.

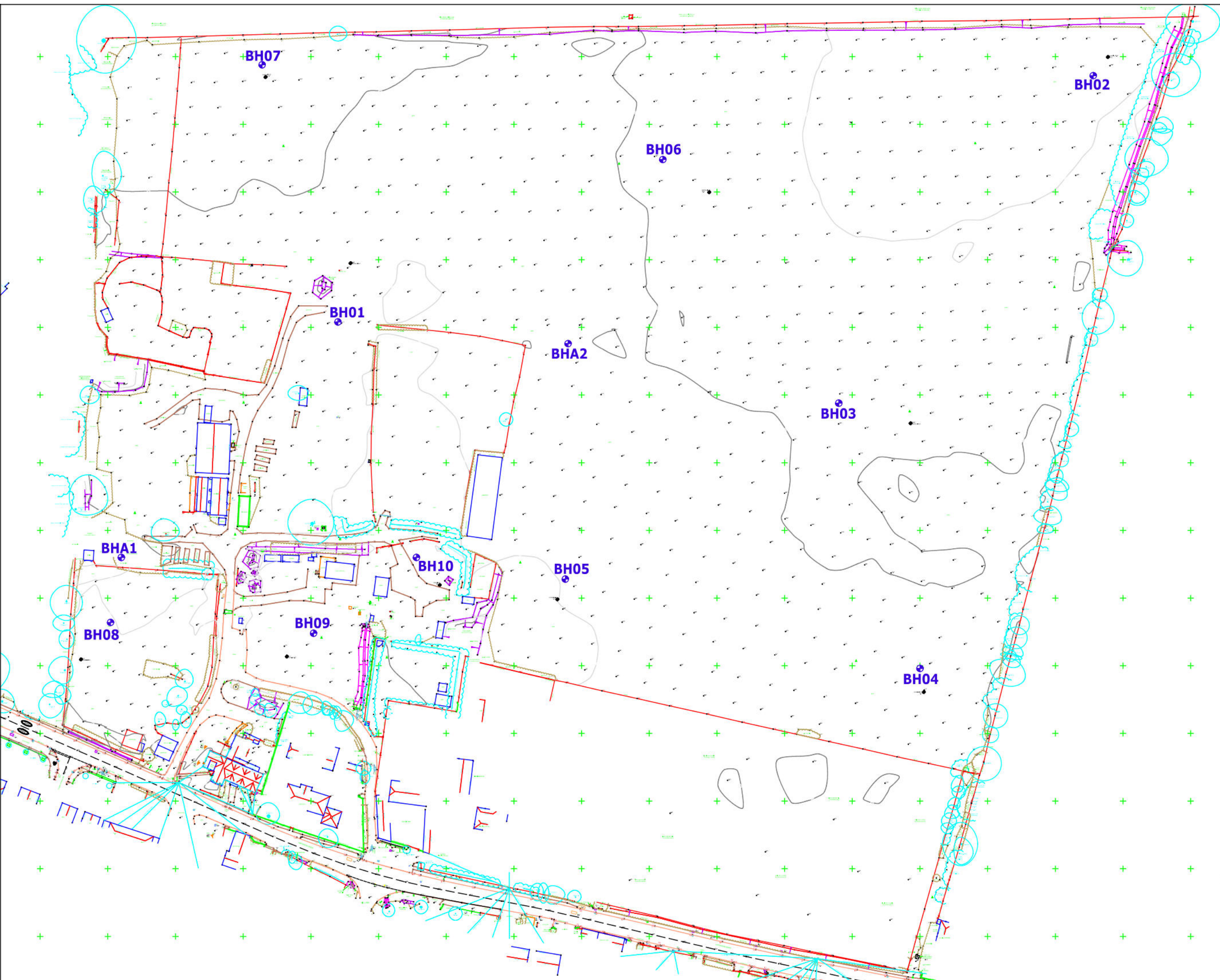
Excavation Method: WLS

Borehole Diameter: Various

Made By: TM

ASHDOWN SITE INVESTIGATION J.M.I.T.F.D	Site Name: Sunnyside, Yapton Road, Barnham, West Sussex						
	Job Number: P16815						
	Start Date: 25/09/2024			Borehole Number: BHA1			
	End Date: 25/09/2024						
						Sheet 1 of 1	
Samples and In Situ Testing							
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth	Stratum Description
						0.00	Topsoil over, MADE GROUND: Dark brown slightly gravelly slightly sandy silty clay. Gravel is subangular to subrounded fine to coarse brick, glass, concrete, ash-like material and chalk.
						0.40	MADE GROUND: Brown slightly sandy silty clay with rare gravel of ash-like material, brick and chalk.
						1.10	Brown and grey brown mottled slightly sandy silty CLAY with occasional iron staining. (River Terrace Deposits)
						1.50	Orange brown and grey brown SAND. (River Terrace Deposits)
						4.00	End of borehole at 4.00m
Remarks Groundwater: Groundwater recorded at 2.20m depth on completion of borehole. Stability: Borehole unstable below 2.80m depth. Notes: Standpipe installed to 3.20m depth; 3.20m to 1.20m slotted pipe with gravel surround; 1.20m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.							Excavation Method: WLS
							Borehole Diameter: Various
							Made By: TM

ASHDOWN SITE INVESTIGATION	Site Name: Sunnyside, Yapton Road, Barnham, West Sussex						
	Job Number: P16815						
	Start Date: 25/09/2024			Borehole Number: BHA2			
	End Date: 25/09/2024						
						Sheet 1 of 1	
Samples and In Situ Testing							
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth	Stratum Description
						0.00	Topsoil.
						0.20	Light brown and light grey silty CLAY with rare subangular to subrounded fine to medium gravel of flint. (River Terrace Deposits)
							with iron staining below 1.00m depth.
						1.70	becoming slightly gravelly and sandy below 1.60m depth.
						2.10	Brown, yellow brown and light brown mottled gravelly sandy CLAY with frequent iron staining. Gravel is subangular to subrounded fine to medium flint and occasional ironstone. (River Terrace Deposits)
							with occasional gravel of chalk below 2.00m depth.
							Brown and orange brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to medium flint. (River Terrace Deposits)
						5.00	End of borehole at 5.00m
Remarks							Excavation Method: WLS
Groundwater: Groundwater recorded at 2.07m depth on completion of borehole.							Borehole Diameter: Various
Stability: Borehole collapsed to 4.50m depth on completion.							Made By: GRD
Notes: Standpipe installed to 4.50m depth; 4.50m to 1.50m slotted pipe with gravel surround; 1.50m to ground level plain pipe with bentonite seal; completed with end cap and upstanding security cover.							



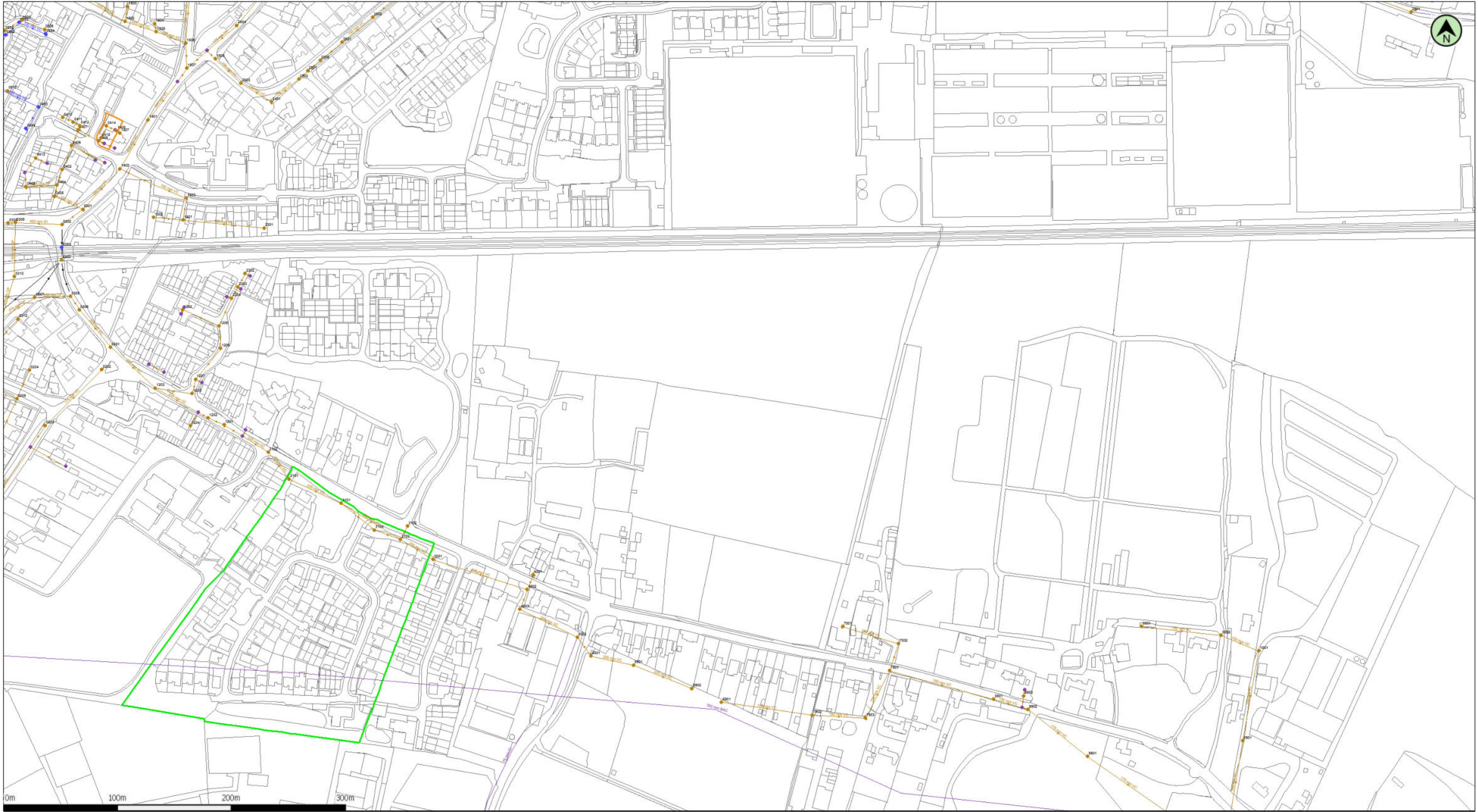
ASHDOWN SITE INVESTIGATION

L · I · M · I · T · E · D

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
01273 483119
contact@ashdownsi.co.uk

Site:
Sunnyside Yapton Road Barnham West Sussex
Project Ref:
P16815
Figure No.
1
Drawing Title
Site Plan
Scale
NTS

Appendix E Public Sewer Records



(c) Crown copyright and database rights 2024 Ordnance Survey 100031673

Date: 15/04/24

Scale: 1:3228

Map Centre: 496651,104224

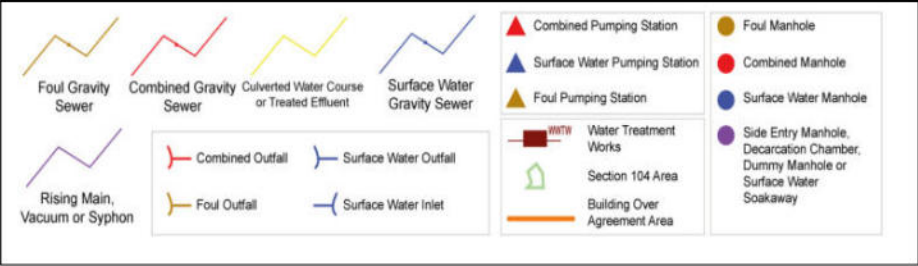
Data updated: 12/01/24

Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



Appendix F Wallingford Greenfield Run-off Calculations (Pre-development)

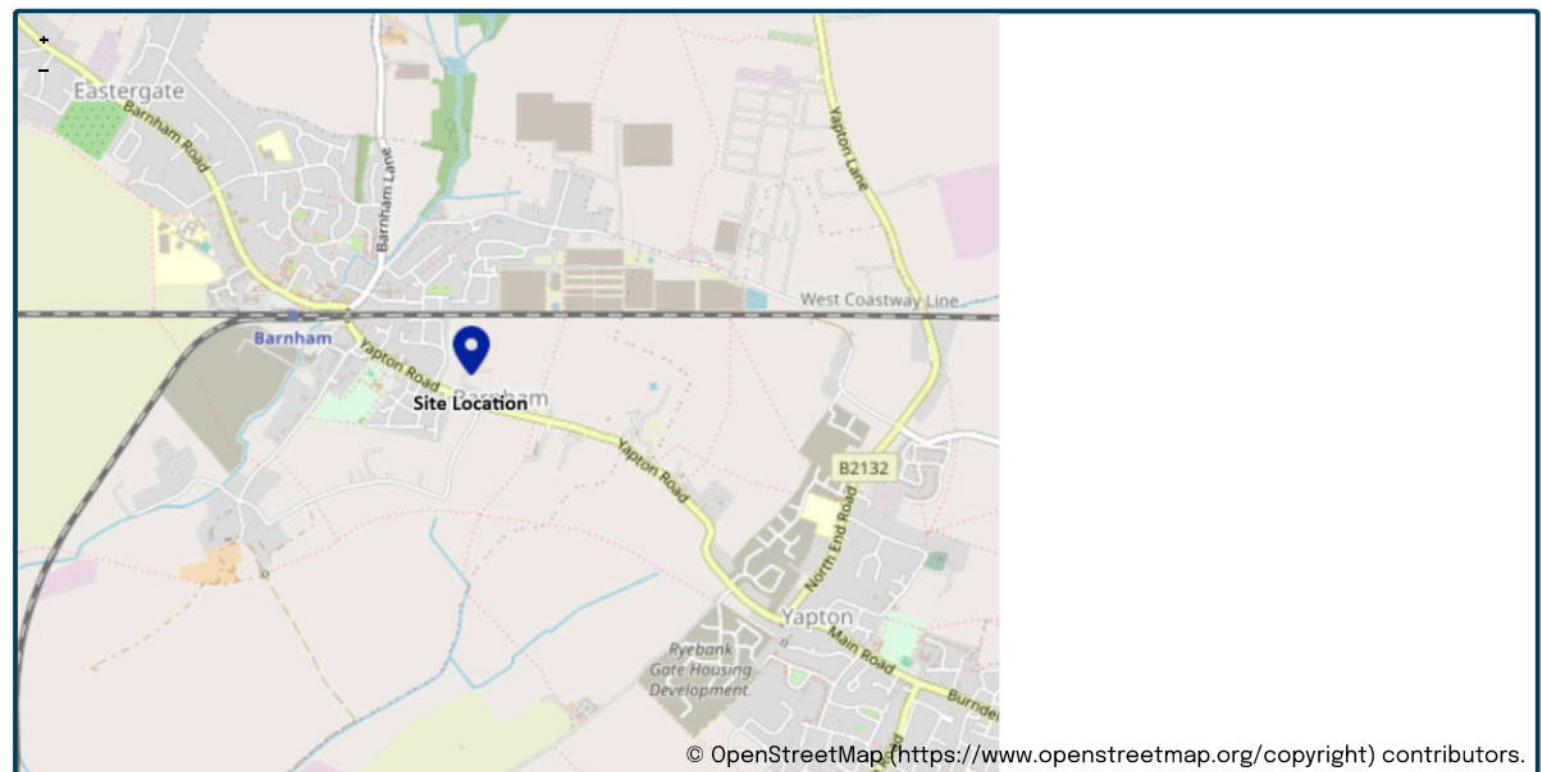
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	04/11/2025
Calculated by	BP Civils
Reference	D2298 Sunnyside
Model version	2.2.1

Location

Site name	D2298 Sunnyside
Site location	



Site easting (British National Grid)	496496
Site northing (British National Grid)	104076

Site details

Total site area (ha)	8.10	ha
----------------------	-----------------------------------	----

Greenfield runoff

Method

Method

FEH statistical (2025)

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	757	mm
BFIHOST19scaled	0.636	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	15.6	l/s
QBar (FEH statistical 2025) (l/s)	17.7	l/s

Growth curve factors

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

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	15.1	l/s
Flow rate 2 year (l/s)	15.6	l/s
Flow rate 10 years (l/s)	28.7	l/s
Flow rate 30 years (l/s)	40.8	l/s
Flow rate 100 years (l/s)	56.6	l/s
Flow rate 200 years (l/s)	66.3	l/s

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

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.1) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix G West Sussex County Council Lead Local Flood Authority Pre-Application Advice

Ground Floor
Northleigh
County Hall
Chichester
West Sussex
PO19 1RH



Lead Local Flood Authority

BP Civils
Office 2 Unit 2
West Barn
Old Dairy Lane
Norton
West Sussex
PO20 3AF

Date 21st August 2024

Dear Liam,

RE: WSCC-635606458 - Sunnyside Barn, Yapton Road, Barnham, West Sussex, PO20 0AZ

WSCC Flood Risk Management Team Level 1 Pre-Application Advice has been sought for an approximately 9.0Ha site in Arun district. It is expected that approximately 200 dwellings will be built.

Flood Risk for Sunnyside Barn:

The proposed site does not lie within Flood Zones 2 or 3 (Appendix A), however it is over 1ha therefore a Flood Risk Assessment in line with guidance from the Environment Agency ([Flood risk assessments: applying for planning permission](#) and [Flood risk assessments: applying for planning permission](#)), NPPF (December 2023 version) and PPG Flood risk and coastal change (August 2022 version; this includes a Site-specific flood risk assessment checklist) will be required. Within the FRA all sources of flooding should be assessed, including flood risk from surface water, ordinary watercourses including ditches, groundwater, artificial sources such as reservoirs and existing drainage infrastructure. The site is not currently located in EA flood warning or alert areas (Appendix B).

The proposed site is in an area of very low to low risk of flooding as identified by the Environment Agency Risk of Surface Water Flooding map (Appendix C). There are no surface water flow paths shown through the site. According to our records there are no ordinary watercourses within the site, however we suspect there is one along the right-hand side of the campsite field (outside red line boundary). This goes into a culvert north-east of Sunnyside Barn and becomes an open watercourse again east of New House, Yapton Road.

It is noted that groundwater monitoring was undertaken in January 2024, which showed levels across the site between 1.50 mbgl and dry (over 4m). These levels will need to be considered in the design of the drainage system. According to BGS data the bedrock for the site is clay, silt and sand, with superficial deposits of River Terrace Deposits-Sand, silt

and clay. This could mean infiltration is not viable for this site, however you will still need to carry out sufficient BRE365 infiltration testing and winter groundwater monitoring. The site is not located in a Source Protection Zone. Groundwater flood risk details can be found in Appendix D.

On EA mapping there are records of fluvial flooding along Yapton Road in 1987 (however this is outside of the fluvial flood zones today) (Appendix E). Barnham and Walberton is identified as a wet spot in our Local Flood Risk Management Strategy (Appendix F). WSCC have no records of surface water or groundwater flood events within the site, however there are some events in the surrounding area (Appendix G). Please note that this does not guarantee that no flooding has occurred within the site boundary or immediate vicinity as flood events might not have been reported to the Flood Risk Management Team.

SuDS Guidance:

The use of Sustainable Drainage Systems (SuDS) should be considered at an early stage in the design process, to integrate SuDS with road networks and other infrastructure. The drainage system should consider the four pillars of SuDS (water quantity, water quality, amenity, and biodiversity) and follow the surface water discharge hierarchy. We expect that investigation into infiltration potential is undertaken using methods in accordance with BRE365. If infiltration testing and groundwater monitoring results are unfavourable for draining the site using infiltration SuDS, any existing runoff rates/volumes must be controlled to a pre-development greenfield runoff rate (Q_{bar}). We would expect that above ground SuDS are used as much as possible to maximise controlling surface water runoff where it falls (e.g. water reuse, green roofs, bioretention areas, ponds, basins, swales etc.).

The FRA/Drainage Strategy should demonstrate there will be sufficient surface water quality treatment by implementing an appropriate amount of water quality treatment stages through the use of SuDS. Chapter 26 of the CIRIA SuDS Manual has lots of guidance for managing surface water quality, including tables for suitability of different SuDS components and the Simple Index Approach. Interception storage should be used in the beginning of the treatment train to ensure the drainage system manages pollutants as close to the source as possible and remove sediment upstream in the system rather than closer to the discharge location.

We would expect that any proposed surface water drainage scheme takes all opportunities to improve any existing risk of flooding to the surrounding road networks. Opportunities should also be considered on how the development may improve flood risk overall by assessing if any additional flood mitigation can be integrated into the scheme, such as storage areas in blue green corridors.

Any phasing of the development must be shown to be able to be developed with a dedicated drainage infrastructure that does not rely on any other phase to be developed. A drainage phasing timeline will be required to show how each element of the drainage system will be implemented prior to completion of the building phase. Details of the required maintenance of any SuDS features and structures and who will be adopting these features for the lifetime of the development must be provided in accordance with the NPPF.

We require the applicant to submit information and drawings which clearly shows the proposed drainage strategy and exceedance flood flow routes for all areas of development.

These plans should include the finished floor levels of all buildings, the proposed finished floor levels and potential exceedance flow route.

Details of the construction phase temporary drainage arrangements are required by the LLFA to ensure there will be no increase in flood risk due to the construction works of the development either onsite or elsewhere. A high-level assessment is required at an initial planning stage. Furthermore, the applicant will also need to submit the proposed construction phasing plans for the development to demonstrate that prior to completing the site there will be no increase in flood risk due to the interim development phases either onsite or elsewhere.

When submitting the application to the Local Planning Authority, please submit the SuDS proforma and validation checklist to assist us in reviewing the application and expedite the process. These can be found here: [Flood Risk Management: Pre-application advice](#).

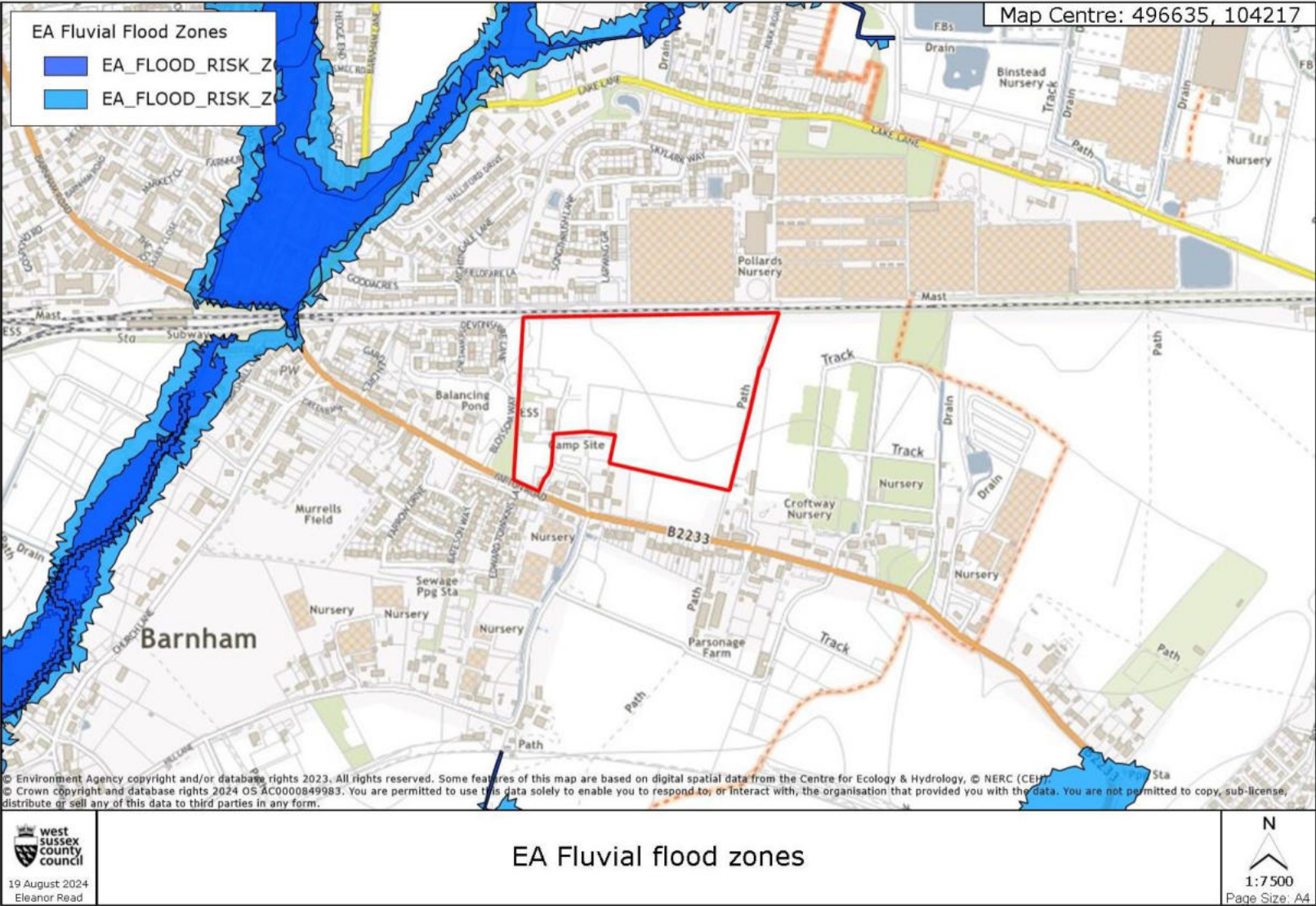
Further guidance on surface water drainage requirements for planning applications within Arun District can be found in on Arun's website: [Surface water drainage](#)

Yours sincerely,

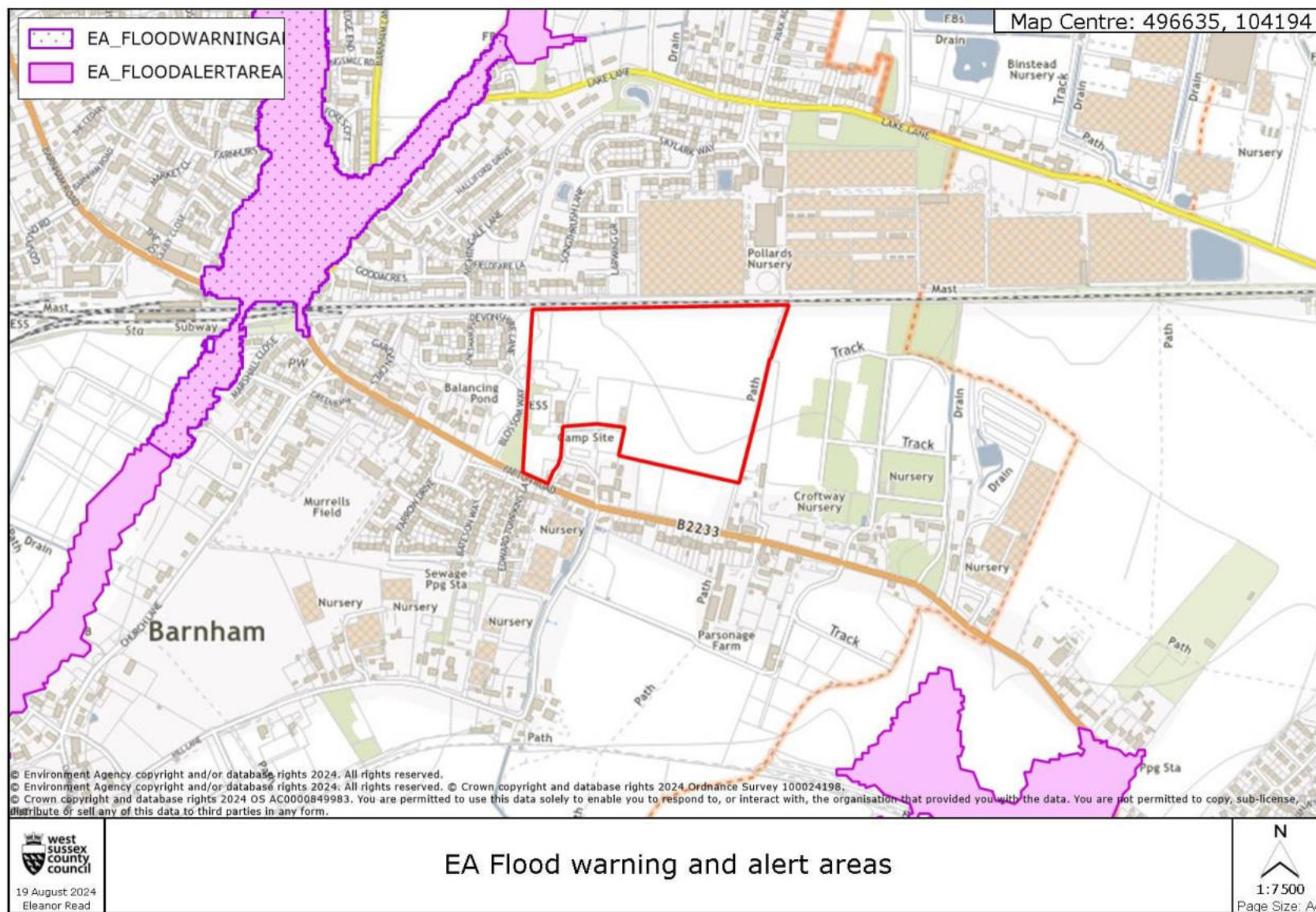
Eleanor Read
Flood Risk Management Team
Eleanor.read@westsussex.gov.uk

Appendices

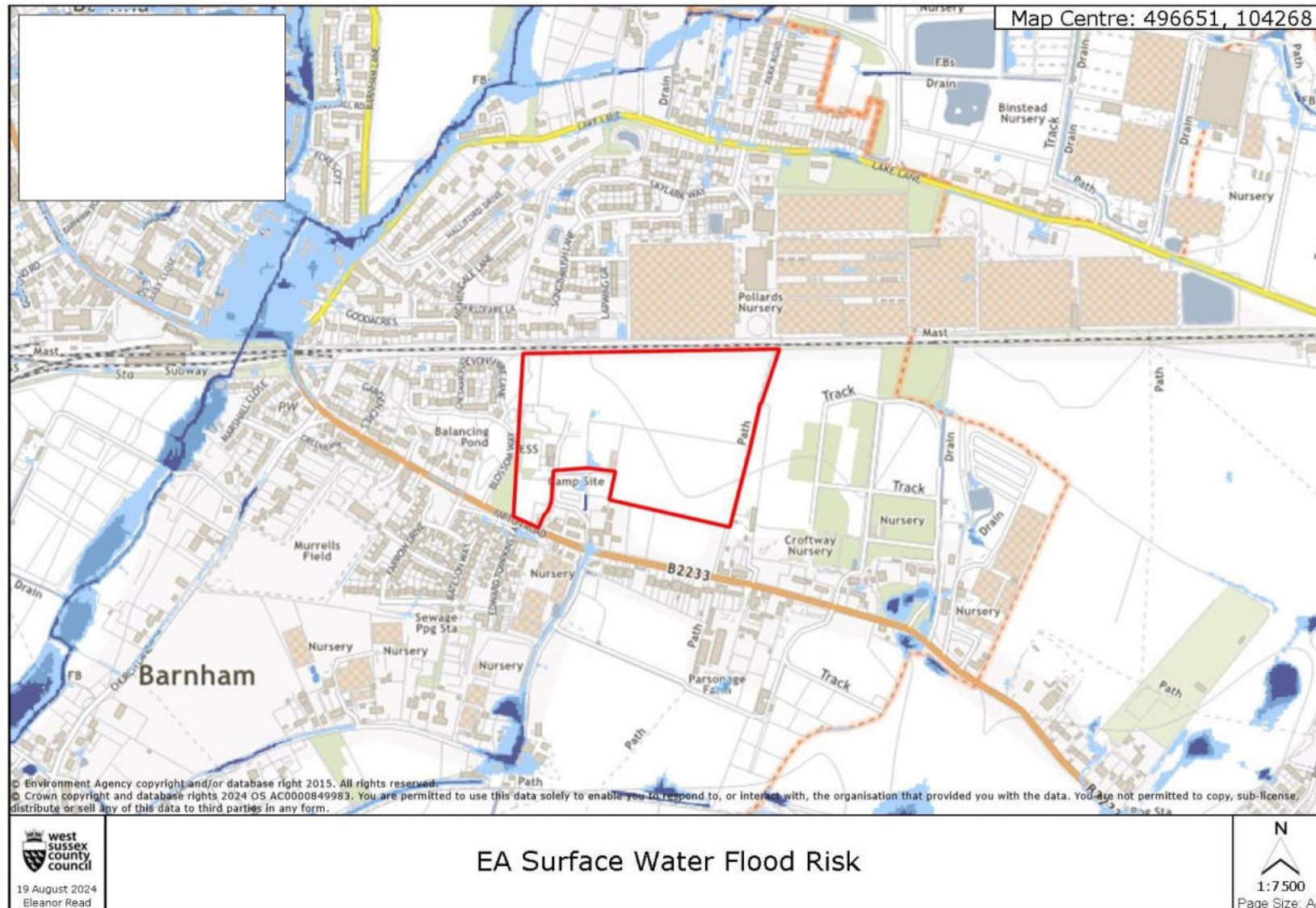
Appendix A-Fluvial flood risk



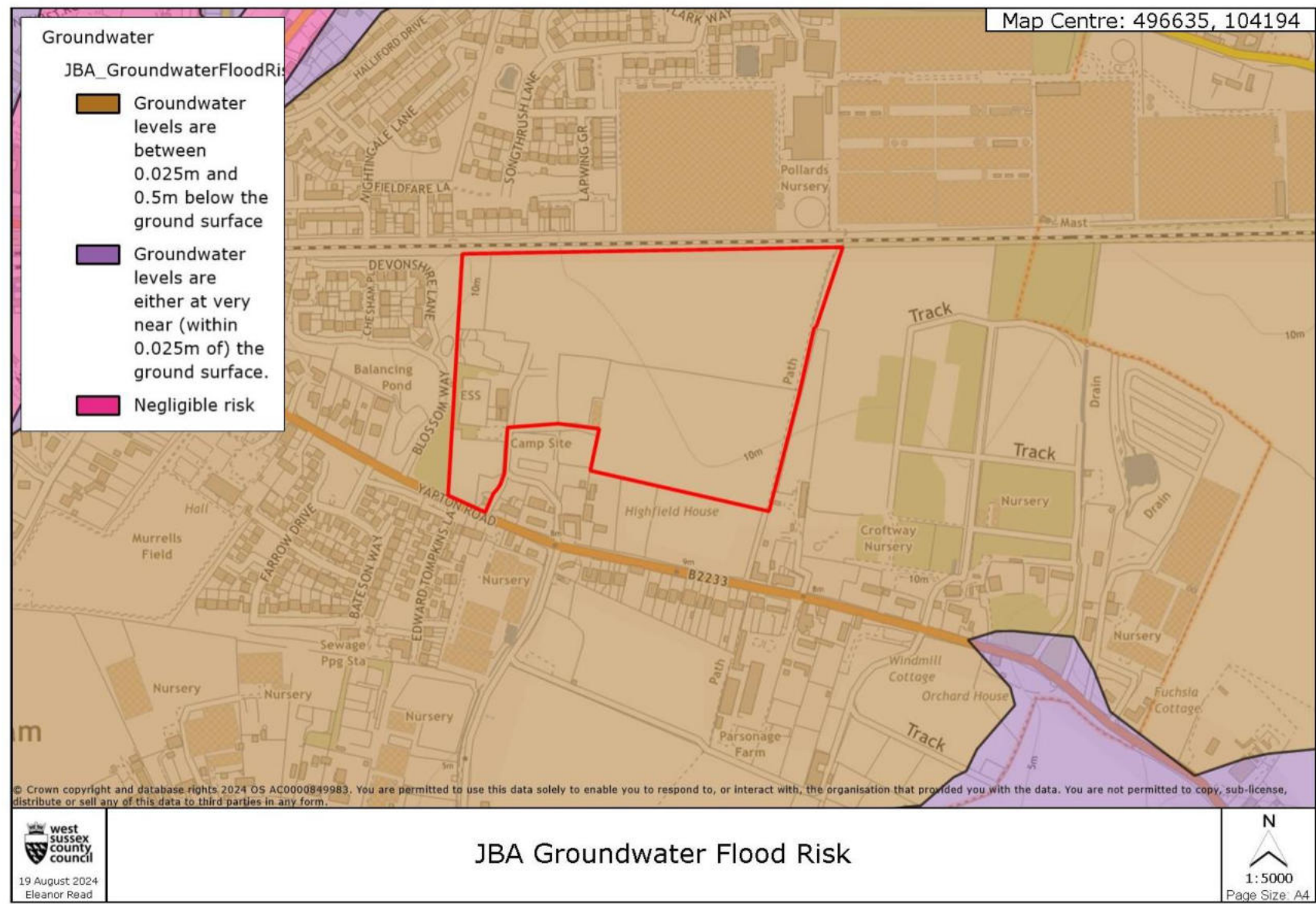
Appendix B-Flood warning and alert areas

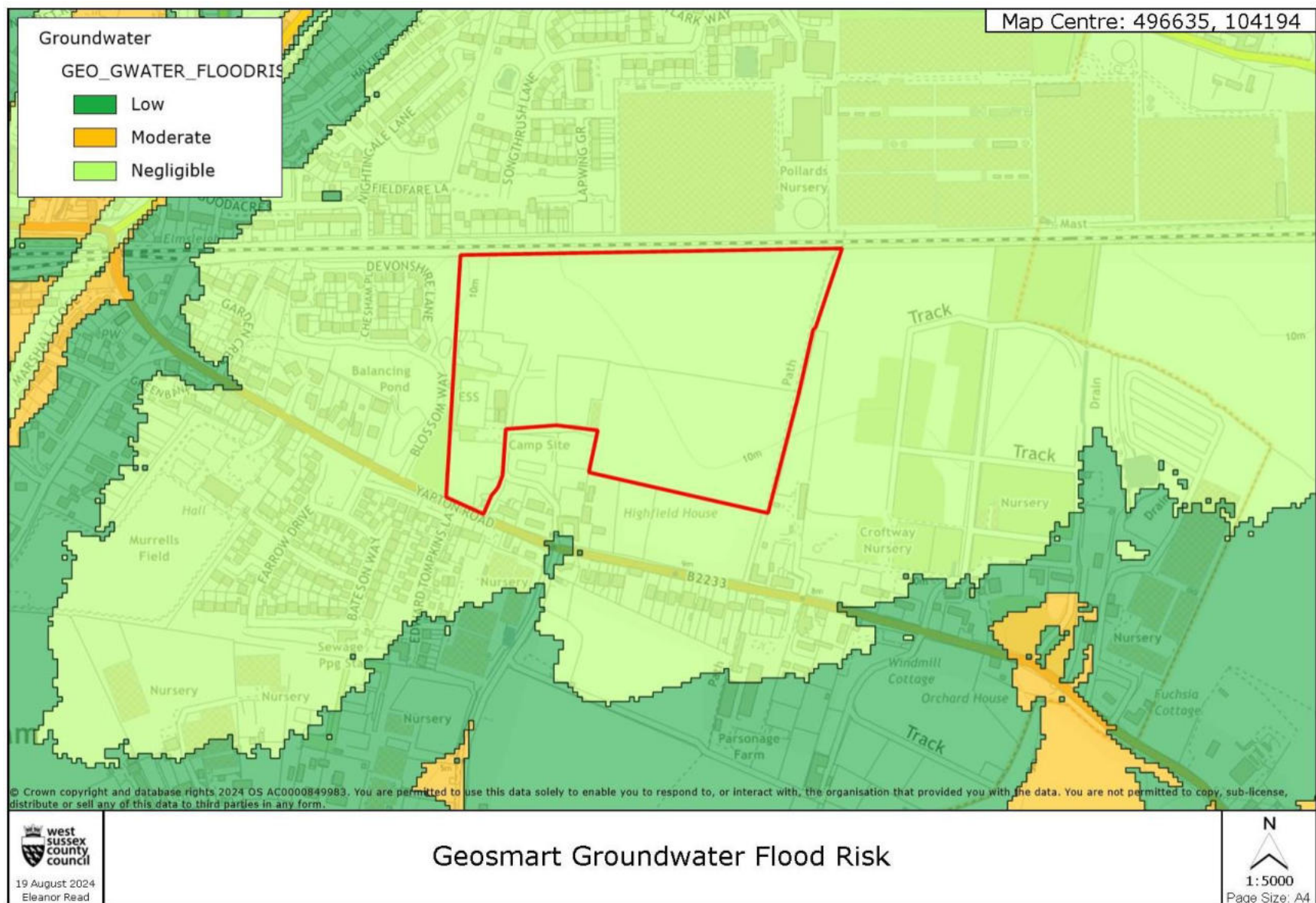


Appendix C-Surface water flood risk

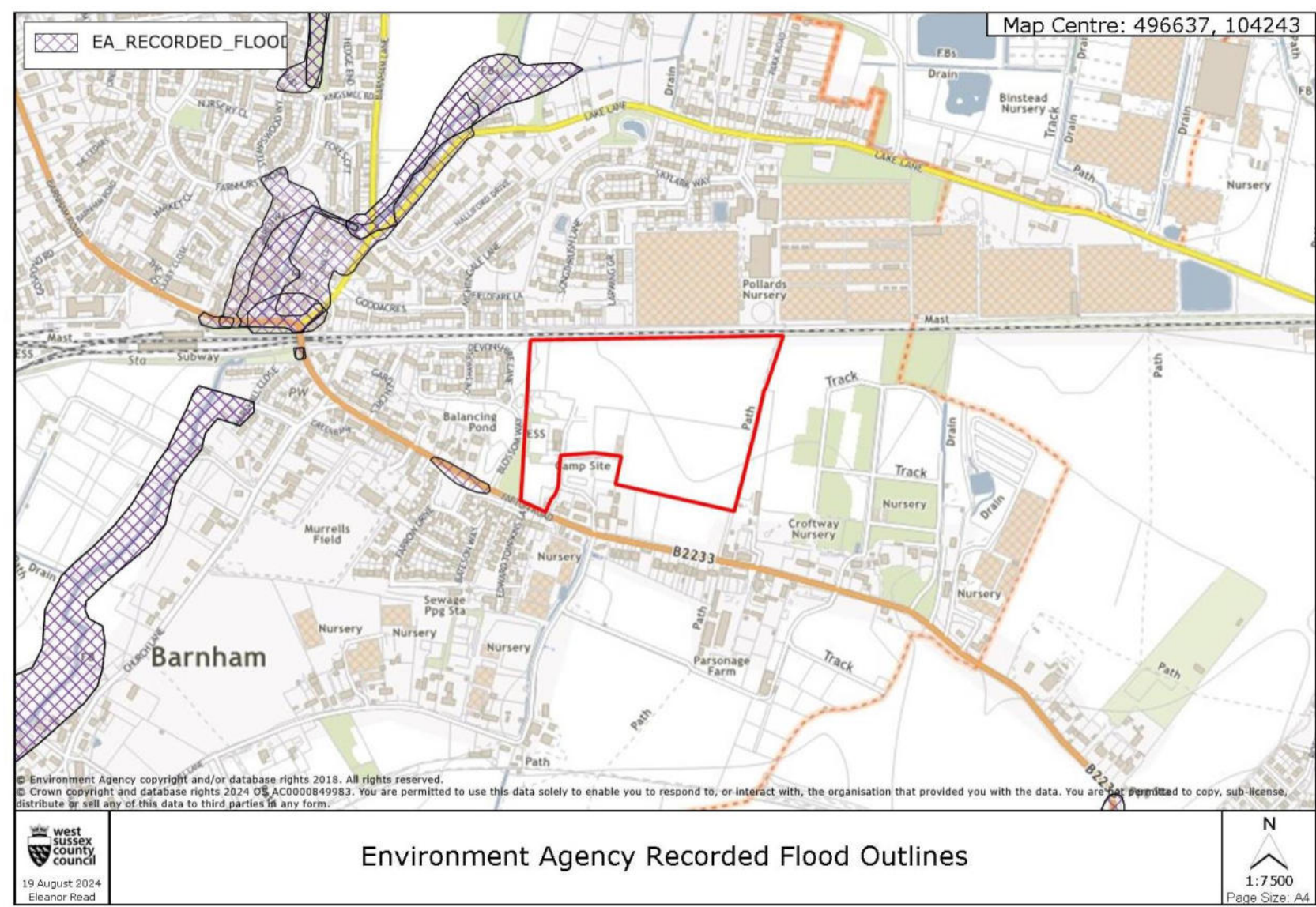


Appendix D-Susceptibility to groundwater flooding





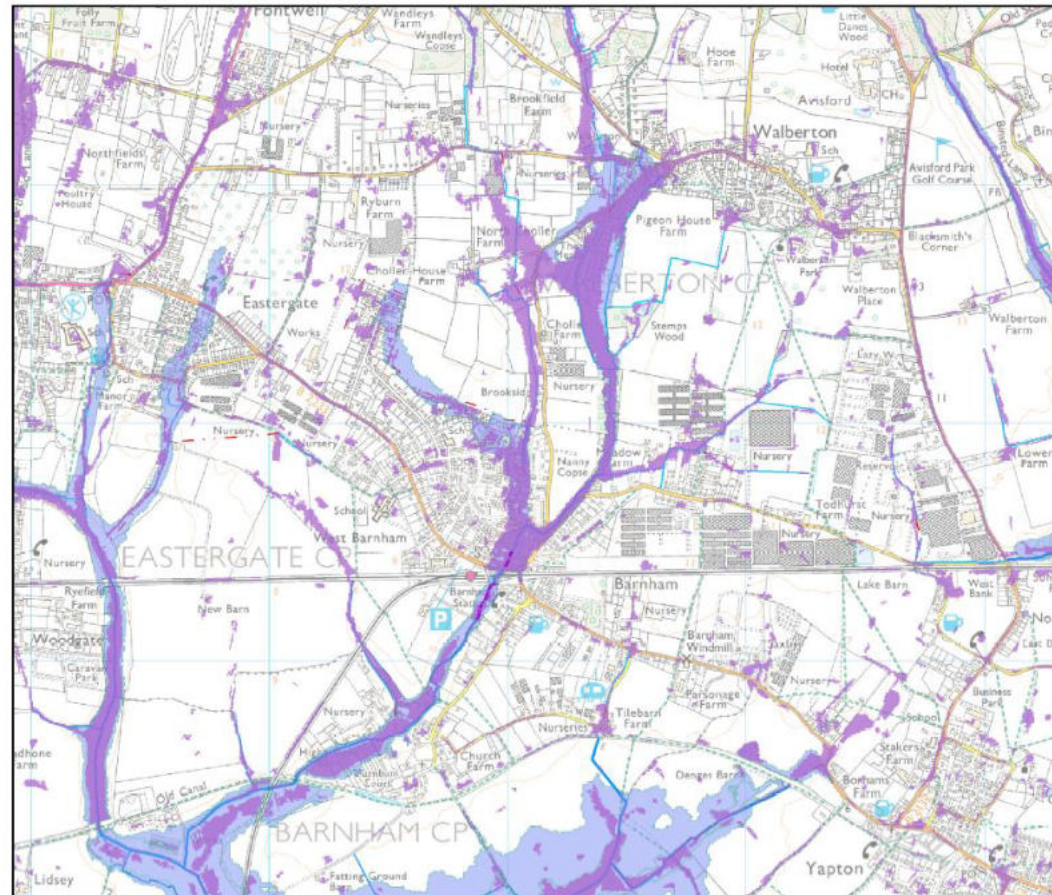
Appendix E-Environment Agency Historic Flood Map



Appendix F-Wet Spots

Wet spots show areas classified in 2013 Local Flood Risk Management Strategy where a significant number of properties may be susceptible to flooding. Barnham and Walberton is identified as a Wet Spot. The site is located within this area.

Barnham and Walberton



Legend

- Surface Water Flood Map
1 in 200 yr rainfall event
- Rivers and Sea Flood Map
1 in 100 year river event,
1 in 200 year sea event

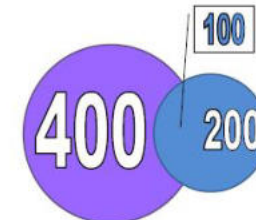
River obstructions

- ARTIFICIAL
- NATURAL
- UNKNOWN

River network

- Primary River
- Secondary River
- Tertiary River
- D/S of High Water Mark
- D/S of Seaward Extension
- Lake / Reservoir
- Canal
- Extended Culvert (> 50m)
- Canal Tunnel
- Underground River (inferred)
- Underground River (local knowledge)

Numbers of properties at risk from surface water vs. rivers and sea



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Ordnance Survey 100024198
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Appendix G-Historic Flood Incidents (WSCC)

No records within site itself

Hill Lane – Highway flooding in November 2010

Eleanor Read

Flood Risk Management Officer
Highways, Transport and Planning Directorate
03302 227048
Eleanor.read@westsussex.gov.uk
www.westsussex.gov.uk

Ground Floor
Northleigh
County Hall
Chichester
PO19 1RH



Hanbury Properties Limited
17 Northgate
Chichester
West Sussex
PO19 1BJ

14th October 2024

Dear James and Stuart,

LLFA/PLAN/PREAPP/24/005-Sunnyside, Yapton Road, Barnham

WSCC Flood Risk Management Team Level 2 Pre-Application Advice has been sought for a 9.20ha site in Barnham, Arun District. Following a kick-off MS Teams meeting on Monday 30th September we have the following comments to make following discussions of the current proposals:

1. For the proposal to infill/culvert the ditch south of the site to allow construction of 3 houses approved under BN/5/20/PL and create a compensatory swale along the southern boundary for the Sunnyside application, this will be considered on its merits as part of the required OW Consent application process, but in order for it to be acceptable in principle adequate compensation will be required. If open ditch is culverted, compensation must be directly linked to the existing network and ensure water continues to travel towards the opening of the culvert. The details may need to be further discussed with Paul Cann at Arun District Council. We would suggest considering the Ordinary Watercourse pre-app service: [Ordinary watercourse land drainage consent - West Sussex County Council](#)
2. Following internal discussions about high groundwater levels and shallow infiltration, we suggest that where the groundwater is >1.3 mbgl, shallow infiltration/percolation testing should be carried out to inform the design of infiltration features such as permeable paving. Where groundwater levels are above <1.3 mbgl, we wouldn't recommend any infiltration/percolation testing in those areas as it will not be a viable means of draining the site.
3. When designing the site for high groundwater levels (and therefore high risk of groundwater flooding), we suggest flow routes for groundwater are considered and maintained during the masterplan process and finished floor levels are at minimum 150 mm above the ground level or 300mm above expected flood levels.
4. Winter groundwater monitoring for the whole winter (Oct-Mar) will still be required for design considerations (flotation/buoyancy for storage features and shallow infiltration feature design).

5. Wholesale ground raising is to be avoided and will be deemed unacceptable if it alters the natural flows and is deemed to increase flood risk elsewhere. Should ground raising be required, any alterations to flow will need to be considered and mitigated. Please note these comments only consider impacts on local flood risk.

For the drainage layout, we strongly suggest using open, source control SuDS features where possible. This includes features such as filter strips, swales, permeable paving, rain gardens, bioretention areas, rainwater harvesting and green roofs. This is because open features are easier to maintain than traditional piped systems and help meet the 4 pillars of SuDS design (water quality, water quantity, amenity and biodiversity). For design criteria please follow guidance in the SuDS Manual.

Paul Cann will provide a summary of the issues in the current drainage network and offered to suggest possible remedial works. He will also provide details of the existing pipe sizes/approved drawings from relevant ordinary watercourse consents in the downstream network.

As agreed, we are happy to conduct one further meeting at a time of your choosing to discuss the drainage strategy when work to develop it has progressed further.

SuDS proforma and validation checklist can be found here: [Flood Risk Management: Pre-application advice - West Sussex County Council](#). Please note LPAs may have separate validation lists.

Yours sincerely,

Ellie Read

Flood Risk Management Team

cc: Stuart Burnett (BP Civils), Mark Akmenkalns (BP Civils), Paul Cann (ADC)

Appendix H1 WSCC Flood Risk Validation Checklist

Flood Risk Validation Checklist for Planning Applications

SITE NAME	Sunnyside, Yapton Road, West Sussex, PO22 0BA
DATE	07/04/2026

1. Proforma

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Application only be validated by LPA if the LLFA surface water proforma is completed and attached	Yes please send enclosed	

2. Site Surveys (if appropriate)

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Topographic survey	SK04 & SK05	
Details of existing site layout, drainage, and catchment areas plus pre- and post-development impermeable areas	SK06,SK07,SK10,SK11	
Evidence of % increase for urban creep and how it has been applied to post-development calculations	SITE3D 1D MODELLING OUTPUT	
Ground investigation including groundwater level information (for seasonally high groundwater level), potential contamination and infiltration testing (to BRE365 or similar)	Please refer to Ashdown SI reports & Ashdown SI Monitoring Well Plan P16815 Fig.1	
Existing drainage scheme survey, e.g., CCTV or historic plans	SK10,SK11, SOUTHERN WATER SEWER RECORDS, ARUN OWC DATA	
Survey of existing waterbodies, e.g., watercourses, ponds or springs and culverts or bridges	SK04 & SK05	

3. Plans and Drawings

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Layout drawing including drainage scheme SuDS and other water features. Including invert levels, cover levels, conveyance systems any pipe gradients, flow directions and labels that match any drainage modelling calculations. Outfall locations, control devices, attenuation systems and water quality treatment features.	SK10 & SK11	

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
High level construction management plan including phasing access arrangements and operational characteristics. Temporary drainage and water pollution including discharge points and flow controls should be included.	N/A	
Landscaping planting scheme for vegetated SuDS	DLA-2242-100-DR-L101.S12 Site Layout	
Maintenance plan and confirmation in principle of adopting authority for the lifetime of the development	To be reviewed at design stage, but will comply with CIRIA guidance	

4. Assessments

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Evidence that the SuDS hierarchy and the 4 pillars have been met	D2298/FRA/1.1, drainage proposals and National Standards	
Full supporting calculations for the drainage design including design parameters using FEH and predevelopment greenfield runoff rates/volumes	D2298/FRA/1.1, Site3D 1D modelling	
Critical storm simulation results of the conveyance network by level and discharge for events 100% AEP, 3.33% AEP, 3.33% AEP plus climate change, 1% AEP and 1% AEP plus climate change	D2298/FRA/1.1, Site3D 1D modelling	
Evidence of calculations to support the sizing of storage features to accommodate the 3.33% AEP plus climate change and 1% AEP climate change critical storms	D2298/FRA/1.1, Site3D 1D modelling	
Evidence and drawing of where any flooding would occur during a 1% AEP plus climate change critical storm event would occur. Information should include extent, depth, and velocity of flooding, demonstrating that it would not leave the site boundary.	D2298/FRA/1.1, Site3D 1D modelling	
Flood resistance and resilience measures 300mm above flood levels	N/A	
Drawing showing exceedance flows greater than 1% AEP plus climate change or if the drainage system is compromised	SK10 & SK11, perimeter collection features	

5. Supplementary Evidence

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Confirmation of discharge location approval (in principal agreements from third parties if appropriate)	S106 FW Sewer Connection to be sought at design stage.	
Confirmation of any consents required	OWC required as highlighted within FRA report	
Evidence of predevelopment discharge capacity analysis (where discharging from an existing pipe)	N/A	

Appendix H2 WSCC LLFA SUDS Pro Forma

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	Sunnyside, Yapton Road, West Sussex, PO22 0BA	Outline & Full
1.2	OS grid reference (easting and northing)	SU 96521 04113	Outline & Full
1.3	Planning application reference		Outline & Full
1.4	Total site area (hectares)	80,978m ² (8.10Ha)	Outline & Full
1.5	Pre-development use	Greenfield agricultural land	Outline & Full
1.6	Proposed design life	Residential	Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)	Yes, principle to utilise an existing ordinary watercourse has been established	Outline & Full
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	Please refer to drawings SK04 & SK05 showing existing survey, levels and contours	Outline & Full

2. Discharge Hierarchy/Methods of Discharge¹

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	No, TBC by client	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	No	Outline & Full
2.3	Hybrid (YES/NO)	No	Outline & Full

¹ Runoff may be discharged via one or multiple methods.

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	Yes	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	No	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	No	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS ² (hectares)	36,549m ² (3.65Ha)	Outline & Full
3.2	Impermeable area drained pre-development ³ (hectares)	0	Outline & Full
3.3	Impermeable area drained post-development ³ (hectares)	36,549m ² (3.65Ha)	Outline & Full
3.4	Urban Creep (hectares)	10% @ 1073.6m ² (0.1Ha)	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	100yr plus 45%	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	Yes	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	Winter 2024-2025 (Full winter)	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	200mm bgl	Full
4.4	Infiltration rate	Not suitable, no testing as agreed via WSCC	Outline & Full

² Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

³ 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	N/A	Full
4.6	Safety factor used for sizing infiltration storage	N/A	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates⁴

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	17.7l/s	Outline & Full
5.2	1 in 1 year rainfall (l/s)	15.1l/s	Outline & Full
5.3	1 in 30 year rainfall (l/s)	40.8l/s	Outline & Full
5.4	1 in 100 year rainfall (l/s)	56.6l/s	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	N/A	Outline & Full
6.2	1 in 30 year rainfall (l/s)	N/A	Outline & Full
6.3	1 in 100 year rainfall (l/s)	N/A	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m ³)	0	Outline & Full
7.2	Attenuation (m ³)	4565 (Quick Est) Refer to SITE3D 1D Modelling for further refinements	Outline & Full
7.3	Separate volume designated as long-term storage ⁵ (m ³)	3721m3 (ditch,basin & tank, 1483m3 PP)	Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m ³)	5204m3 (inc freeboard depths)	Full

⁴ Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

⁵ In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	7l/s	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	7l/s	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)	7l/s	Outline & Full
		1 in 100 (1%) AEP (m/s)	7l/s	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	7l/s	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		Yes	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		Yes	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		Yes	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		Yes. Surcharged outfall not required where flow control inverts are above ultimate outfall ground level (Hill Lane)	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	Please refer to Ashdown SI reports & Ashdown SI Monitoring Well Plan P16815 Fig.1	Outline & Full
9.2	Detailed drainage design layout	Please refer to drawings SK10 & SK11 illustrating Drainage GA's	Full
9.3	Maintenance strategy	To be reviewed at design stage, but will comply with CIRIA guidance	Full

No.	Requirement	Answer	Application Type
9.4	Detailed development layout	Please refer to drawings SK10 & SK11 illustrating Drainage GA's	Full
9.5	Impermeable area plan	Please refer to drawings SK06 & SK07 illustrating catchment areas	Full
9.6	Phasing plan?	N/A	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	Yes. Please refer to drawings SK10 & SK11 illustrating Drainage GA's	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	Mark Akmenkalns
Qualification of person responsible for signing off this proforma	Director
Company	BP Civils
On behalf of (client's details)	Confidential
Date	07.04.2026

Appendix H3 Arun DC Surface Water Drainage Design

OUTLINE APPLICATIONS ONLY

Surface Water Drainage Design

This checklist has been created to assist designers, by clearly defining our expectations and requirements for surface water drainage designs that are submitted to support **outline** planning applications – where the layout and scale of the proposed development is not being decided.

The checklist and critical items have been designed to align with the National Standards for SuDS and The SuDS Manual, offering clarity where there are deviations between them.

Critical items are highlighted in **bold**. A failure to address these will result in an **objection** to any outline application.

It is recommended that applicants and their designers take time, at the outset of the planning process, to familiarise themselves with our checklists and guidance. For details of our expectations for a fully detailed surface water drainage design, to support a full or reserved matters planning application, or an application to discharge a surface water drainage design condition, please refer to our Full Surface Water Drainage Design Checklist.

It is expected that surface water drainage information is submitted with all planning applications. Surface water drainage information may be requested for smaller proposals where drainage is expected to affect determination – for example, in the Lidsey Wastewater Treatment Catchment area.

Applicants who submit all the information requested by the checklist, as early as possible in the planning process, benefit from quicker review times and less delays caused by requests for further information. The omission of information may lead to objection to, or refusal of planning applications or applications to discharge conditions.

Applicants for major development sites must be aware that West Sussex County Council [WSCC] acting as Lead Local Flood Authority [LLFA] are a statutory consultee for flood risk and surface water drainage design. It is important to consult WSCC guidance in addition to our guidance and this checklist.

A major planning application is defined as:

- The creation of 10 or more residential units,
- Residential development of on a site of 0.5 hectares or more (where the number of residential units is not yet known i.e. for outline applications),
- Non-Residential development or change of use on a site of at least 1 hectare,
- Creation or change of use of 1000 square metres or more of gross floor space (not including housing).

Applicants have the option to apply for confidential pre-application advice relating to their surface water drainage design from either Arun District Council or WSCC. Bespoke advice is not offered outside of a fee-paying application.

ADC pre-application advice: <https://www.arun.gov.uk/pre-application-advice>

WSCC pre-application advice: <https://www.westsussex.gov.uk/roads-and-travel/information-for-developers/flood-risk-management-pre-application-advice/>

OUTLINE APPLICATIONS ONLY

Surface Water Drainage Design Checklist

Site Name/Address:	Sunnyside, Yapton Road, West Sussex, PO22 0BA
Application Description:	Residential Development
Any relevant planning application references:	TBC by client

Policy and Guidance Information
Arun District Council Local Plan – Section 18, Water Adopted Local Plan.pdf (arun.gov.uk) National planning Policy Framework - National Planning Policy Framework (publishing.service.gov.uk) Arun District Council Surface Water Drainage Guidance (including design checklists) - https://www.arun.gov.uk/surfacewater Land Drainage Consent – https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/ordinary-watercourse-land-drainage-consent/ Arun District Council Land Drainage Byelaws - https://www.arun.gov.uk/byelaws/ Arun District Council surface water pre-commencement conditions - https://www.arun.gov.uk/planning-pre-commencement-conditions The National Standards for SuDS - https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds The SuDS Manual [C753] by CIRIA

Ground Investigation Results
Ideally site-specific ground investigation results - to support a desk study - will be submitted with an outline planning application. If infiltration is proposed at the outline planning application stage and there are no winter infiltration tests and winter groundwater monitoring available to prove that the strategy is viable, then alternative proposals for discharge must be provided. This will ensure that if subsequent site-specific winter ground investigations show that infiltration is not possible, then the site can still be sustainably and effectively drained. If there are no alternative sustainable means of disposing of surface water, apart from using infiltration, then site-specific winter ground investigation results are <u>essential</u> prior to determination. Groundwater monitoring ☒ Plan showing location of monitoring points providedⁱ. ☒ Depths of holes detailedⁱⁱ. ☒ Dates of observations and depth to groundwater recorded. ☒ Evidence of the strata within borehole or monitoring pits provided. ☒ Plan showing the peak groundwater levels at each monitoring point in mAOD (preferred). ☒ Peak groundwater levels recorded in metres below ground level and mAOD (preferred).

- ☐ If in an area of possible tidal influence, provide a comparison of readings against tide times/levels (preferred).

Infiltration testing

- ☐ Infiltration testing is completed strictly in accordance with BRE DG 365, CIRIA R156 or a similar approved method.
- ☐ Plan showing location of trial pits provided.
- ☐ Pit dimensions provided.
- ☐ Depths of testing providedⁱⁱⁱ.
- ☐ Dates, times and readings of each test recorded.
- ☐ Calculations for the infiltration rate for each test provided.
- ☐ Incomplete testing results are not extrapolated to obtain design values for infiltration rates.
- ☐ Evidence of the strata within trial pits provided.
- ☐ Test locations, and depths correspond with the expected location and depths of proposed infiltration features.
- ☐ Depths of testing provided in m below ground level and mAOD (optional).
- ☐ Specialist advice is submitted to support designs where infiltration is proposed where there may be,
- risk of dissolution,
 - risk of slope instability,
 - infiltrating features closer than 5m to buildings or highways,
 - contamination,
 - made ground at the infiltration depth,
 - ground raising proposed,
 - deep bore soakaways proposed^{iv}.

Surface Water Drainage Statement

1. Runoff destination

Existing Site

☒ **The condition, performance (including capacity where appropriate) and ownership of any existing site surface water drainage infrastructure must be accurately reported.**

- ☒ It is clear what the natural drainage characteristics of the site and hydraulically linked areas are^v.
- ☒ Natural flow paths are identified on a plan (where applicable).
- ☒ Existing site drainage features are investigated – condition, performance, and ownership^{vi}.
- ☒ Environmentally sensitive receiving water bodies are identified – for example groundwater source protection zones.
- ☒ **Existing and future flood risk from any source is detailed^{vii}.**

Proposed Design

☒ **The proposed discharge method must accord with the SuDS hierarchy as given below.**

1. Rainwater reuse
2. Infiltration to ground
3. Hybrid infiltration and restricted discharge to an appropriate water body^{viii} or surface water sewer is proposed
4. Restricted discharge to a water body
5. Restricted discharge to a surface water sewer or another piped surface water drainage system
6. Restricted discharge to a public combined sewer

☒ **Adequate evidence is supplied to justify the proposed discharge method^{ix}.**

☒ Where infiltration has not been adequately investigated but is proposed, a second sustainable disposal method has been identified. ☒ No connection of surface water to the public foul sewer is proposed^x. ☒ It is demonstrated that the drainage proposals will integrate with and not compromise the function of the natural and existing drainage systems on the site. ☒ The design can be gravity based with no use of pumps^{xi}. ☐ 1m unsaturated ground is provided between peak groundwater levels and the base of any infiltration feature. ☒ If surface water must be discharged to a sewer network, then hydraulic capacity checks are provided. ☐ Relevant restrictions relating to discharging to an environmentally sensitive receiving water body – for example a groundwater source protection zone - are investigated, reported and adhered to. ☐ Details of any offsite works, plus any associated permissions or legal agreements from asset or landowners are identified and ‘in principle’ consents provided. <u>Preferred</u> ☒ Ground raising is avoided where possible. ☒ Any previous relevant correspondence or pre-application advice from the Local Planning Authority [LPA] or the Lead Local Flood Authority [LLFA] regarding the surface water drainage design is included with the statement.
2. Interception drainage – N/A for OUTLINE applications
3. Extreme rainfall and flooding Proposed Design ☒ Statement confirming the proposed design criteria including fixed design calculation inputs for the SuDS system. Examples include: • Climate change allowances, • Urban creep, • CV values, • Rainfall data, • MADD factor or additional storage ☒ The proposed discharge rate (per hectare) is explained and justified for attenuation designs. ☒ Any relaxation factors applied to discharge rates for previously developed sites^{xii} are agreed prior to the scale and layout of the development being approved. ☒ It is shown how a surface water drainage design will not conflict with additional areas of flood storage or compensation. ☒ Surface water flow entering the site from elsewhere can be conveyed safely around or through the site without compromising the SuDS system.
4. Water quality, amenity, biodiversity, construction and maintenance ☒ The design is committed to the use of multifunctional SuDS to meet community and environmental requirements. ☐ It is confirmed what the adoption arrangements for SuDS components will be. ☐ It is confirmed what elements of the SuDS will be private.
Surface Water Drainage Calculations/Modelling <u>General</u> ☒ FEH22 point descriptors for the site are submitted confidentially^{xiii}.

☒ The most recently applicable, or previously agreed FEH rainfall data is used.
<u>Infiltration</u> ☐ Half drain times do not exceed 24 hours for the critical 3.33% AEP + CCA event.
Drainage Plans and Specifications
☒ Appropriate easements and permissions relating to watercourses^{xiv}, infiltrating structures^{xv}, other services and third-party land^{xvi} must be evidenced and shown on all plans where applicable. ☐ Existing and proposed site sections and levels.

This checklist is designed to aid an applicant with their submission. The list is not exhaustive, and our engineers may request additional information to enable them to review a proposal to their satisfaction.

Where an outline planning application proposes to determine more than the principle of development and access, the applicant is encouraged to refer to our full detailed design checklist for more information on what may be required.

The checklist may also request information that an applicant does not feel is relevant to their submission. In this case the applicant can provide an explanation as to why they have omitted certain information in their drainage statement. However, the appraising engineer reserves the right to request this information if they believe it is necessary for their review.

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- ⁱ The monitoring locations must correspond with the location and depth of proposed infiltration features.
 - ⁱⁱ Groundwater monitoring holes must be deep enough to allow for 1m of unsaturated ground between the peak groundwater level and the base of any potential or proposed infiltration feature.
 - ⁱⁱⁱ Testing depths must account for groundwater levels and 1m of unsaturated ground between the base of the test pit and the peak groundwater level.
 - ^{iv} Deep bore soakaways are strongly resisted and any planning application that suggests the use of them without formal acceptance from the Environment Agency will be objected to.
 - ^v It is suggested that this is achieved with reference to the ground investigations and a topographical plan. Where there is more than one catchment these should be clearly identified.
 - ^{vi} Confirmation, plans and surveys of any existing drainage infrastructure on the site.
 - ^{vii} Flood maps (fluvial, tidal, pluvial, groundwater, sewer, and reservoir) are supplied (or Flood Risk Assessment referred to). Full details of any known flooding on the site is referred to.
 - ^{viii} A water body may be defined as a river, watercourse, ditch, culverted watercourse, reservoir, wetland or the sea.
 - ^{ix} Evidence includes ground investigations, locations, mapping, network types, flow direction, ownership/responsibility, depth, capacity, condition and cost. Higher priority destinations must be used to the maximum extent practicable.
 - ^x Engineers will object to any proposed connection of surface water to the foul sewer under all circumstances.
 - ^{xi} All surface water drainage designs must drain via gravity to corresponding points of discharge where possible. The use of pumps for surface water drainage will only be agreed to in exceptional circumstances.
 - ^{xii} See Arun District Council guidance note regarding surface water drainage of previously developed sites at www.arun.gov.uk/surfacewater.
 - ^{xiii} Please submit FEH22 point data files, in accordance with clause 5.1.7 of the FEH Web Service terms of use (<https://fehweb.ceh.ac.uk/Home/Terms>). These must be submitted directly to land.drainage@arun.gov.uk rather than to the planning portal (via the planning officer), this is to ensure that the data remains confidential in accordance with those terms.
 - ^{xiv} 3m from the top of the bank of all ordinary watercourses, and from the edge of all culverted watercourses. 8m from the top of the bank of all main rivers - unless an alternative easement has been stipulated by the Environment Agency.
 - ^{xv} 5m from all buildings and highways, unless an alternative easement is recommended by a geotechnical specialist. (Aside from permeable paving that does not take any extra impermeable catchment such as a roof).
 - ^{xvi} As stipulated by the utility owner or landowner.

Appendix I Site3D Hydraulic Calculations

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Size (mm)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S68	0.000	1350	Type C	11.170	10.192	0.603	496747.492	104322.727
S69	0.000	1350	Type C	11.282	10.064	0.843	496709.235	104321.978
S119	0.000	1350	Type C	11.219	10.018	0.827	496676.890	104339.773
S70	0.000	1350	Type C	11.453	9.957	1.121	496677.146	104321.550
S71	0.000	1350	Type C	11.415	9.925	1.115	496672.878	104312.829
S138	0.334	1350	Type C	11.410	9.842	1.193	496672.188	104287.983
S72	0.039	1350	Type C	11.311	9.822	1.115	496672.070	104281.938
S137	0.200	1350	Type C	11.232	9.949	0.908	496756.136	104282.694
S73	0.050	1350	Type C	11.537	9.745	1.416	496694.947	104282.074
S142	0.053	1350	Type C	11.294	10.518	0.626	496687.352	104251.405
S74	0.000	1350	Type C	11.218	9.643	1.200	496695.199	104251.421
S75	0.098	1350	Type C	11.067	9.571	1.120	496694.406	104229.871
S131	0.014	1350	Type C	11.152	9.437	1.341	496686.321	104190.242
S106	0.042	1350	Type C	10.918	9.378	1.165	496703.343	104185.751
S103	0.103	1350	Type C	10.556	9.400	0.856	496678.326	104162.812
S76	0.000	1350	Type C	10.597	9.284	1.012	496697.497	104158.336
S99	0.000	1350	Type C	10.383	9.202	0.805	496692.574	104134.199
S77	0.000	---	Type C	10.300	9.150	0.775	496689.336	104118.855
S135	0.000	1350	Type C	11.009	9.656	0.978	496708.092	104228.260
S134	0.000	1350	Type C	10.921	9.589	0.957	496728.143	104229.524
S133	0.113	1350	Type C	10.845	9.538	0.933	496743.580	104228.370
S132	0.051	1350	Type C	10.703	9.463	0.865	496739.754	104206.326
S102	0.000	1350	Type C	10.527	9.346	0.806	496731.968	104172.021
S144	0.082	1350	Type C	10.425	9.675	0.600	496716.385	104129.904
S1	0.000	1350	Type C	10.278	9.195	0.708	496719.878	104128.460
S2	0.096	---	Type C	10.300	9.150	0.775	496716.586	104115.351
S3	0.000	---	Type C	10.300	9.050	0.875	496664.757	104114.406
S4	0.000	---	Type C	10.300	8.950	0.975	496644.028	104117.041
S45	0.024	1350	Type C	11.067	10.400	0.517	496544.439	104347.209
S47	0.051	1350	Type C	11.174	10.200	0.749	496629.411	104347.672
S46	0.000	1350	Type C	10.912	9.900	0.787	496600.997	104346.519
S48	0.007	---	Type C	10.800	9.850	0.725	496600.791	104339.894
S49	0.000	---	Type C	10.800	9.800	0.775	496600.600	104327.883
S61	0.050	1350	Type C	10.874	10.050	0.599	496551.915	104322.059
S60	0.112	1350	Type C	10.660	9.825	0.610	496592.369	104321.152
S50	0.008	1350	Type C	10.622	9.626	0.621	496599.457	104321.001
S51	0.067	---	Type C	10.600	9.611	0.614	496600.452	104313.331
S52	0.000	---	Type C	10.600	9.523	0.702	496600.134	104287.328
S141	0.045	1350	Type C	11.099	9.907	0.817	496653.611	104281.845
S140	0.026	1350	Type C	10.915	9.853	0.687	496637.465	104281.843
S139	0.005	1350	Type C	10.773	9.804	0.595	496623.166	104277.974
S64	0.119	1350	Type C	10.990	9.700	0.915	496556.334	104279.074
S53	0.087	2100	Type C	10.822	9.496	0.951	496598.360	104277.860
S54	0.019	---	Type C	10.650	9.457	0.818	496595.479	104267.650
S55	0.032	---	Type C	10.650	9.361	0.914	496590.812	104239.324
S63	0.000	1350	Type C	11.511	10.200	1.161	496547.189	104273.749
S62	0.089	1350	Type C	10.877	9.875	0.777	496546.204	104238.093
S112	0.010	1350	Type C	10.590	9.725	0.640	496561.352	104234.601
S145	0.000	1350	Type C	10.837	10.087	0.600	496598.137	104233.600
S111	0.000	1350	Type C	10.648	9.339	0.933	496588.222	104233.852
S56	0.036	---	Type C	10.300	9.316	0.609	496587.641	104227.381
S57	0.000	---	Type C	10.300	9.175	0.750	496576.343	104178.182
S59	0.173	---	Type C	10.300	9.000	0.925	496571.761	104153.759
S136	0.047	1350	Type C	11.080	9.805	0.900	496661.798	104197.303
S92	0.113	1350	Type C	10.733	9.300	1.058	496624.949	104221.172
S93	0.000	1350	Type C	10.912	9.242	1.295	496623.214	104203.754
S94	0.000	1350	Type C	10.923	9.178	1.370	496618.536	104185.130
S121	0.220	1350	Type C	10.763	9.123	1.265	496611.874	104170.042
S124	0.000	1350	Type C	10.733	9.300	1.058	496644.233	104145.614
S122	0.000	1350	Type C	10.530	9.066	1.090	496606.339	104153.975
S123	0.000	---	Type C	10.300	9.000	0.925	496601.730	104134.742
S22	0.000	---	Type C	10.300	8.800	1.125	496577.018	104130.945
S5	0.000	1350	Type C	10.200	8.700	1.275	496569.938	104130.408
S130	0.000	1350	Type C	9.455	8.300	0.930	496525.093	104137.042

Manhole Schedule

Manhole	Catchment Area (ha)	Size (mm)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S38	0.030	1350	Type C	9.600	8.850	0.600	496532.106	104166.596
S85	0.000	1350	Type C	9.600	8.750	0.700	496525.729	104165.773
S6	0.000	---	Unknown	9.479	8.200	1.054	496521.450	104138.982
S7	0.000	---	Type C	8.957	7.900	0.832	496517.434	104108.243
S36	0.050	1350	Type C	11.015	9.874	0.766	496533.688	104283.859
S31	0.131	1350	Type C	11.049	9.833	0.841	496521.391	104284.886
S32	0.035	1350	Type C	11.263	9.800	1.088	496483.556	104316.658
S23	0.000	1350	Type C	11.348	9.800	1.173	496456.506	104331.110
S33	0.063	1350	Type C	11.461	9.600	1.486	496456.178	104317.385
S24	0.070	1350	Type C	11.270	9.400	1.495	496455.654	104295.489
S25	0.000	1350	Type C	10.810	9.267	1.168	496454.636	104286.777
S26	0.076	1350	Type C	10.900	9.249	1.276	496450.210	104283.606
S27	0.094	1350	Type C	10.693	9.220	1.098	496447.502	104275.548
S44	0.074	1350	Type C	10.374	9.600	0.624	496485.715	104237.721
S65	0.000	1350	Type C	10.525	9.360	1.015	496452.916	104238.943
S28	0.010	1350	Type C	10.700	9.095	1.230	496448.031	104239.286
S29	0.000	1350	Type C	10.298	9.050	0.873	496447.040	104226.935
S30	0.000	---	Type C	10.050	9.000	0.675	496434.480	104219.916
S13	0.155	---	Type C	10.050	8.800	0.875	496428.200	104182.662
S18	0.000	1350	Type C	9.990	8.700	0.915	496436.978	104177.520
S19	0.060	1350	Type C	10.046	8.650	1.021	496439.197	104165.651
S125	0.076	1350	Type C	9.989	9.239	0.600	496444.800	104119.038
S143	0.000	1350	Type C	9.998	8.500	1.123	496442.671	104131.398
S16	0.000	1350	Type C	9.886	8.400	1.261	496454.704	104128.589
S43	0.000	1350	Type C	9.602	8.470	0.907	496434.528	104097.304
S20	0.027	1350	Type C	9.464	8.415	0.825	496446.613	104094.043
S21	0.000	1350	Type C	9.807	8.327	1.255	496453.552	104112.547
S17	0.000	1350	Type C	9.801	8.212	1.289	496455.477	104121.214
S41	0.036	1350	Type C	9.590	9.312	0.128	496498.819	104153.040
S40	0.033	1350	Type C	9.792	8.575	1.067	496471.760	104158.158
S39	0.000	1350	Type C	9.669	8.400	1.119	496470.764	104135.739
S12	0.000	1350	Type C	9.554	8.138	1.129	496472.312	104121.516
S126	0.000	1350	Type C	9.799	8.088	1.410	496482.262	104117.006
S127	0.000	1350	Type C	9.162	7.998	0.863	496502.034	104112.945
S128	0.000	1350	Type C	8.992	7.939	0.753	496513.757	104105.887
S129	0.000	1350	Type C	8.741	7.790	0.651	496518.736	104101.029
S8	0.000	1350	Type C	8.713	7.681	0.731	496523.783	104086.830
S9	0.000	1350	Type C	7.890	7.487	0.103	496522.691	104057.650
S10	0.000	---	Type C	7.975	7.452	0.223	496518.571	104054.448
S11	0.000	---	Type C	7.243	7.375	-0.432	496514.519	104043.639

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (mm)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S68	10.192	S69	10.064	Circ	375	38.264	300	0.600	0.603	0.843
1.001	S69	10.064	S70	9.957	Circ	375	32.092	300	0.600	0.843	1.121
2.000	S119	10.018	S70	9.957	Circ	375	18.224	300	0.600	0.827	1.121
1.002	S70	9.957	S71	9.925	Circ	375	9.710	300	0.600	1.121	1.115
1.003	S71	9.925	S138	9.842	Circ	375	24.855	300	0.600	1.115	1.193
1.004	S138	9.842	S72	9.822	Circ	375	6.047	300	0.600	1.193	1.115
1.005	S72	9.822	S73	9.745	Circ	375	22.877	300	0.600	1.115	1.416
3.000	S137	9.949	S73	9.745	Circ	375	61.192	300	0.600	0.908	1.416
1.006	S73	9.745	S74	9.643	Circ	375	30.654	300	0.600	1.416	1.200
4.000	S142	10.518	S74	9.868	Circ	150	7.847	12	0.600	0.626	1.200
1.007	S74	9.643	S75	9.571	Circ	375	21.565	300	0.600	1.200	1.120
1.008	S75	9.571	S131	9.437	Circ	375	40.445	300	0.600	1.120	1.341
1.009	S131	9.437	S106	9.378	Circ	375	17.604	300	0.600	1.341	1.165
1.010	S106	9.378	S76	9.284	Circ	375	28.031	300	0.600	1.165	0.937
5.000	S103	9.400	S76	9.284	Circ	300	19.687	170	0.600	0.856	1.012
1.011	S76	9.284	S99	9.202	Circ	375	24.634	300	0.600	0.937	0.805
1.012	S99	9.202	S77	9.150	Circ	375	15.682	300	0.600	0.805	0.775
1.013	S77	9.150	S3	9.050	Circ	375	24.978	250	0.600	0.775	0.875
6.000	S135	9.656	S134	9.589	Circ	375	20.091	300	0.600	0.978	0.957
6.001	S134	9.589	S133	9.538	Circ	375	15.480	300	0.600	0.957	0.933
6.002	S133	9.538	S132	9.463	Circ	375	22.373	300	0.600	0.933	0.865

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (mm)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
6.003	S132	9.463	S102	9.346	Circ	375	35.178	300	0.600	0.865	0.806
6.004	S102	9.346	S1	9.195	Circ	375	45.207	300	0.600	0.806	0.708
7.000	S144	9.675	S1	9.420	Circ	150	3.780	15	0.600	0.600	0.708
6.005	S1	9.195	S2	9.150	Circ	375	13.516	300	0.600	0.708	0.775
6.006	S2	9.150	S3	9.050	Circ	375	51.837	518	0.600	0.775	0.875
1.014	S3	9.050	S4	8.950	Circ	375	20.896	209	0.600	0.875	0.975
1.015	S4	8.950	S22	8.800	Circ	375	68.438	456	0.600	0.975	1.125
8.000	S45	10.400	S46	9.975	Circ	150	56.563	133	0.600	0.517	0.787
9.000	S47	10.200	S46	9.975	Circ	225	28.438	126	0.600	0.749	0.712
8.001	S46	9.900	S48	9.850	Circ	225	6.628	133	0.600	0.787	0.725
8.002	S48	9.850	S49	9.800	Circ	225	12.012	240	0.600	0.725	0.775
8.003	S49	9.800	S50	9.776	Circ	225	6.976	286	0.600	0.775	0.621
10.000	S61	10.050	S60	9.825	Circ	225	40.464	180	0.600	0.599	0.610
10.001	S60	9.825	S50	9.776	Circ	225	7.090	144	0.600	0.610	0.621
8.004	S50	9.626	S51	9.611	Circ	375	7.734	530	0.600	0.621	0.614
8.005	S51	9.611	S52	9.523	Circ	375	26.005	296	0.600	0.614	0.702
8.006	S52	9.523	S53	9.496	Circ	375	9.633	355	0.600	0.702	0.951
11.000	S141	9.907	S140	9.853	Circ	375	16.146	300	0.600	0.817	0.687
11.001	S140	9.853	S139	9.804	Circ	375	14.814	300	0.600	0.687	0.595
11.002	S139	9.804	S53	9.721	Circ	375	24.806	300	0.600	0.595	0.726
12.000	S64	9.700	S53	9.546	Circ	375	42.044	273	0.600	0.915	0.901
8.007	S53	9.496	S54	9.457	Circ	375	10.609	270	0.600	0.951	0.818
8.008	S54	9.457	S55	9.361	Circ	375	28.708	300	0.600	0.818	0.914
8.009	S55	9.361	S111	9.339	Circ	375	6.053	274	0.600	0.914	0.933
13.000	S63	10.200	S62	9.950	Circ	150	35.670	143	0.600	1.161	0.777
13.001	S62	9.875	S112	9.725	Circ	225	15.545	104	0.600	0.777	0.640
13.002	S112	9.725	S111	9.489	Circ	225	26.880	114	0.600	0.640	0.933
14.000	S145	10.087	S111	9.564	Circ	150	9.919	19	0.600	0.600	0.933
8.010	S111	9.339	S56	9.316	Circ	375	6.497	283	0.600	0.933	0.609
8.011	S56	9.316	S57	9.175	Circ	375	50.479	358	0.600	0.609	0.750
8.012	S57	9.175	S59	9.000	Circ	375	24.849	142	0.600	0.750	0.925
8.013	S59	9.000	S22	8.800	Circ	375	23.412	117	0.600	0.925	1.125
15.000	S136	9.805	S93	9.675	Circ	375	39.120	300	0.600	0.900	0.862
16.000	S92	9.300	S93	9.242	Circ	375	17.504	300	0.600	1.058	1.295
15.001	S93	9.242	S94	9.178	Circ	375	19.202	300	0.600	1.295	1.370
15.002	S94	9.178	S121	9.123	Circ	375	16.493	300	0.600	1.370	1.265
15.003	S121	9.123	S122	9.066	Circ	375	16.994	300	0.600	1.265	1.090
17.000	S124	9.300	S122	9.066	Circ	375	38.806	166	0.600	1.058	1.090
15.004	S122	9.066	S123	9.000	Circ	375	19.778	300	0.600	1.090	0.925
15.005	S123	9.000	S22	8.800	Circ	375	25.002	125	0.600	0.925	1.125
1.016	S22	8.800	S5	8.700	Circ	375	7.100	71	0.600	1.125	1.125
1.017	S5	8.700	S130	8.300	Circ	225	45.333	113	0.600	1.275	0.930
1.018	S130	8.300	S6	8.200	Circ	225	4.128	41	0.600	0.930	1.054
18.000	S38	8.850	S85	8.750	Circ	150	6.430	64	0.600	0.600	0.700
18.001	S85	8.750	S6	8.600	Circ	150	27.130	181	0.600	0.700	0.729
1.019	S6	8.479	S7	7.957	Swale	500x1000	31.000	59	0.600	0.000	0.000
1.020	S7	7.900	S129	7.865	Circ	225	7.331	209	0.600	0.832	0.651
19.000	S36	9.874	S31	9.833	Circ	375	12.340	300	0.600	0.766	0.841
19.001	S31	9.833	S25	9.610	Circ	375	66.782	300	0.600	0.841	0.825
20.000	S32	9.800	S33	9.600	Circ	375	27.388	137	0.600	1.088	1.486
21.000	S23	9.800	S33	9.600	Circ	375	13.729	69	0.600	1.173	1.486
20.001	S33	9.600	S24	9.400	Circ	375	21.903	110	0.600	1.486	1.495
20.002	S24	9.400	S25	9.267	Circ	375	8.771	66	0.600	1.495	1.168
19.002	S25	9.267	S26	9.249	Circ	375	5.444	300	0.600	1.168	1.276
19.003	S26	9.249	S27	9.220	Circ	375	8.501	300	0.600	1.276	1.098
19.004	S27	9.220	S28	9.095	Circ	375	36.266	290	0.600	1.098	1.230
22.000	S44	9.600	S65	9.360	Circ	150	32.822	137	0.600	0.624	1.015
22.001	S65	9.360	S28	9.320	Circ	150	4.897	121	0.600	1.015	1.230
19.005	S28	9.095	S29	9.050	Circ	375	12.391	275	0.600	1.230	0.873
19.006	S29	9.050	S30	9.000	Circ	375	14.388	288	0.600	0.873	0.675
19.007	S30	9.000	S13	8.800	Circ	375	37.779	189	0.600	0.675	0.875
19.008	S13	8.800	S18	8.700	Circ	375	10.173	102	0.600	0.875	0.915
19.009	S18	8.700	S19	8.650	Circ	375	12.074	241	0.600	0.915	1.021
19.010	S19	8.650	S16	8.400	Circ	375	40.176	161	0.600	1.021	1.111
23.000	S125	9.239	S16	8.625	Circ	150	13.759	22	0.600	0.600	1.111
24.000	S143	8.500	S16	8.400	Circ	375	12.356	124	0.600	1.123	1.111
19.011	S16	8.400	S17	8.287	Circ	225	7.415	66	0.600	1.261	1.289
25.000	S43	8.470	S20	8.415	Circ	225	12.517	225	0.600	0.907	0.825

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (mm)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
25.001	S20	8.415	S21	8.327	Circ	225	19.762	225	0.600	0.825	1.255
25.002	S21	8.327	S17	8.287	Circ	225	8.878	225	0.600	1.255	1.289
19.012	S17	8.212	S12	8.138	Circ	300	16.837	225	0.600	1.289	1.116
26.000	S41	9.312	S40	8.575	Circ	150	27.539	37	0.600	0.128	1.067
26.001	S40	8.575	S39	8.400	Circ	150	22.441	128	0.600	1.067	1.119
26.002	S39	8.400	S12	8.275	Circ	150	14.308	114	0.600	1.119	1.129
19.013	S12	8.138	S126	8.088	Circ	300	10.925	223	0.600	1.116	1.410
19.014	S126	8.088	S127	7.998	Circ	300	20.185	224	0.600	1.410	0.863
19.015	S127	7.998	S128	7.939	Circ	300	13.684	230	0.600	0.863	0.753
19.016	S128	7.939	S129	7.790	Circ	300	6.957	47	0.600	0.753	0.651
1.021	S129	7.790	S8	7.681	Circ	300	15.069	139	0.600	0.651	0.731
1.022	S8	7.681	S9	7.487	Circ	300	29.201	150	0.600	0.731	0.103
1.023	S9	7.487	S10	7.452	Circ	300	5.218	150	0.600	0.103	0.223
1.024	S10	7.452	S11	7.375	Circ	300	11.544	150	0.600	0.223	-0.432

Permeable Paving Schedule

Permeable Paving	Assigned Manhole	Effective Storage Volume (m3)	CL (m)	IL (m)	Storage Infil Rate (m/hr)	Safety Factor	Easting (m)	Northing (m)
Permeable Paving 37	S138	265.821	11.410	10.680	0.00000000	2.00	496671.496	104318.071
Permeable Paving 45	S137	40.345	11.232	10.502	0.00000000	2.00	496754.707	104282.340
Permeable Paving 43	S142	63.800	11.294	10.564	0.00000000	2.00	496675.883	104241.322
Permeable Paving 39	S103	102.252	10.556	9.826	0.00000000	2.00	496685.986	104161.517
Permeable Paving 41	S133	53.900	10.845	10.115	0.00000000	2.00	496743.363	104228.536
Permeable Paving 40	S144	71.270	10.425	9.695	0.00000000	2.00	496725.994	104152.022
Permeable Paving23	S61	45.382	10.874	10.244	0.00000000	2.00	496535.696	104319.285
Permeable Paving24	S60	73.172	10.660	10.030	0.00000000	2.00	496578.404	104324.438
Permeable Paving10	S62	54.352	10.877	10.147	0.00000000	2.00	496551.053	104244.789
Permeable Paving 46	S92	96.482	10.733	10.003	0.00000000	2.00	496603.255	104229.111
Permeable Paving 42	S121	212.720	10.763	10.033	0.00000000	2.00	496615.899	104187.026
Permeable Paving3	S38	18.855	9.600	8.870	0.00000000	2.00	496544.990	104164.886
Permeable Paving1	S32	38.822	11.263	10.533	0.00000000	2.00	496481.097	104325.959
Permeable Paving18	S33	75.277	11.461	10.731	0.00000000	2.00	496452.336	104331.023
Permeable Paving2	S24	80.709	11.270	10.540	0.00000000	2.00	496434.426	104290.106
Permeable Paving8	S44	76.190	10.374	9.644	0.00000000	2.00	496491.566	104252.576
Permeable Paving 36	S125	67.157	9.989	9.259	0.00000000	2.00	496435.616	104126.735
Permeable Paving4	S41	29.943	9.590	8.860	0.00000000	2.00	496506.809	104145.968
Permeable Paving5	S40	28.047	9.792	9.062	0.00000000	2.00	496490.701	104147.560

Outfall Details

Outfall Manhole S11 : Free Discharge

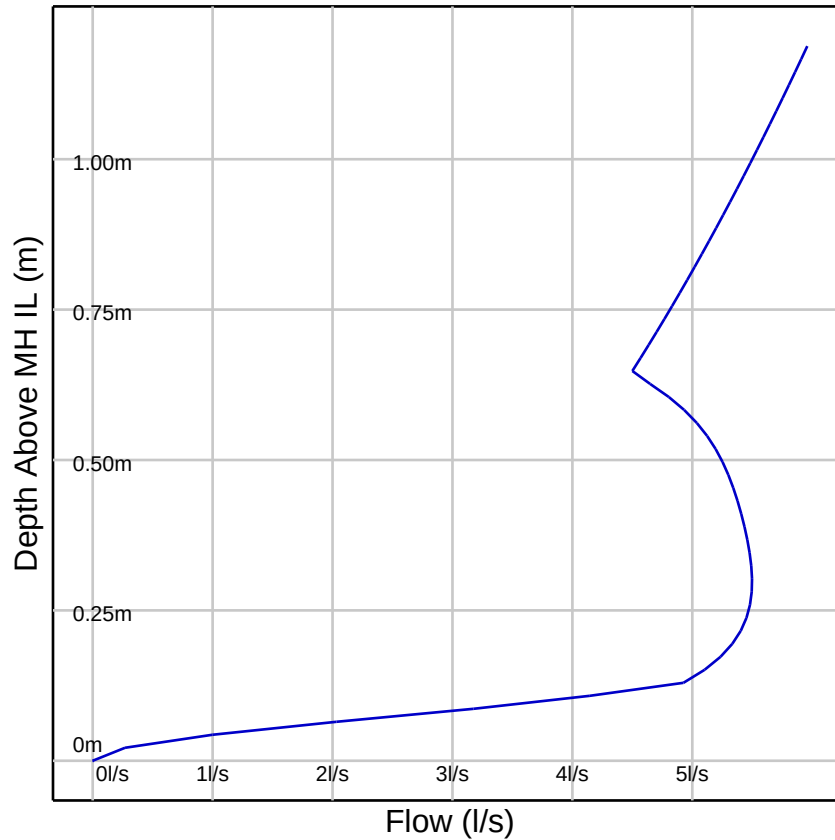
Flow Control Details

Controls within Manhole S138

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0110-5500-1000-5500	1.000	5.500	0.000	0.298	5.498	0.644	4.488

Hydro-Brake® Optimum Control from S138 to S72

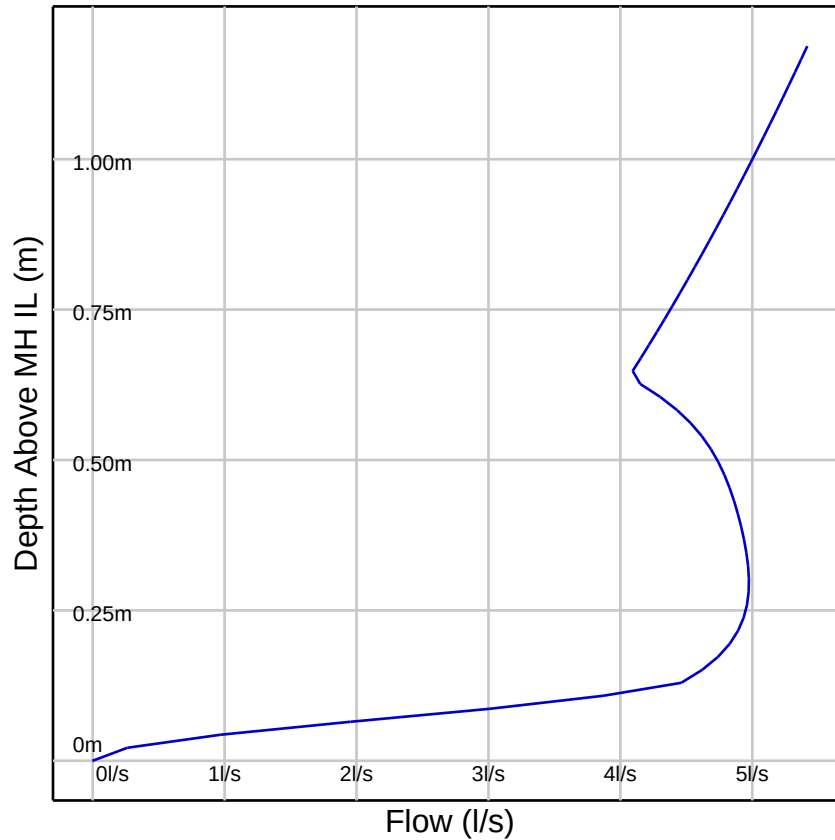


Controls within Manhole S133

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0106-5000-1000-5000	1.000	5.000	0.000	0.296	4.975	0.637	4.060

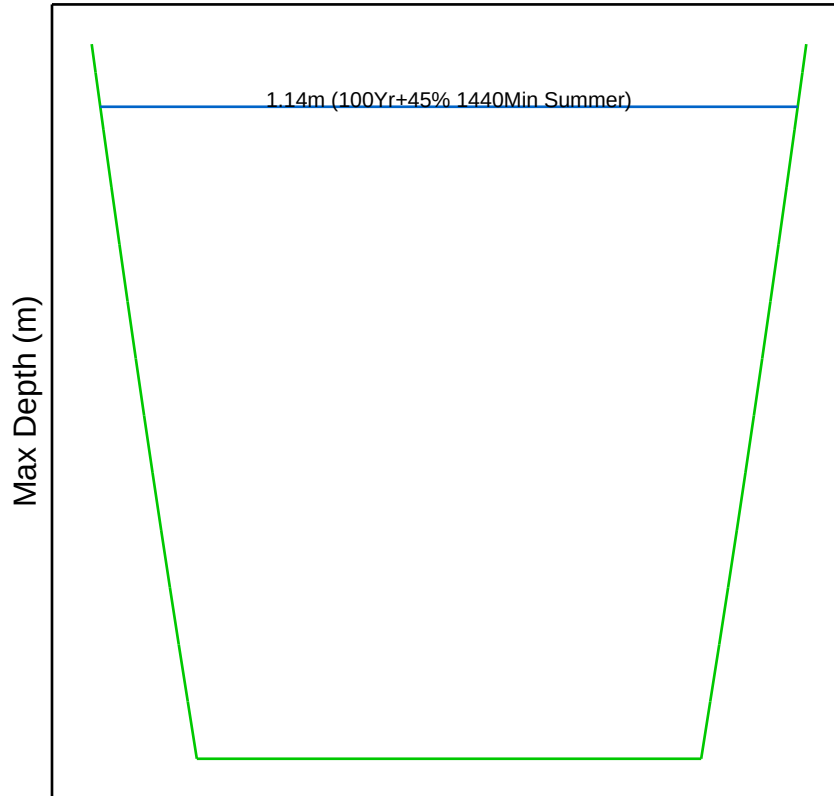
Hydro-Brake® Optimum Control from S133 to S132



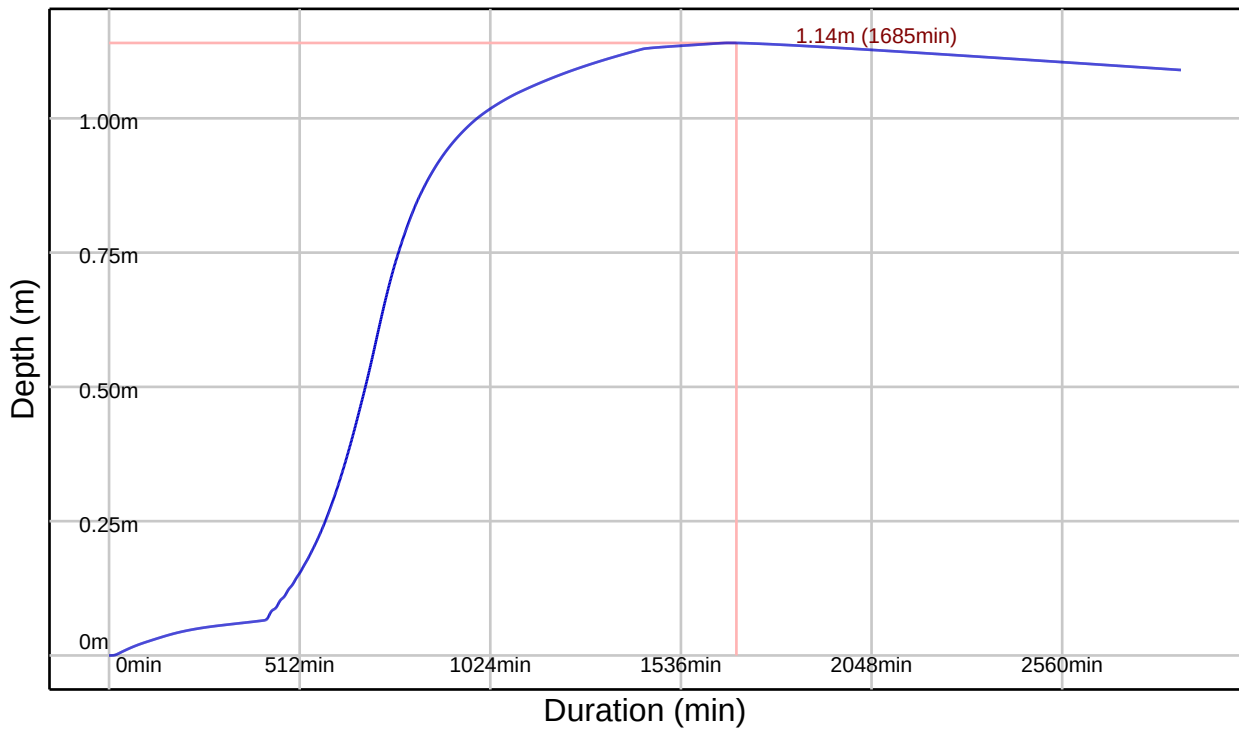
Pond Structure at Manhole S3

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
9.050	1.250	893.001	10.300	0.000	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S3



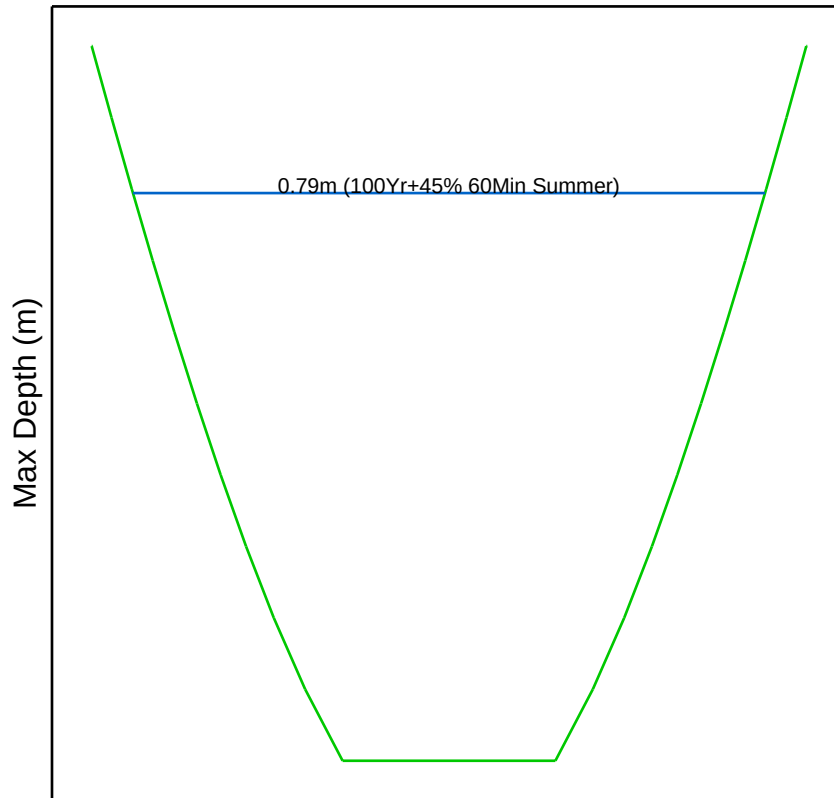
BASIN 3 at S3 (100Yr+45% 1440Min Summer)



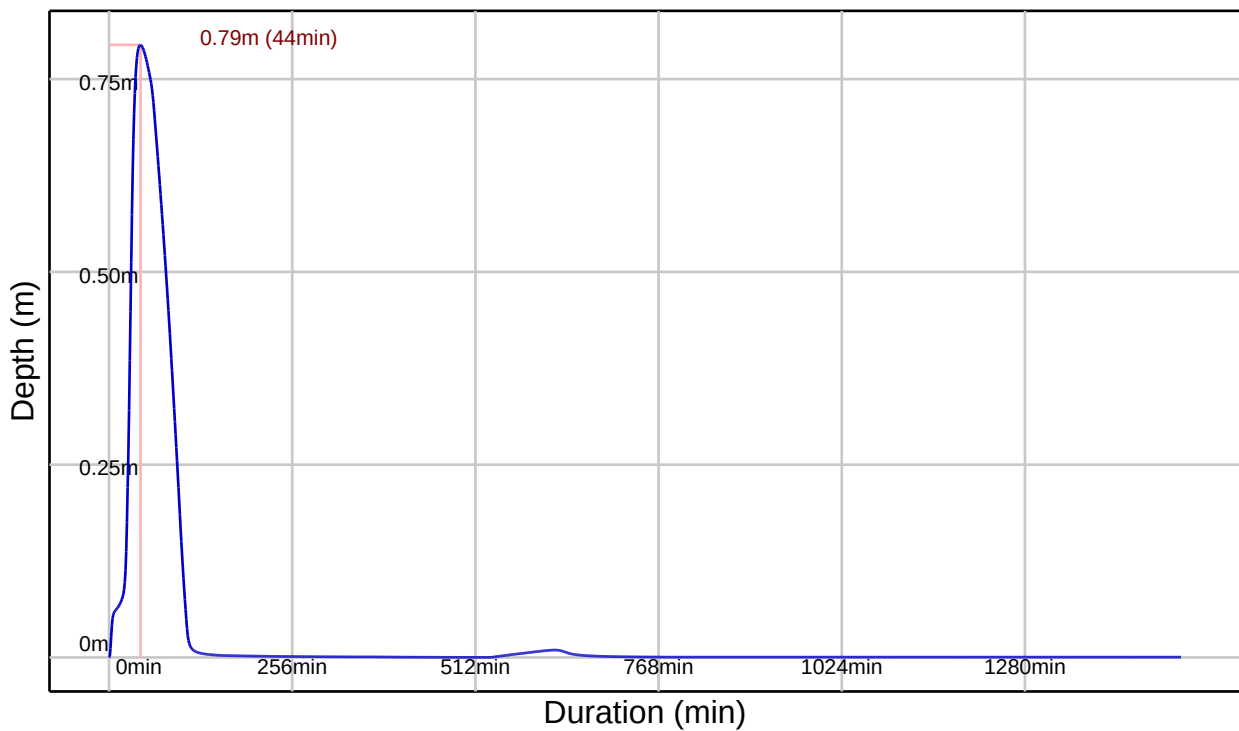
Pond Structure at Manhole S49

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
9.800	1.000	35.214	10.800	0.000	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S49



DITCH 1 at S49 (100Yr+45% 60Min Summer)

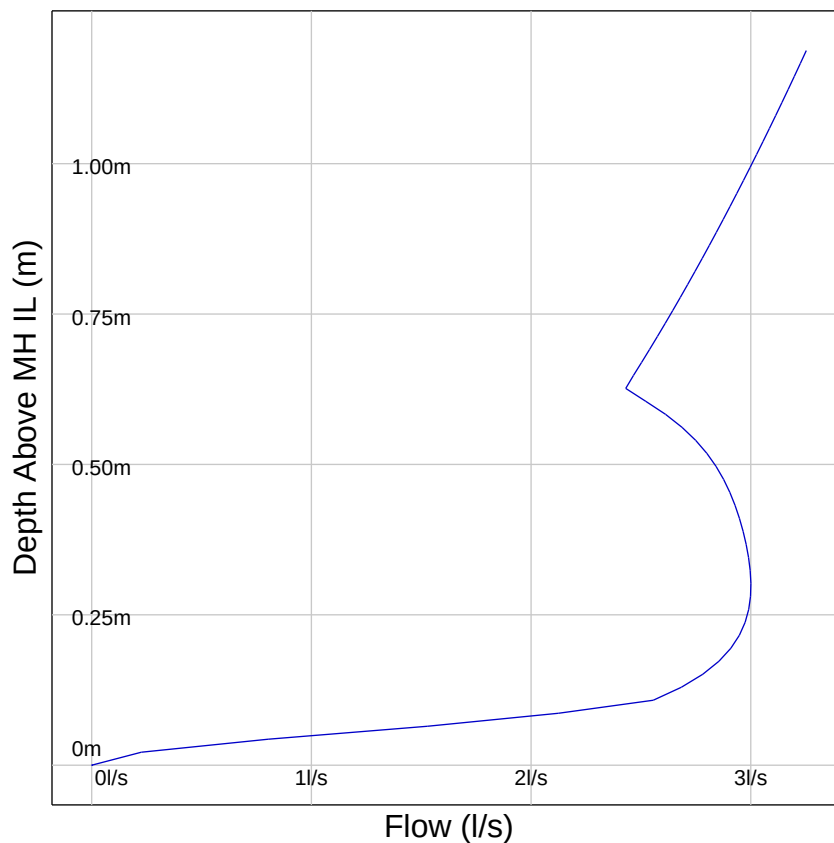


Controls within Manhole S60

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0082-3000-1000-3000	1.000	3.000	0.000	0.298	3.001	0.624	2.424

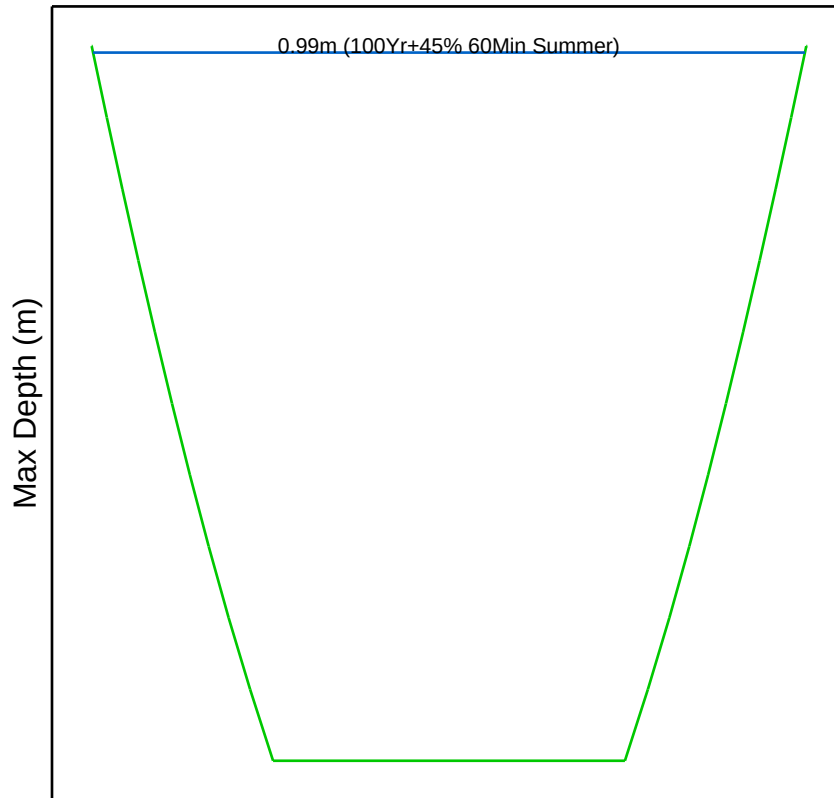
Hydro-Brake® Optimum Control from S60 to S50



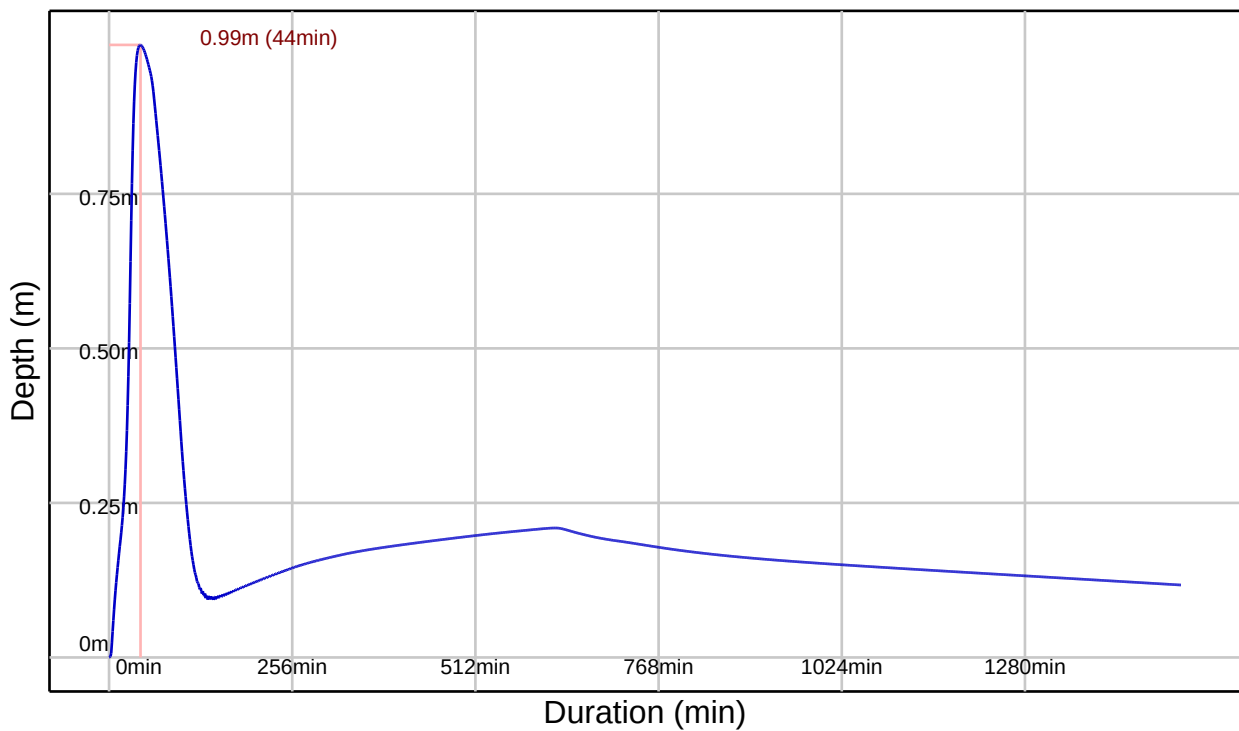
Pond Structure at Manhole S52

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
9.600	1.000	97.840	10.600	0.000	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S52



DITCH 2 at S52 (100Yr+45% 60Min Summer)

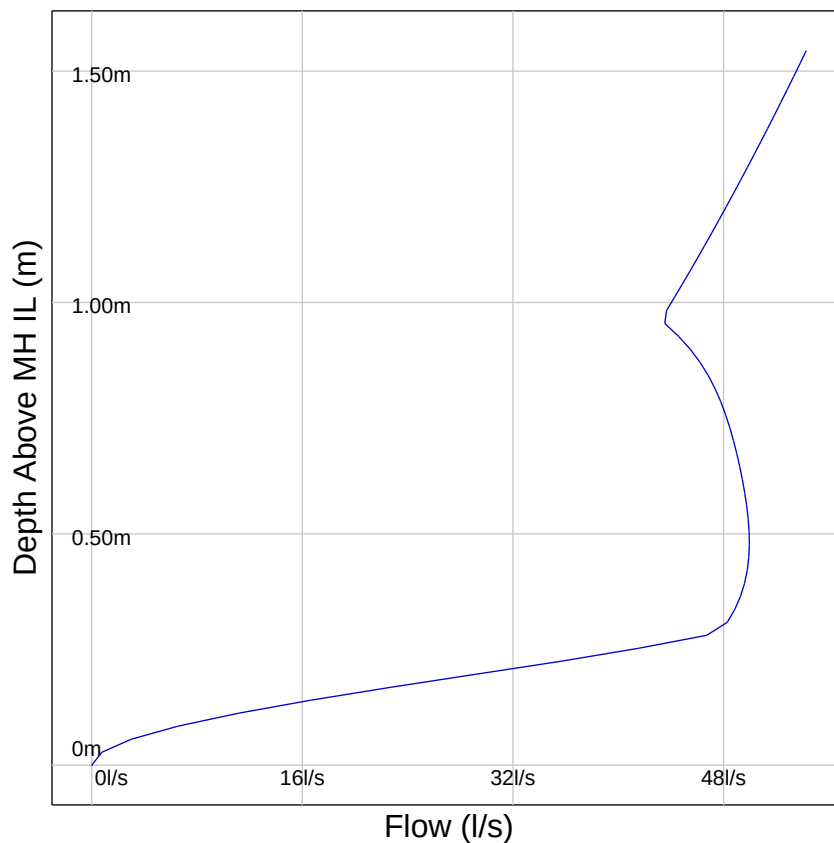


Controls within Manhole S53

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0291-5000-1300-5000	1.300	50.000	0.000	0.481	49.956	0.961	43.200

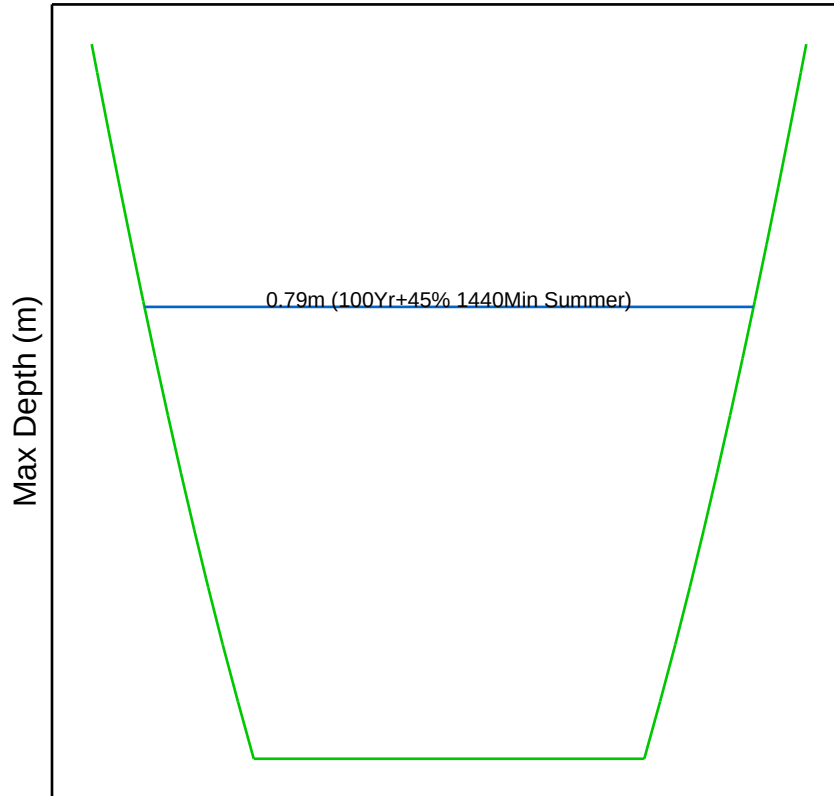
Hydro-Brake® Optimum Control from S53 to S54



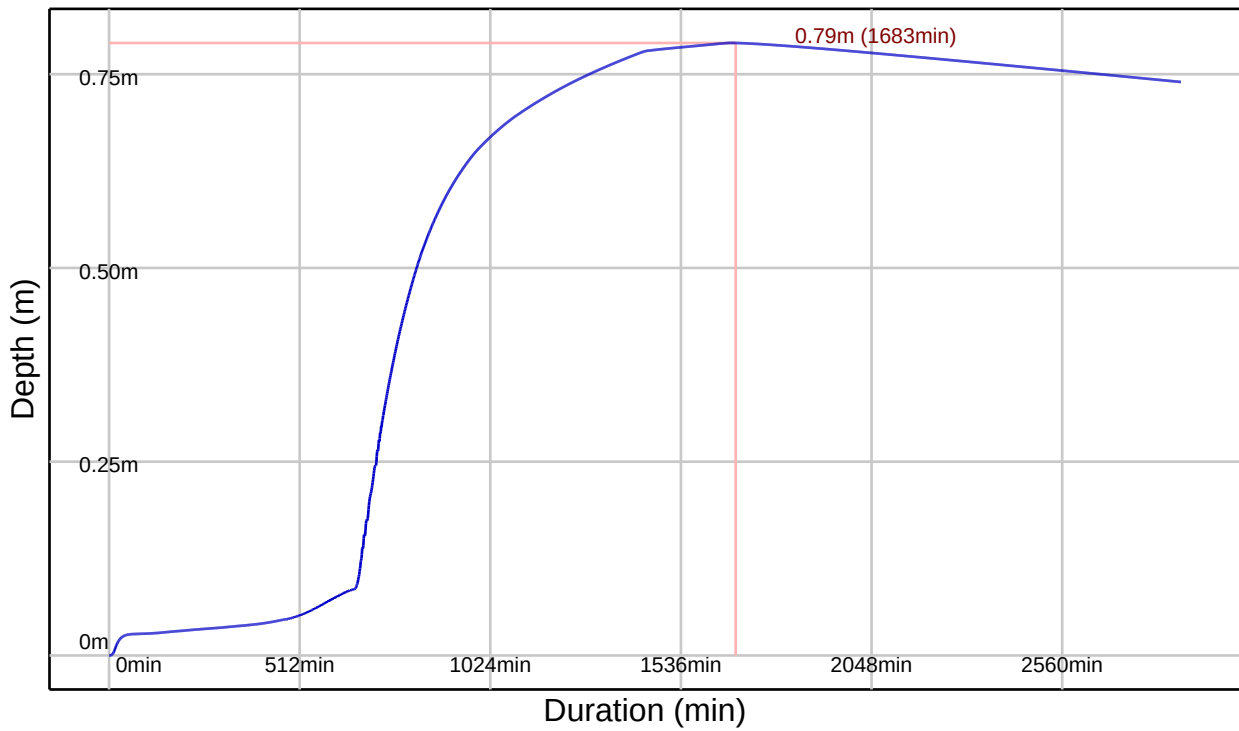
Pond Structure at Manhole S55

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
9.400	1.250	101.186	10.350	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S55



DITCH 3 at S55 (100Yr+45% 1440Min Summer)

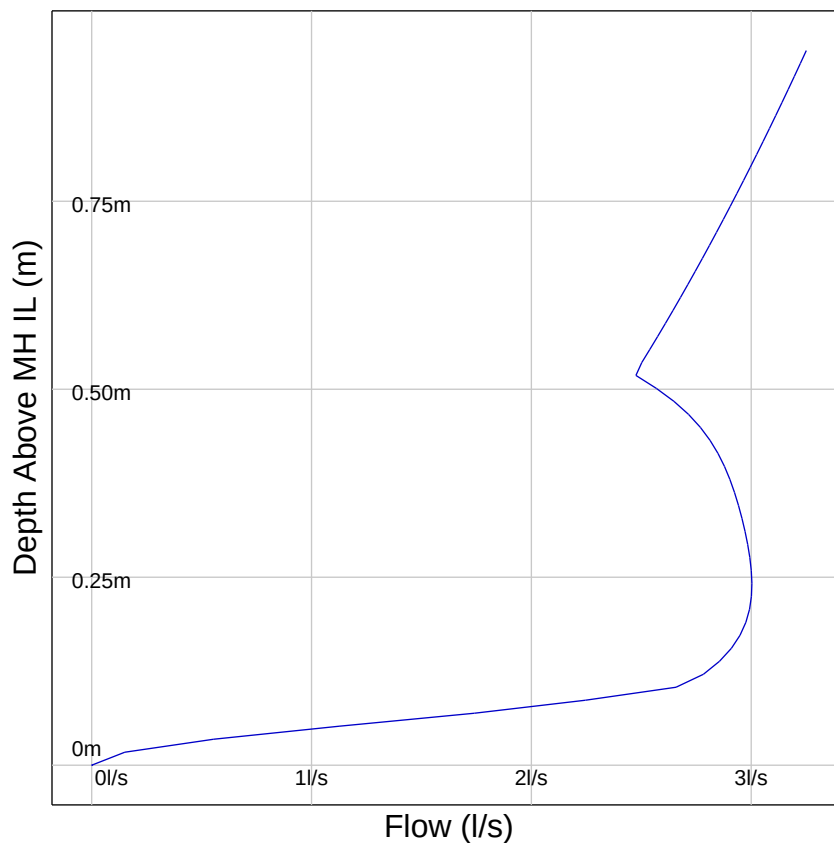


Controls within Manhole S62

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0085-3000-0800-3000	0.800	3.000	0.000	0.240	3.003	0.519	2.466

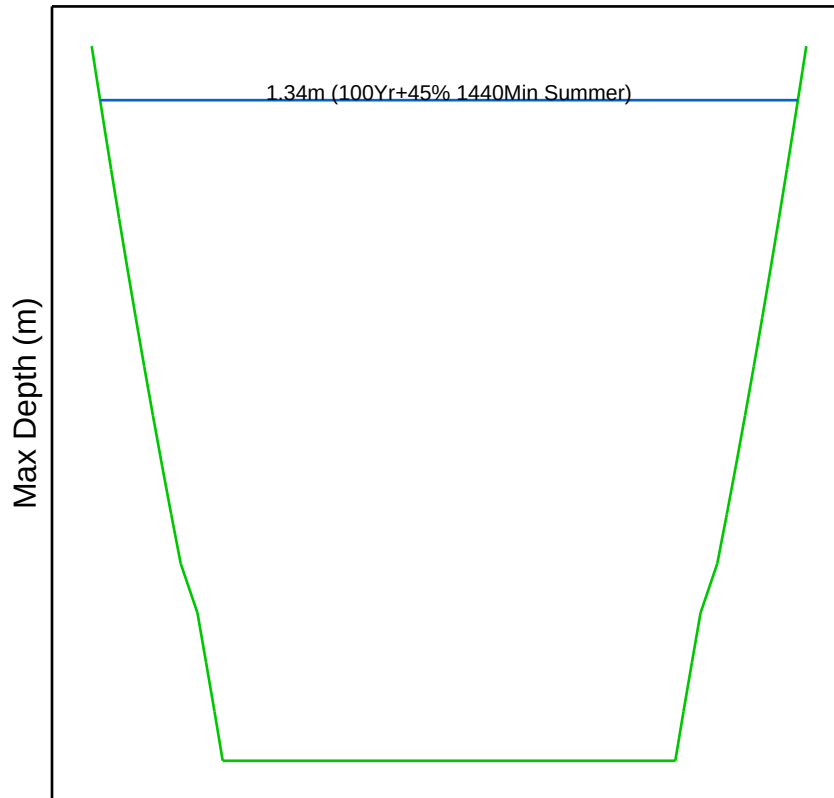
Hydro-Brake® Optimum Control from S62 to S112



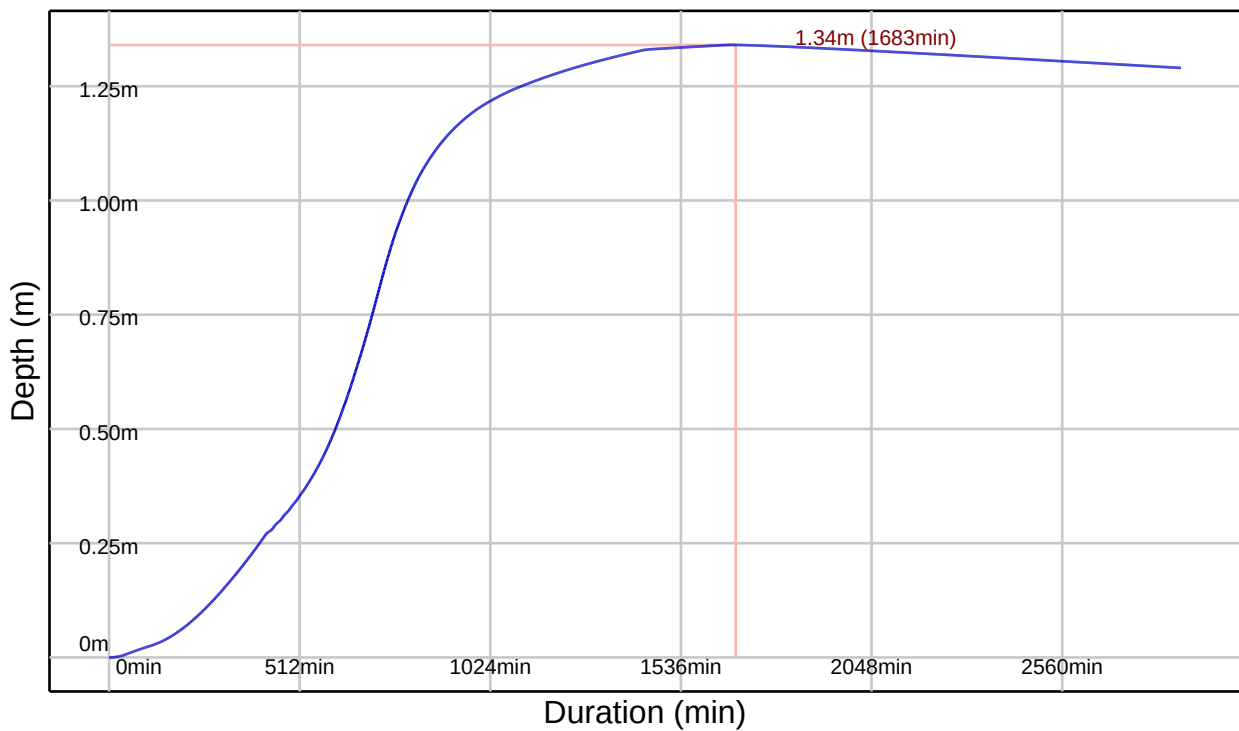
Pond Structure at Manhole S22

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
8.850	1.450	1741.914	10.300	0.000	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S22



BASIN 2 at S22 (100Yr+45% 1440Min Summer)

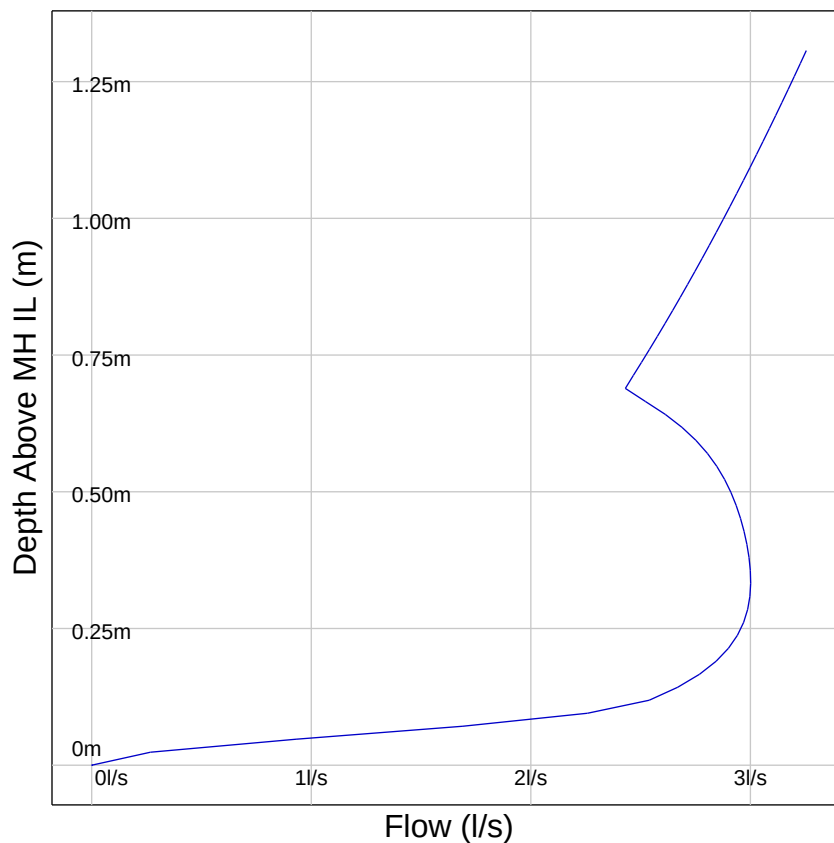


Controls within Manhole S5

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0081-3000-1100-3000	1.100	3.000	0.000	0.336	3.001	0.686	2.424

Hydro-Brake® Optimum Control from S5 to S130

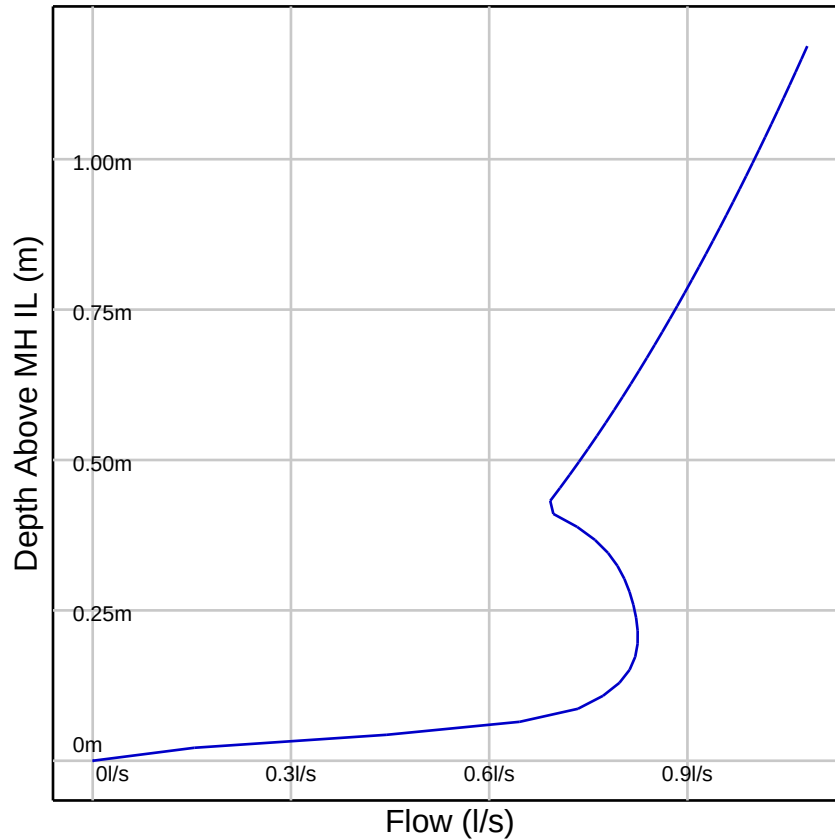


Controls within Manhole S85

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0047-1000-1000-1000	1.000	1.000	0.000	0.206	0.825	0.417	0.682

Hydro-Brake® Optimum Control from S85 to S6

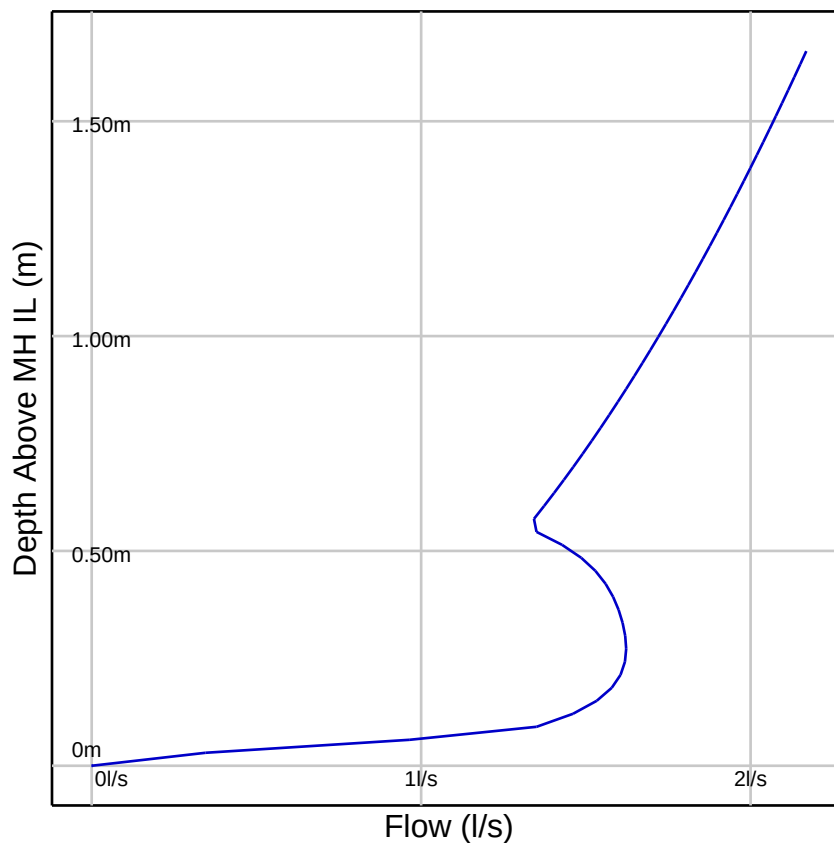


Controls within Manhole S24

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0062-2000-1400-2000	1.400	2.000	0.000	0.272	1.622	0.553	1.320

Hydro-Brake® Optimum Control from S24 to S25

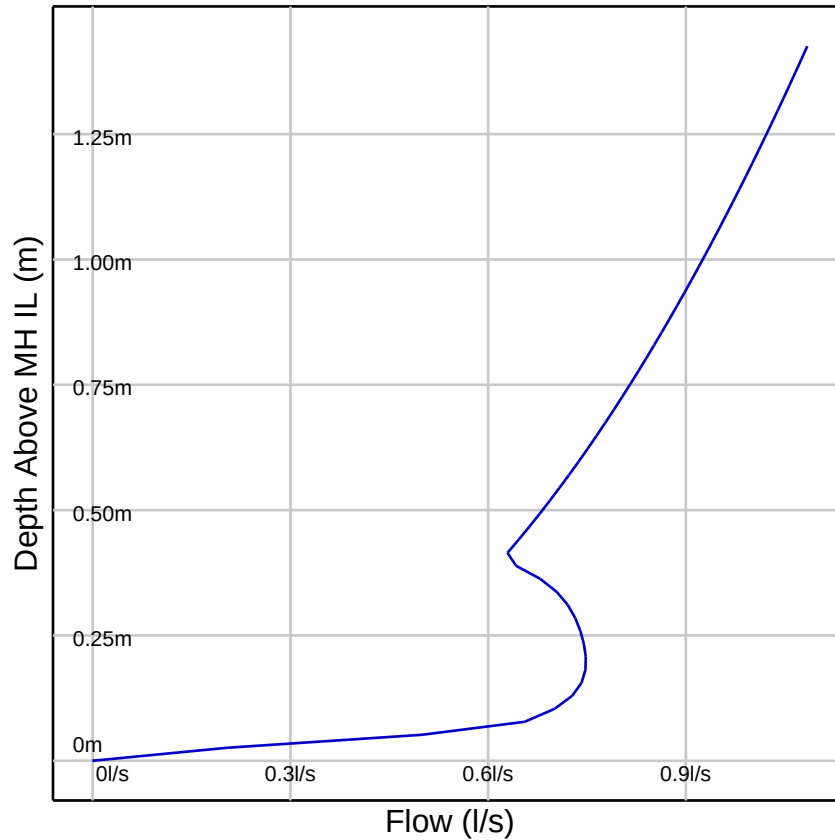


Controls within Manhole S65

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0045-1000-1200-1000	1.200	1.000	0.000	0.197	0.748	0.401	0.620

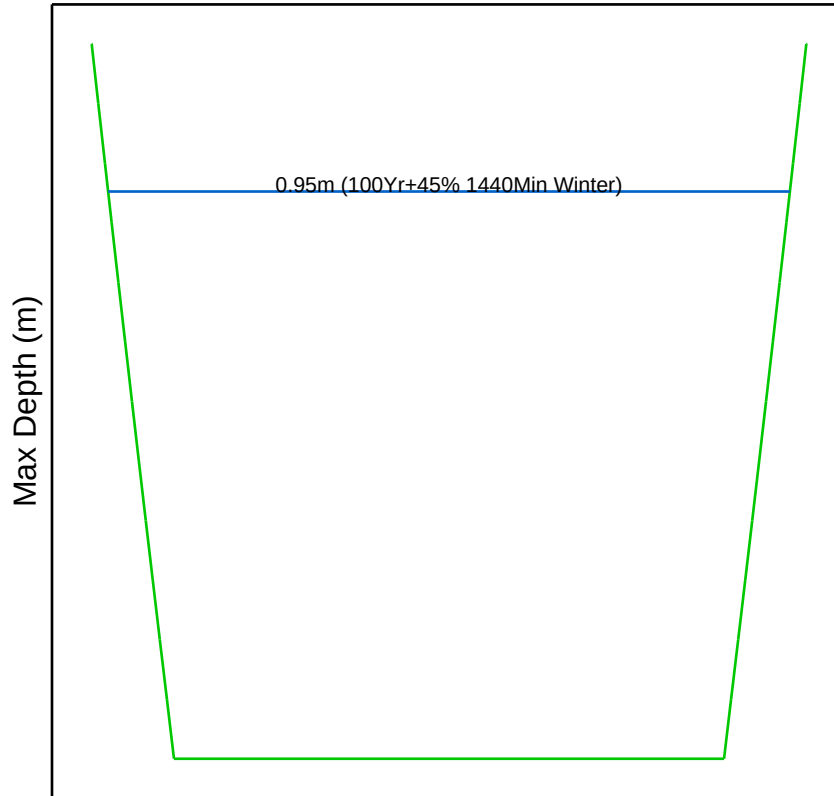
Hydro-Brake® Optimum Control from S65 to S28



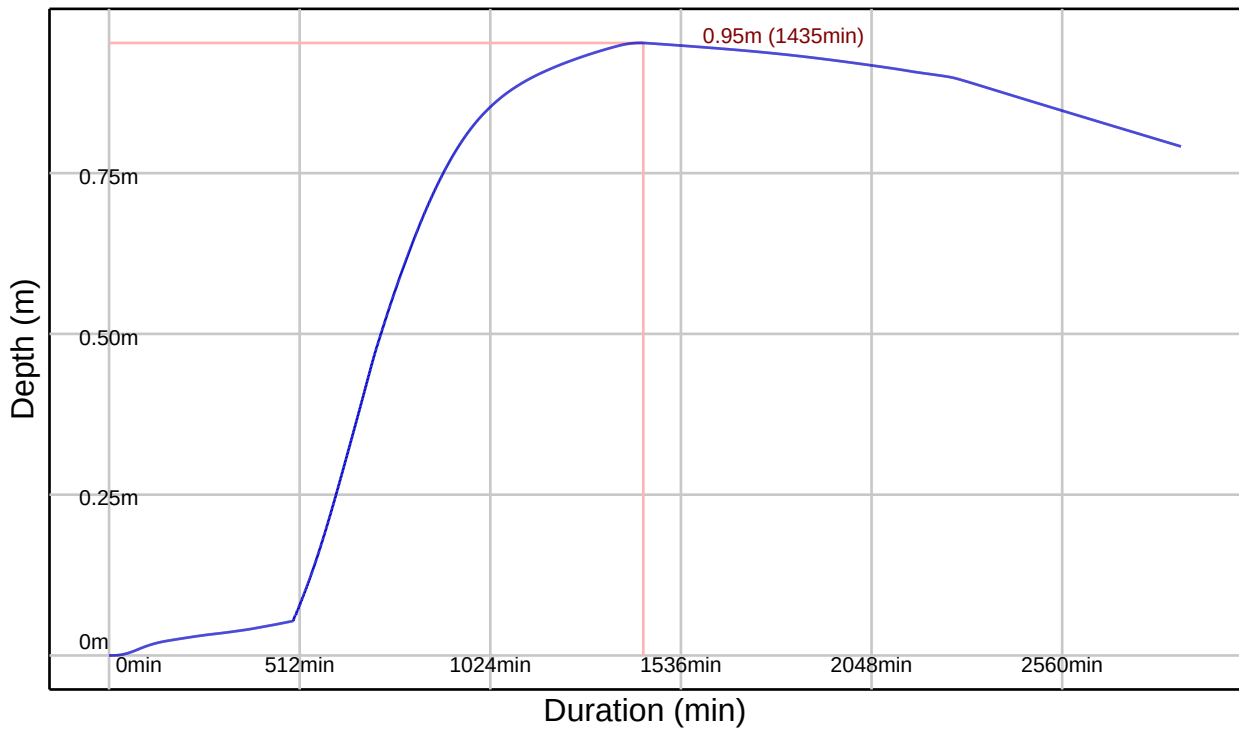
Pond Structure at Manhole S13

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
8.850	1.200	773.994	10.050	0.000	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S13



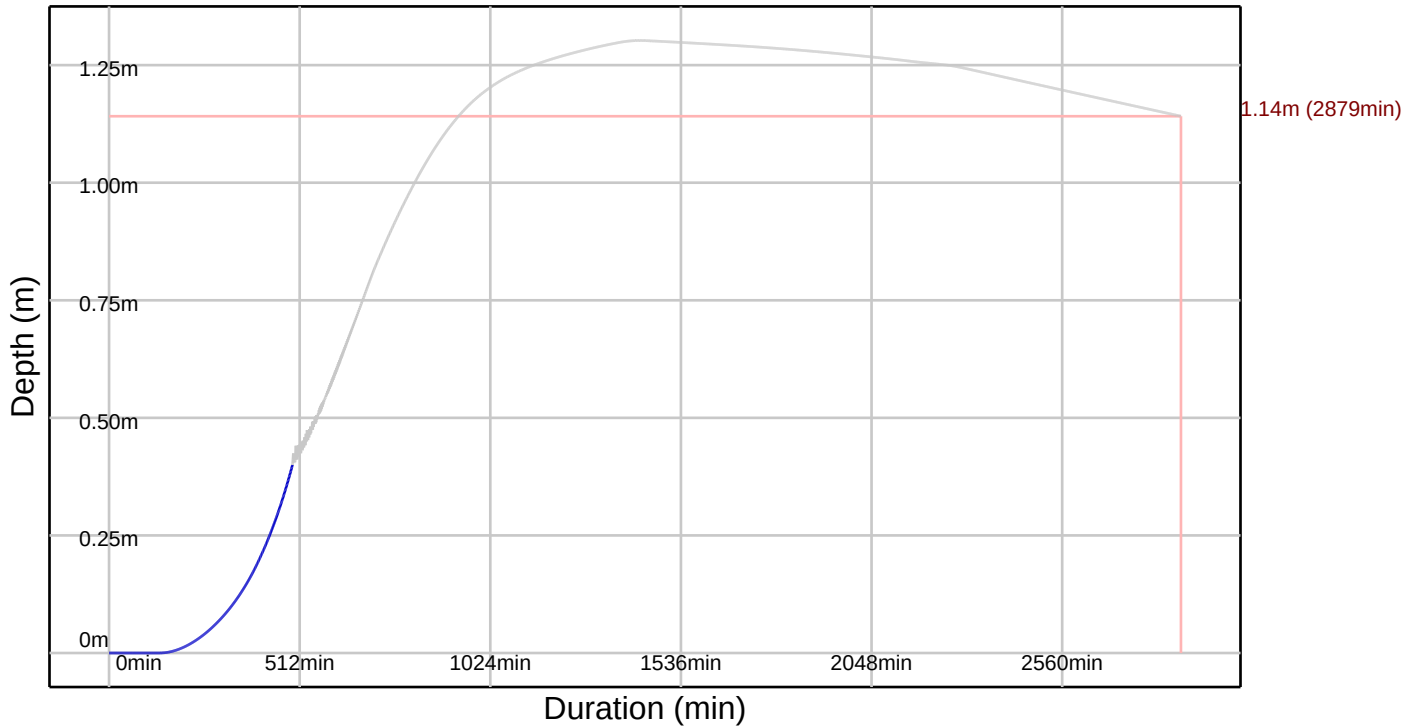
BASIN 1 at S13 (100Yr+45% 1440Min Winter)



Tank Structure at Manhole S143

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
8.500	0.400	95.00	210.500	199.975	79.990	0.00000000	0.00000000	2.00

Tank 2 at S143 (100Yr+45% 1440Min Winter)

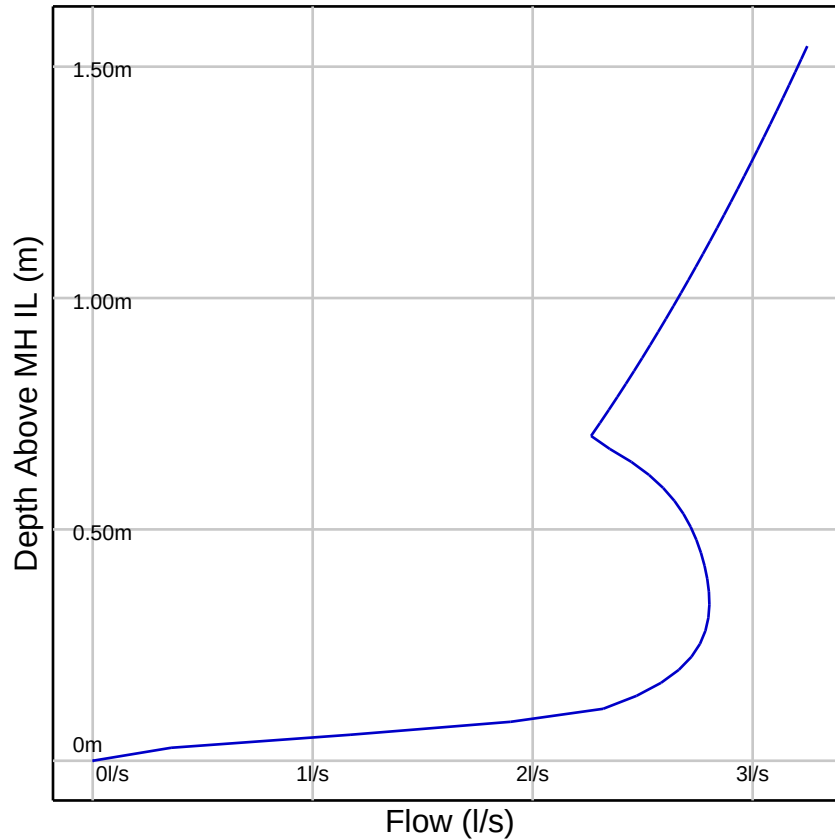


Controls within Manhole S16

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0078-3000-1300-3000	1.300	3.000	0.000	0.341	2.803	0.695	2.256

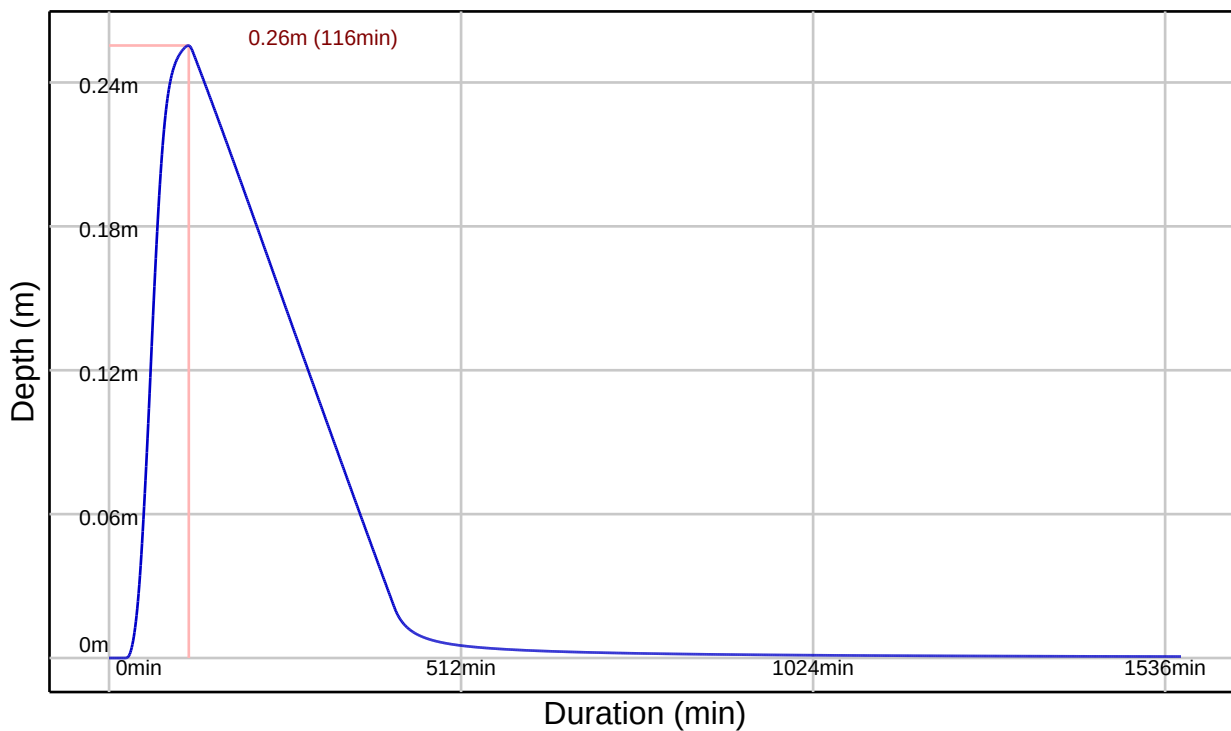
Hydro-Brake® Optimum Control from S16 to S17



Tank Structure at Manhole S43

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
8.470	0.400	95.00	53.307	50.642	20.257	0.00000000	0.00000000	2.00

Tank 1 at S43 (100Yr+45% 120Min Winter)

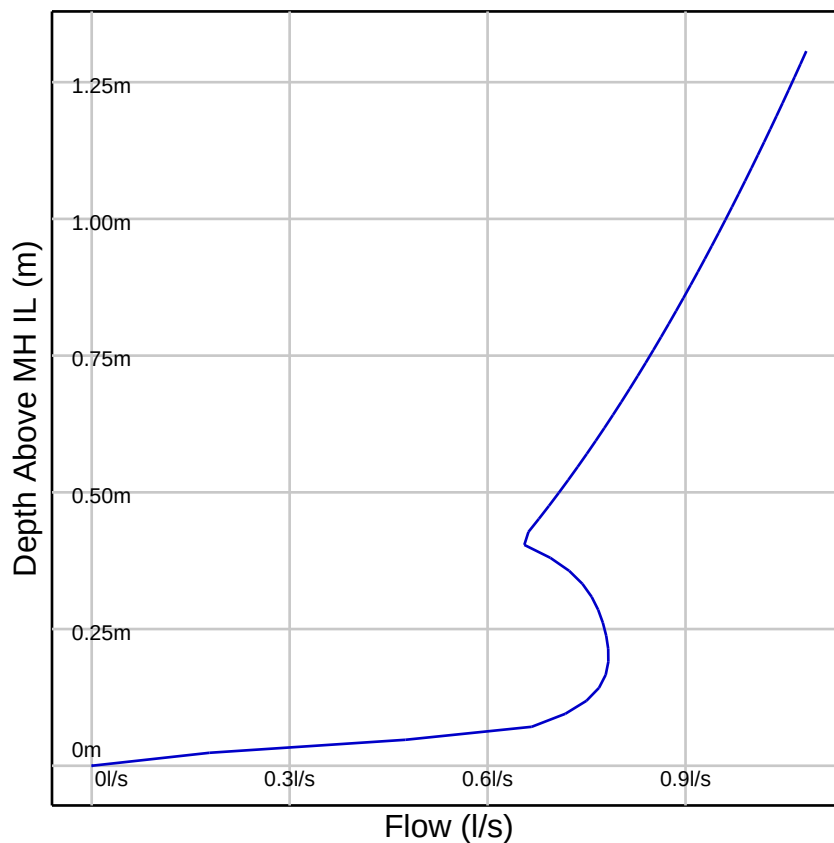


Controls within Manhole S21

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0046-1000-1100-1000	1.100	1.000	0.000	0.200	0.783	0.407	0.648

Hydro-Brake® Optimum Control from S21 to S17

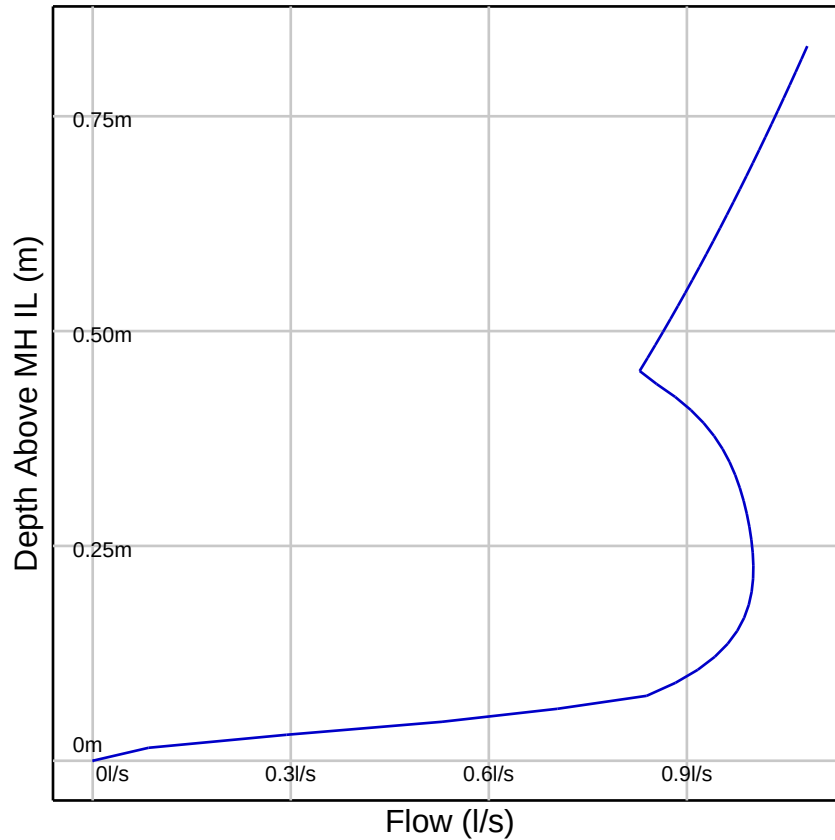


Controls within Manhole S41

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0051-1000-0700-1000	0.700	1.000	0.000	0.224	1.001	0.450	0.826

Hydro-Brake® Optimum Control from S41 to S40

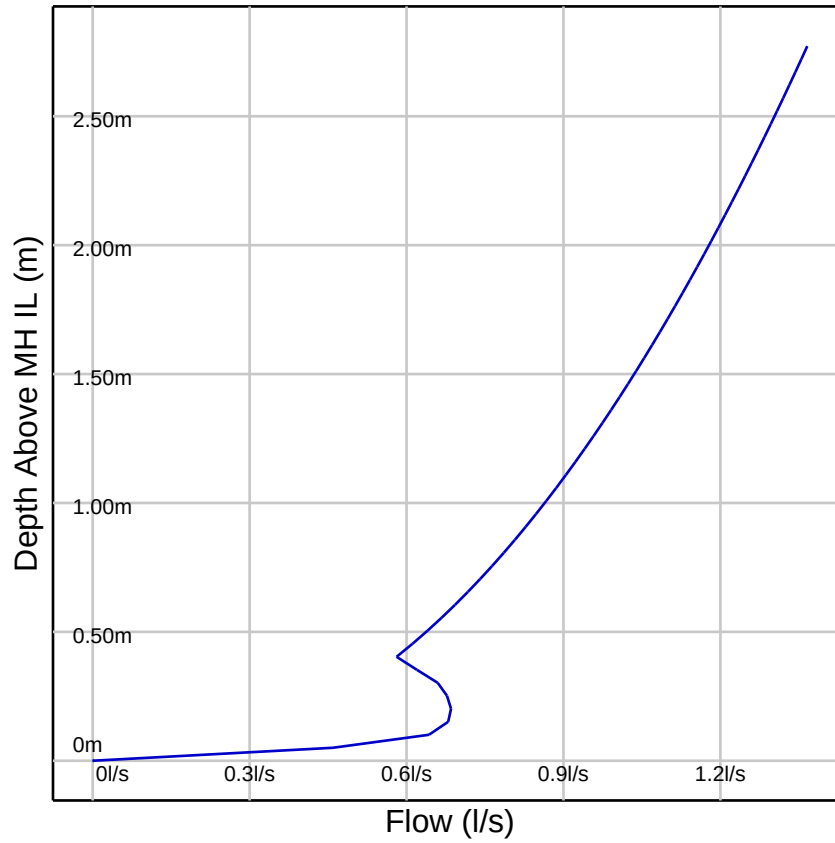


Controls within Manhole S40

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0043-1000-1400-1000	1.400	1.000	0.000	0.191	0.685	0.386	0.570

Hydro-Brake® Optimum Control from S40 to S39



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_496471_104138_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Periods (yrs) + Climate Change: (100, +45%)

Manhole Flood Risk Freeboard: 0.300m

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
100Yr+45% 15Min Winter	148.758	0.00	0.30	100Yr+45% 360Min Summer	16.405	0.00	1.21
100Yr+45% 15Min Summer	148.758	0.00	0.27	100Yr+45% 360Min Winter	16.405	0.00	1.21
100Yr+45% 30Min Winter	99.799	0.00	0.50	100Yr+45% 480Min Summer	13.025	0.00	1.19
100Yr+45% 30Min Summer	99.799	0.00	0.48	100Yr+45% 480Min Winter	13.025	0.00	1.19
100Yr+45% 60Min Winter	64.159	0.00	0.71	100Yr+45% 600Min Summer	10.870	0.00	1.21
100Yr+45% 60Min Summer	64.159	0.00	0.72	100Yr+45% 600Min Winter	10.870	0.00	1.24
100Yr+45% 120Min Winter	38.412	0.00	0.91	100Yr+45% 720Min Summer	9.358	0.00	1.24
100Yr+45% 120Min Summer	38.412	0.00	0.92	100Yr+45% 720Min Winter	9.358	0.00	1.21
100Yr+45% 180Min Summer	28.139	0.00	1.02	100Yr+45% 960Min Summer	7.371	0.00	1.23
100Yr+45% 180Min Winter	28.139	0.00	1.02	100Yr+45% 960Min Winter	7.371	0.00	1.22
100Yr+45% 240Min Summer	22.589	0.00	1.09	100Yr+45% 1440Min Winter	5.268	0.00	1.22
100Yr+45% 240Min Winter	22.589	0.00	1.08	100Yr+45% 1440Min Summer	5.268	0.00	1.22

Simulation Results

Return Period (yrs) + Climate Change (%):

100yr+45%

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S68	240 min Winter	233	11.119	0.927	0.000		Flood Risk
S69	240 min Winter	233	11.119	1.055	0.000		Flood Risk
S119	240 min Winter	233	11.119	1.101	0.000		Flood Risk
S70	240 min Winter	233	11.119	1.162	0.000		Surcharged
S71	240 min Winter	233	11.119	1.194	0.000		Flood Risk
S138	240 min Winter	233	11.119	1.277	5.959		Flood Risk
S72	15 min Summer	10	10.917	1.096	27.734		Surcharged
S137	15 min Summer	10	10.983	1.033	106.644		Flood Risk
S73	15 min Summer	10	10.907	1.161	131.224		Surcharged
S142	15 min Summer	10	10.728	0.210	15.058		Surcharged
S74	15 min Summer	10	10.786	1.143	122.013		Surcharged
S75	15 min Summer	10	10.722	1.150	171.634		Surcharged
S131	15 min Summer	10	10.429	0.992	177.084		Surcharged
S106	15 min Summer	10	10.276	0.898	202.312		Surcharged
S103	1440 min Summer	1656	10.191	0.791	0.021		Surcharged
S76	1440 min Summer	1655	10.191	0.906	4.898		Surcharged
S99	1440 min Summer	1656	10.191	0.988	4.764		Flood Risk
S77	1440 min Summer	1659	10.191	1.041	4.386		Flood Risk
S135	120 min Winter	103	10.635	0.979	0.000		Surcharged
S134	120 min Winter	103	10.635	1.046	0.002		Flood Risk
S133	120 min Winter	103	10.635	1.098	5.046		Flood Risk
S132	1440 min Summer	1661	10.190	0.727	0.013		Surcharged
S102	1440 min Summer	1661	10.190	0.845	0.012		Surcharged
S144	1440 min Summer	1665	10.190	0.515	0.004		Flood Risk
S1	1440 min Summer	1661	10.190	0.995	0.021		Flood Risk
S2	1440 min Summer	1662	10.191	1.041	0.008		Flood Risk
S3	1440 min Summer	1661	10.190	1.140	4.068		Surcharged
S4	1440 min Summer	1665	10.190	1.240	3.681		Flood Risk
S45	15 min Summer	10	10.901	0.501	17.145		Flood Risk
S47	30 min Summer	18	10.655	0.455	29.319		Surcharged
S46	60 min Summer	43	10.601	0.701	8.851		Surcharged
S48	60 min Summer	43	10.598	0.748	9.647		Flood Risk
S49	60 min Summer	44	10.594	0.794	8.947		Surcharged
S61	180 min Summer	181	10.631	0.581	0.063		Flood Risk
S60	180 min Summer	180	10.631	0.806	2.913		Flood Risk
S50	60 min Summer	44	10.592	0.967	9.895		Flood Risk
S51	60 min Summer	44	10.592	0.981	14.135		Flood Risk
S52	60 min Summer	44	10.591	0.991	14.146		Surcharged
S141	60 min Summer	44	10.591	0.684	4.793		Surcharged
S140	60 min Summer	44	10.591	0.737	7.530		Surcharged
S139	60 min Summer	44	10.591	0.787	8.082		Flood Risk
S64	60 min Summer	43	10.591	0.891	13.749		Surcharged
S53	60 min Summer	44	10.590	1.094	44.831		Flood Risk
S54	1440 min Summer	1673	10.190	0.734	0.429		Surcharged
S55	1440 min Summer	1671	10.190	0.790	0.432		Surcharged
S63	120 min Winter	116	10.673	0.473	0.001		Surcharged
S62	120 min Winter	116	10.673	0.798	2.939		Flood Risk
S112	1440 min Summer	1672	10.190	0.465	0.000		Surcharged
S145	1440 min Summer	1669	10.191	0.103	0.011		OK
S111	1440 min Summer	1670	10.190	0.851	0.452		Surcharged
S56	1440 min Summer	1675	10.190	0.874	0.438		Flood Risk
S57	1440 min Summer	1672	10.190	1.015	0.426		Flood Risk
S59	1440 min Summer	1672	10.190	1.190	0.430		Flood Risk
S136	1440 min Summer	1670	10.190	0.385	0.000		Surcharged
S92	1440 min Summer	1671	10.190	0.890	0.002		Surcharged
S93	1440 min Summer	1673	10.190	0.949	0.012		Surcharged
S94	1440 min Summer	1673	10.190	1.013	0.000		Surcharged
S121	1440 min Summer	1671	10.190	1.068	0.044		Surcharged
S124	1440 min Summer	1679	10.190	0.890	0.000		Surcharged
S122	1440 min Summer	1671	10.190	1.124	0.050		Surcharged

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S123	1440 min Summer	1674	10.190	1.190	0.013		Flood Risk
S22	1440 min Summer	1673	10.190	1.340	3.225		Surcharged
S5	1440 min Summer	1673	10.190	1.490	3.254		Flood Risk
S130	960 min Summer	890	8.505	0.205	3.255		OK
S38	180 min Winter	167	9.383	0.533	0.803		Flood Risk
S85	180 min Winter	167	9.383	0.633	0.804		Flood Risk
S6	30 min Winter	20	8.505	0.305	3.795		OK
S7	1440 min Summer	1017	7.950	0.050	4.079		OK
S36	15 min Summer	10	10.903	1.029	34.955		Flood Risk
S31	15 min Summer	10	10.899	1.066	125.929		Flood Risk
S32	360 min Winter	348	10.942	1.142	0.408		Surcharged
S23	360 min Winter	348	10.942	1.142	0.000		Surcharged
S33	360 min Winter	348	10.942	1.342	1.134		Surcharged
S24	360 min Winter	348	10.942	1.542	1.945		Surcharged
S25	15 min Summer	10	10.663	1.396	120.359		Flood Risk
S26	15 min Summer	10	10.635	1.386	164.243		Flood Risk
S27	15 min Summer	10	10.557	1.337	227.831		Flood Risk
S44	480 min Winter	464	10.086	0.486	0.631		Flood Risk
S65	480 min Winter	464	10.085	0.725	0.631		Surcharged
S28	15 min Summer	11	10.092	0.997	217.196		Surcharged
S29	15 min Summer	11	9.907	0.857	220.999		Surcharged
S30	1440 min Winter	1427	9.803	0.803	2.815		Flood Risk
S13	1440 min Winter	1427	9.803	0.953	2.943		Surcharged
S18	1440 min Winter	1428	9.802	1.102	2.947		Flood Risk
S19	1440 min Winter	1429	9.802	1.152	2.998		Flood Risk
S125	1440 min Winter	1423	9.802	0.564	0.019		Flood Risk
S143	1440 min Winter	1436	9.802	1.302	0.015		Surcharged
S16	1440 min Winter	1426	9.802	1.402	3.074		Flood Risk
S43	120 min Winter	115	8.725	0.255	0.036		Surcharged
S20	120 min Winter	115	8.725	0.311	0.737		Surcharged
S21	120 min Winter	115	8.725	0.399	0.700		Surcharged
S17	720 min Summer	721	8.257	0.045	3.776		OK
S41	360 min Winter	282	9.588	0.276	0.939		Flood Risk
S40	360 min Winter	348	9.504	0.929	0.828		Flood Risk
S39	360 min Winter	349	8.422	0.022	0.827		OK
S12	720 min Winter	694	8.187	0.050	4.585		OK
S126	720 min Winter	695	8.138	0.050	4.585		OK
S127	720 min Winter	695	8.048	0.050	4.585		OK
S128	720 min Winter	695	7.971	0.032	4.585		OK
S129	960 min Winter	820	7.851	0.061	8.645		OK
S8	960 min Winter	821	7.743	0.062	8.645		OK
S9	960 min Winter	821	7.550	0.064	8.645		OK
S10	960 min Winter	821	7.514	0.062	8.645		OK
S11	960 min Winter	821	7.437	0.062	8.645		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	360 min Winter	981	S68	S69	0.375	0.027	0.832	0.007	Surcharged
1.001	240 min Summer	879	S69	S70	0.375	0.041	2.021	0.018	Surcharged
2.000	120 min Winter	753	S119	S70	0.375	0.056	0.540	0.005	Surcharged
1.002	240 min Winter	882	S70	S71	0.375	0.051	3.176	0.028	Surcharged
1.003	30 min Summer	464	S71	S138	0.375	0.075	3.686	0.032	Surcharged
1.004	15 min Summer	18	S138	S72	0.375	0.556	6.983	0.061	Surcharged
1.005	15 min Summer	8	S72	S73	0.375	0.549	20.756	0.181	Surcharged
3.000	15 min Summer	8	S137	S73	0.375	1.026	96.466	0.840	Surcharged
1.006	15 min Summer	10	S73	S74	0.375	1.105	122.013	1.063	Surcharged
4.000	30 min Summer	28	S142	S74	0.150	2.516	13.013	0.253	Surcharged
1.007	15 min Summer	12	S74	S75	0.375	1.022	112.840	0.983	Surcharged
1.008	15 min Summer	10	S75	S131	0.375	1.515	167.316	1.458	Surcharged
1.009	15 min Summer	11	S131	S106	0.375	1.586	175.210	1.526	Surcharged
1.010	15 min Summer	10	S106	S76	0.375	1.809	199.785	1.741	Surcharged
5.000	30 min Winter	32	S103	S76	0.300	0.538	19.650	0.232	Surcharged
1.011	15 min Summer	11	S76	S99	0.375	1.692	186.862	1.628	Surcharged
1.012	15 min Summer	11	S99	S77	0.375	1.700	187.736	1.636	Surcharged

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.013	30 min Summer	130	S77	S3	0.375	2.259	182.613	1.450	Surcharged
6.000	15 min Summer	12	S135	S134	0.375	0.061	1.394	0.012	Surcharged
6.001	30 min Winter	187	S134	S133	0.375	0.065	2.791	0.024	Surcharged
6.002	600 min Summer	429	S133	S132	0.375	0.431	4.974	0.043	Surcharged
6.003	120 min Summer	461	S132	S102	0.375	0.847	24.309	0.212	Surcharged
6.004	60 min Summer	347	S102	S1	0.375	0.609	34.426	0.300	Surcharged
7.000	120 min Summer	383	S144	S1	0.150	2.608	16.972	0.365	Surcharged
6.005	15 min Summer	11	S1	S2	0.375	0.732	74.979	0.653	Surcharged
6.006	30 min Summer	130	S2	S3	0.375	1.664	118.441	1.362	Surcharged
1.014	30 min Winter	62	S3	S4	0.375	1.028	103.054	0.748	Surcharged
1.015	30 min Winter	31	S4	S22	0.375	1.049	102.211	1.102	Surcharged
8.000	15 min Summer	9	S45	S46	0.150	0.923	14.761	0.963	Surcharged
9.000	15 min Summer	8	S47	S46	0.225	1.220	41.387	0.897	OK
8.001	15 min Summer	7	S46	S48	0.225	1.162	46.194	1.026	OK
8.002	15 min Summer	8	S48	S49	0.225	1.246	49.449	1.485	OK
8.003	15 min Summer	8	S49	S50	0.225	1.021	27.486	0.902	OK
10.000	15 min Summer	22	S61	S60	0.225	0.124	4.947	0.128	OK
10.001	30 min Summer	65	S60	S50	0.225	0.668	3.387	0.078	OK
8.004	15 min Summer	7	S50	S51	0.375	0.270	21.618	0.251	Surcharged
8.005	15 min Summer	7	S51	S52	0.375	0.984	60.661	0.525	Surcharged
8.006	15 min Summer	18	S52	S53	0.375	0.638	48.277	0.458	Surcharged
11.000	15 min Summer	9	S141	S140	0.375	0.687	36.351	0.317	Surcharged
11.001	15 min Summer	9	S140	S139	0.375	0.924	53.532	0.466	Surcharged
11.002	15 min Summer	9	S139	S53	0.375	0.797	54.003	0.470	Surcharged
12.000	15 min Summer	8	S64	S53	0.375	0.872	96.346	0.801	Surcharged
8.007	15 min Summer	13	S53	S54	0.375	0.916	50.333	0.416	Surcharged
8.008	15 min Summer	9	S54	S55	0.375	1.176	62.967	0.549	Surcharged
8.009	15 min Summer	14	S55	S111	0.375	1.171	125.988	1.048	Surcharged
13.000	600 min Winter	628	S63	S62	0.150	0.015	0.231	0.016	Surcharged
13.001	720 min Winter	950	S62	S112	0.225	0.674	3.003	0.059	OK
13.002	360 min Summer	383	S112	S111	0.225	0.772	4.632	0.095	OK
14.000	1440 min Summer	1669	S145	S111	0.127	0.003	0.050	0.001	OK
8.010	15 min Summer	13	S111	S56	0.375	1.236	136.553	1.155	Surcharged
8.011	15 min Summer	13	S56	S57	0.375	1.419	146.406	1.395	Surcharged
8.012	15 min Summer	13	S57	S59	0.375	1.610	154.042	0.919	Surcharged
8.013	30 min Summer	47	S59	S22	0.375	2.861	217.296	1.177	Surcharged
15.000	1440 min Summer	1450	S136	S93	0.375	0.468	2.676	0.023	Surcharged
16.000	60 min Summer	196	S92	S93	0.375	0.692	19.481	0.170	Surcharged
15.001	30 min Summer	496	S93	S94	0.375	0.925	42.125	0.367	Surcharged
15.002	30 min Summer	185	S94	S121	0.375	0.910	42.100	0.367	Surcharged
15.003	60 min Summer	67	S121	S122	0.375	1.005	47.439	0.413	Surcharged
17.000	60 min Summer	1101	S124	S122	0.375	0.001	0.091	0.001	Surcharged
15.004	60 min Summer	59	S122	S123	0.375	1.136	47.322	0.412	Surcharged
15.005	60 min Summer	53	S123	S22	0.375	0.938	47.279	0.265	Surcharged
1.016	30 min Winter	31	S22	S5	0.375	0.726	59.894	0.252	Surcharged
1.017	600 min Winter	730	S5	S130	0.122	0.469	3.255	0.067	OK
1.018	1440 min Summer	1124	S130	S6	0.215	0.172	3.267	0.040	OK
18.000	15 min Summer	19	S38	S85	0.150	0.620	2.734	0.123	Surcharged
18.001	960 min Winter	471	S85	S6	0.025	0.422	0.825	0.063	OK
1.019	1440 min Summer	1016	S6	S7	0.027	0.317	4.079		OK
1.020	1440 min Summer	1017	S7	S129	0.050	0.629	4.079	0.114	OK
19.000	15 min Summer	9	S36	S31	0.375	0.419	34.179	0.298	Surcharged
19.001	15 min Summer	10	S31	S25	0.375	1.147	120.359	1.049	Surcharged
20.000	15 min Summer	22	S32	S33	0.375	0.466	7.257	0.043	Surcharged
21.000	15 min Summer	26	S23	S33	0.375	0.012	1.284	0.005	Surcharged
20.001	120 min Summer	78	S33	S24	0.375	0.174	8.029	0.042	Surcharged
20.002	15 min Summer	15	S24	S25	0.375	0.532	16.858	0.068	Surcharged
19.002	15 min Summer	11	S25	S26	0.375	1.138	125.707	1.095	Surcharged
19.003	15 min Summer	11	S26	S27	0.375	1.478	163.214	1.422	Surcharged
19.004	15 min Summer	10	S27	S28	0.375	2.025	223.691	1.915	Surcharged
22.000	30 min Winter	21	S44	S65	0.150	0.391	3.867	0.256	Surcharged
22.001	30 min Summer	24	S65	S28	0.150	0.515	2.682	0.167	Surcharged
19.005	15 min Summer	10	S28	S29	0.375	2.033	224.507	1.873	Surcharged
19.006	15 min Summer	11	S29	S30	0.375	2.017	222.761	1.900	Surcharged
19.007	60 min Summer	204	S30	S13	0.375	1.970	182.414	1.258	Surcharged
19.008	30 min Summer	45	S13	S18	0.375	1.339	120.220	0.606	Surcharged
19.009	15 min Summer	14	S18	S19	0.375	1.232	132.443	1.034	Surcharged
19.010	30 min Summer	19	S19	S16	0.375	1.307	143.942	0.915	Surcharged

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
23.000	60 min Summer	51	S125	S16	0.150	0.952	14.732	0.391	Surcharged
24.000	360 min Summer	151	S143	S16	0.375	0.152	16.804	0.094	Surcharged
19.011	1440 min Winter	1426	S16	S17	0.032	0.885	3.074	0.048	OK
25.000	60 min Summer	67	S43	S20	0.225	0.228	0.838	0.024	OK
25.001	15 min Summer	8	S20	S21	0.225	0.521	4.396	0.128	OK
25.002	1440 min Summer	905	S21	S17	0.022	0.386	0.783	0.023	OK
19.012	720 min Summer	721	S17	S12	0.047	0.528	3.776	0.051	OK
26.000	360 min Winter	277	S41	S40	0.150	0.088	0.946	0.032	Surcharged
26.001	360 min Winter	349	S40	S39	0.023	0.490	0.827	0.053	OK
26.002	360 min Winter	349	S39	S12	0.022	0.508	0.827	0.050	OK
19.013	720 min Winter	694	S12	S126	0.050	0.596	4.585	0.062	OK
19.014	720 min Winter	695	S126	S127	0.050	0.593	4.585	0.062	OK
19.015	720 min Winter	695	S127	S128	0.049	0.600	4.585	0.063	OK
19.016	720 min Winter	710	S128	S129	0.047	0.696	4.585	0.028	OK
1.021	960 min Winter	821	S129	S8	0.061	0.835	8.645	0.092	OK
1.022	960 min Winter	821	S8	S9	0.063	0.806	8.645	0.096	OK
1.023	960 min Winter	821	S9	S10	0.063	0.806	8.645	0.096	OK
1.024	960 min Winter	821	S10	S11	0.062	0.825	8.645	0.096	OK

Permeable Paving Storage

Permeable Paving	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Surface Runoff (m3)	Status
Permeable Paving 37	240 min Winter	231	11.135	0.455	6.106			OK
Permeable Paving 45	30 min Summer	22	10.708	0.205	23.348			OK
Permeable Paving 43	60 min Summer	43	10.720	0.156	13.166			OK
Permeable Paving 39	1440 min Summer	1656	10.191	0.364	0.059			OK
Permeable Paving 41	120 min Winter	103	10.641	0.526	3.522			OK
Permeable Paving 40	1440 min Summer	1661	10.190	0.495	0.145			OK
Permeable Paving23	180 min Summer	182	10.631	0.387	0.434			OK
Permeable Paving24	120 min Winter	92	10.660	0.630	11.725	1.462		Flood
Permeable Paving10	120 min Winter	116	10.677	0.530	2.939			OK
Permeable Paving 46	60 min Summer	50	10.245	0.242	18.931			OK
Permeable Paving 42	120 min Summer	88	10.323	0.291	21.809			OK
Permeable Paving3	180 min Winter	167	9.385	0.515	0.796			OK
Permeable Paving1	360 min Winter	348	10.942	0.409	0.399			OK
Permeable Paving18	360 min Winter	348	10.942	0.211	0.706			OK
Permeable Paving2	360 min Winter	348	10.942	0.402	0.789			OK
Permeable Paving8	480 min Winter	464	10.086	0.442	0.632			OK
Permeable Paving 36	1440 min Winter	1424	9.802	0.544	0.112			OK
Permeable Paving4	480 min Winter	348	9.590	0.730	1.111	0.055		Flood
Permeable Paving5	360 min Winter	349	9.504	0.443	0.356			OK