CONSULTING CIVIL AND STRUCTURAL ENGINEERS

LAND AT BOLNEY GRANGE INDUSTRIAL PARK, JOBS LANE, HICKSTEAD

SURFACE WATER DRAINAGE SCHEME

JULY 2026

Ref: 16933/01/HOP/RPT/02

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Client : ASP Planning
& Development Consultancy
Old Bank Chambers
London Road
Crowborough
TN6 2TT

Prepared by	Checked by	Approved by	Revision
Andrew Keen	**Ivan Mulero Ramirez**	**Andrew Keen**	**P01 03.07.2026**

1.0 INTRODUCTION AND PLANNING CONDITION

1.1 HOP Consulting Ltd has been engaged by ASP Planning to provide details of the permanent surface water drainage scheme for land at Bolney Grange Industrial Park, Job's Lane, Hickstead. This report has been prepared to address Planning Condition 3, which requires detailed designs of a surface water drainage scheme to be submitted to and agreed with the Local Planning Authority prior to, or in conjunction with, each reserved matters application.

1.2 The site, also known as 'Parcel 24', is currently undeveloped and is located on the south-west edge of the Bolney Grange Industrial Park, north of Job's Lane, near Burgess Hill, West Sussex.

1.3 The site has been granted outline planning permission (Reference DM/23/3208, decision date 9 June 2025) for the erection of 10x class E(G), B2 and B8 flexible use commercial units including details of access and layout.

1.4 The purpose of this report is to demonstrate that the proposed drainage strategy accords with the submitted Flood Risk Assessment and Drainage Strategy (FRADS) report dated 13 December 2023, reference D2085/FRA1.1, and the Technical Note dated 09 October 2024, reference D2085, in response to each requirement of Planning Condition 3, as cited below;

> ***3.*** *Prior to or in conjunction with the submission of each reserved matters application, detailed designs of a surface water drainage scheme shall be submitted to and agreed with the Local Planning Authority. The approved scheme will be implemented prior to the first occupation of the development and shall address greenfield runoff rates, attenuation storage, hydraulic modelling for the 3.33% AEP and 1% AEP events including climate change, exceedance routes, finished floor levels, SuDS Manual water quality treatment, ordinary watercourse consent and long-term maintenance and management.*

1.5 The assessment is supported by the proposed drainage drawing 16933-HOP-XX-XX-DR-C-0500 (Appendix A); drainage details drawings 16933-HOP-XX-XX-DR-C-0550 & 0551 (Appendix A); and the Causeway Flow hydraulic calculations dated 01 July 2026 (Appendix B). These the key elements and interconnectivity of the proposed surface water conveyance network, permeable paving, attenuation ponds, flow controls, outfalls and connection to the wider ditch/watercourse network.

1.6 The drainage scheme incorporates source control, conveyance and attenuation measures designed in accordance with the principles of CIRIA C753 The SuDS Manual, including the consideration of water quantity, water quality and provision for safe management of exceedance flows. An exceedance flow plan is also included as Appendix C.

2.0 SURFACE WATER DRAINAGE STRATEGY

2.1 The development is proposed to be served by a surface water drainage network comprising rainwater downpipe connections, road gullies, channel drains, inspection chambers, carrier drains, permeable block paving, attenuation ponds/basins, flow control chambers and outfalls to the existing ditch/watercourse system. The drawing identifies the surface water drainage network, site boundary, permeable block paving, permeable sub-base, proposed drains, concrete manholes and drainage outfalls.

2.2 The site falls generally from the north-west toward the south-east, where the existing ditch and wider watercourse network are located. The drainage arrangement therefore follows the natural fall of the site, with controlled discharge ultimately directed toward the existing watercourse network rather than leaving the site in an uncontrolled manner as per the current undeveloped site conditions.

3.0 PLANNING CONDITION 3 COMPLIANCE

Greenfield runoff and discharge rate

3.1 Planning Condition 3 requires that the greenfield runoff rate of 19.5 litres/second (agreed with the Lead Local Flood Authority and detailed in the FRA) and post-development runoff to be attenuated to the equivalent greenfield rate for all rainfall events up to and including the 1% AEP event. The Flow model includes an online Hydro-Brake at Node 23 with a design flow of 19.5 litres/second and design depth of 0.800 m, providing controlled discharge from the downstream attenuation system. The drawing identifies the corresponding surface water manhole with Hydro-Brake and limited 19.50 litres/second flow rate discharging toward the ditch/watercourse network.

3.2 The model also includes a separate online Hydro-Brake at Node 31 with a design flow of 22.0 litres/second serving an upstream attenuation pond, providing local control before flows pass through the downstream network.

3.3 Additional orifice controls are included within the drainage model to manage local sub-catchments, including controls with design flows of 2.0 litres/second, 2.5 litres/second, 20.0 litres/second, 20.5 litres/second, 70.0 litres/second, 150.0 litres/second and 200.0 litres/second.

3.4 The discharge location is shown on the drainage drawing as connecting with the existing ditch and wider watercourse network in the south-east of the site, with headwalls and ditch connections identified.

3.5 Ordinary watercourse consent will be sought from the relevant authority for works associated with the discharge of surface water to the ordinary watercourse.

Attenuation Storage

3.6 The scheme provides surface water attenuation through a combination of ponds and permeable paving storage. The hydraulic model identifies Pond Storage Structure Node 30 with an invert level of 19.200 m and storage areas of 660.0 m² at 0.000 m depth and 904.0 m² at 1.000 m depth. Pond Storage Structure Node 22 has an invert level of 19.000 m and storage areas of 362.0 m² at 0.000 m depth and 635.0 m² at 0.800 m depth.

Permeable Paving Storage

3.7 Porous paving storage is included at Nodes 3, 7, 9, 13, 17, 38 and 41. These elements provide source control and distributed attenuation across the site. The model applies a porosity of 0.30 and storage depths of up to 0.400 m within the permeable paving systems, with underdrains provided to discharge to the wider surface water network.

3.8 The permeable paving areas shown on the drainage drawing correspond with the modelled porous paving storage structures and form part of the treatment train, providing interception, filtration and attenuation before controlled discharge through the network.

Hydraulic Modelling for 3.33% AEP and 1% AEP Events

3.9 The Flow+ calculations include critical storm simulations for the 30 year event with a 40% climate change allowance and the 100 year event with a 45% climate change allowance. These outputs demonstrate that the principal attenuation and conveyance network has been modelled for the storm events required by the condition. For the 30 year plus climate change event, the reported lowest mass balance is 99.94%, with no recorded flood volumes in the model output. For the 100 year plus climate change event, the reported lowest mass balance is 99.91%, with no recorded flood volumes in the model output.

Exceedance and Flood Routing

3.10 The drainage design uses the natural fall of the site to direct exceedance flows away from buildings and toward the downstream attenuation and ditch network in the south-east. The drainage drawing identifies a spillway associated with the detention/pond features, allowing exceedance flows greater than the 1% AEP plus climate change event to be managed along defined routes and reducing risk to people and property.

3.11 The hydraulic model indicates that the 1% AEP plus climate change scenario is contained without a modelled flood volume at the reported nodes. Where nodes are shown as surcharged or at flood risk, the reported flood volume remains 0.0 m^3, indicating that storage and conveyance capacity is available within the drainage system and associated SuDS features.

3.12 Finished floor levels (FFL) shown on the drawing include levels of 21.00 m, 21.20 m, 22.00 m, 22.75 m and 24.00 m above Ordnance Datum (AOD). These levels are set above adjacent external ground levels and drainage features and should be checked at detailed design stage to confirm that each finished floor level remains a minimum of 300 mm above expected flood levels from all sources, or 150 mm above adjacent ground level, whichever is more precautionary.

3.13 The detention basin design incorporates spillway provision and the drainage structures include freeboard allowance through the separation between modelled water levels, chamber cover levels, pond crest levels and finished floor levels. This should be retained through detailed design and verified on the final construction drawings.

Water quality and SuDS Manual compliance

3.14 The proposed strategy follows the SuDS Manual principles of managing water quantity, improving water quality and providing source control. Permeable paving provides interception, filtration and attenuation at source, while swales/ponds, settlement within attenuation features and controlled discharge provide further treatment prior to discharge to the receiving ditch/watercourse network.

3.15 The drainage features shown on the submitted drawing and represented in the hydraulic model are therefore considered to provide an appropriate SuDS treatment train for the proposed commercial development, subject to detailed construction specification, maintenance access and management arrangements being secured post-construction.

Maintenance and Management

3.16 A drainage maintenance and management schedule has been provided in Appendix D. The schedule sets out the recommended inspection frequencies for each drainage feature and identifies the responsibilities for undertaking maintenance and servicing, either by a specialist contractor or by the site management team.

3.17 All drainage within the development is private and will not be adopted. The site management team will therefore retain overall responsibility for ensuring that the maintenance and management schedule is implemented for the lifetime of the development, including arranging specialist inspection, servicing and remedial works where required.

4.0 CONCLUSIONS

4.1 The proposed surface water drainage scheme provides a managed and controlled drainage arrangement for the development. The submitted drainage layout, drainage details and Causeway Flow calculations demonstrate the proposed conveyance network, permeable paving source control, attenuation ponds, hydraulic controls, spillway provision and controlled discharge to the existing ditch/watercourse network.

4.2 The scheme has been developed to respond directly to the requirements of Planning Condition 3. In particular, the downstream discharge is controlled to the greenfield runoff rate of 19.5 litres/second, with additional upstream controls used to manage individual drainage sub-catchments before flows are conveyed to the attenuation and outfall network.

4.3 The hydraulic modelling shows that the drainage system has been assessed for the 3.33% AEP and 1% AEP rainfall events with climate change allowances. The results show that the attenuation ponds, permeable paving storage and conveyance network provide storage and hydraulic capacity such that there are no modelled flood volumes indicated for the critical design events reported.

4.4 The drainage strategy incorporates SuDS principles through the use of permeable paving, attenuation basins, controlled outlets and treatment prior to discharge. The arrangement also provides for exceedance management, with the site levels and spillway provision directing flows away from buildings and toward the downstream attenuation and ditch network during events exceeding the design standard.

4.5 It is therefore considered that the information provided in this report is sufficient to demonstrate compliance with the requirements of Condition 3.

APPENDIX A – DRAINAGE LAYOUT AND DETAILS

Project/Task No. 16933-01 Scale: 1:500 ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. BELOW GROUND DRAINAGE

(i) All foul and storm water drains which are not to be adopted as public sewers under a Section 104 Agreement must be constructed in accordance with Building Regulations Approved Document H, BS EN 752:2017 and, where appropriate, the relevant agreement certificates.

(ii) All adoptable drainage (manholes, sewers, gullies, gully connections, and other sewerage structures) intended to convey foul water and surface water are to be constructed in accordance with Water UK's 'Sewerage Sector Guidance' (SSG) and the relevant Council Design Guide.

(iii) Plastic pipes and fittings shall be of unplasticised polyvinyl chloride (PVC-U) complying with the requirements of BS EN 1401-1:2019 +A1:2023.

(iv) Concrete pipes shall be spun by a centrifugal process or be vertically pressed. Concrete pipes shall comply with the requirements of, and be tested in accordance with, BS 5911-1:2021 and BS EN 1916:2002.

(v) Vitrified Clay pipes, fittings, joints, adaptors and couplings shall comply with the requirements of BS EN 295-1:2013 and BS EN 295-4:2013.

(vi) All private foul water drains are to be laid at minimum gradient of 1 in 40 at the head of pipe runs, and minimum 1 in 80 elsewhere, unless otherwise stated on the drawing. Use chamber main channel invert levels to set gradient. Incoming branch invert level is typically 50mm above main channel.

(vii) All private foul water drains are 100mm diameter, unless otherwise stated on the drawing.

(viii) All private surface water drains are to be laid at minimum gradient of 1 in 80 unless otherwise stated on the drawing. Use chamber main channel invert levels to set gradient. Incoming branch invert level is typically 50mm above main channel.

(ix) All private surface water drains are 150mm unless otherwise stated on the drawing.

(x) Allow for rodding access above ground where rainwater downpipes do not have a direct connection to an inspection chamber.

(xi) Plastic Inspection Chambers shall comply with the requirements of BS EN 13598-1:2020.

(xii) Precast concrete manhole units shall comply with the requirements of BS 5911-3:2022 and BS EN 1917:2002. Manhole cover slabs situated under carriageways shall be heavy duty and those situated elsewhere shall be light duty. The relevant absorption tests required shall be carried out on a sample of those rings and slabs used unless a certificate of testing is supplied by the manufacturer.

(xiii) Manhole covers and frames are to be a minimum of:
Class B125 in non-trafficked areas, footways and verges.
Class D400 in trafficked areas and highways.
Class E600 and F900 manhole covers to be used for heavy duty applications such as docks, airports and industrial areas.

(xiv) Manhole covers and frames to be bedded and haunched externally in mortar.

(xv) All concrete used in drainage works is to comply with BRE Special Digest 1 (SD1:2005 - 3rd Edition) for Class 2 sulphate conditions.

(xvi) Any existing drain or sewer being re-used is to be surveyed and levelled prior to commencement of the drainage works, and refurbished if necessary.

(xvii) Connections to an adopted sewer are only to be made after receiving approval, from the relevant Sewerage Undertaker, of a sewer connection application (Section 106 - Water Industry Act 1991).

(xviii) All drains, sewers and manholes are to be cleaned and tested for water tightness on completion of construction.

(xix) Any above ground drainage is shown indicatively and must be confirmed by a suitably qualified third party.

Description	By	Aprvd.	Date	Rev.
ISSUED FOR INFORMATION	IMR	AK	03.07.26	P01

ISSUED FOR INFORMATION

Title
FOUL AND SURFACE WATER DRAINAGE

Project
BOLNEY GRANGE INDUSTRIAL PARK
JOB'S LANE, HICKSTEAD BN6 9HE

Client
LONDON TOWN PROPERTY HOLDINGS

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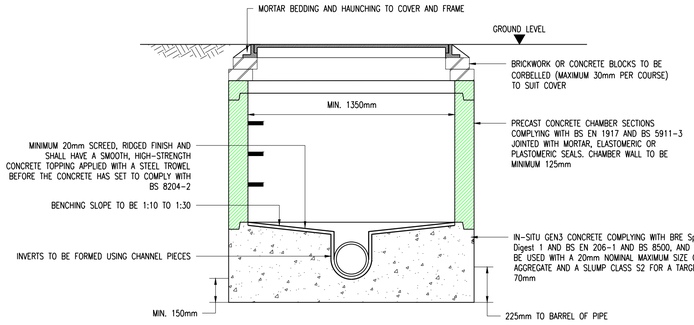


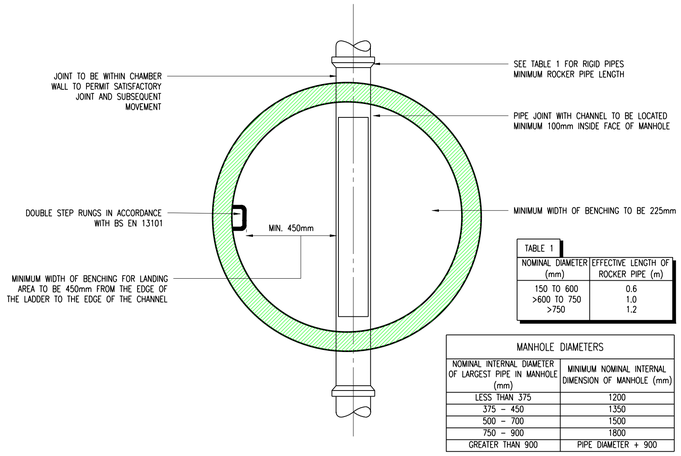


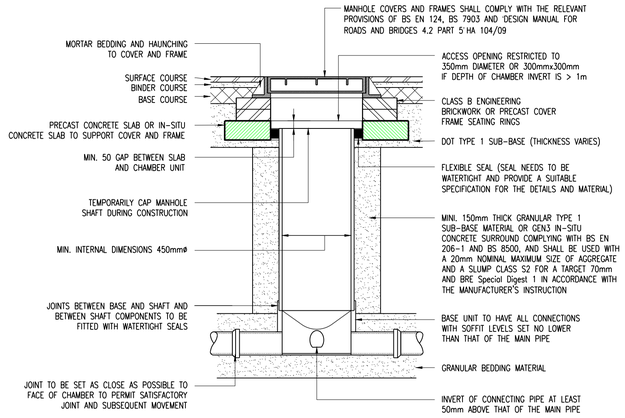
TABLE 1

NOMINAL DIAMETER (mm)	EFFECTIVE LENGTH OF ROCKER PIPE (m)
150 TO 600	0.6
>600 TO 750	1.0
>750	1.2

MANHOLE DIAMETERS

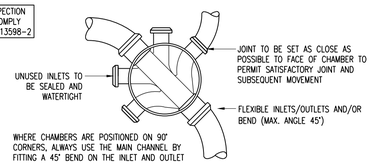
NOMINAL INTERNAL DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	MINIMUM NOMINAL INTERNAL DIMENSION OF MANHOLE (mm)
LESS THAN 375	1200
375 – 450	1350
500 – 700	1500
750 – 900	1800
GREATER THAN 900	PIPE DIAMETER + 900

TYPE C MANHOLE
(DEPTH TO INVERT <1.5m)
(1:20)

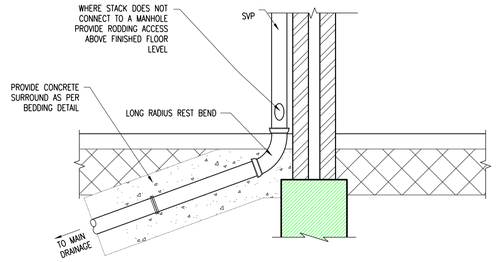


ALTERNATIVE BASE INVERT LAYOUTS
ALL CONNECTIONS TO BE MIN. SOFFIT TO SOFFIT

THERMOPLASTICS MANHOLES, INSPECTION CHAMBERS AND RINGS SHALL COMPLY WITH BS EN 13598-1 OR BS EN 13598-2



TYPE D ACCESS CHAMBER – FLEXIBLE MATERIAL
(SUBJECT TO VEHICLE LOADING, MAX. DEPTH 3m, NON-ENTRY)
(1:20)



SVP CONNECTION
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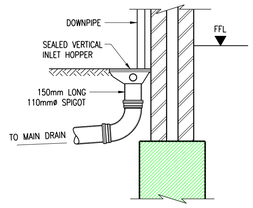
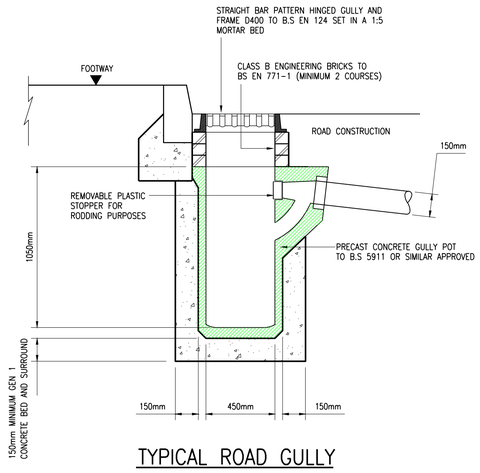
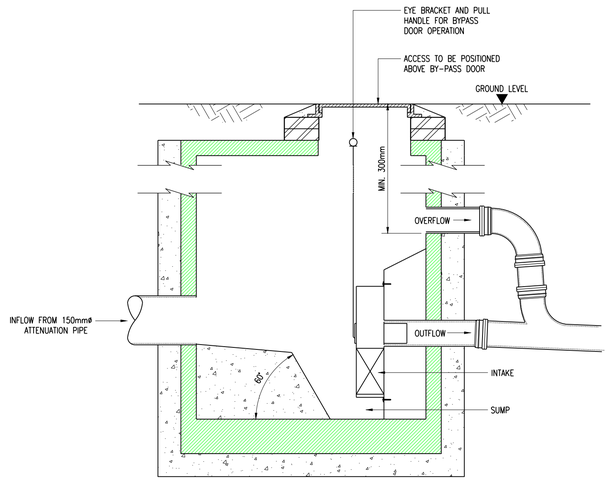


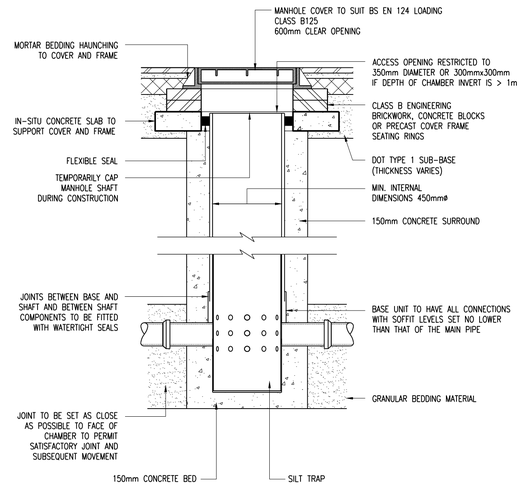
RWP CONNECTION.
(1:20)



TYPICAL ROAD GULLY
(1:20)



HYDROBRAKE MANHOLE.
(REFER TO FLOW CONTROL MANUFACTURER'S DETAILS FOR INTERNAL MANHOLE ARRANGEMENT)
(1:20)



TYPE 3 ACCESS CHAMBER – FLEXIBLE MATERIAL WITH PERFORATED BUCKET-SILT TRAP
(SUBJECT TO VEHICLE LOADING, MAX. DEPTH 1.2m, NON-ENTRY)
(1:20)

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(xviii) All drains, sewers and manholes are to be cleaned and tested for water tightness on completion of construction.

(xix) Any above ground drainage is shown indicatively and must be confirmed by a suitably qualified third party.

Description	By	Aprvd.	Date	Rev.
ISSUED FOR INFORMATION	IMR	AK	03.07.26	P01

ISSUED FOR INFORMATION

Title
DRAINAGE DETAILS
SHEET 1 OF 2

Project
BOLNEY GRANGE, HICKSTEAD

Client
LONDON TOWN PROPERTY HOLDINGS

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Drawing No. 16933-HOP-ZZ-XX-DR-C-0550 Status S2 Rev. P01

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1:20 0 0.2m 0.4m 0.6m 0.8m 1m 1:50 0 0.5m 1m 1.5m 2m 2.5m 1:100 0 1m 2m 3m 4m 5m

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Project/Task No. 16933-01 Scale: AS SHOWN ORIGINAL DRAWING SIZE A1

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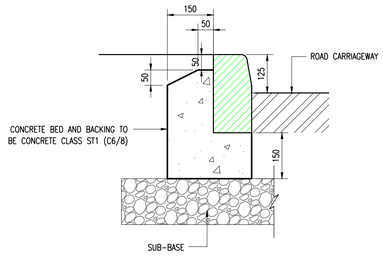

HALF-BATTERED KERB
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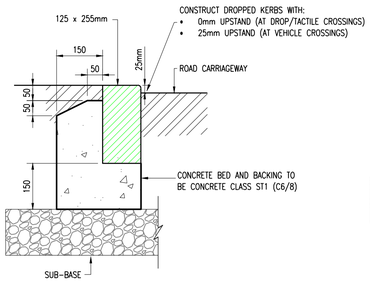

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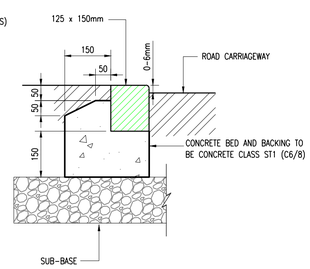

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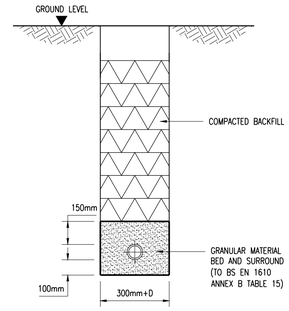
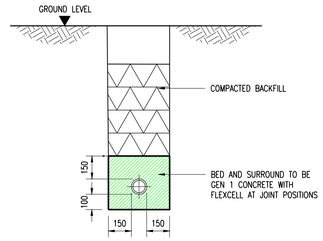


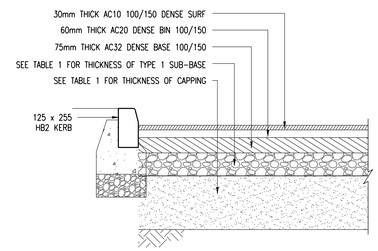
CLASS S BEDDING
(WHERE COVER >600mm IN LANDSCAPED AREAS OR >900mm IN TRAFFICKED AREAS)
(1:20)



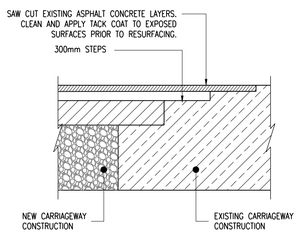
CLASS Z BEDDING
(WHERE COVER <600mm IN LANDSCAPED AREAS OR <900mm IN TRAFFICKED AREAS)
(1:20)

TABLE 1: PAVEMENT FOUNDATION	
CBR </= 1%	CONSIDER STABILISATION OF WEAK MATERIAL OR MIN 600mm CAPPING ON GEOTEXTILE + 150mm SUB-BASE
CBR </= 2%	600mm CAPPING, 150mm SUB-BASE. GEOTEXTILE BENEFICIAL
2% < CBR </= 2.5%	450mm CAPPING, 150mm SUB-BASE
2.5% < CBR </= 5%	350mm CAPPING, 150mm SUB-BASE OR 300mm SUB-BASE
5% < CBR </= 15%	225mm SUB-BASE
CBR > 15%	150mm SUB-BASE

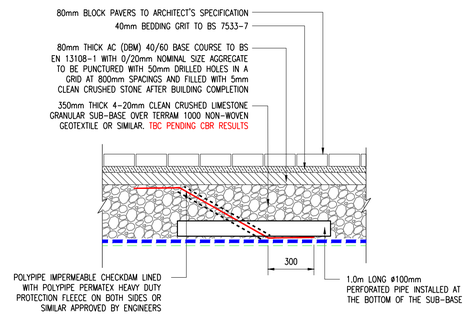
TABLE 2: PERMEABLE SUB-BASE BASED ON IN-SITU FORMATION LEVEL CBR TESTING	
CBR </= 2%	CONSIDER STABILISATION OF WEAK MATERIAL OR GEOGRID AND SUB-BASE TO GEOGRID MANUFACTURER DESIGN
2% < CBR </= 2.5%	550mm SUB-BASE
2.5% < CBR </= 5%	360mm SUB-BASE
CBR > 5%	150mm SUB-BASE



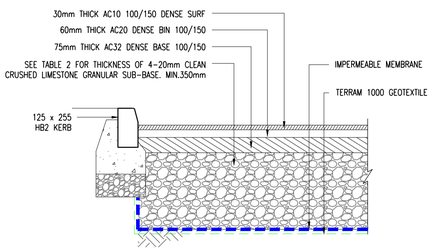
TRAFFICKED ASPHALT SURFACING
IMPERMEABLE
(1:20)



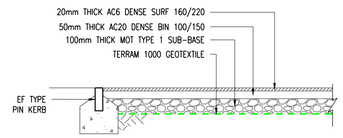
CARRIAGEWAY TIE-IN DETAIL
(1:20)



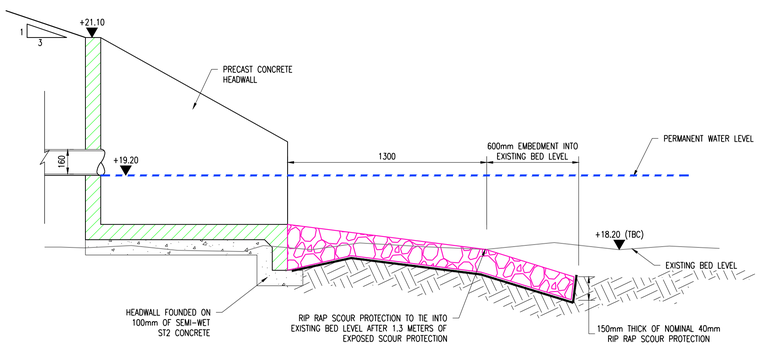
TRAFFICKED PERMEABLE BLOCK PAVING
SHOWING BAFFLE
(1:20)



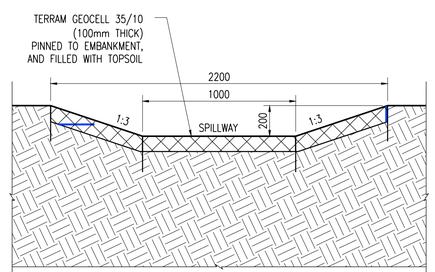
TRAFFICKED ASPHALT SURFACING
IMPERMEABLE SURFACE WITH PERMEABLE SUBBASE
(1:20)



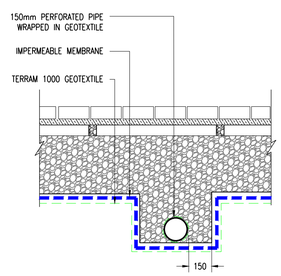
NON-TRAFFICKED ASPHALT
IMPERMEABLE
(1:20)



POND OUTFALL SECTION
(1:20)



EMBANKMENT SPILLWAY
(1:20)



PERFORATED PIPE TRENCH
(1:20)

Description	By	Aprvd.	Date	Rev.
ISSUED FOR INFORMATION	IMR	AK	03.07.26	P01

ISSUED FOR INFORMATION

Title
DRAINAGE DETAILS
SHEET 2 OF 2

Project
BOLNEY GRANGE, HICKSTEAD

Client
LONDON TOWN PROPERTY HOLDINGS

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
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+44 (0)1273 223900

Drawing No. 16933-HOP-ZZ-XX-DR-C-0550
Status S2
Rev. P01

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1:20 0 0.2m 0.4m 0.6m 0.8m 1m
1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m

Y:\PROJECTS\16933 Bolney Grange, Hickstead\Drawings\HOP\16933-HOP-XX-XX-DR-C-0550 Ivan Ramirez

APPENDIX B – HYDRAULIC CALCULATION OUTPUT

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.050
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Links (Results)

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
7.000	1.090	8.6	0.0	0.400	0.500	0.000	0.0	0	0.000
14.000	2.039	16.0	0.0	0.050	0.300	0.000	0.0	0	0.000
6.000	2.120	149.9	25.4	0.100	0.100	0.043	0.0	83	1.590
8.000	1.247	9.8	0.0	0.175	0.300	0.000	0.0	0	0.000
15.000	2.961	209.3	0.0	0.100	0.100	0.000	0.0	0	0.000
9.000	0.794	6.2	0.0	0.250	0.300	0.000	0.0	0	0.000
5.001	1.081	8.5	0.0	0.400	0.450	0.000	0.0	0	0.000
17.000	3.116	220.3	0.0	0.100	0.100	0.000	0.0	0	0.000
10.000	2.346	165.8	0.0	0.100	0.100	0.000	0.0	0	0.000
4.000	0.699	5.5	0.0	0.700	0.300	0.000	0.0	0	0.000
13.000	2.615	184.8	0.0	0.100	0.100	0.000	0.0	0	0.000
11.000	1.225	9.6	0.0	0.200	0.300	0.000	0.0	0	0.000
1.000	0.544	52.4	0.0	0.050	0.053	0.000	0.0	0	0.000
1.001	2.018	321.0	235.0	0.000	0.900	0.410	0.0	287	2.195
1.002	1.032	291.8	229.1	0.750	0.800	0.410	0.0	402	1.137
2.000	3.686	146.6	101.0	0.350	1.675	0.173	0.0	138	3.965
1.003	4.750	1343.2	228.2	0.800	1.130	0.410	0.0	166	3.589
5.000	1.913	15.0	0.0	0.300	0.400	0.000	0.0	0	0.000
2.001	1.632	180.2	100.3	1.525	1.225	0.173	0.0	200	1.675
3.000	0.710	12.5	0.0	2.250	1.700	0.000	0.0	0	0.000
16.000	1.486	11.7	0.0	0.200	0.300	0.000	0.0	0	0.000
3.001	1.678	118.6	0.0	1.550	1.600	0.000	0.0	0	0.000
12.000	1.737	13.6	0.0	0.900	0.984	0.000	0.0	0	0.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

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Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	40	0	0
100	45	0	0

Node 31 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	19.150	Product Number	CTL-SHE-0200-2200-1500-2200
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	22.0	Min Node Diameter (mm)	1800

Node 41 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	20.0		
Invert Level (m)	22.200	Diameter (m)	0.128		

Node 38 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.0		
Invert Level (m)	22.700	Diameter (m)	0.039		

Node 7 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.5		
Invert Level (m)	21.900	Diameter (m)	0.044		

Node 9 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	20.5		
Invert Level (m)	21.700	Diameter (m)	0.130		

Node 3 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	150.0		
Invert Level (m)	21.700	Diameter (m)	0.401		

Node 13 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	200.0		
Invert Level (m)	21.200	Diameter (m)	0.495		

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Node 17 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	70.0		
Invert Level (m)	20.600	Diameter (m)	0.253		

Node 23 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	18.816	Product Number	CTL-SHE-0199-1950-0800-1950
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.5	Min Node Diameter (mm)	1500

Node 30 Pond Storage Structure

Invert Level (m)	19.200	Time to half empty (mins)		Analyse flow through structure	x

Inlets

29 | 26

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	660.0	1.000	904.0

Node 22 Pond Storage Structure

Invert Level (m)	19.000	Time to half empty (mins)		Analyse flow through structure	x

Inlets

20

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	362.0	0.800	635.0

Node 3 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	21.700
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	232
Underdrain Height above base (m)	0.000		

Inlets

2

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3105.5	0.0	0.400	3105.5	102.7

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Node 7 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	21.900
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

6

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	444.4	0.0	0.400	444.4	44.9

Node 38 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	22.700
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

40

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	572.8	0.0	0.400	572.8	60.6

Node 41 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	50.000	Invert Level (m)	22.200
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

44	33	32

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3680.7	3680.7	0.400	3680.7	3787.2

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Node 17 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	20.600
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

14

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	4100.3	4100.3	0.400	4100.3	4206.3

Node 9 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	21.700
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

42 | 8

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	435.0	435.0	0.400	435.0	478.1

Node 13 Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	225	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	20.000	Invert Level (m)	21.200
Underdrain Slope (1:X)	9999.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000		

Inlets

10 | 4

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	490.2	490.2	0.400	490.2	539.9

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	1	148	21.839	0.139	0.1	0.1573	0.0000	SURCHARGED
240 minute summer	2	148	21.839	0.239	57.2	0.0000	0.0000	OK
240 minute summer	3	152	21.826	0.126	31.4	127.6440	0.0000	OK
360 minute summer	4	232	21.354	0.152	21.4	0.0000	0.0000	OK
360 minute summer	5	248	22.520	0.020	0.6	0.0223	0.0000	OK
720 minute summer	6	480	21.977	0.075	1.8	0.0000	0.0000	OK
720 minute summer	7	495	21.974	0.074	1.2	10.2273	0.0000	OK
720 minute summer	8	495	21.829	0.127	0.9	0.0000	0.0000	OK
720 minute summer	9	495	21.822	0.122	7.4	16.9677	0.0000	OK
360 minute summer	10	240	21.348	0.146	7.1	0.0000	0.0000	OK
15 minute summer	11	1	21.200	0.000	0.0	0.0000	0.0000	OK
15 minute summer	12	1	21.100	0.000	107.9	0.0000	0.0000	OK
360 minute summer	13	240	21.331	0.131	25.4	21.1866	0.0000	OK
960 minute summer	14	690	20.756	0.154	21.7	0.0000	0.0000	OK
15 minute summer	15	1	20.700	0.000	0.0	0.0000	0.0000	OK
15 minute summer	16	1	20.600	0.000	63.2	0.0000	0.0000	OK
960 minute summer	17	705	20.746	0.146	15.7	183.0637	0.0000	OK
15 minute summer	18	10	20.689	0.139	74.1	2.7211	0.0000	OK
15 minute summer	19	11	20.327	0.177	65.0	0.3121	0.0000	OK
15 minute summer	21	10	22.095	0.070	31.3	0.5005	0.0000	OK
15 minute summer	25	11	20.194	0.094	65.6	0.1665	0.0000	OK
1440 minute summer	26	1080	19.502	0.302	16.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	7.000	2	-0.3	-0.058	-0.034	0.0351	
240 minute summer	2	Porous Paving	3	5.4	0.240	1.108		
240 minute summer	3	15.000	4	20.5	1.650	0.098	0.0354	
360 minute summer	4	Porous Paving	13	7.6	0.302	1.559		
360 minute summer	5	5.001	6	0.6	0.615	0.076	0.0027	
600 minute summer	6	Porous Paving	7	0.8	0.081	0.163		
720 minute summer	7	17.000	8	0.9	0.740	0.004	0.0060	
720 minute summer	8	Porous Paving	9	4.3	0.191	0.880		
720 minute summer	9	10.000	10	7.4	1.124	0.045	0.0298	
360 minute summer	10	Porous Paving	13	7.6	0.302	1.559		
15 minute summer	11	4.000	12	0.0	0.000	0.000	0.0000	0.0
360 minute summer	13	13.000	14	25.3	1.624	0.137	0.0567	
960 minute summer	14	Porous Paving	17	5.6	0.205	1.152		
15 minute summer	15	11.000	16	0.0	0.000	0.000	0.0000	0.0
960 minute summer	17	1.000	18	14.5	0.677	0.277	0.0634	
15 minute summer	18	1.001	19	65.0	1.320	0.202	2.0019	
15 minute summer	19	1.002	25	65.6	1.379	0.225	1.3362	
15 minute summer	21	2.000	28	31.0	2.053	0.211	0.3722	
15 minute summer	25	1.003	26	65.5	2.429	0.049	0.5205	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	28	10	20.213	0.113	31.0	0.1611	0.0000	OK
1440 minute summer	29	1080	19.495	0.295	7.3	0.0000	0.0000	OK
1440 minute summer	30	1080	19.492	0.292	15.6	208.1930	0.0000	SURCHARGED
1440 minute summer	31	1080	19.399	0.249	15.0	0.8630	0.0000	OK
480 minute summer	32	312	22.321	0.116	5.4	0.0000	0.0000	OK
360 minute summer	38	248	22.761	0.061	1.5	10.6847	0.0000	OK
15 minute summer	39	1	23.700	0.000	0.0	0.0000	0.0000	OK
360 minute summer	40	240	22.763	0.061	2.9	0.0000	0.0000	OK
480 minute summer	41	320	22.316	0.116	13.9	130.5914	0.0000	OK
720 minute summer	42	495	21.833	0.131	6.7	0.0000	0.0000	OK
15 minute summer	43	1	23.350	0.000	0.0	0.0000	0.0000	OK
480 minute summer	44	312	22.322	0.117	14.8	0.0000	0.0000	OK
480 minute summer	45	312	22.321	0.021	0.0	0.0236	0.0000	OK
15 minute summer	46	1	22.725	0.000	0.0	0.0000	0.0000	OK
480 minute summer	33	312	22.321	0.116	4.4	0.0000	0.0000	OK
1440 minute summer	20	1290	19.235	0.235	15.0	0.0000	0.0000	OK
1440 minute summer	22	1290	19.226	0.226	13.7	93.0368	0.0000	SURCHARGED
1440 minute summer	23	1290	18.965	0.149	13.2	0.2641	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	28	2.001	29	30.6	1.174	0.170	0.3221	
1440 minute summer	30	3.000	31	15.0	0.852	1.196	0.1747	
1440 minute summer	31	3.001	20	15.0	1.062	0.126	0.1051	
480 minute summer	32	Porous Paving	41	2.1	0.111	0.440		
360 minute summer	38	5.000	5	0.6	0.736	0.043	0.0029	
15 minute summer	39	16.000	40	0.0	0.000	0.000	0.0000	
360 minute summer	40	Porous Paving	38	0.6	0.077	0.117		
480 minute summer	41	6.000	42	6.7	1.029	0.045	0.0360	
720 minute summer	42	Porous Paving	9	4.3	0.191	0.880		
15 minute summer	43	14.000	44	0.0	0.000	0.000	0.0000	
480 minute summer	44	Porous Paving	41	2.1	0.111	0.440		
240 minute winter	45	9.000	32	0.0	-0.016	-0.004	0.0137	
15 minute summer	46	8.000	33	0.0	0.000	0.000	0.0000	
480 minute summer	33	Porous Paving	41	2.1	0.111	0.440		
1440 minute summer	22	12.000	23	13.2	1.682	0.965	0.0287	
1440 minute summer	23	Hydro-Brake®		13.2				730.7

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	1	76	22.053	0.353	0.3	0.3994	0.0000	FLOOD RISK
120 minute summer	2	76	22.053	0.453	260.7	0.0000	0.0000	OK
120 minute summer	3	80	22.017	0.317	140.8	319.6442	0.0000	FLOOD RISK
180 minute summer	4	120	21.569	0.367	87.3	0.0000	0.0000	OK
360 minute summer	5	264	22.528	0.028	1.2	0.0317	0.0000	OK
480 minute summer	6	480	22.137	0.235	5.9	0.0000	0.0000	OK
480 minute summer	7	480	22.133	0.233	3.4	32.3012	0.0000	OK
480 minute summer	8	416	22.013	0.311	5.7	0.0000	0.0000	OK
480 minute summer	9	416	22.002	0.302	17.0	41.5612	0.0000	FLOOD RISK
180 minute summer	10	120	21.549	0.347	16.1	0.0000	0.0000	OK
15 minute summer	11	1	21.200	0.000	0.0	0.0000	0.0000	OK
15 minute summer	12	1	21.100	0.000	385.6	0.0000	0.0000	OK
180 minute summer	13	120	21.511	0.311	94.8	50.2907	0.0000	FLOOD RISK
480 minute summer	14	376	20.932	0.330	78.9	0.0000	0.0000	OK
15 minute summer	15	1	20.700	0.000	0.0	0.0000	0.0000	OK
15 minute summer	16	1	20.600	0.000	225.8	0.0000	0.0000	OK
480 minute summer	17	376	20.909	0.309	53.9	388.8173	0.0000	OK
15 minute summer	18	10	20.848	0.298	264.8	5.8453	0.0000	OK
960 minute summer	19	1020	20.540	0.390	54.6	0.6889	0.0000	OK
15 minute summer	21	10	22.170	0.145	111.8	1.0399	0.0000	OK
960 minute summer	25	1020	20.539	0.439	89.8	0.7765	0.0000	OK
960 minute summer	26	1020	20.539	1.339	119.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	7.000	2	-0.8	-0.099	-0.090	0.0393	
30 minute summer	2	Porous Paving	3	18.9	0.492	3.903		
120 minute summer	3	15.000	4	84.6	2.257	0.404	0.1063	
180 minute summer	4	Porous Paving	13	18.2	0.457	3.751		
360 minute summer	5	5.001	6	1.2	0.733	0.147	0.0043	
120 minute summer	6	Porous Paving	7	3.7	0.179	0.766		
240 minute summer	7	17.000	8	6.5	0.804	0.030	0.0939	
480 minute summer	8	Porous Paving	9	9.8	0.249	2.013		
480 minute summer	9	10.000	10	16.9	1.388	0.102	0.0549	
180 minute summer	10	Porous Paving	13	18.2	0.457	3.751		
15 minute summer	11	4.000	12	0.0	0.000	0.000	0.0000	0.0
180 minute summer	13	13.000	14	94.6	2.185	0.512	0.1570	
240 minute summer	14	Porous Paving	17	12.1	0.315	2.495		
15 minute summer	15	11.000	16	0.0	0.000	0.000	0.0000	0.0
480 minute summer	17	1.000	18	45.8	0.957	0.874	0.1414	
15 minute summer	18	1.001	19	218.3	1.882	0.680	4.7153	
15 minute summer	19	1.002	25	219.4	1.956	0.752	3.1006	
15 minute summer	21	2.000	28	111.1	3.066	0.758	0.8200	
15 minute summer	25	1.003	26	220.4	3.322	0.164	1.2805	

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	28	1050	20.522	0.422	11.0	0.6043	0.0000	SURCHARGED
960 minute summer	29	1050	20.522	1.322	26.5	0.0000	0.0000	OK
960 minute summer	30	1020	20.523	1.323	40.0	1087.9170	0.0000	SURCHARGED
960 minute summer	31	1020	20.347	1.197	22.2	4.1448	0.0000	SURCHARGED
360 minute summer	32	248	22.515	0.310	18.9	0.0000	0.0000	OK
360 minute summer	38	264	22.874	0.174	4.1	30.7866	0.0000	FLOOD RISK
15 minute summer	39	1	23.700	0.000	0.0	0.0000	0.0000	OK
360 minute summer	40	256	22.877	0.175	8.0	0.0000	0.0000	OK
360 minute summer	41	256	22.506	0.306	47.0	346.5363	0.0000	FLOOD RISK
480 minute summer	42	408	22.022	0.320	16.4	0.0000	0.0000	OK
15 minute summer	43	1	23.350	0.000	0.0	0.0000	0.0000	OK
360 minute summer	44	248	22.517	0.312	51.7	0.0000	0.0000	OK
360 minute summer	45	248	22.515	0.215	0.1	0.2428	0.0000	FLOOD RISK
15 minute summer	46	1	22.725	0.000	0.0	0.0000	0.0000	OK
360 minute summer	33	248	22.514	0.309	15.2	0.0000	0.0000	OK
2160 minute winter	20	2280	19.724	0.724	22.0	0.0000	0.0000	OK
2160 minute winter	22	2280	19.709	0.709	20.7	348.6862	0.0000	FLOOD RISK
2160 minute winter	23	2280	19.138	0.322	19.5	0.5686	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	28	2.001	29	110.2	1.605	0.612	0.8447	
960 minute summer	30	3.000	31	22.2	1.260	1.769	0.1747	
480 minute winter	31	3.001	20	22.0	1.170	0.185	0.3094	
60 minute summer	32	Porous Paving	41	9.0	0.259	1.861		
360 minute summer	38	5.000	5	1.2	0.877	0.083	0.0047	
15 minute summer	39	16.000	40	0.0	0.000	0.000	0.0000	
120 minute summer	40	Porous Paving	38	3.7	0.184	0.767		
360 minute summer	41	6.000	42	16.4	1.301	0.110	0.0698	
480 minute summer	42	Porous Paving	9	9.8	0.249	2.013		
15 minute summer	43	14.000	44	0.0	0.000	0.000	0.0000	
60 minute summer	44	Porous Paving	41	9.0	0.259	1.861		
30 minute summer	45	9.000	32	-0.8	-0.154	-0.124	0.0367	
15 minute summer	46	8.000	33	0.0	0.000	0.000	0.0000	
60 minute summer	33	Porous Paving	41	9.0	0.259	1.861		
2160 minute summer	22	12.000	23	19.5	2.493	1.430	0.0287	
2160 minute summer	23	Hydro-Brake®		19.5				1699.4

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	1	76	22.143	0.443	0.4	0.5014	0.0000	FLOOD RISK
120 minute summer	2	76	22.143	0.543	338.0	0.0000	0.0000	OK
120 minute summer	3	78	22.098	0.398	187.3	400.5184	0.0000	FLOOD RISK
120 minute summer	4	84	21.659	0.457	125.1	0.0000	0.0000	OK
480 minute summer	5	336	22.530	0.030	1.4	0.0344	0.0000	OK
600 minute summer	6	600	22.239	0.337	6.3	0.0000	0.0000	OK
600 minute summer	7	600	22.235	0.335	3.7	46.1814	0.0000	FLOOD RISK
480 minute summer	8	440	22.101	0.399	5.4	0.0000	0.0000	OK
480 minute summer	9	440	22.088	0.388	19.7	53.1865	0.0000	FLOOD RISK
120 minute summer	10	86	21.632	0.430	17.7	0.0000	0.0000	OK
15 minute summer	11	1	21.200	0.000	0.0	0.0000	0.0000	OK
15 minute summer	12	1	21.100	0.000	502.1	0.0000	0.0000	OK
120 minute summer	13	86	21.586	0.386	129.7	62.3144	0.0000	FLOOD RISK
480 minute summer	14	368	21.022	0.420	103.0	0.0000	0.0000	OK
15 minute summer	15	1	20.700	0.000	0.0	0.0000	0.0000	OK
15 minute summer	16	1	20.600	0.000	293.9	0.0000	0.0000	OK
1440 minute summer	17	1440	20.998	0.398	54.4	494.4286	0.0000	FLOOD RISK
1440 minute summer	18	1440	20.982	0.432	64.3	8.4801	0.0000	OK
1440 minute summer	19	1440	20.980	0.830	64.3	1.4667	0.0000	SURCHARGED
15 minute summer	21	11	22.299	0.274	145.6	1.9605	0.0000	SURCHARGED
1440 minute summer	25	1440	20.980	0.880	64.2	1.5545	0.0000	SURCHARGED
1440 minute summer	26	1440	20.980	1.779	64.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	7.000	2	-1.0	-0.124	-0.113	0.0393	
30 minute summer	2	Porous Paving	3	21.1	0.530	4.347		
120 minute summer	3	15.000	4	118.3	2.423	0.565	0.1374	
120 minute summer	4	Porous Paving	13	20.4	0.514	4.213		
480 minute summer	5	5.001	6	1.4	0.762	0.170	0.0048	
60 minute summer	6	Porous Paving	7	5.6	0.230	1.159		
1440 minute summer	7	17.000	8	8.0	0.864	0.036	0.1351	
480 minute summer	8	Porous Paving	9	10.6	0.267	2.194		
480 minute summer	9	10.000	10	19.6	1.440	0.118	0.0615	
120 minute summer	10	Porous Paving	13	20.4	0.514	4.213		
15 minute summer	11	4.000	12	0.0	0.000	0.000	0.0000	0.0
120 minute summer	13	13.000	14	129.0	2.328	0.698	0.1988	
240 minute summer	14	Porous Paving	17	13.2	0.339	2.721		
15 minute summer	15	11.000	16	0.0	0.000	0.000	0.0000	0.0
480 minute summer	17	1.000	18	56.7	1.026	1.082	0.2076	
15 minute summer	18	1.001	19	280.9	2.032	0.875	5.6324	
15 minute summer	19	1.002	25	283.2	2.095	0.970	3.7165	
15 minute summer	21	2.000	28	142.2	3.579	0.970	0.9749	
15 minute summer	25	1.003	26	284.2	3.526	0.212	1.5554	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	28	1440	20.968	0.868	10.4	1.2426	0.0000	SURCHARGED
1440 minute summer	29	1440	20.968	1.768	25.0	0.0000	0.0000	OK
1440 minute summer	30	1440	20.964	1.764	44.1	1490.9060	0.0000	SURCHARGED
1440 minute summer	31	1440	20.793	1.643	22.3	5.6905	0.0000	FLOOD RISK
480 minute summer	32	328	22.610	0.405	19.0	0.0000	0.0000	OK
480 minute summer	38	336	22.929	0.229	4.3	40.4476	0.0000	FLOOD RISK
15 minute summer	39	1	23.700	0.000	0.0	0.0000	0.0000	OK
480 minute summer	40	336	22.932	0.230	8.1	0.0000	0.0000	OK
480 minute summer	41	328	22.600	0.400	49.5	452.9460	0.0000	FLOOD RISK
480 minute summer	42	432	22.112	0.410	19.3	0.0000	0.0000	OK
15 minute summer	43	1	23.350	0.000	0.0	0.0000	0.0000	OK
480 minute summer	44	328	22.613	0.408	52.2	0.0000	0.0000	OK
480 minute summer	45	328	22.610	0.310	0.1	0.3506	0.0000	FLOOD RISK
15 minute summer	46	1	22.725	0.000	0.0	0.0000	0.0000	OK
480 minute summer	33	328	22.610	0.405	15.4	0.0000	0.0000	OK
2160 minute summer	20	2340	19.586	0.586	22.0	0.0000	0.0000	OK
2160 minute summer	22	2340	19.572	0.572	19.3	268.1096	0.0000	SURCHARGED
2160 minute summer	23	2340	19.030	0.214	19.0	0.3778	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	28	2.001	29	141.6	1.693	0.786	1.0263	
480 minute summer	30	3.000	31	22.3	1.269	1.782	0.1747	
180 minute winter	31	3.001	20	22.0	1.175	0.186	0.2908	
60 minute summer	32	Porous Paving	41	11.2	0.291	2.309		
480 minute summer	38	5.000	5	1.4	0.910	0.096	0.0053	
15 minute summer	39	16.000	40	0.0	0.000	0.000	0.0000	
60 minute summer	40	Porous Paving	38	5.8	0.239	1.203		
480 minute summer	41	6.000	42	19.3	1.354	0.129	0.0787	
480 minute summer	42	Porous Paving	9	10.6	0.267	2.194		
15 minute summer	43	14.000	44	0.0	0.000	0.000	0.0000	
60 minute summer	44	Porous Paving	41	11.2	0.291	2.309		
30 minute summer	45	9.000	32	-0.9	-0.178	-0.151	0.0367	
15 minute summer	46	8.000	33	0.0	0.000	0.000	0.0000	
60 minute summer	33	Porous Paving	41	11.2	0.291	2.309		
2160 minute summer	22	12.000	23	19.0	2.428	1.392	0.0287	
2160 minute summer	23	Hydro-Brake®		19.0				1763.8

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APPENDIX C – EXCEEDANCE FLOW PLAN

Project/Task No. 16933-01 Scale: 1:500 ORIGINAL DRAWING SIZE A1

LEGEND

FOUL WATER	SURFACE WATER	
FW	SW	PROPOSED DRAIN
		EXISTING DRAINAGE
		EXISTING DRAINAGE TO BE REMOVED/ABANDONED
		PROPOSED CONCRETE MANHOLE
		PROPOSED TYPE 3 INSPECTION CHAMBER 450mmø / 600mmø
BG/RG		TRAPPED BIN STORE GULLY / ROAD GULLY
SVP		SOIL AND VENT PIPE
	RWP	RAIN WATER PIPE
		ø150mm PERFORATED PIPE
		CHANNEL DRAIN
		RISING MAIN
		SITE BOUNDARY
		BAFFLE
		PERMEABLE BLOCK PAVING
		PERMEABLE SUB-BASE

LEGEND

EXCEEDANCE FLOW PATH POST CONSTRUCTION

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. BELOW GROUND DRAINAGE

(i) All foul and storm water drains which are not to be adopted as public sewers under a Section 104 Agreement must be constructed in accordance with Building Regulations Approved Document H, BS EN 752:2017 and, where appropriate, the relevant agreement certificates.

(ii) All adoptable drainage (manholes, sewers, gullies, gully connections, and other sewerage structures) intended to convey foul water and surface water are to be constructed in accordance with Water UK's "Sewerage Sector Guidance" (SSG) and the relevant Council Design Guide.

(iii) Plastic pipes and fittings shall be of unplasticised polyvinyl chloride (PVC-U) complying with the requirements of BS EN 1401-1:2019 +A1:2023.

(iv) Concrete pipes shall be spun by a centrifugal process or be vertically pressed. Concrete pipes shall comply with the requirements of, and be tested in accordance with, BS 5911-1:2021 and BS EN 1916:2002.

(v) Vitrified Clay pipes, fittings, joints, adaptors and couplings shall comply with the requirements of BS EN 295-1:2013 and BS EN 295-4:2013.

(vi) All private foul water drains are to be laid at minimum gradient of 1 in 40 at the head of pipe runs, and minimum 1 in 80 elsewhere, unless otherwise stated on the drawing. Use chamber main channel invert levels to set gradient. Incoming branch invert level is typically 50mm above main channel.

(vii) All private foul water drains are 100mm diameter, unless otherwise stated on the drawing.

(viii) All private surface water drains are to be laid at minimum gradient of 1 in 80 unless otherwise stated on the drawing. Use chamber main channel invert levels to set gradient. Incoming branch invert level is typically 50mm above main channel.

(ix) All private surface water drains are 150mm unless otherwise stated on the drawing.

(x) Allow for rodding access above ground where rainwater downpipes do not have a direct connection to an inspection chamber.

(xi) Plastic Inspection Chambers shall comply with the requirements of BS EN 13598-1:2020.

(xii) Precast concrete manhole units shall comply with the requirements of BS 5911-3:2022 and BS EN 1917:2002. Manhole cover slabs situated under carriageways shall be heavy duty and those situated elsewhere shall be light duty. The relevant absorption tests required shall be carried out on a sample of those rings and slabs used unless a certificate of testing is supplied by the manufacturer.

(xiii) Manhole covers and frames are to be a minimum of:
Class B125 in non-trafficked areas, footways and verges.
Class D400 in trafficked areas and highways.
Class E600 and F900 manhole covers to be used for heavy duty applications such as docks, airports and industrial areas.

(xiv) Manhole covers and frames to be bedded and haunched externally in mortar.

(xv) All concrete used in drainage works is to comply with BRE Special Digest 1 (SD1:2005 - 3rd Edition) for Class 2 sulphate conditions.

(xvi) Any existing drain or sewer being re-used is to be surveyed and levelled prior to commencement of the drainage works, and refurbished if necessary.

(xvii) Connections to an adopted sewer are only to be made after receiving approval, from the relevant Sewerage Undertaker, of a sewer connection application (Section 106 - Water Industry Act 1991).

(xviii) All drains, sewers and manholes are to be cleaned and tested for water tightness on completion of construction.

(xix) Any above ground drainage is shown indicatively and must be confirmed by a suitably qualified third party.

N

INDICATIVE ONLY

1:500

0 5m 10m 15m 20m 25m

Description	By	Aprvd.	Date	Rev.
ISSUED FOR INFORMATION	IMR	AK	03.07.26	P01

ISSUED FOR INFORMATION

Title
EXCEEDANCE FLOW PATH PLAN

Project
BOLNEY GRANGE INDUSTRIAL PARK
JOB'S LANE, HICKSTEAD BN6 9HE

Client
LONDON TOWN PROPERTY HOLDINGS

HOP
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Drawing No. 16933-HOP-XX-XX-DR-C-0501

Status S2

Rev. P01

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1:20 0 0.2m 0.4m 0.6m 0.8m 1m 1:50 0 0.5m 1m 1.5m 2m 2.5m 1:100 0 1m 2m 3m 4m 5m

APPENDIX D – SuDS MAINTENANCE AND MANAGEMENT SCHEDULE

LAND AT BOLNEY GRANGE INDUSTRIAL PARK, JOBS LANE, HICKSTEAD

PROPOSED MAINTENANCE & INSPECTION SCHEDULE FOR BELOW GROUND DRAINAGE (FOUL WATER AND SURFACE WATER) INCLUDING SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

Item	Required Maintenance/Monitoring	Suggested Frequency	Responsibility
Private Foul Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures	As required	Specialist
Private Surface Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures.	As required	Specialist
Gullies and Channel Drains	Check gullies and channel drains for damage, condition and function.	Every six months	Facilities Management
	Remove sediment, oil/grease, litter and debris.	As necessary	Facilities Management
	Replace or repair malfunctioning parts or structures.	As required	Specialist
Permeable Block Paving	Sweep clean of debris and inspect integrity of bedding grit. Replace bedding grit locally if required.	Every six months	Facilities Management
	Lift blocks and remove bedding grit and replace and re-bed paving.	Full bedding replacement currently recommended by manufacturers every 20 years	Specialist
Wet Ponds	Inspect pond side slopes, banks, permanent water level, and embankments for erosion, settlement, scour, burrowing animals, or signs of instability.	Quarterly	Facilities Management
	Inspect inlets, outlets, control structures and headwalls for blockage, damage and free flow conditions.	Quarterly and after major storm events	Facilities Management
	Remove litter, debris, excessive algae, invasive species and floating vegetation as required.	Monthly and after major storm events	Facilities Management
	Assess health and coverage of marginal and aquatic planting; replant or manage vegetation as required.	Twice yearly (spring and autumn)	Facilities Management
	Inspect forebays and pond base for sediment accumulation and monitor storage capacity.	Annually	Facilities Management
	Remove accumulated sediment from forebays and pond areas when capacity is significantly reduced.	As required (typically every 5–10 years)	Specialist
	Repair erosion, damaged structures, outlets, embankments or other defects.	As required	Specialist
General	Remove sediment, litter, debris and vegetation from the surface of pathways areas	As necessary and after heavy rainfall	Facilities Management
Private Foul Water Pump Station	Inspect pump station chamber, covers, access hatches and kiosk for damage, security and condition.	Monthly	Facilities Management

	Check operation of duty and standby pumps, controls, alarms and telemetry systems.	Monthly	Facilities Management
	Inspect valve chambers, pipework and fittings for leaks, corrosion or damage.	Quarterly	Facilities Management
	Remove accumulated fats, oils, grease, silt and debris from the wet well as necessary.	Every six months or as required	Specialist
	Service pumps, level controls, non-return valves and electrical equipment in accordance with manufacturer recommendations.	Annually	Specialist
	Test high-level alarms, telemetry and emergency response arrangements.	Annually	Specialist
	Repair or replace malfunctioning pumps, controls, pipework or structures.	As required	Specialist
On-site & Boundary Ditches/Watercourses	Remove litter and debris	Monthly or as required	Facilities Management
	Manage and/or cut back vegetation	Monthly or as required	Facilities Management
	Cut grass	Monthly or as required	Facilities Management
	Inspect inlets and outlets	Monthly	Facilities Management
	Inspect base for silt and remove as required	Every six months	Facilities Management
Flood Flow Routes	Ensure flood flow routes are not obstructed (i.e. lower lying portions of the land that will direct surface water runoff away from vulnerable assets in the event of drainage failure).	Every six months and during periods of heavy rainfall	Facilities Management

NOTES

The facilities management company employed by the future site operators will be responsible for the implementation of the maintenance schedule for below ground drainage, by appointing appropriate persons and/or sub-consultants that are qualified to undertake these operations.

Maintenance for private drainage systems and SuDS features is to be carried out by the facilities management or by a specialist contractor, as noted in the Responsibility column above.

This maintenance schedule has been produced with reference to the guidelines outlined in 'The SuDS Manual' (CIRIA C753: 2015). The suggested frequency of maintenance is considered a guide, and should not replace the guidance from manufacturers of proprietary systems.

Refer to Engineering drawings for location and details of below ground drainage assets and SuDS features.

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