



INFRASTRUCTURE DESIGN LTD
EST 2000

Land South of St Stephen's Church, Hamsland, Horsted Keynes, West Sussex

Planning Ref No: DM/20/4692

Pre-Commencement Conditions 6

Issue 1: 14th January 2026

1.0 Introduction

- 1.1 Macar Homes has appointed Infrastructure Design Ltd (IDL) to prepare a surface water detailed design for their proposed residential development site in order to satisfy the planning conditions imposed on the above planning consents.
- 1.2 A Flood Risk Assessment and Drainage Strategy report C86274-JNP-XX-XX-RP-C-1000 dated November 2020 and prepared by JNP Group Consulting Engineers.
- 1.3 The detailed design of the onsite drainage considers the following documents, in particular, the rainfall parameters and selection of SuDS techniques:
- Flood Risk Assessment report C86274-JNP-XX-XX-RP-C-1000, dated November 2020, prepared by JNP Group Consulting Engineers.
 - Southern Water foul water capacity check results dated 5th January 2023
 - ST Consult Desk study, preliminary site investigation & risk assessment report J14075 dated 9th August 2019.
 - Topographical Survey prepared by Survey Solution dated 1ST February 2024.
 - Detailed drainage design checklist condition discharge stage from the Mid Sussex District Council Flood Risk and Drainage Planning.
- 1.4 This summary report supplies the information required to satisfy pre-commencement condition 6.

2.0 Pre-commencement Condition 6-Drainage

Prior to the commencement of any development above ground/slab level details of the proposed foul and surface water drainage and means of disposal shall have been submitted to and approved in writing by the local planning authority. The details shall include the delivery of SuDS in the southern part of the site, a timetable for its implementation and a management and maintenance plan for the lifetime of the development which shall include arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime. Maintenance and management during the lifetime of the development should be in accordance with the approved details.

No building shall be occupied until all the approved drainage works have been carried out in accordance with the approved details.

Reason: To ensure that the proposal is satisfactorily drained and to accord with Policy DP41 of the District Plan Policy HK12 of the Neighbourhood Plan and the NPPF.

3.0 Pre-commencement Condition 6 Response

Alignment With Approved Strategy

The detailed surface water drainage design follows the methodologies, discharge constraints and SuDS hierarchy set out within the approved Drainage Strategy and Flood Risk Assessment, ensuring no deviation from the established principles agreed at the planning stage.

Greenfield Run-off and Discharge Rate Compliance

- Original impermeable area: 0.644 ha, allowable discharge 4.1 l/s.
- Refined impermeable area: 0.503 ha, including 10% urban creep allowance.
- Updated design discharge: 3 l/s, fully compliant with the revised greenfield run-off rate.

These parameters meet LLFA requirements for restricting post-development run-off to greenfield performance. Figure 1 below gives the greenfield discharge rates for the site;

Figure 1 Greenfield Run-off Rates – Using Proposed Site Impermeable Area

<u>Pre-development Discharge Rate</u>			
Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.503	Betterment (%)	0
SAAR (mm)	838	QBar	3.0
Soil Index	4	Q 1 year (l/s)	2.5
SPR	0.47	Q 2 year (l/s)	2.6
Region	7	Q 30 year (l/s)	7.2
Growth Factor 1 year	0.85	Q 100 year (l/s)	9.6
Growth Factor 2 year	0.88		

SuDS Strategy & Compliance

The design incorporates a SuDS-led approach consistent with national standards and LLFA expectations. Key SuDS features include:

- **Permeable paving** with a minimum 350 mm low-fines sub-base, encapsulated within an impermeable membrane and connected to the drainage system via perforated pipes or tanks.
- **Cellular storage systems** sized to accommodate run-off from all storm events up to the 1 in 100-year + 40% climate change allowance.
- **Flow control** provided through a Hydrobrake within the final control chamber.

Together, these measures reduce peak run-off, provide attenuation, improve water quality and support long-term system sustainability.

Hydraulic Modelling and Climate Change Allowance

Hydraulic modelling has been updated using FEH2022 rainfall data, which represents an improvement over the datasets used in the original strategy.

- All critical durations, including the 1 in 100-year + 40% climate change event, have been tested.
- The drainage network demonstrates zero flooding during all modelled storm events.

These outcomes confirm compliance with LLFA expectations for resilience under future climate change. Refer to Appendix B for the surface water drainage calculations.

Exceedance Strategy

The scheme includes defined exceedance flow paths, shown on the drainage drawings, enabling safe conveyance of surface water during extreme rainfall or blockage conditions. This ensures flows are routed away from vulnerable areas and aligns with LLFA requirements for overland exceedance planning. Refer to Appendix A for the drainage plans and levels drawings.

Water Quality Management

The suitability of the proposed drainage strategy to manage the development's pollution risk has been assessed using the Simple Index Approach set out in *The SuDS Manual (CIRIA C753, 2015)*. This method compares the pollution-hazard indices associated with each site activity with the mitigation indices provided by the proposed SuDS components. A summary is provided in Figure 2

Figure 2: Surface Water Quality Management (Simple Index Approach)

Surface Water Quality Management (Simple Index Approach)				
Runoff Source / Treatment Train 1	Land Use / SuDS Hazard Level	TSS	Metals	Hydrocarbons
Pollution Hazard Indices				
Residential Roofs	Very Low	0.2	0.2	0.05
Driveways, residential car parks and low-traffic roads	Low	0.5	0.4	0.4
SuDS Mitigation Indices				
Downstream Defender (Vortex Separator)	–	0.5	0.4	0.8

The mitigation indices provided by the Downstream Defender exceed the pollution hazard indices for all relevant contaminants (TSS, metals, and hydrocarbons). Accordingly:

- The treatment train provides adequate pollutant removal for all identified run-off sources.
- The system is fully compliant with the Simple Index Approach requirements in *The SuDS Manual (2015)*.
- Water quality treatment is appropriately matched to the pollution hazard level of each contributing area, ensuring protection of downstream receiving waters.

This confirms that the proposed drainage strategy delivers a robust, compliant water-quality management solution.

Construction-Phase Surface Water Management

A Surface Water Management Plan (SWMP) has been produced to address construction-phase risks. It includes measures to:

- Manage temporary drainage
- Control sediment and pollutants

- Protect receiving watercourses

This ensures compliant water management during site preparation and construction. Refer to Appendix D for the Surface Water Management Plan report.

Maintenance and Lifetime Management

A comprehensive Maintenance and Management Plan is provided (Appendix C), setting out:

- Inspection intervals
- Operational responsibilities
- Long-term maintenance actions for SuDS and drainage infrastructure

This ensures the drainage system remains effective and compliant throughout the development's lifetime. Please note that Macar Homes remains responsible for maintaining all development elements until they are transferred to the Management Company or the Freeholders.

Foul Drainage Compliance

The foul drainage system:

- It is fully separate from the surface water drainage system.
- It connects via gravity to the foul package pump station located at the south of the site, then discharges foul water through a rising main to a short section of gravity pipe, which connects to the public foul sewer at the site entrance.
- A privately maintained foul package pumping station is required due to the site's gradients.
- Downstream capacity has been confirmed in accordance with the original drainage strategy (see Southern Water capacity check confirmation in Appendix F).
- The system has been submitted for approval under a Section 106 sewer connection application and is currently awaiting approval.

These measures ensure compliance with Sewers for Adoption, Building Regulations Part H, and statutory undertaker expectations.

Overall Statement of Compliance

The detailed surface water and foul drainage design:

- Complies fully with the approved drainage strategy and LLFA requirements
- Achieves greenfield run-of-flow performance with a controlled discharge of 3 l/s
- Uses a robust SuDS-focused approach, incorporating permeable paving and cellular attenuation
- Demonstrates no flooding during the 1 in 100-year + 40% climate change design storm
- Includes a clear exceedance routing strategy
- The proposed drainage strategy delivers a robust and compliant water quality management solution
- Provides a construction-phase SWMP
- Ensures long-term maintainability of all drainage assets
- Delivers a fully compliant, gravity-based foul drainage system to the onsite foul package pumping station and then discharges to the public sewer system via foul rising main and a short section of the gravity pipe.

Overall, the scheme provides a sustainable, policy-compliant and technically robust drainage solution suitable for approval by the Lead Local Flood Authority.

Appendix A

Levels Layout, Drainage Layout and Construction Details

CONTRACT DOCUMENT

Notes

- This drawing is to be read in conjunction with the private drainage construction details IDL/1334/07/ series and all other relevant contract documents.
 - All private drainage works to be carried out in accordance with the provisions laid down in BS EN 944 & The Building Regulations, Part H.
 - Levels shown in buildings are Finished Floor Level.
 - Before commencing any Sewer or drainage works, the Developer's Groundworker must satisfy themselves, the developer and the Local Authority of actual levels and conditions of existing sewers.
 - Buried concrete to satisfy the requirements of BRE Special Digest 1 as predetermined by the site's Geotechnical Report.
 - Depth and Location of existing services to be traced prior to any excavation.
 - All private drainage to be laid to levels shown using flexibly jointed pipes, either uPVC to BS 4660 and BS 5481 or vitrified clayware to BS EN 295.
 - Generally pipes to have granular Bed & Surround in accordance with manufacturers recommendations, ensuring adequate protection with respect to depth and location. Where bedding material is placed at depths susceptible to ground water ingress, it is to be wrapped in a geotextile (Terram 700 or better).
 - Private precast concrete manholes and catchpits to be constructed using conc. box sections or circular rings to BS 5911-200, with 150mm conc. surround, size and construction to comply with Table 12 of Approved Document, Part H.
 - Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
 - Access panels are to be provided to all rainwater pipes, a max. 600 above finished ground level.
 - All manholes / inspection chambers in hard surfaced areas, to have recessed covers. These are to be orientated such as to minimise cut blocks.
 - All pipework to be 100mmØ unless otherwise stated, 150mm dia from road gullies.
 - All levels in metres (m) unless specified otherwise.
 - Upon completion of all underground drainage works, the groundworker is to provide a written report and CCTV record of the as built foul and surface water drainage systems installed.
 - All drain runs from SVP's, stub stacks or FW gullies to be laid at min. 1.40 gradient unless otherwise stated.
 - SVP's, stub stacks & RWP's are shown indicative only. Refer to Architectural dimensioned GA's for accurate locations.
 - External drainage to be laid prior to erection of scaffold.
 - All cover and invert levels shown are in metres. All pipe diameters are in millimetres U.N.O.
- IMPORTANT NOTE:**
At depths where groundwater ingress is encountered, consider the use of a sump / pump arrangement.
Where excavations are >1m deep, consider the use of full perimeter trench support.

- IMPORTANT NOTE:**
The new sewer connections are to be successfully made prior to commencing any upstream drainage works.

- IMPORTANT NOTE:**
Upon completion of all underground drainage works, the groundworker is to provide a written report and CCTV record of the as built foul and surface water drainage systems installed.

P2 Additional notes added to Southern Waters request. 05.12.25
P1 Preliminary Issue 05.12.25

Rev	Description	Date
P2	Additional notes added to Southern Waters request.	05.12.25
P1	Preliminary Issue	05.12.25

Status:

Preliminary Issue



Scale: 1:250@A1	Checked:	Approved:
Date: Dec 2025		
Drawn: IDL	BM	PT

Title:

Private Drainage Layout

Project:

Land South of Hamsland, Horsted Keynes

Drg. No:	Rev:	File Ref:
IDL/1334/07/01	P2	1334-07
		Plot Ref: 1334-07-01

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Key

- Private foul water drainage
- Private foul water rising main
- Private surface water drainage
- Denotes extent of below-ground drainage to benefit from a root barrier system. To be confirmed for Construction Issue
- Patio Drain - Land drainage to soft areas. 100 dia perforated pipe, lined with a geotextile sock and having 150mm pea-shingle bed and surround
- Polypropylene universal inspection chambers 1200 deep max, 450 dia, 100 inlet / outlet connections (6 no. max) or 150 inlet/outlet connections (4 no max) as detailed on private drainage construction details.
- Polypropylene 'non-entry' inspection chambers 3000 deep max, 450 dia (with 300 dia. or square cover) 100 inlet / outlet connections (6 no. max), or 150 inlet/outlet connections (4 no max) as detailed on private drainage construction details.
- Denotes 250 dia ppic, 600mm deep with 4 no. max 100 dia inlets / outlets, as detailed on IDL drainage construction details. **IMPORTANT NOTE:** Should the depth to invert exceed 600mm, a 450mm dia IC **MUST** be used.
- Denotes 500/600 dia ppic, 3000mm deep max with 4 no. max inlets / outlets up to 150mm dia, as detailed on private drainage construction details. Where >1200mm deep, use reduced size access cover. Wavin Range 500/600 or similar.
- Denotes 450 dia polypropylene silt trap with 300mm nominal sump, as messrs Polypipe Basic Silt Trap or similar.
- Rodding eye same dia. as downstream drain
- 900 deep gully (trapped) with 150 outlet.
- Denotes 708x708x150mm distribution tank by Formpave or similar approved
- Proposed Headwall
- Proposed finished floor level
- Slotted linear drainage channel with sump unit and outlet to drainage system, as messrs ACO or similar approved. Grating type as specified by Macar Homes.
- Threshold drainage channel with sump unit and outlet to drainage system, as messrs ACO or similar approved. Grating type as specified by Macar Homes.

Refer to surfacing layout plans, 1334/06/** for extent of permeable paving

CONTRACT DOCUMENT

Notes

P1 Preliminary Issue 05.12.25

Rev Description Date

Status:

Preliminary Issue



Scale: 1:250@A1

Date: Dec 2025

Drawn: IDL

Checked: Approved:

BM PT

Title:

Drainage Area Plan

Project:

Land South of Hamsland, Horsted Keynes

Drg. No: IDL/1334/07/02

Rev: P1

File Ref: 1334-07

Plot Ref: 1334-07-02

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Manhole No.	Pipe No.	Adoptable IMP	Adoptable UC	Private IMP	Private UC	Total IMP + UC
SW1	1.000	0.000	0.000	364.110	26.775	390.885
SW3	1.001	0.000	0.000	896.583	24.440	921.023
SW5	1.002	0.000	0.000	301.417	9.642	311.059
SW6	1.003	0.000	0.000	602.545	18.206	620.751
SW8	1.004	0.000	0.000	613.307	32.770	646.077
SW11	1.005	0.000	0.000	207.074	0.000	207.074
SW12	1.006	0.000	0.000	160.253	0.000	160.253
SW13	1.007	0.000	0.000	237.104	7.684	244.789
SW14	1.008	0.000	0.000	302.940	23.287	326.226
SW15	1.009	0.000	0.000	133.935	0.000	133.935
SW16	1.010	0.000	0.000	0.000	0.000	0.000
SW17	1.011	0.000	0.000	0.000	0.000	0.000
SW2	2.000	0.000	0.000	0.000	0.000	0.000
SW4	3.000	0.000	0.000	157.058	0.000	157.058
SW7	4.000	0.000	0.000	491.158	14.307	505.465
SW9	5.000	0.000	0.000	0.000	0.000	0.000
SW10	5.001	0.000	0.000	381.331	24.076	405.407
Totals:		0.000	0.000	4848.813	181.187	5030

Total impermeable area is 5030m2 (0.503 Ha) including 10% UC

CONTRACT DOCUMENT

Notes

- 1. For longitudinal sections, refer to IDL1334-04-**- series drawings
- 2. All levels in metres unless noted otherwise.
- 3. All paving and garden areas to be graded evenly between spot levels given.
- 4. Prior to erecting plot boundary fencing, and before laying topsoil, subsoil to rear gardens to be thoroughly reworked to a depth of min 450mm to reintroduce free-draining properties.
- 5. Any discrepancies to be referred to the Project Engineer immediately.

P2	Exceedance flood route added	14.01.26
P1	Preliminary Issue	05.12.25

Rev	Description	Date
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Status:

Preliminary Issue

	Scale : 1:250@A1		
	Date : Dec 2025	Checked:	Approved:
	Drawn : IDL	BM	PT

Title :

External Levels Layout

Project :

Land South of Hamsland, Horsted Keynes

Drg. No:	Rev:	File Ref:	1334-05
IDL/1334/05/01	P2	Plot Ref:	1334-05-01

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Key

- +17.47 Proposed finished levels
- +18.50 Interpolated existing spot levels
- FFL 18.475 Proposed finished floor level
- +17.640 Existing (pre-demolition) levels
- Denotes extent of underbuild
- Denotes extent of raised DPC where external levels are higher than FFL
- Denotes extent of retaining wall Height as noted on plan
- Denotes extent of 1.8m screen wall
- Denotes extent of Unilog retaining wall
- Falls to drives & parking areas
- Denotes location of channel drain to driveways
- Adoptable Road gully (trapped) with 150 outlet.
- Denotes extent of close board fence with concrete posts and gravel boards. Retaining height as noted.
- Contouring
 - Primary (every 250mm)
 - Secondary (every 50mm)
- Exceedance flood flow path

CONTRACT DOCUMENT

Notes

- 1. All adoptable highway works to be carried out under the supervision of, and to the satisfaction of the local highway authority.
- 2. For longitudinal sections, refer to 1334/04/** series drawings
- 3. All levels in metres unless noted otherwise.
- 4. All paving and garden areas to be graded evenly between spot levels given.
- 5. Prior to erecting plot boundary fencing, and before laying topsoil, subsoil to rear gardens to be thoroughly reworked to a depth of min 450mm to reintroduce free-draining properties.
- 6. Any discrepancies to be referred to the Project Engineer immediately.



Surfacing Key

- 1200mm wide Access Paths in 600 x 600 (20mm thick) Kandla Grey Indian Sandstone - Sawm and Honed smooth paving slabs. Patio Areas and side / rear access paths in 900 x 600 Stepping Stones 600x600
- 900mm wide in Brett Chaucer Charcoal Front access paths in 600mmx600mm (35mm thick) Patio areas and side/rear access paths in 450mmx450mm (32mm thick)
- Parking spaces and drives in Permeable Block Paving as Brett Omega Flow 60mm deep, laid 90 degree herringbone. Colour Burnt Oak.
- Road Aisles in Block Paving as Brett Omega 80mm deep, laid 45 degree herringbone. Colour Burnt Oak.
- Parking spaces and drives in Block Paving as Brett Omega 60mm deep, laid 90 degree herringbone. Colour Burnt Oak.
- Porous Tarmac Access Road.
- Bituminous macadam access road construction (blacktop)
- Bituminous macadam parking construction (blacktop)
- Bituminous macadam footway construction (blacktop)
- 150mm topsoil and turf to private rear gardens
- Emergency access turning head constructed using in Cellpave 50 - Finished with seed mix
- Refuse Collection Point constructed in min Cellpave 40. Finished with 6-10mm gravel. Colour - Dorset Gold
- Min. 100mm gravel infill to ASHP base.
- PCC HB2 kerb with 125mm face
- PCC BN kerb with 25mm face (6mm where noted 'F')
- Conservation Edging with 25mm upstand - Colour charcoal
- PCC EF edging laid flush
- Steel edging as Core Pro Edge laid flush, ref. CPEAL100.
- Channel block laid flush
- Marshall's Mistral Selt Paving band. 1.0m wide. (silver grey)
- Dropper Kerb
- 1.8m high close board fence
- 1.8m high brick screen wall
- Retaining wall with 1.8m high close board fence above
- Retaining wall with 1.8m high brick screen wall above
- Dwarf retaining wall - retaining height as noted on the Levels Layout.
- Denotes extent of unilog retaining wall - refer to levels layout for retaining height
- Bin storage location

P2	Key updated	13.01.26
P1	Preliminary Issue	05.12.25

Rev	Description	Date
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Status: Preliminary Issue

	Scale : 1:250@A1		
	Date : Dec 2025	Checked:	Approved:
	Drawn : IDL	BM	PT

Title : Private Surfacing Layout

Project : Land South of Hamsland, Horsted Keynes			
Drg. No:	Rev:	File Ref:	1334-06
IDL/1334/06/01	P2	Plot Ref:	1334-06-01

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Notes

1. This drawing is to be read in conjunction with the External
Surfacing Layout, IDU/1334/06/01 for details of soil
landscaping, refer to the Landscape Architect's drawings.
- 3a. Refer to private road and parking areas to be proof rolled
Any soft spots encountered are to be removed and replaced
with granular Type 2 material or clean well-graded hardcore
lain in layers not exceeding 250mm thick fully compacted.
For permeable roads and parking areas to be proof rolled
Any soft spots encountered are to be removed and replaced with granular
Type 1 material laid in layers not exceeding 250mm thick fully
compacted.
4. For permeable roads and parking areas to be proof
rolled. Any soft spots encountered are to be reported to the
Project Engineer for advice on how to proceed.
5. All manholes / inspection chambers in paved areas, to
have a paved cover.
All manholes / inspection chambers to have square
with paving or rectangular cover & frame orientated 'square'
with paving to minimise cut slabs or blocks.
5. These details have been completed base on the CBR rating
of soils as designed in the soil investigation report from Southern
Testing

P2	Porous tarmac in RPZ and optional perm block driveway details added.	13.01.26
P1	Preliminary Issue	05.12.25
Rev	Description	Date

Status:

Scale : 1:250@A1		
Date : Dec 2025	Checked:	Approved:
Drawn : IDL	BM	PT

Title :

Project :

Land South of Hamsland, Horsted Keynes

Org. No: IDL/1334/06/05	Rev:	File Ref:	1334-06
	P2	Plot Ref:	1334-06-05

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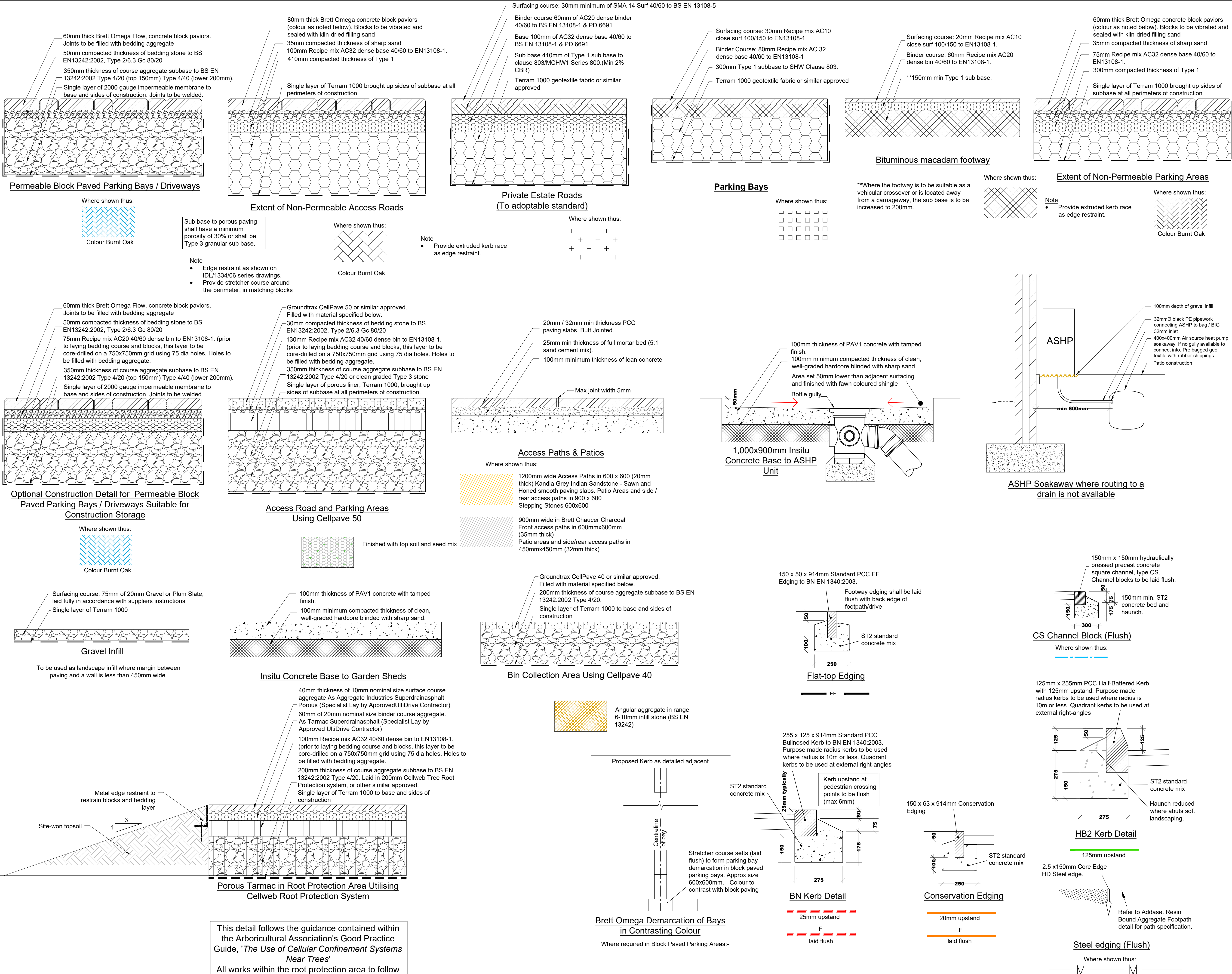


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Notes

-
- 1200mm Ø ductile iron cover and frame to BS EN 124-1994 class B125 when used in driveways & parking bays.
- Fibre board movement joint
- 150mm concrete plinth when used in driveways/parking bays
- 150mm Sidefill of suitable as-dug or granular material
- 450mm Ø universal inspection chamber shafts
- 450mm Ø universal inspection chamber base. Stop-up any unused inlet connections
- 100mm Bed of suitable as-dug or granular material

Technical drawing of a 1500mm x 3000mm inspection chamber. The drawing shows a cross-section of the chamber with various components labeled. The overall dimensions are 1500mm in width and 3000mm in height. The chamber has a 450mm minimum internal diameter. The top is covered with a 3500 or 300x300 square cover max and frame (class B125 when used in driveways & parking bays), with 150 concrete plinth. The sides are made of fibre board movement joint. The bottom is made of 150 bed of suitable as-dug or granular material. The chamber has a 1500 outlet required use reducer. Stop up any unused inlet connections. The chamber has a non entry inspection chamber shaft and a non entry inspection chamber base (on 1500 outlet required use reducer). The chamber has a 150 concrete plinth. The chamber has a 1500 outlet required use reducer. Stop up any unused inlet connections. The chamber has a non entry inspection chamber shaft and a non entry inspection chamber base (on 1500 outlet required use reducer).

Labels in the drawing include:

- In order to restrict access 3500 or 300x300 square cover max and frame (class B125 when used in driveways & parking bays), with 150 concrete plinth
- Fibre board movement joint
- 150 concrete plinth
- 450 minimum internal Ø
- 1500 maximum
- 150 bed of suitable as-dug or granular material
- Non entry inspection chamber shaft
- Non entry inspection chamber base (on 1500 outlet required use reducer. Stop up any unused inlet connections)
- 1500 outlet required use reducer

The diagram illustrates the connection of a bottle gully to a drainage system. It shows a cross-section of a pre-cast concrete or brick base supporting a bottle gully. The bottle gully has a sealed cover on top. A bend is shown connecting the bottle gully to a 110 connection that leads to the FV (Fresh Water) drainage system. Labels include: 110 Bottle Gully with sealed cover, Bend to suit, 110 connection to FV drainage system, and Pre-cast concrete or brick base.

75 deep lintel unless specified otherwise on structural engineering drawings

2500 Sealed cover and frame to BS EN 124

150 ST4 concrete plinth when used in driveways

2500 Shallow inspection chamber (stop-up any unused inlets)

150 sidefall of suitable as-dug or granular material

Short radius bend(s) to suit level of main drain

45° junction on main drainage run

100 bed of suitable as-dug or granular material

22m max

600 max

150 ST4 concrete thrust block

150

Slot drain as messers Marshalls Duo Slot Drain or other similar approved. To be constructed in accordance with manufacturers recommendations.

Grade ST4 concrete 150mm minimum bed and surround for Class B125-C250 loadings.

Slot Drain Detail

Gratings to be class B125 loading for driveways and class C250 for parking areas.

OSMA SKNW100 channel units (inbuilt falls to suit ranging from 130 to 250mm depth.).

laterally by bedding securely on a polymer modified mortar (by cretplus or similar approved).

Grade ST4 concrete 150mm minimum bed and surround for Class B125-C250 loadings.

Drainage Channel detail

NOTES:

Rodding point terminal

Local concrete surround grade ST1

110Ø 45° bend (or as required to achieve R.E invert level). With taper piece if req'd

110 or 160 drain

Refer to layout drawings

Connection to SW re system

Rodding eye

POROUS BLOCK PAVING ADJACENT TO WALL

500mm

POROUS BLOCKPAVING
ADJACENT TO WALL

500mm

Top of gully to be 100mm below road surfacing

C250 grating and frame to BS EN 124 : 1994 (D400 where used in estate road)

12mm min. Mortar bed

Laid in English bond and bedded in cement mortar 1-3 courses Class B engineering bricks.

150mm connection to storm drainage system

450Ø

Precast concrete trapp: gully pot to BS 5911 part 1 complete with stopper chain. 900mm deep

150mm min. ST4 Concrete surround

Technical drawing of a 300 Ø Trapped Yard Gully. The drawing shows a cross-section of the gully with the following components and dimensions:

- Pavement construction**: The top surface of the gully.
- Gully Cover and frame to BSEN 124:1994 - Class B125**: The cover and frame of the gully.
- 250 deep x 150 thick grade ST4 concrete surround**: The concrete structure surrounding the gully.
- Galvanised mild steel perforated catchment bucket**: The main body of the gully, labeled **300 Ø**.
- Trapped yard gully 300Ø, 600 deep with rubber stopper**: The gully assembly, including the bucket and the stopper.
- 150 minimum surround of suitable granular material**: The granular material surrounding the gully.
- 100 minimum surround of suitable granular material**: The granular material surrounding the gully.
- 100**: Dimension indicating the height of the granular material surround.
- 150**: Dimension indicating the width of the granular material surround.

Note: Root barrier to be wrapped around drainage runs where shown thus

Refer to trench details for construction & materials

Re-root 2000 - root barrier geo-textile membrane by Greenleaf or similar approved to line the perimeter of the excavation

Note: Root barrier to be located on side of trench adjacent to tree roots

Refer to trench details for construction & materials

Re-root 2000 - root barrier geo-textile membrane by Greenleaf or similar approved to line the perimeter of the excavation

The diagram shows a cross-section of a trench. On the left, a tree root is shown extending into the trench. A root barrier, represented by a cross-hatched area, is located on the side of the trench adjacent to the tree root. A dashed line indicates the perimeter of the excavation. Two callout boxes provide additional information: one refers to trench details for construction and materials, and the other specifies the root barrier material as Re-root 2000 or similar approved geo-textile membrane by Greenleaf.

450mm Ø ductile iron cover and frame to BS EN 124:1994 class B125 when used in driveways & parking bays.

Where total depth >1.2m, and in order to restrict access, use 350mm dia. (or 300mm x 300mm sq cover) max and frame with 150mm concrete plinth.

Labels in diagram:

- Fibre board movement joint
- 150mm concrete plinth
- 150mm sidefill of suitable granular material (concrete surround where situated in trafficked areas)
- Non-entry inspection chamber shafts
- 300

Connecting pipe from RWP

Distribution tank as Formpave type or similar and approved with Terram 1000 surround on 10mm pipe bedding. Invert level as given on drainage layout

For porous pavement specification,
refer to drawing IDU/1334/06/05

Depth varies. Refer to
IDU/1334/07/series layouts

Single layer of 2000 gauge
impermeable membrane to extend
underside of subbase and perforated
pipe bedding.

Perforated pipe, with perforations facing up
(diameter as noted on drainage layout drawings).

100mm min thickness pea bed and
surround, single sized pea shingle.

Perforated Pipe Detail (Minimum Level)

32/40 waste pipe

110 socket plug with boss socket adaptor

110 pipe coupler

110mm 87.5° long radius rest bend R=200 minimum

ST4 concrete thrust block

75 deep lintel unless specified otherwise on structural engineering drawings

For sealing of gaps, refer to "Pipes through walls" detail

Access pipe 600 maximum
Above ground

Rainwater pipe

Rainwater adaptor

110mm 87.5° long radius rest bend

82/110 SVP or 50/82/110 stub stack

110 access-pipe

110 pipe coupler and socket reducer as required

75 deep lintel unless specified otherwise on structural engineering drawings

110mm 87.5' long radius rest-bend R=200 minimum

ST4 concrete thrust block

For sealing of gaps, refer to "Pipes through walls" detail

150mm min
clean topsoil

300mm min

100mm min

300mm min

Terram 700

100mm min thickness pea bed and surround, single sized pea shingle.

100mm dia uPVC perforated pipe as Wavincoil or similar

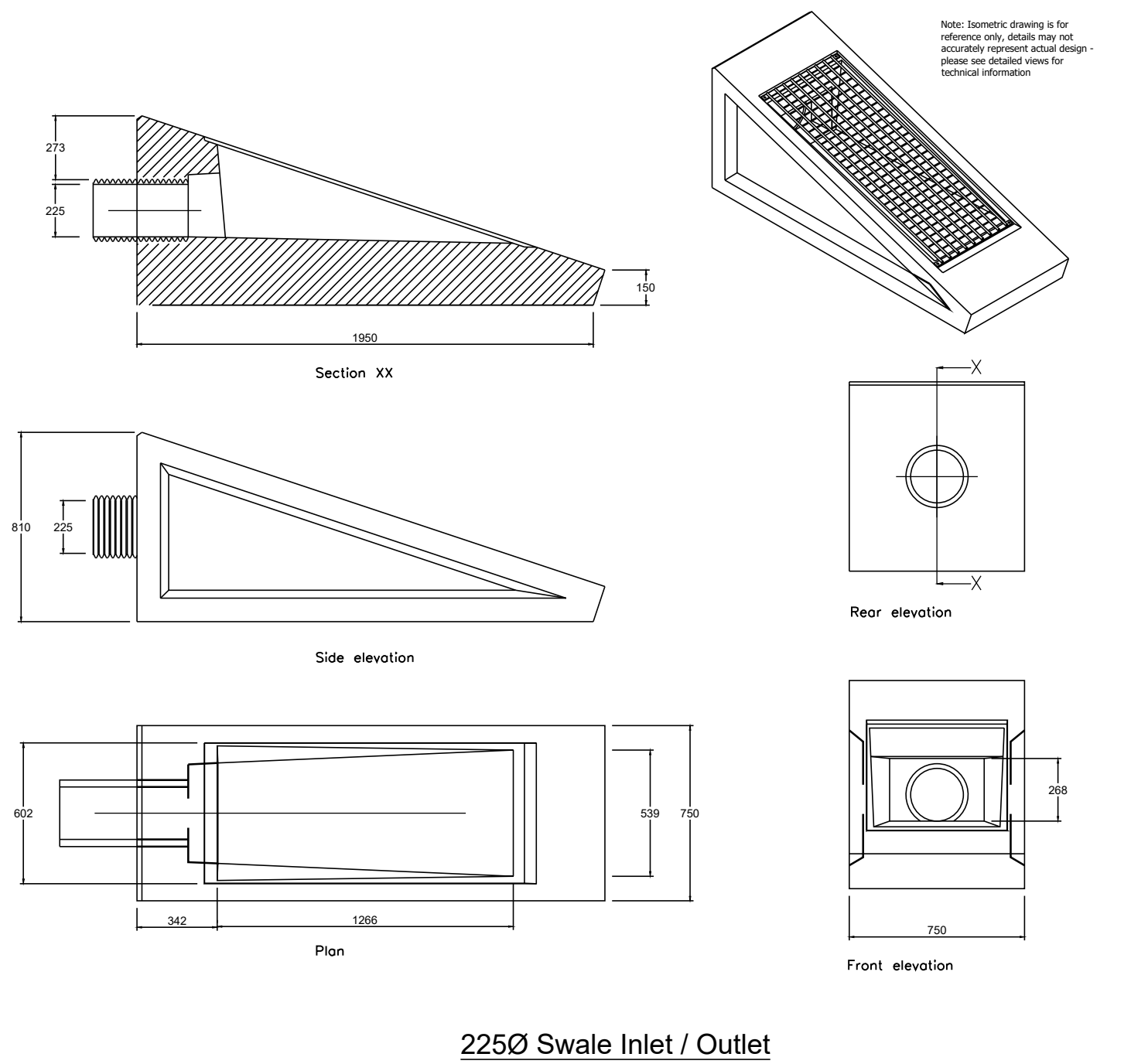
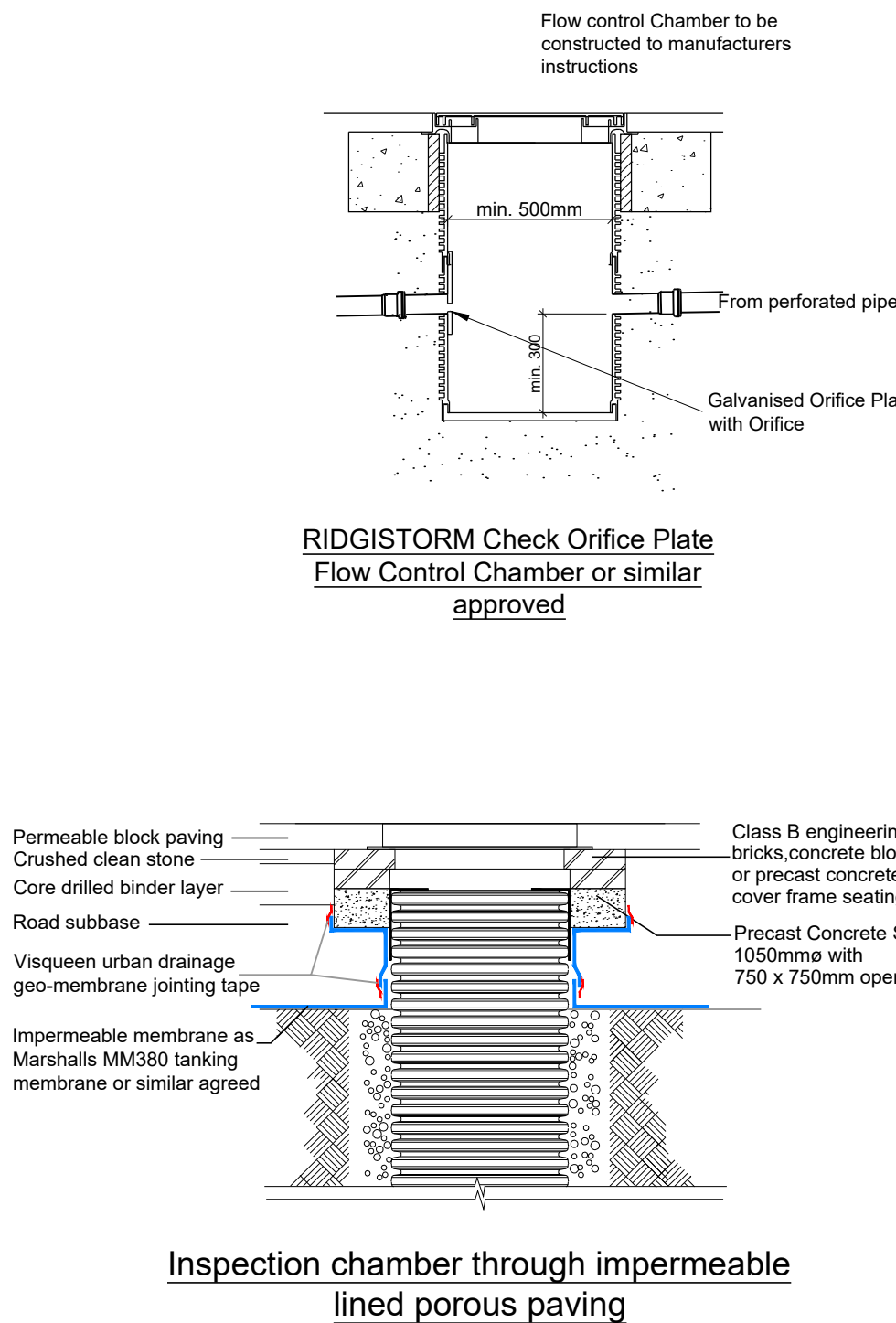
NOTE
Refer to Layout plan for invert
Min gradient 1 in 200

Diagram illustrating the construction of a garden bed structure:

- 20x100 min Tanalised timber board fixed to Tanalised timber stake.** (Top layer)
- 40x40x300 Tanalised timber stake at 1.0m intervals.** (Main structure)
- Terram 700** (Surface material)
- Lawn** (Adjacent area)
- Patio** (Adjacent area)
- peashingle fill to be brought to the surface** (Fill material)

Tel: 0207 145 4545

TYPE	SIZE OF LARGEST PIPE (DN)	MIN. INTERNAL DIMENSIONS (1) RECTANGULAR LENGTH AND WIDTH	CIRCULAR DIAMETER	MIN. CLEAR OPENING SIZE (1) RECTANGULAR LENGTH AND WIDTH	CIRCULAR DIAMETER
MANHOLE <1.5m deep to soffit	<= 150 225 300 >300	750 x 675 (7) 1200 x 675 1200 x 750 1800 x (DN+450)	1000 (7) 1200 1200 The larger of 1800 (or (DN+450))	750 x 675 (2) 1200 x 675 (2)	na (3)
>1.5m deep to soffit	<= 225 300 375-450 >450	1200 x 1000 1200 x 1075 1350 x 1225 1800 x (DN+775)	1200 1200 1200 The larger of 1800 (or (DN+775))	600 x 600	600
MANHOLE SHAFT (4)	Steps (5) Ladder (5) Winch (6)	1050 x 800 1200 x 800 900 x 800	1050 1200 900	600 x 600	600
Notes: (1) Larger sizes may be required for manholes on bends or where there are junctions. (2) May be reduced to 600 by 600 where required by highway loading considerations, subject to a safe system of work being specified. (3) Not applicable due to working space needed. (4) Minimum height of chamber in shafted manhole 2m from benching to underside of reducing slab. (5) Min clear space between ladder or steps and the opposite face of the shaft should be approximately 900mm. (6) Winch only - no steps of ladders, permanent or removable. (7) The minimum size of any manhole serving a sewer (i.e. any drain serving more than one property) should be 1200mm x 675mm rectangular or 1200mm diameter.					



Sectional Plan

Rigid pipes built into manhole should have a flexible joint as close as feasible to the external face of the structure and the length of the next rocker pipe should be as shown.

Nominal diameter (mm)	Maximum effective length (m)
150 - 600	0.6
601 - 750	1.00
over 750	1.25

Technical drawing of a precast concrete cover frame assembly, showing a cross-section and a plan view.

Cross-section details:

- Bedding and haunching to cover and frame to Clause E5.7
- Minimum 1 course of Class B engineering bricks or precast concrete cover frame seating rings
- Lifting eyes in concrete rings to be pointed
- Surface of benching and channel formed monolithically with high-strength concrete base or a proprietary liner
- Self-cleaning toe holes to be provided where channel exceeds 600 mm wide
- Cover complying with Clause E2.32, 600 mm x 600 mm clear opening
- Precast concrete slab complying with E2.30
- Minimum clear access 600 mm
- Precast concrete chamber sections complying with Clause E2.29 jointed with mortar, elastic or plastic seals. Chamber wall to be minimum 125 mm
- Chamber height (not less than 900 mm)
- Benching slope to be 1:10 to 1:30
- Precast concrete base unit
- 150 mm to underside of channel
- DN10 to Clause B5.2.12

Plan view details:

- Joint to be within chamber wall to permit satisfactory joint and subsequent movement
- See Figure B.13 and Clause E6.6.2 for rocker pipe details
- Minimum width of benching to be 225 mm
- Labels: CHAMBER, DRAIN

Not to scale

Mortar bedding and haunching to cover and frame to Clause E6.7

Minimum 1 course of Class B engineering bricks or precast concrete cover frame seating rings

Precast concrete slab complying with E2.30

Precast clear access 600 mm

Precast concrete chamber sections complying with Clause E2.23 joined with mortar, elastomeric or plastic seals

Minimum clear access 600 mm

DN10 to Clause E5.2

Chamber height (not less than 900 mm)

150 mm concrete surround

Benching slope to be 1:10 to 1:30

The bottom precast manhole ring to be built into base concrete minimum 75 mm

Distance between top of pipe and underside of precast section to be minimum 50 mm to maximum 300 mm

In-situ GEN3 concrete complying with E4.1 and BRE Special Digest 1

225 mm to underside of chamber

Self-cleaning tee joint to be provided where channel exceeds 600 mm wide

Inverts to be formed using channel pipes

Joint to be as close as possible to face of manhole to permit satisfactory joint and subsequent movement

Pipe joint with channel to be located minimum 100 mm inside face of manhole

Minimum width of benching to be 225 mm

Not to scale

Notes

1. This drawing is to be read in conjunction with the Drainage Layout, IDL/1334/07/01
2. All private drainage works to be constructed in accordance with the latest edition of the Building Regulations part H (Drainage & Waste Disposal) and to BS EN752.
3. This drawing is to be read in conjunction with the structural and architectural drawings and specification. Bespoke detailing of lintels / pipe sleeving, etc shown on the structural engineers drawings take precedence over the standard details shown on this drawing.
4. All manholes within block paved areas to have recessed covers and frames.

P3	Type B manhole detail updated to omit steps.	14.01.26
P2	DCG Details added for Southern Water approval.	05.12.25
P1	Preliminary Issue	05.12.25
Rev	Description	Date

Status

Scale : NTS@A1		
Date : Dec 2025	Checked:	Approved:
Drawn : IDL	BM	PT

Title :

Project

Land South of Hamsland, Horsted Keynes

Drg. No: IDL/1334/07/06	Rev:	File Ref:	1334-07
	P3	Plot Ref:	1334-07-06

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HOMES

Macar Homes
City House
Sutton
SM1 2EA

Tel: 0207 145 4545

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	2.100	3.000
Flush-Fl ^o ™	0.306	2.130
Kick-Fl ^o ™	0.622	1.722
Mean Flow		2.253

hydro-int components

POSITION & DIRECTION OF FLOW MUST BE SPECIFIED ON THE CONTRACT DRAWINGS

MASONRY STUD ANCHOR FIXING BOLTS

HYDRO-BRAKE® OPTIMUM FLOW CONTROL FITTED WITH PIVOTING BY-PASS DOOR

100 I.D. OUTLET (MINIMUM)

100mm MIN FOR FENCES

BENCHING

ACCESS TO BE POSITIONED ABOVE BY-PASS DOOR

FULL HANDLE & EYE BRACKET FOR OPERATING ROPE

PIVOTING BY-PASS DOOR OPERATING STEEL ROPE

PIVOTING BY-PASS DOOR

RUBBER GASKET

WINDO

ADJUSTABLE INTAKE

SUMP

75

150

770

425

565

SECTION A-A

SECTION B-B

IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY THE DEVICE WILL BE HANDLED TO SUIT SITE CONDITIONS FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL. ALL CIVIL AND INSTALLATION WORK BY OTHERS. HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL.

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The headflow characteristics of this SHE-0069-3000-2100-3000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full headflow characteristic curve. The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

DATE

01/12/2025 10:57

SITE

Horsted Keynes

DESIGNER

Ronnie Martin

REF

1334 /sw8

Hydro International

A CRH COMPANY

SHE-0069-3000-2100-3000

Hydro-Brake® Optimum

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ronnie@infrades.co.uk

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	3.000
Flush-Fl ^o ™	0.329	2.578
Kick-Fl ^o ™	0.671	2.076
Mean Flow		2.415

hydro-int components

POSITION & DIRECTION OF FLOW MUST BE SPECIFIED ON THE CONTRACT DRAWINGS

MASONRY STUD ANCHOR FIXING BOLTS

HYDRO-BRAKE® OPTIMUM FLOW CONTROL FITTED WITH PIVOTING BY-PASS DOOR

100 I.D. OUTLET (MINIMUM)

100mm MIN FOR FENCES

BENCHING

ACCESS TO BE POSITIONED ABOVE BY-PASS DOOR

FULL HANDLE & EYE BRACKET FOR OPERATING ROPE

PIVOTING BY-PASS DOOR OPERATING STEEL ROPE

PIVOTING BY-PASS DOOR

RUBBER GASKET

WINDO

ADJUSTABLE INTAKE

SUMP

85

172

405

460

615

SECTION A-A

SECTION B-B

IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY THE DEVICE WILL BE HANDLED TO SUIT SITE CONDITIONS FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL. ALL CIVIL AND INSTALLATION WORK BY OTHERS. HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL.

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The headflow characteristics of this SHE-0075-3000-1500-3000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full headflow characteristic curve. The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

DATE

01/12/2025 11:02

SITE

Horsted Keynes

DESIGNER

Ronnie Martin

REF

1334 SW17

Hydro International

A CRH COMPANY

SHE-0075-3000-1500-3000

Hydro-Brake® Optimum

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ronnie@infrades.co.uk

Access cover and frame to BS EN 124:1994 Class A15 for private gardens, Class B125 for amenity areas, individual drives and parking bays and Class D400 for roads and shared parking areas.

Road make-up

Road subbase/capping

Class B engineering bricks/concrete blocks or precast concrete cover frame seating rings

Precast Concrete Slab 1050mm with 750 x 750mm opening

Shutter Ribs with TwinWall End Cap with 350mm hole in the top, to restrict access, where noted 'nme' on layout drawings

Refer to detail opposite for general construction notes

Shaft 500/600mm ø (available in 3m or 6m lengths to be cut to suit)

Type 1 compacted side fill material where situated in soft/pedestrian areas. ST4 concrete surround elsewhere

150/225/300mm Ø UltraRib pipework, complete with oblique junction pieces and 45° bends as required.

Covering layer as bedding spec. to be taken above base

100mm min. bed as per pipe bedding

150/225/300mm ø Range 500 or 600 base

Messrs Wavin 'Range500 or Range600' Inspection chamber

For use in any trafficked areas (up to D400 rating) and / or where pipe diameters >150 and up to 300mm dia. Range500 suitable for 100 and 150mm dia pipes. Range600 suitable also for 225 and 300mm diameter pipes. Where noted 'R500' or 'R600' on layouts

Messrs Wavin 'Range500 or Range600' IC with External Backdrop

Diagram showing dimensions A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UU, UV, UW, UX, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.

BS EN124 CLASS

Clear Opening mm AxB

Base Size mm CxD

Depth mm E

Nominal Weight kg

Product Ref

C250

650x650

765x725

41

77

RE 70 H 1 FD

Stanton Ductile Iron Pavement Grating (or similar approved)
Manufactured to BS EN124 Class C250

Vented Cover to Hydrobrake Chamber

CONTRACT DOCUMENT

Notes

1. This drawing is to be read in conjunction with the Drainage Layout, IDL/1334/07/01
2. All private drainage works to be constructed in accordance with the latest edition of the Building Regulations part H (Drainage & Waste Disposal) and to BS EN752.
3. This drawing is to be read in conjunction with the structural and architectural drawings and specification. Bespoke detailing of lintels / pipe sleeving, etc shown on the structural engineers drawings take precedence over the standard details shown on this drawing.
4. All manholes within block paved areas to have recessed covers and frames.

Datasheet for Hydrobrake SW8

Diagram showing Section B - B Typical Hydrobrake Flow Control. Intake flow, Pivoting by-pass door, D.

Section B - B
Typical Hydrobrake Flow Control
Refer to Table

Datasheet for Hydrobrake SW17

Diagram showing Earth to be locally shaped to tie in with outfall structure. 225Ø SW sewer. 150mm min compacted thickness of Type 1 granular material. 225Ø outlet to Existing Watercourse.

Diagram showing Section A - A Typical 'Hydrobrake' Catchpit Manhole Detail. Pull handle, Fixing lugs with masonry stud anchor fixing bolts, Concrete mounting block, Hydrobrake@ flow control fitted with pivoting by-pass door, Neoprene rubber gasket, In flow, Vent, From Storage, Out flow, Benching shaped to guide flows to Hydro-brake flow control intake, H (100mm min), Plan, 650x650 C250 duty cover and frame as detailed opposite, Class (i) mortar haunching to cover and frame, Cover slab bedded on PC chamber section with mortar, proprietary bitumen or resin mastic sealant, Pivoting by-pass door operating steel rope, 150mm C20 concrete surround, 1 no. 110Ø HDP(vent pipe) from Aquacell storage, 1/30, Inflow, Outflow, Intake sump, Benching, 1200mm Ø PCC rings, Hydrobrake flow control fitted with pivoting by-pass door, Outlet spigot, Access to be positioned above by-pass door, 2 - 4 courses Class B engineering bricks (see note B), Eye bracket for operating rope, Pull handle.

Section A - A
Typical 'Hydrobrake' Catchpit Manhole Detail

Important Notes: -
1. Ensure hydrobrake can be passed through standard opening. Consideration to increasing opening size may be required for larger hydrobrakes.
2. Where hydrobrakes considered from alternative suppliers, provide Engineer with details of the flow/head relationship to allow a check to be made on the storage volume required. Flow control units have varying efficiencies and this may affect the storage volumes required.

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Appendix B

Surface Water Drainage Calculations

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)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW1	0.039	5.00	89.500	600	538460.422	127900.357	1.200
SW2		5.00	88.700	1200	538471.665	127881.605	2.050
SW3	0.092	5.00	88.750	1500	538468.254	127887.294	2.150
SW4	0.016	5.00	89.800	1200	538431.073	127880.064	2.460
SW5	0.031	5.00	89.100	1500	538437.529	127868.873	2.800
SW6	0.062	5.00	89.230	1500	538427.340	127857.922	3.000
SW7	0.051	5.00	90.370	1200	538406.027	127864.094	4.040
SW8	0.065	5.00	89.400	1500	538414.021	127850.238	3.250
SW9		5.00	90.950	600	538368.532	127858.700	1.450
SW10	0.041	5.00	90.050	600	538377.491	127843.269	1.730
SW11	0.021	5.00	89.500	1500	538385.193	127833.607	3.600
SW12	0.016	5.00	87.900	1200	538390.609	127810.698	2.120
SW13	0.024	5.00	86.850	1200	538410.714	127801.320	1.440
SW14	0.033	5.00	86.250	1200	538434.770	127804.174	1.650
SW15	0.012	5.00	85.600	1500	538450.123	127800.587	1.630
SW16			85.625	1500	538450.229	127797.571	1.775
SW17			85.400	1500	538449.419	127794.102	2.200
HW			84.310	1	538451.846	127781.267	1.190
CP7			91.100	1200	538398.309	127877.472	4.770
CP2			88.650	1500	538461.982	127875.800	2.000
CP17			86.250	1500	538429.943	127798.651	3.050

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW1	SW3	15.231	0.600	88.300	86.600	1.700	9.0	225	5.06	150.0
2.000	SW2	SW3	6.633	0.600	86.650	86.600	0.050	132.7	225	5.10	150.0
1.001	SW3	SW5	35.824	0.600	86.600	86.380	0.220	162.8	225	5.68	150.0
3.000	SW4	SW5	12.920	0.600	87.340	86.450	0.890	14.5	225	5.06	150.0
1.002	SW5	SW6	14.958	0.600	86.300	86.230	0.070	213.7	300	5.91	150.0
1.003	SW6	SW8	15.377	0.600	86.230	86.150	0.080	192.2	300	6.14	150.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	4.397	174.8	21.2	0.975	1.925	0.039	0.0
2.000	1.133	45.1	0.0	1.825	1.925	0.000	0.0
1.001	1.022	40.6	71.1	1.925	2.495	0.131	0.0
3.000	3.452	137.2	8.5	2.235	2.425	0.016	0.0
1.002	1.071	75.7	96.5	2.500	2.700	0.178	0.0
1.003	1.130	79.9	130.1	2.700	2.950	0.240	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.000	SW7	SW8	15.997	0.600	86.330	86.230	0.100	160.0	225	5.26	150.0
1.004	SW8	SW11	33.281	0.600	86.150	85.980	0.170	195.8	300	6.64	150.0
5.000	SW9	SW10	17.843	0.600	89.500	88.400	1.100	16.2	150	5.12	150.0
5.001	SW10	SW11	12.356	0.600	88.320	88.000	0.320	38.6	225	5.22	150.0
1.005	SW11	SW12	23.541	0.600	85.900	85.780	0.120	196.2	300	6.99	149.5
1.006	SW12	SW13	22.185	0.600	85.780	85.410	0.370	60.0	300	7.17	148.0
1.007	SW13	SW14	24.225	0.600	85.410	84.600	0.810	29.9	300	7.31	146.9
1.008	SW14	SW15	15.766	0.600	84.600	83.970	0.630	25.0	300	7.39	146.2
1.009	SW15	SW16	3.018	0.600	83.970	83.850	0.120	25.1	300	7.41	146.1
1.010	SW16	SW17	3.562	0.600	83.850	83.200	0.650	5.5	300	7.42	146.0
1.011	SW17	HW	13.062	0.600	83.200	83.120	0.080	163.3	150	7.70	143.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
4.000	1.031	41.0	27.4	3.815	2.945	0.051	0.0
1.004	1.120	79.2	192.6	2.950	3.220	0.355	0.0
5.000	2.513	44.4	0.0	1.300	1.500	0.000	0.0
5.001	2.111	83.9	22.0	1.505	1.275	0.041	0.0
1.005	1.119	79.1	225.0	3.300	1.820	0.416	0.0
1.006	2.034	143.8	231.4	1.820	1.140	0.433	0.0
1.007	2.885	203.9	242.6	1.140	1.350	0.457	0.0
1.008	3.155	223.0	258.8	1.350	1.330	0.490	0.0
1.009	3.147	222.5	264.8	1.330	1.475	0.501	0.0
1.010	6.757	477.6	264.6	1.475	1.900	0.501	0.0
1.011	0.784	13.8	260.6	2.050	1.040	0.501	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	15.231	9.0	225	Circular	89.500	88.300	0.975	88.750	86.600	1.925
2.000	6.633	132.7	225	Circular	88.700	86.650	1.825	88.750	86.600	1.925
1.001	35.824	162.8	225	Circular	88.750	86.600	1.925	89.100	86.380	2.495
3.000	12.920	14.5	225	Circular	89.800	87.340	2.235	89.100	86.450	2.425
1.002	14.958	213.7	300	Circular	89.100	86.300	2.500	89.230	86.230	2.700
1.003	15.377	192.2	300	Circular	89.230	86.230	2.700	89.400	86.150	2.950
4.000	15.997	160.0	225	Circular	90.370	86.330	3.815	89.400	86.230	2.945
1.004	33.281	195.8	300	Circular	89.400	86.150	2.950	89.500	85.980	3.220
5.000	17.843	16.2	150	Circular	90.950	89.500	1.300	90.050	88.400	1.500

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW1	600	Manhole	Adoptable	SW3	1500	Manhole	Adoptable
2.000	SW2	1200	Manhole	Adoptable	SW3	1500	Manhole	Adoptable
1.001	SW3	1500	Manhole	Adoptable	SW5	1500	Manhole	Adoptable
3.000	SW4	1200	Manhole	Adoptable	SW5	1500	Manhole	Adoptable
1.002	SW5	1500	Manhole	Adoptable	SW6	1500	Manhole	Adoptable
1.003	SW6	1500	Manhole	Adoptable	SW8	1500	Manhole	Adoptable
4.000	SW7	1200	Manhole	Adoptable	SW8	1500	Manhole	Adoptable
1.004	SW8	1500	Manhole	Adoptable	SW11	1500	Manhole	Adoptable
5.000	SW9	600	Manhole	Adoptable	SW10	600	Manhole	Adoptable

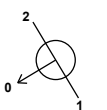
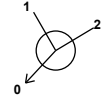


Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
5.001	12.356	38.6	225	Circular	90.050	88.320	1.505	89.500	88.000	1.275
1.005	23.541	196.2	300	Circular	89.500	85.900	3.300	87.900	85.780	1.820
1.006	22.185	60.0	300	Circular	87.900	85.780	1.820	86.850	85.410	1.140
1.007	24.225	29.9	300	Circular	86.850	85.410	1.140	86.250	84.600	1.350
1.008	15.766	25.0	300	Circular	86.250	84.600	1.350	85.600	83.970	1.330
1.009	3.018	25.1	300	Circular	85.600	83.970	1.330	85.625	83.850	1.475
1.010	3.562	5.5	300	Circular	85.625	83.850	1.475	85.400	83.200	1.900
1.011	13.062	163.3	150	Circular	85.400	83.200	2.050	84.310	83.120	1.040

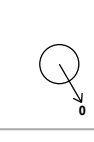
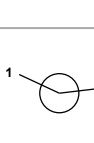
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.001	SW10	600	Manhole	Adoptable	SW11	1500	Manhole	Adoptable
1.005	SW11	1500	Manhole	Adoptable	SW12	1200	Manhole	Adoptable
1.006	SW12	1200	Manhole	Adoptable	SW13	1200	Manhole	Adoptable
1.007	SW13	1200	Manhole	Adoptable	SW14	1200	Manhole	Adoptable
1.008	SW14	1200	Manhole	Adoptable	SW15	1500	Manhole	Adoptable
1.009	SW15	1500	Manhole	Adoptable	SW16	1500	Manhole	Adoptable
1.010	SW16	1500	Manhole	Adoptable	SW17	1500	Manhole	Adoptable
1.011	SW17	1500	Manhole	Adoptable	HW	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW1	538460.422	127900.357	89.500	1.200	600		0	1.000	88.300	225
SW2	538471.665	127881.605	88.700	2.050	1200		0	2.000	86.650	225
SW3	538468.254	127887.294	88.750	2.150	1500		1	2.000	86.600	225
							2	1.000	86.600	225
SW4	538431.073	127880.064	89.800	2.460	1200		0	1.001	86.600	225
SW5	538437.529	127868.873	89.100	2.800	1500		1	3.000	86.450	225
							2	1.001	86.380	225
							0	1.002	86.300	300
SW6	538427.340	127857.922	89.230	3.000	1500		1	1.002	86.230	300
							0	1.003	86.230	300
SW7	538406.027	127864.094	90.370	4.040	1200		0	4.000	86.330	225



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW8	538414.021	127850.238	89.400	3.250	1500		1	4.000	86.230	225
							2	1.003	86.150	300
							0	1.004	86.150	300
SW9	538368.532	127858.700	90.950	1.450	600		0	5.000	89.500	150
SW10	538377.491	127843.269	90.050	1.730	600		1	5.000	88.400	150
							0	5.001	88.320	225
SW11	538385.193	127833.607	89.500	3.600	1500		1	5.001	88.000	225
							2	1.004	85.980	300
							0	1.005	85.900	300
SW12	538390.609	127810.698	87.900	2.120	1200		1	1.005	85.780	300
							0	1.006	85.780	300
SW13	538410.714	127801.320	86.850	1.440	1200		1	1.006	85.410	300
							0	1.007	85.410	300
SW14	538434.770	127804.174	86.250	1.650	1200		1	1.007	84.600	300
							0	1.008	84.600	300
SW15	538450.123	127800.587	85.600	1.630	1500		1	1.008	83.970	300
							0	1.009	83.970	300
SW16	538450.229	127797.571	85.625	1.775	1500		1	1.009	83.850	300
							0	1.010	83.850	300
SW17	538449.419	127794.102	85.400	2.200	1500		1	1.010	83.200	300
							0	1.011	83.200	150
HW	538451.846	127781.267	84.310	1.190	1		1	1.011	83.120	150
CP7	538398.309	127877.472	91.100	4.770	1200					
CP2	538461.982	127875.800	88.650	2.000	1500					

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
CP17	538429.943	127798.651	86.250	3.050	1500				

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓	1 year (l/s)	2.5
Rainfall Events	Singular	Drain Down Time (mins)	10080	2 year (l/s)	2.6
Summer CV	1.000	Additional Storage (m³/ha)	0.0	30 year (l/s)	7.2
Winter CV	1.000	Starting Level (m)		100 year (l/s)	9.6
Analysis Speed	Detailed	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.503	Betterment (%)	0
SAAR (mm)	838	QBar	3.0
Soil Index	4	Q 1 year (l/s)	2.5
SPR	0.47	Q 2 year (l/s)	2.6
Region	7	Q 30 year (l/s)	7.2
Growth Factor 1 year	0.85	Q 100 year (l/s)	9.6
Growth Factor 2 year	0.88		

Node SW17 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	83.200	Product Number	CTL-SHE-0075-3000-1500-3000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node SW8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	86.150	Product Number	CTL-SHE-0070-3000-2100-3000
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node SW17 Tank Storage Structure

Invert Level (m) 83.200 | Time to half empty (mins) 2220 | Analyse flow through structure x

Inlets

CP17

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	135.0	0.750	135.0	1.500	135.0	1.501	0.0

Node SW7 Tank Storage Structure

Invert Level (m) 86.330 | Time to half empty (mins) 990 | Analyse flow through structure x

Inlets

CP7

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.0	0.750	130.0	1.500	130.0	1.501	0.0

Node SW2 Tank Storage Structure

Invert Level (m) 86.650 | Time to half empty (mins) 660 | Analyse flow through structure x

Inlets

CP2

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	49.0	0.750	49.0	1.500	49.0	1.501	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	88.325	0.025	4.6	0.0071	0.0000	OK
30 minute summer	SW2	22	86.657	0.007	1.1	0.3502	0.0000	OK
15 minute summer	SW3	10	86.691	0.091	15.5	0.1613	0.0000	OK
15 minute summer	SW4	10	87.359	0.019	1.9	0.0209	0.0000	OK
360 minute summer	SW5	264	86.592	0.292	6.7	0.5162	0.0000	OK
360 minute summer	SW6	264	86.592	0.362	8.4	0.6399	0.0000	SURCHARGED
360 minute summer	SW7	264	86.592	0.262	9.9	33.4925	0.0000	SURCHARGED
360 minute summer	SW8	264	86.592	0.442	10.4	0.7812	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.357	0.037	4.8	0.0106	0.0000	OK
15 minute summer	SW11	10	85.972	0.072	9.4	0.1266	0.0000	OK
15 minute summer	SW12	11	85.838	0.058	11.2	0.0656	0.0000	OK
15 minute summer	SW13	11	85.463	0.053	13.9	0.0605	0.0000	OK
15 minute summer	SW14	11	84.657	0.057	17.7	0.0643	0.0000	OK
15 minute summer	SW15	11	84.042	0.072	19.0	0.1279	0.0000	OK
15 minute summer	SW16	10	83.900	0.050	19.0	0.0884	0.0000	OK
1440 minute summer	SW17	990	83.451	0.251	4.2	34.0130	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	1.8	0.0000	0.0000	OK
360 minute summer	CP7	272	86.591	0.261	4.8	0.0000	0.0000	OK
30 minute summer	CP2	25	86.657	0.007	0.5	0.0000	0.0000	OK
1440 minute summer	CP17	990	83.450	0.250	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	1.000	SW3	4.6	0.617	0.026	0.1333	
30 minute summer	SW2	2.000	SW3	-1.1	-0.201	-0.025	0.0471	
15 minute summer	SW3	1.001	SW5	14.3	0.810	0.352	0.9602	
15 minute summer	SW4	3.000	SW5	1.9	1.092	0.014	0.1797	
360 minute summer	SW5	1.002	SW6	6.1	0.354	0.080	1.0496	
360 minute summer	SW6	1.003	SW8	8.0	0.176	0.100	1.0828	
360 minute summer	SW7	4.000	SW8	-8.0	0.369	-0.196	0.6362	
360 minute summer	SW8	Hydro-Brake®	SW11	2.1				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0000	
15 minute summer	SW10	5.001	SW11	4.8	1.128	0.057	0.0522	
15 minute summer	SW11	1.005	SW12	9.3	0.831	0.117	0.2636	
15 minute summer	SW12	1.006	SW13	11.1	1.234	0.077	0.1996	
15 minute summer	SW13	1.007	SW14	14.0	1.577	0.069	0.2148	
15 minute summer	SW14	1.008	SW15	17.7	1.601	0.080	0.1760	
15 minute summer	SW15	1.009	SW16	19.0	1.916	0.086	0.0307	
15 minute summer	SW16	1.010	SW17	19.2	3.715	0.040	0.0307	
1440 minute summer	SW17	Hydro-Brake®	HW	2.6				160.4

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	88.331	0.031	7.2	0.0088	0.0000	OK
360 minute winter	SW2	328	86.710	0.060	1.6	3.0785	0.0000	OK
15 minute summer	SW3	11	86.754	0.154	24.1	0.2729	0.0000	OK
15 minute summer	SW4	10	87.363	0.023	2.9	0.0255	0.0000	OK
15 minute summer	SW5	11	86.716	0.416	27.8	0.7355	0.0000	SURCHARGED
360 minute winter	SW6	328	86.710	0.480	7.2	0.8483	0.0000	SURCHARGED
360 minute winter	SW7	328	86.710	0.380	8.5	48.6097	0.0000	SURCHARGED
360 minute winter	SW8	328	86.710	0.560	9.1	0.9897	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.367	0.047	7.4	0.0132	0.0000	OK
15 minute summer	SW11	10	85.985	0.085	13.1	0.1503	0.0000	OK
15 minute summer	SW12	10	85.850	0.070	15.9	0.0787	0.0000	OK
15 minute summer	SW13	11	85.474	0.064	20.3	0.0728	0.0000	OK
15 minute summer	SW14	10	84.669	0.069	26.1	0.0779	0.0000	OK
15 minute summer	SW15	11	84.061	0.091	28.1	0.1609	0.0000	OK
15 minute summer	SW16	10	83.910	0.060	28.2	0.1053	0.0000	OK
1440 minute winter	SW17	1080	83.505	0.305	3.8	41.4177	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	2.1	0.0000	0.0000	OK
360 minute winter	CP7	344	86.710	0.380	4.2	0.0000	0.0000	OK
360 minute winter	CP2	344	86.710	0.060	0.8	0.0000	0.0000	OK
1440 minute winter	CP17	1110	83.505	0.305	0.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	1.000	SW3	7.2	0.690	0.041	0.2454	
360 minute winter	SW2	2.000	SW3	-1.6	-0.223	-0.037	0.0923	
15 minute summer	SW3	1.001	SW5	19.8	0.821	0.486	1.2327	
15 minute summer	SW4	3.000	SW5	2.9	1.073	0.021	0.2702	
15 minute summer	SW5	1.002	SW6	28.4	0.546	0.375	1.0533	
360 minute winter	SW6	1.003	SW8	7.0	0.182	0.088	1.0828	
360 minute winter	SW7	4.000	SW8	-6.9	0.365	-0.168	0.6362	
360 minute winter	SW8	Hydro-Brake®	SW11	2.1				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0000	
15 minute summer	SW10	5.001	SW11	7.4	1.275	0.088	0.0713	
15 minute summer	SW11	1.005	SW12	13.0	0.908	0.165	0.3385	
15 minute summer	SW12	1.006	SW13	15.8	1.354	0.110	0.2595	
15 minute summer	SW13	1.007	SW14	20.2	1.745	0.099	0.2811	
15 minute summer	SW14	1.008	SW15	26.0	1.742	0.117	0.2379	
15 minute summer	SW15	1.009	SW16	28.2	2.108	0.127	0.0416	
15 minute summer	SW16	1.010	SW17	28.3	3.886	0.059	0.0379	
1440 minute winter	SW17	Hydro-Brake®	HW	2.6				200.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	88.349	0.049	18.7	0.0140	0.0000	OK
360 minute winter	SW2	352	87.212	0.562	8.1	28.8031	0.0000	SURCHARGED
360 minute winter	SW3	352	87.213	0.612	8.8	1.0823	0.0000	SURCHARGED
15 minute summer	SW4	10	87.376	0.036	7.5	0.0402	0.0000	OK
360 minute winter	SW5	352	87.212	0.912	8.5	1.6121	0.0000	SURCHARGED
360 minute winter	SW6	352	87.212	0.982	11.0	1.7358	0.0000	SURCHARGED
360 minute winter	SW7	352	87.212	0.882	14.8	112.8108	0.0000	SURCHARGED
360 minute winter	SW8	352	87.212	1.062	14.2	1.8771	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.398	0.078	19.4	0.0221	0.0000	OK
15 minute summer	SW11	10	86.035	0.135	31.1	0.2388	0.0000	OK
15 minute summer	SW12	10	85.892	0.112	38.5	0.1261	0.0000	OK
15 minute summer	SW13	10	85.513	0.103	49.9	0.1169	0.0000	OK
15 minute summer	SW14	10	84.714	0.114	65.2	0.1289	0.0000	OK
15 minute summer	SW15	11	84.129	0.159	70.4	0.2817	0.0000	OK
15 minute summer	SW16	10	83.943	0.093	70.4	0.1645	0.0000	OK
1440 minute summer	SW17	1470	83.891	0.691	6.7	93.7758	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	2.5	0.0000	0.0000	OK
360 minute winter	CP7	360	87.211	0.881	7.4	0.0000	0.0000	OK
360 minute winter	CP2	352	87.211	0.561	4.0	0.0000	0.0000	OK
1440 minute summer	CP17	1470	83.891	0.691	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	1.000	SW3	18.7	0.735	0.107	0.3520	
360 minute winter	SW2	2.000	SW3	-8.1	-0.392	-0.179	0.2638	
360 minute winter	SW3	1.001	SW5	6.2	0.572	0.152	1.4248	
15 minute summer	SW4	3.000	SW5	7.5	1.148	0.054	0.2829	
360 minute winter	SW5	1.002	SW6	7.9	0.351	0.104	1.0533	
360 minute winter	SW6	1.003	SW8	10.8	0.199	0.135	1.0828	
360 minute winter	SW7	4.000	SW8	-12.0	0.374	-0.293	0.6362	
360 minute winter	SW8	Hydro-Brake®	SW11	2.2				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0000	
15 minute summer	SW10	5.001	SW11	19.3	1.649	0.230	0.1446	
15 minute summer	SW11	1.005	SW12	30.8	1.130	0.390	0.6428	
15 minute summer	SW12	1.006	SW13	38.2	1.691	0.266	0.5027	
15 minute summer	SW13	1.007	SW14	49.6	2.168	0.243	0.5574	
15 minute summer	SW14	1.008	SW15	64.8	2.088	0.291	0.4918	
15 minute summer	SW15	1.009	SW16	70.4	2.552	0.316	0.0849	
15 minute summer	SW16	1.010	SW17	70.6	4.122	0.148	0.1048	
1440 minute summer	SW17	Hydro-Brake®	HW	2.6				381.5

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.61%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	88.357	0.057	25.2	0.0163	0.0000	OK
480 minute winter	SW2	464	87.570	0.920	7.1	47.1267	0.0000	SURCHARGED
480 minute winter	SW3	464	87.570	0.970	9.1	1.7143	0.0000	SURCHARGED
480 minute winter	SW4	464	87.570	0.230	1.1	0.2601	0.0000	SURCHARGED
480 minute winter	SW5	464	87.570	1.270	7.6	2.2441	0.0000	SURCHARGED
480 minute winter	SW6	464	87.570	1.340	9.9	2.3677	0.0000	SURCHARGED
480 minute winter	SW7	464	87.570	1.240	15.4	158.5605	0.0000	SURCHARGED
480 minute winter	SW8	464	87.570	1.420	14.2	2.5090	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.413	0.093	26.1	0.0262	0.0000	OK
15 minute summer	SW11	10	86.060	0.160	41.5	0.2822	0.0000	OK
15 minute summer	SW12	10	85.912	0.132	51.3	0.1488	0.0000	OK
15 minute summer	SW13	10	85.532	0.122	66.8	0.1376	0.0000	OK
15 minute summer	SW14	10	84.737	0.136	87.4	0.1544	0.0000	OK
2160 minute winter	SW15	2100	84.233	0.263	7.1	0.4654	0.0000	OK
2160 minute winter	SW16	2100	84.233	0.383	19.9	0.6774	0.0000	SURCHARGED
2160 minute winter	SW17	2100	84.233	1.033	13.1	140.1854	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	2.6	0.0000	0.0000	OK
480 minute winter	CP7	472	87.568	1.238	7.7	0.0000	0.0000	OK
480 minute winter	CP2	472	87.569	0.919	3.5	0.0000	0.0000	OK
2160 minute winter	CP17	2100	84.232	1.032	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	1.000	SW3	25.1	0.877	0.144	0.3636	
480 minute winter	SW2	2.000	SW3	-7.1	-0.395	-0.157	0.2638	
480 minute winter	SW3	1.001	SW5	5.5	0.531	0.135	1.4248	
480 minute winter	SW4	3.000	SW5	1.1	0.708	0.008	0.5138	
480 minute winter	SW5	1.002	SW6	7.1	0.387	0.094	1.0533	
480 minute winter	SW6	1.003	SW8	9.7	0.195	0.121	1.0828	
480 minute winter	SW7	4.000	SW8	-11.9	0.365	-0.292	0.6362	
480 minute winter	SW8	Hydro-Brake®	SW11	2.5				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0064	
15 minute summer	SW10	5.001	SW11	25.9	1.776	0.309	0.1805	
15 minute summer	SW11	1.005	SW12	41.1	1.211	0.519	0.7984	
15 minute summer	SW12	1.006	SW13	51.0	1.812	0.355	0.6266	
15 minute summer	SW13	1.007	SW14	66.4	2.304	0.326	0.7021	
15 minute summer	SW14	1.008	SW15	86.9	2.203	0.390	0.6216	
2160 minute winter	SW15	1.009	SW16	9.0	1.481	0.040	0.2052	
2160 minute winter	SW16	1.010	SW17	12.9	1.072	0.027	0.2508	
2160 minute winter	SW17	Hydro-Brake®	HW	2.6				577.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.61%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	88.356	0.056	23.6	0.0157	0.0000	OK
480 minute winter	SW2	464	87.451	0.801	6.6	41.0056	0.0000	SURCHARGED
480 minute winter	SW3	464	87.451	0.851	8.4	1.5031	0.0000	SURCHARGED
480 minute winter	SW4	464	87.451	0.111	1.0	0.1250	0.0000	OK
480 minute winter	SW5	464	87.451	1.151	7.7	2.0330	0.0000	SURCHARGED
480 minute winter	SW6	464	87.451	1.221	9.9	2.1566	0.0000	SURCHARGED
480 minute winter	SW7	464	87.451	1.120	14.1	143.2755	0.0000	SURCHARGED
480 minute winter	SW8	464	87.450	1.300	13.1	2.2979	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.409	0.089	24.5	0.0253	0.0000	OK
15 minute summer	SW11	10	86.054	0.154	38.9	0.2717	0.0000	OK
15 minute summer	SW12	10	85.907	0.127	48.2	0.1434	0.0000	OK
15 minute summer	SW13	10	85.527	0.117	62.6	0.1326	0.0000	OK
15 minute summer	SW14	10	84.731	0.131	82.0	0.1482	0.0000	OK
2160 minute summer	SW15	2160	84.172	0.202	10.4	0.3562	0.0000	OK
2160 minute summer	SW16	2160	84.175	0.325	23.2	0.5735	0.0000	SURCHARGED
2160 minute summer	SW17	2160	84.172	0.972	15.2	131.8765	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	2.6	0.0000	0.0000	OK
480 minute winter	CP7	472	87.449	1.119	7.0	0.0000	0.0000	OK
480 minute winter	CP2	472	87.450	0.800	3.3	0.0000	0.0000	OK
2160 minute summer	CP17	2160	84.171	0.971	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	1.000	SW3	23.6	0.827	0.135	0.3608	
480 minute winter	SW2	2.000	SW3	-6.6	-0.392	-0.145	0.2638	
480 minute winter	SW3	1.001	SW5	5.6	0.530	0.137	1.4248	
480 minute winter	SW4	3.000	SW5	1.0	0.708	0.007	0.3822	
480 minute winter	SW5	1.002	SW6	7.2	0.367	0.095	1.0533	
480 minute winter	SW6	1.003	SW8	9.7	0.202	0.121	1.0828	
480 minute winter	SW7	4.000	SW8	-10.9	0.359	-0.267	0.6362	
480 minute winter	SW8	Hydro-Brake®	SW11	2.4				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0040	
15 minute summer	SW10	5.001	SW11	24.3	1.748	0.290	0.1720	
15 minute summer	SW11	1.005	SW12	38.5	1.193	0.487	0.7609	
15 minute summer	SW12	1.006	SW13	47.8	1.785	0.333	0.5967	
15 minute summer	SW13	1.007	SW14	62.3	2.275	0.305	0.6668	
15 minute summer	SW14	1.008	SW15	81.5	2.178	0.365	0.5902	
2160 minute summer	SW15	1.009	SW16	11.9	1.560	0.054	0.1822	
2160 minute summer	SW16	1.010	SW17	15.2	0.684	0.032	0.2508	
2160 minute summer	SW17	Hydro-Brake®	HW	2.6				548.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	SW1	690	88.535	0.235	2.6	0.0666	0.0000	SURCHARGED
720 minute winter	SW2	690	88.535	1.885	5.8	78.7307	0.0000	FLOOD RISK
720 minute winter	SW3	690	88.535	1.935	8.6	3.4195	0.0000	FLOOD RISK
720 minute winter	SW4	690	88.535	1.195	1.0	1.3515	0.0000	SURCHARGED
720 minute winter	SW5	690	88.535	2.235	5.6	3.9492	0.0000	SURCHARGED
720 minute winter	SW6	690	88.535	2.305	9.4	4.0728	0.0000	SURCHARGED
720 minute winter	SW7	690	88.535	2.205	14.3	195.2125	0.0000	SURCHARGED
720 minute winter	SW8	690	88.535	2.385	13.4	4.2140	0.0000	SURCHARGED
15 minute summer	SW9	1	89.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SW10	10	88.429	0.109	34.2	0.0309	0.0000	OK
15 minute summer	SW11	10	86.088	0.188	53.9	0.3324	0.0000	OK
15 minute summer	SW12	10	85.934	0.154	66.9	0.1747	0.0000	OK
15 minute summer	SW13	10	85.552	0.142	87.2	0.1609	0.0000	OK
15 minute summer	SW14	10	84.764	0.164	114.2	0.1850	0.0000	OK
2880 minute winter	SW15	2760	84.688	0.718	5.8	1.2681	0.0000	SURCHARGED
2880 minute winter	SW16	2760	84.688	0.838	38.6	1.4800	0.0000	SURCHARGED
2880 minute winter	SW17	2760	84.688	1.488	6.5	201.8439	0.0000	SURCHARGED
15 minute summer	HW	1	83.120	0.000	2.6	0.0000	0.0000	OK
720 minute winter	CP7	690	88.534	2.204	7.1	0.0000	0.0000	OK
720 minute winter	CP2	690	88.534	1.884	3.0	0.0000	0.0000	OK
2880 minute winter	CP17	2820	84.687	1.487	2.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	SW1	1.000	SW3	2.6	0.371	0.015	0.6058	
720 minute winter	SW2	2.000	SW3	-5.8	-0.334	-0.128	0.2638	
720 minute winter	SW3	1.001	SW5	4.0	0.500	0.098	1.4248	
720 minute winter	SW4	3.000	SW5	1.0	0.626	0.007	0.5138	
720 minute winter	SW5	1.002	SW6	5.3	0.362	0.070	1.0533	
720 minute winter	SW6	1.003	SW8	9.2	0.165	0.116	1.0828	
720 minute winter	SW7	4.000	SW8	-11.0	0.352	-0.268	0.6362	
720 minute winter	SW8	Hydro-Brake®	SW11	3.2				
15 minute summer	SW9	5.000	SW10	0.0	0.000	0.000	0.0214	
15 minute summer	SW10	5.001	SW11	34.0	1.894	0.405	0.2218	
15 minute summer	SW11	1.005	SW12	53.4	1.287	0.676	0.9776	
15 minute summer	SW12	1.006	SW13	66.5	1.923	0.462	0.7704	
15 minute summer	SW13	1.007	SW14	86.7	2.416	0.425	0.8739	
15 minute summer	SW14	1.008	SW15	113.6	2.308	0.509	0.7699	
2880 minute winter	SW15	1.009	SW16	22.1	1.499	0.100	0.2125	
2880 minute winter	SW16	1.010	SW17	-16.4	1.075	-0.034	0.2508	
2880 minute winter	SW17	Hydro-Brake®	HW	3.0				843.8

Appendix C

MANAGEMENT & MAINTENANCE REGIME

The management and maintenance of the SW drainage system is essentially split into 2 categories:-

Macar Homes remains responsible for maintaining all development elements until they are transferred to the Management Company or the Freeholders.

1. The Management Company are responsible for all plot shared drainage, manholes, plastic inspection chambers and shared permeable paving.
2. The Freeholders are generally responsible for on-plot parking/hardstanding areas, on-plot drainage, and permeable paving on private drives.

The Management Company

Handover to the Management Company coincides with the completion of the final residential unit.

The Management Company employs a specialist Managing Agent to manage the development which includes all aspects of maintenance.

At handover, the Management Company and Managing Agent receive as-built information together with operating and maintenance manuals that detail all maintenance protocols.

Approximately after 1 year of completion of the final unit, the residents will be invited to elect members to become directors of the Management Company, the Macar appointed directors at that time resign from the Management Company to be replaced by the elected representatives of the residents.

To ensure continuity and a full understanding of the development, operation and maintenance of its various components, the representative of the Managing Agent remains as a director of the Management Company and the appointment of the Managing Agents is fixed for a minimum period of two years following the date of resignation of the last Macar director.

After two years, the Management Company have the right to re-tender the Managing Agent services.

Within the first two years from the final unit completion of the development, the residents have two ways in which they can report any defects and problems, which would include flooding, and that is either to Macar Homes Aftersales department or to the Managing Agents, the residents are issued with telephone numbers for both, which include out of hours emergency response. After two years, Macar Aftersales contacts are normally replaced by members of the Management Company. Therefore, the residents can contact them or the Managing Agents, which then remains through the life of the development.

The Freeholders

Handover to the Freeholders coincides with completion and sale of each respective residential unit. At handover the Freeholders will receive as built information together with (where applicable) operating and maintenance manuals which detail all maintenance protocols.

Foul Water Drainage, inc Pump Station (by Management Company)

The Management Company will be responsible for maintaining those private sewers that reside outside of a Freeholder's individual responsibility.

Annually

- Select approx. 20% of the development's foul water inspection chambers (situated in accessible non-freehold areas) and inspect for blockages. If found, remove blockages via rodding or jetting. Rotate on a 5 yearly cycle to cover all such chambers over this period.

Every 2-5 years (depending on outcome of aforementioned inspections)

- Commission a CCTV survey and report on condition of the foul water piped drainage to check for structural integrity and hydraulic fluidity. Carry out promptly any remedial work as advised by CCTV company.

Upon handover of the site to the Management Company, the highest possible level of Service and Maintenance Agreement with the supplier of the pumping station, will be entered into. This servicing package provides for 4no visits a year and increases the standard warranty from 1 year to 2 years.

Events such as pump trip or pump failure will be alerted directly to the pump supplier by the provision of a telemetry system. The system provides redundancy for a minimum of 24 hours, whereas callouts are responded to typically in less than 8 hours.

With regards to expected lifespan of the pumping station as long as the regular servicing as noted above is carried out the pump should have a minimum lifespan of 15 years.

All residents will make contributions to the management company on the site, which will secure the future management and maintenance of the services for the site. This will include for servicing, repair and replacement of the pumping station.

Surface Water drainage (by Management Company)

The Management Company will be responsible for maintaining those private sewers that reside outside of a Freeholder's individual responsibility.

The following measures are to be undertaken to ensure the longevity of the surface water drainage system;

Every 6 months

- Remove silt build up from **all** catchpits and manholes. Items to be observed and cleared are high levels of grit, leaves and other such detritus. The main aim of these inspections will be to prevent siltation, which, if allowed to develop will reduce the effectiveness of the system.

Annually

- Select approx. 20% of the development's surface water inspection chambers (situated in accessible non-private areas) and inspect for blockages / silt build up. Remove silt and debris. Rotate on a 5 yearly cycle to cover all such chambers over this period.

Every 2-5 years (depending on outcome of aforementioned inspections)

- Commission a CCTV survey and report on condition of the surface water piped drainage system upstream of the infiltration pond to check for structural integrity and hydraulic fluidity. Carry out promptly any remedial work as advised by CCTV company.

Permeable Paving (by Management Company)

Where suitable, some private shared and individual drives are to be constructed of permeable block paving. This approach serves to;

- a) Delay the surface water runoff from these areas, into the ground below, and
- b) Enhance the quality of the rainwater percolating through the granular subbase before discharging into a sewer and any downstream receptor.

The Freeholders (individual drives) and Management Company (shared drives and roads) will ensure that the following measures are undertaken to ensure the longevity of the pervious pavement;

Quarterly

- i) Inspect the pervious pavement for signs of ponding and ensure there is no migration of soils from adjacent landscaped areas or other deleterious material that may prematurely clog up the jointing stone situated in the gaps between the blocks. Ideally this type of inspection should be undertaken immediately following a heavy rainfall event.
- ii) Commission vacuum sweeping and brushing of the pervious pavement to ensure joints are kept free of silt. Minimum 3 sweeping per year, thus;
 - a) End of Winter (April) – to collect winter debris
 - b) Mid-Summer (July/August) – to collect dust, flower and grass-type deposits.
 - c) After Autumn leaf fall (November)

The company commissioned to carry out this work should ensure that their vacuum equipment is adjusted accordingly to avoid removal of jointing material. Any lost material should be replaced promptly to avoid the blocks from being dislodged.

Last Resort Remedial Action

- Should a portion of the pervious pavement become substantially impervious due to excessive siltation, the following procedure should be followed;
 - a) Lift block paving and laying course
 - b) Break out underlying bitmac base layer and replace with similar compacted depth of course aggregate subbase material to BS EN 13242:2002 Type 4/20, wrapped in geotextile as Terram 1000 or similar.
 - c) Renew laying course, replace blocks and renew jointing material

NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Cellular storage tank (by Management Company)

The principle means of surface water attenuation/disposal from the development is by way of cellular soakaways storage.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Inspections to identify any areas not operating correctly, pollution, blocked inlets or outlets, standing water etc.

Collect and remove from site all extraneous rubbish that is detrimental to the operation or detract from the appearance of the site, including paper, bottles, cans and similar debris.

Control Chamber (by Management Company)

A system of regular inspections should be established, initially these inspections should be carried out in October and March, however, this may be modified to suit observations over time. Items to be observed and cleared are high levels of grit, leaves and other such detritus. The main aim of these inspections will be to prevent siltation of the system, which, if allowed to develop may reduce the effectiveness of the system by clogging the soakage medium.

All inlets into the chamber and the well head should be checked to ensure unimpeded flow, with the emphasis being on the removal of any silt/detritus build up within the chamber.

Headwalls (by Management Company)

The following measures are to be undertaken to ensure the longevity of the surface water drainage system;

Initially the headwalls shall be inspected on a monthly basis. All extraneous material such as litter and rubble be removed and cleared. After this initial three months the Headwalls themselves are to be checked for structural integrity on a six monthly inspection and any issues made good as per the original design drawings. Ensure water flows freely by removal of vegetation and siltation as necessary.

Ordinary ordinary watercourse maintenance under riparian responsibility (by Management Company)

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the ordinary ordinary watercourse system;

Regular maintenance

Monthly or as required

- i) Remove litter (including leaf litter) and debris.
- ii) Cut grass- to retain grass height within specified design range.
- iii) Manage other vegetation and remove nuisance plants
- iv) Inspect inlets, outlets and overflow for blockages and clear if required.

Occasional maintenance as required

- i) Remove or control tree roots where they are encroaching the ordinary ordinary watercourse.

5 years or as required

- i) In the event of complete blockage, excavate and remove build-up of sediment. Re-level uneven surfaces and reinstate ordinary ordinary watercourse to the design levels.

Appendix D

SURFACE WATER MANAGEMENT PLAN (SWMP)



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SURFACE WATER MANAGEMENT PLAN (SWMP)

SURFACE WATER MANAGEMENT PLAN (SWMP)
LAND SOUTH OF ST STEPHEN'S CHURCH, HAMSLAND, HORSTED KEYNES, WEST SUSSEX
ON BEHALF OF MACAR HOMES
JANUARY 2026
IDL/1334/DS/010



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SURFACE WATER MANAGEMENT PLAN (SWMP)

IDL/1334/DS/010

REPORT ISSUE

Revision	Date	Notes
P01	14/01/2026	Preliminary Issue

PREPARED BY

Brijesh Mistry Infrastructure Engineer	January 2026
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REVIEWED BY

Phil Tomes Director	January 2026
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1 INTRODUCTION

- 1.1 Infrastructure Design Ltd has been appointed to prepare this report in order to support their planning application for their proposed residential development site.
- 1.2 This report aims to demonstrate the proposed measures for temporary drainage on site and the exceedance flow management.
- 1.3 This report should be read with the Flood Risk Assessment and Drainage Strategy report C86274-JNP-XX-XX-RP-C-1000 dated November 2020, prepared by JNP Group Consulting Engineers, and IDL drainage plans and calculations.

2 LOCATION OF SITE

- 2.1 The site is located in Land South of St Stephen's Church, Hamsland, Horsted Keynes, West Sussex. The National Grid Reference for the site is TQ 38423 27862, and the nearest postcode is RH17 7DX.

Figure 1 – Site Location Plan



3 PROPOSAL OF THE SWMP

- 3.1 The SWMP will ensure that during the construction phase, any surface water runoff leaving the development site is sufficiently treated as to be acceptable for disposal into controlled waters.
- 3.2 This will be achieved by:
- Identifying potential entry and collection points of surface water runoff onto or within site.
 - The implementation of specific measures for capture of this surface water runoff.
 - Final treatment of surface water runoff, within the development site boundary, prior to being discharged off-site.
 - Implementation of Emergency Measures/ Arrangements.
- 3.3 Additionally, the plan will identify the requirements to ensure that any implemented measures are adequate and effective. This will be achieved/supported through monitoring, maintenance, sample collections and other means.
- 3.4 Records are to be kept and will form part of the site handover documentation.
- 3.5 The plan will identify the responsible parties for each management item and the frequency of any actions to be undertaken.
- 3.6 The plan will be reviewed at appropriate frequencies, dependent on risk and impact.

4 DRAINAGE STRATEGY

Permanent Phase Plan

- 4.1 The IDL prepared a detailed drainage strategy for the proposed residential development.
- 4.2 The philosophy and calculations for the permanent situation have been defined in the IDL Foul & Surface water drainage strategy plan and calculations.

Potential Water Sources

- 4.3 Topographically, the site falls towards the south corner of the site.
- 4.4 The potential overland flow of water going towards the south into the ordinary watercourse and adjacent properties must be protected during construction and regularly inspected for siltation and pollutants.

Discharge Points

- 4.1 The discharge from the cellular storage/Porous paving for 30 dwellings will be at a controlled rate into the watercourse via a hydrobrake control manhole to the surface water outfall pipes located at the south of the site, noted on the drainage plan.
- 4.2 Construction surface water runoff captured via the measures described in this SWMP will be treated and then discharged into the existing watercourse.

5 CAPTURE & TREATMENT

Capture through French Drains

- 5.1 The site compound area will be constructed to include collecting French drains, which will discharge to the surface water sewer system, cellular storage via catch pit manholes.

Capture through linear drainage channels with sump units and trapped gullies & cathpit manholes

- 5.2 The surface water runoff from the hardstanding areas will discharge to the drainage channels or trapped gullies, which will discharge into the cellular storage via catch pit manholes.
- 5.3 Catchpit manholes are installed to minimise debris entering the drainage system.

Treatment

- 5.4 The compound area and all proposed external paved and path areas are to be regularly brushed and cleaned.
- 5.5 The clean granular stone fill within the trenches of the French drains will provide initial treatment of the runoff from the compound areas.
- 5.6 The French drains discharge via conventional pipes into the cellular storage before discharging into the watercourse, providing a level of treatment.
- 5.7 All the road gullies are to have a permeable geotextile membrane placed under the grating or a place to capture silt runoff during construction.
- 5.8 The course aggregate subbase construction makeup will have a tarmac layer (without drilled holes) on top to avoid any surface water runoff going through the subbase during construction.

6 EXCEEDANCE MANAGEMENT

- 6.1 National SuDS standards, the Design and Construction Guidance 2020 and Sewers for Adoption recommend that the 1 in 30-year storm event is managed below ground with exceedance flows managed above ground.
- 6.2 Any runoff up to a 1 in 100-year storm event, including 40% climate change, will be attenuated within the curtilage of the site in the proposed drainage system, cellular storage and porous paving subbase.
- 6.3 The proposed layout, indicating management of exceedance flows, has been produced and included in the IDL drainage plan.
- 6.4 Emergency pumping will be undertaken in the unlikely event that areas are inundated with floodwater. The construction manager will be made aware of low points and will monitor these during excessive storm events. An emergency team will be appointed by contractors.

7 MONITORING

7.1 The monitoring and maintenance regime for the temporary and permanent drainage during construction is shown below:

Elements	Maintenance Action	Frequency	Responsible Party Manager
Trapped Gullies /drainage channels	Inspected, and cleaned of debris as necessary to prevent entry into the main drainage system.	Every two weeks, or at a greater frequency due to site conditions	Site Manager
Compound areas – French Drains	Inspected, and cleaned of debris as necessary to prevent entry into the main drainage system.	Every two weeks, or at a greater frequency due to site conditions	Site Manager
Catch pits	Inspected and cleaned of debris as necessary to prevent entry into the main drainage system	Every two weeks, or at a greater frequency due to site conditions	Site Manager
French drains	Surface stone to be inspected and cleaned of debris by removal and replacing of top 75mm of stone to ensure adequate infiltration	Following heavy rainfall	Site Manager
Subabse/attenuation pond	Inspected and cleaned of debris/ blockages, as necessary. The systems to be checked to ensure operating adequately	Every two weeks, or at a greater frequency due to site conditions. rainfall	Site Manager
Site entry and exit points	Inspected and cleaned of debris with road sweeper plant, as necessary	Daily	Site Manager
Testing/ analysis of samples	Suspended solids test, hydrocarbons, sample from watercourse	Before to set a baseline and then every 1 month, or at a greater frequency if required	Site Manager

Capture

7.2 The following incidents should be reported to Construction Management immediately:

- Breaches of measures to control flows (e.g. damage to French drains and crates etc.)
- Inadequacy of implemented measures to control flows (localised flooding, new sources of water flow, etc.)
- Changes of visual water quality through the outfalls
- Changes to suspended solids or hydrocarbons in sampled water analysis.

Review Frequencies

7.3 The SWMP, environmental objective, and any required actions must be reviewed periodically. The frequencies of each review are shown below:

Elements	Review Procedure	Frequency	Responsible Party
Surface Water Management Plan	A set procedure – minimum every two weeks and following/ during severe weather conditions	Every two weeks and following adverse weather.	Site Manager
Environmental objective	Silt/ slurry collection, also visual assessments, flow rate assessments	Every two weeks and following adverse weather.	Site Manager
Actions	System amendment if potential failures Identified.	Immediate	Site Manager

7.4 All the permanent drainage elements, such as manholes, drainage pipes, drainage channels, silt or catchpit pits, gullies and SuDS features such as subbase/cellular storage, should be inspected after construction is completed to ensure the reliability and functionality of the drainage system. A full CCTV survey and verification report should also be carried out as necessary to ensure it is constructed according to approved drawings. In all instances, inspection and cleaning should be carried out only by a specialist contractor. Refer to IDL drainage management and maintenance regime requirements for the permanent maintenance of the drainage system after handover to the management company.

Appendix E

MSDC DETAILED DRAINAGE DESIGN CHECKLIST (CONDITION DISCHARGE STAGE)

DETAILED DRAINAGE DESIGN CHECKLIST – CONDITION DISCHARGE STAGE

Checklist for Applicants and Agents (Aligned with Defra June 2025 National standards for sustainable drainage systems (SuDS) and CIRIA SuDS Manual C753) v2.0

issued 071125

PURPOSE OF THIS CHECKLIST

This checklist supports applicants, agents, and drainage engineers in preparing condition discharge submissions to Mid Sussex District Council (MSDC) for surface water and foul drainage schemes. It is intended to ensure all submissions are:

- Technically complete and policy compliant
- Aligned with the National standards for sustainable drainage systems (SuDS) (Defra, June 2025)
- Aligned with the CIRIA SuDS Manual (C753)
- Consistent with West Sussex LLFA Policy and EA Climate Change Guidance

All drainage strategies and condition discharge submissions must follow the MSDC Detailed Drainage Design Technical Summary. This technical summary sets out the specific local implementation of national policy and SuDS standards, and defines MSDC's minimum expectations for buildability, hydraulic performance, water quality treatment, biodiversity, and longterm maintenance.

This checklist should accompany all formal submissions to discharge drainage conditions. It is designed to reflect the minimum technical content expected by MSDC. Where requirements are not met or are only partially addressed, this must be clearly justified within the submission.

Applicants are strongly advised to read this Checklist and accompanying Detailed Drainage Design Technical Summary guidance in full before preparing condition discharge submissions. Early compliance with these requirements will reduce risk of re-submission or refusal.

GENERAL GUIDANCE FOR APPLICANTS

This checklist is intended to support the discharge of post-permission drainage conditions. It does not replace validation guidance at application stage but should be used where conditions state:

- *"No development shall commence until a detailed surface water drainage scheme..."*
- *"The development hereby permitted shall not be commenced until details of the disposal of foul and surface water..."*
- Or similar wording requiring drainage design to be agreed prior to construction.

All submissions must demonstrate compliance with relevant drainage standards and be tailored to the specifics of the site, its constraints, and the proposed development.

Surface Water

Surface water drainage strategies must show how runoff will be managed in a safe, sustainable, and policy-compliant manner. In line with the MSDC Detailed Drainage Design Technical Summary, designs should:

- Demonstrate compliance with the drainage hierarchy, with priority given to infiltration-based solutions
- Include hydraulic calculations based on the critical storm duration for the 1 in 30 and 1 in 100-year events, with appropriate climate change uplift applied to rainfall intensity in accordance with the latest Environment Agency guidance
- Apply flow and volume control measures using FEH rainfall data, avoiding use of outdated methods such as FSR
- Use the Simple Index Approach to assess and provide appropriate water quality treatment
- Maximise amenity and biodiversity through the use of above-ground, vegetated SuDS features where feasible
- Provide a detailed layout showing catchments, flow paths, SuDS components, levels, and exceedance routing
- Include a clear maintenance and management plan, including named responsible party and legal mechanism
- Avoid siting SuDS components (e.g. basins, permeable paving) within flood zones or mapped surface water risk areas unless resilience under flood conditions can be clearly demonstrated

Submissions must be realistic and buildable. MSDC will not accept assumptions or data that do not reflect current best practice.

Foul Water

Applicants must provide a fully detailed foul drainage strategy that ensures effective and lawful discharge of wastewater from the site. The strategy must:

- Prioritise connection to the public sewer wherever viable
- Include evidence from the sewerage undertaker confirming availability or constraints to connection
- Where non-mains systems are proposed, provide justification for infeasibility of a mains connection and demonstrate full compliance with the General Binding Rules or applicable EA permit requirements
- Where an existing non-mains foul system (e.g. septic tank) is to be retained, include documented evidence that the system complies with the current General Binding Rules and any required discharge consents
- If the existing system is non-compliant, submit design proposals for an upgrade or replacement as part of the condition discharge submission

Foul water designs must also be supported by detailed layout plans, flow calculations, and where applicable, pumping station specifications.

Application Stage Best Practice

Applicants who wish to avoid pre-commencement drainage conditions altogether are strongly encouraged to follow this checklist and the MSDC Detailed Drainage Design Technical Summary at planning application stage.

Providing full drainage details with the initial submission increases the likelihood that conditions can be avoided, and allows drainage issues to be resolved earlier in the design process. This proactive approach promotes confidence in the deliverability of the drainage strategy and minimises delays later in the planning process.

PART 1 – SURFACE WATER DRAINAGE DESIGN CHECKLIST

Requirement	Summary of Expectation	Summary	Reference (Drawing / Report Section)
<i>For all strategies</i>			
Greenfield runoff rate (Qbar)	<i>FEH method or similar approved; based on predevelopment catchment</i>	QBar rate of 3 l/s	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
On-site infiltration testing	<i>BRE365-compliant tests at SuDS location/depth; safety factor applied</i>	Refer to the approved FRA, the Geology section. The infiltration techniques are not viable for this scheme.	Refer to the approved FRA, the Geology section
Groundwater monitoring (if relevant)	<i>Demonstrates seasonal high water table is >1m below base</i>	Not relevant. Not using infiltration techniques here.	
Catchment and drainage areas	<i>Plans show areas drained and contributing catchments for each SuDS feature</i>	Yes	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Climate change allowances	<i>EA guidance applied to rainfall intensity</i>	1 in 100 years plus 40% climate change has been used.	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Urban creep allowance	<i>10% additional impermeable area unless justified</i>	10% Urban Creep used	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Design rainfall	<i>Latest FEH data; FSR not accepted without justification</i>	FEH 22 rainfall data have been used in the drainage calculations. Please note that the	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.

		approved scheme was based on FEH 2013.	
Cv value	<i>1.0 applied to all impermeable surfaces</i>	CV 1.0 applied despite the approved drainage calculation was used CV value of 0.75 for summer & 0.84 for winter	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Hydraulic calculations	<i>1 in 1, 1 in 30, 1 in 30 + CC, and 1 in 100 + CC critical storm durations; no flooding</i>	Yes	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Flow control structures	<i>Head-discharge curve, outlet sizing, orifice protection from blockage</i>	Yes, refer to drainage sheet 3 of 3	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
SuDS layout plan	<i>Full drainage layout with invert levels, cover levels, flow directions, and labels</i>	Yes	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Longitudinal and cross sections	<i>For basins, pipes, flow controls, below-ground structures</i>	Yes	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Exceedance flow routing	<i>Plans show how exceedance flows are managed/safely routed</i>	Yes The exceedance flood route has been produced.	
Finished floor levels	<i>FFLs at least 150mm above surrounding ground/exceedance routes</i>	Yes	Refer to the levels drawing
Water quality treatment	<i>Simple Index Approach; mitigation index $\geq$ hazard index</i>	Yes	Refer to the approved FRA, as explained in section 5.4, Table 5.2. We have also used the downstream defender prior to the control

			manhole. This will mitigate pollution.
Proprietary systems (if used)	<i>Certification, design basis, and O&M provided</i>	N/A	
SuDS details	<i>Type, size, function, inlet/outlet, invert and cover levels, safety features</i>	Yes	Refer to the drainage layout.
Maintenance plan	<i>Asset register and inspection/maintenance schedule; CIRIA Table 32.1 referenced</i>	Yes	
Maintenance party and mechanism	<i>Legal body named; landowner, management company or adoption route clear</i>	The on-site will be privately maintained.	Refer to the pre-commencement condition report for maintenance and management of the drainage/SuDS elements.
For infiltration based strategies N/A			
Soakaway or infiltration design <24h	<i>Sizing for 6-hour 1 in 100 +CC storm; half-drain time</i>		
For strategies which discharge to the watercourse			
Discharge to watercourse	<i>Restricted to Qbar; outfall location and construction details provided</i>	Yes, Greenfield runoff rate of QBar applied.	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
Attenuation sizing	<i>Demonstrates storage for 1 in 100 +CC event without flooding</i>	Yes	Refer to the pre-commencement condition report, drainage calculations, and the drainage plans.
For strategies which discharge to sewer N/A			
Discharge to sewer	<i>Qbar max unless sewerage undertaker agrees higher rate</i>		N/A
Sewer connection approval	<i>Undertaker correspondence confirming acceptability of rate and location; S106 not required</i>		N/A
Attenuation sizing	<i>Demonstrates storage for 1 in 100 +CC event without flooding</i>		N/A

PART 2 – FOUL WATER DRAINAGE DESIGN CHECKLIST

Requirement	Summary of Expectation	Summary	Reference (Drawing / Report Section)
For all strategies			
Foul drainage layout	<i>Inverts, pipe sizes, gradients, connection points</i>	Yes	Refer to the drainage plans.
System type	<i>Gravity or pumped; pump design and calculations if applicable</i>	Gravity	Refer to the drainage plans.
Peak flow rate	<i>Based on occupancy and discharge volume</i>		0.27 l/s (Refer to the capacity check letter from Southern Water) in the pre-commencement condition.

<i>For strategies which discharge to sewer</i>			
Public sewer connection	<i>Location confirmed; manhole ID and route to sewer</i>		(Refer to the capacity check letter from Southern Water) in the pre-commencement condition.
Undertaker correspondence	<i>Email or letter showing awareness of proposal and preliminary approval</i>		(Refer to the capacity check letter from Southern Water) in the pre-commencement condition.
<i>For strategies which discharge via non-mains foul system</i>			
Non-mains foul system	<i>Justification for use; compliance with General Binding Rules</i>		N/A
Drainage field infiltration	<i>BS6297-compliant infiltration test results provided</i>		N/A
EA Permit	<i>Submitted or confirmed not required (e.g. for discharge to water)</i>		N/A

Appendix F

FOUL SEWER CAPACITY CHECK ENQUIRY



Paul Gibson
Rydon Homes
Lux Ford Place
Lower Road
Forest Row
East Sussex
RH18 5HE

Your ref

Our ref

DSA000018809

Date

05 January 2023

Contact

Tel 0330 303 0119

Dear Mr Gibson,

Level 1 Capacity Check Enquiry: Land at Hamsland, Horstead Keynes, Haywards Heath, West Sussex, RH17 7DX.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of **0.27 l/s** for the above development at manhole reference TQ3827**4902**. Please note that no surface water flows (existing or proposed) can be accommodated within the existing foul sewerage system unless agreed by the Lead Local Flood Authority in consultation with Southern Water, after the hierarchy Part H3 of Building Regulations has been complied with.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Should it be necessary to contact us please quote our above reference number relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

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

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