AXIOM
STRUCTURES

FOUNTAIN HOUSE HOTEL, 116-118 CHURCH ROAD HAYES UB3 2LW
BELOW GROUND DRAINAGE AND SUDS STRATEGY NOTES

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Prepared by	AP= Andrzej Plocieniak MSc CEng MIStructE
Checked by	HC

Axiom Structures Limited
177 Southwark Bridge Road, London
SE1 0ED

Tel: 020 3637 2751
Email: office@axiom-structures.co.uk

1. INTRODUCTION

This report has been prepared to provide below ground drainage strategy for foul and surface water systems at the above referenced property to assist the planning application and the project development.

The proposed development at Fountain House Hotel is located within Borough of Hillington. The location of the site is presented in **Figure 1**.

Figure 1

The site is located in Flood Zone 1 and is not in an area identified as having critical drainage issues as explained in separate Basement Impact Assessment. The site is less than 1 hectare.

Proposed drainage strategy, SuDS systems, location of manholes, anti-flood control measures are also presented on the drainage strategy drawing 21144-ASL-SK-0600 & SK-DR- included in **Appendix A**.

Existing Development:

The existing development includes the existing hotel which was converted from a school house back in 1930s. The building was also extended back in the 20th century with rear and link extensions as detailed in Architects planning reports.

The existing site layout is enclosed in **Appendix A**.

Proposed Development

The proposed scheme involves complete refurbishment of the hotel to provide modern facilities and living standards, and construction of an additional building with a basement. The development will also involve improvement to external areas and landscaping. There is no change of use of the building.

Response to Planning Condition

In addition to detailed drainage proposal, the report addresses the Planning Condition 15.
The responses are summarised in the table below and references given to the relevant sections of the report.

Planning requirement (Condition 5)	Response / Report Section
Prior to the construction of the herby approved basement, a scheme for the provision of sustainable water management shall be submitted to, and approved in writing by the Local Planning Authority. The scheme shall clearly demonstrate how the approved development will incorporate sustainable urban drainage (SuDs) in accordance with the hierarchy set out in Policy 5.13 of the London Plan and will:	The proposal aims to reduce run-off as much as possible with existing and new roofs and paving connected to the attenuation storage before discharging to Surface Water Sewer. The area of soft landscaping and permeable paving are introduced. Refer to Section 4 and Appendix A & B of the report for details
i. provide information on all SuDs features including the method employed to delay and control the surface water discharged from the site and:	Attenuation tank with flow control system has been introduced as per Section 4 and drawings in appendix A
ii. provide a management and maintenance plan for the lifetime of the development of arrangements to secure the operation of the scheme throughout its lifetime. Including appropriate details of Inspection regimes, appropriate performance specification.	Refer to Clause 6 for maintenance regime
The scheme shall also demonstrate the use of methods to minimise the use of potable water through water collection, reuse and recycling and will: iii. provide details of water collection facilities to capture excess rainwater; and how water usage will be reduced in the development. *Thereafter the development shall be implemented and retained/maintained in accordance with these details for as long as the development remains in existence.*	When considering rainwater re-use from a sustainability perspective (NPPF principles environmental, social and economic) this basically translates as an order of priorities; reduce, reuse, recycle. Therefore, it makes much more sense to use less water (by using water efficient appliances) than it does to install a RWH system. Treatment systems which involve filters and possibly UV have a high embodied energy and perform poorly in terms of their Life Cycle Analysis. In addition typical quoted lifespans for most RWH systems is approximately 10 years, prior to significant repairs being required and a potentially inefficient system. Whilst the principles of RWH is endorsed, at this time for this development it is not considered to be the most environmentally friendly and due to the additional complex drainage installation requirements it is considered that this does not offset the limited quantum of water it removes from the surface water drainage system. Therefore it would fail to meet the social, environmental and economic tests of the NPPF.

2. EXISTING BELOW GROUND DRAINAGE SYSTEMS

Following review of Thames Water Assets, detailed CCTV survey of existing drains and walk over surveys, the below ground drainage is as follows:

Foul Water system is a separate system and discharges in gravity to Thames Water foul water sewer via two sewer connections. CCTV survey identified a number of defects and insufficient falls in the existing drains system; the drains will be replaced or altered to suit the latest standards.

Surface Water system, as summarised on SK-DR-020, discharges from the building roofs and some pavement areas to the existing soakaways. As noted in CCTV survey, the soakaways are blocked and located very close to the existing buildings (1.0m or so) which does not comply with the current Building Regulations and put the buildings at risk of subsidence. Some rainwater downpipes are also connected to the foul water system.

The hardstanding pavement areas to the side and rear of the site seem not to have obvious surface water discharge strategy. Most likely any heavy rainwater goes uncontrolled to the road or some gullies located adjacent to the existing buildings.

The front garden is partially paved or/and covered with soft landscaping, in this case the surface water discharges at source.

3. PROPOSED FOUL WATER DRAINAGE STRATEGY

In similar manner to the existing condition, foul water system will be a gravity system and existing sewer connections are to be reused.

The existing system will be altered where necessary to connect new drain runs. The existing main runs, identified with inadequate falls, will be replaced and re-laid to meet regulations.

The foul water from a new basement to be pumped up to the foul water manhole as noted on drainage layout.

The overall system will be improved with introduction of non-return vales to reduce risk of sewer flooding.

Refer to CCTV survey for required repair.

Design Strategy Notes

The design of the foul water drainage has been undertaken in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings, BS EN 12056.

The foul flow rates were calculated based on the water consumption method in accordance with Flow Loads by British Water and Urban Drainage by Butler & Davies. Thames Water has also been engaged with regard to the foul water rates.

The proposed foul water flow rate of the Development was calculated to be 0.8 l/s (daily peak flow) based on the number of hotel rooms (38 rooms, assuming 2 people in the room) in the development.

The foul water connection will be made to the public sewer system through a Section 106 Agreement with Thames Water under the Water Industry Act 1991 using existing foul water connections.

4. SURFACE WATER DRAINAGE OUTLINE STRATEGY

Refer to SK-DR-021 for surface water strategy notes and DR-600 for drainage plans.

The surface water from downpipes (all roofs) will be gravity drained to the new surface water drainage system and directed to attenuation tank and flow control before entering Thames Water surface water sewer. A new sewer connection is required to the sewer as non was found during CCTV surveys.

The existing hard finishes and landscaping from front and side gardens/ hard-standing to be removed and new permeable finishes introduced. In this area, the surface of the garden will generally be permeable to allow surface-water to discharge directly into the ground and to improve biodiversity. Impermeable membrane to be placed along the existing buildings to protect foundations in case of any water build-up under the surface. In addition, land drains will be placed as a secondary protection measure.

Where hard-landscaping is retained such as over the basement and in the car park / refuse area, a series of discharge channels are proposed to ensure that surface water will retain on site and will not flood the highway. The channels will be connected via perforated pipes to the attenuation tank.

The soils are permeable in the area. Sands and Gravels were noted in the trial pits and boreholes. The groundwater level is well below finished floor level (at least 6m below garden level) so there is no risk of flooding from this source.

Design Strategy Notes

The surface water sewer system for the residential development has been designed to convey surface water only with foul water being discharged separately. Sewers will be designed to comply with BS EN 752 and Building Regulations Part H.

A Pre-Development Enquiry will be submitted to Thames Water to confirm acceptable discharge rainwater flow rates into the sewer.

The surface water drainage has been designed using the Microdrainage Source control to estimate conservative attenuation required and can be accommodated both in the attenuation tank and permeable paving. The calculations are based on areas noted on SK-DR-020 & 021 (see Appendix B) Source control calculation are also provided in Appendix B.

Greenfield run-off as indicated [total area size = 1100m2] in the requirement of 8 l/s/ha equates to 0.46 l/s. This flow rate will not be possible to accommodate through any flow control structure as it would lead to blockage, flooding and continued maintenance. Based on flow control measures available which would reduce the possibility of blockage, a hydrobrake with an allowable flow rate of 2 l/s has been used.

The volume of attenuation accounts for an increase in rainfall of 40% due to climate change over the lifetime of the Development and the risk to the development. The required volume is 77 cubic metres including the volume to be accommodated from the pumped discharge from the lightwell is located in the geo-cellular attenuation tank and voided sub base of the permeable paving. Discharge from the permeable paving will be controlled using orifice and discharge to the sewer via the attenuation tank.

Surface Water from the Lower Ground Floor light well and cavity drainage will be pumped to the higher level to protect these areas against surcharge from the attenuation tank. Pumping station will be duty/standby and have a rating of 2 l/s, therefore pumping for 1-minute for each pump cycle requiring attenuation of 120 litres each time. Attenuation tank is present to provide the volume requirement.

5. SUDS COMMENT AND STRATEGY

One the most effective means of reducing surface water flows and run-off is to control the rainfall at source with the use of increased soft landscaping, green roofs, permeable paving.

The existing decking/ paving is to be removed and soft landscaping and perimeter planters introduced as noted on Landscape Architects Proposals. The above will improve biodiversity and a natural habitat.

The main roof of the property will remain as it and new roofs are pitched to suit planning requirements so the opportunity to introduce green roof is extremely limited. Due to limited external area and site constraints the attenuation tank has been recommended to assist in limiting flow rates before discharging via new connection to Thames Water surface water sewer.

Any new drainage should be designed in accordance with the Building Regulations to allow for easy access for maintenance and blockage clearance.

5.1 SuDS Hierarchy

In line with Building Regulations, the London Plan and the National Standards for Sustainable Drainage Systems, the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference:

- Discharge to ground;
- Discharge to a surface water body;
- Discharge to a surface water sewer; and
- Discharge to a combined sewer.

Discharge to Ground

The most effective way to reduce surface water runoff is through infiltration into the subsoil which reduces the total volume of runoff, rather than simply reducing peak flows. This can include features such as infiltration trenches, soakaways, infiltration basins, and permeable paving.

Preliminary review of site-specific site investigation indicate that the site lies within gravel and therefore soakaway is possible. However, the garden is surrounded by existing buildings and therefore the requirement to be 5m away from building foundation and trees in accordance to Building Regulations is not satisfied and therefore the soakways are not possible.

Discharge to a Surface Water Body

There is no watercourse in close proximity of the development and therefore discharging directly to a surface water body is not a viable option for the Development.

Discharge to a Surface Water Sewer

There is surface water sewer in close proximity of the proposed development and **it is proposed to discharge rainwater to surface water sewer via attenuation tank, permeable paving with voided sub base and flow control**.

Discharge to a Combined Water Sewer

Thames Water Asset plans and CCTV drainage survey indicated that drainage systems are separate for foul and separate for surface water.

5.2 Sustainable Drainage Systems

The implementation of sustainable water management through SuDS is becoming more common in an effort to use and manage water sustainably.

The philosophy of SuDS is to mimic the natural drainage patterns of the land prior to development as closely as possible and treat runoff to remove pollutants. The use of vegetative features to treat pollution and reduce flow rates provides the opportunity to enhance the landscape and provide wildlife habitat.

Due to the urbanised nature of this site, it is unlikely that swales and ponds will be suitable method. As such, the only form of SuDS being provided at the site is increased soft landscaping, permeable surfaces and an addition of attenuation tank under the front garden. By providing attenuation, this will reduce the discharge of surface water to public sewer.

5.3 Soft landscaping

Due to the presence of adjacent buildings and proposed basement, infiltration for roof water is not possible for the development. However localised infiltration from footpath and soft landscaping for the garden area is being provided. Soft landscaping would provide water quality benefits, in addition to attenuating the flows and would provide passive irrigation for proposed planting.

5.4 Underground Attenuation

Cellular crates attenuation units are to be placed under the front garden to provide storage before discharge. The attenuation tanks have been sized to ensure flooding does not occur for the 1 in 100 year event with an allowance of 40% climate change.

6. SUSTAINABLE DRAINAGE SYSTEMS MAINTENANCE PLAN

The Planning Practice SuDS Guidance sets requirement for out the developers to consider the operation, management and maintenance of all SuDS.

Maintenance Plan for Underground Attenuation

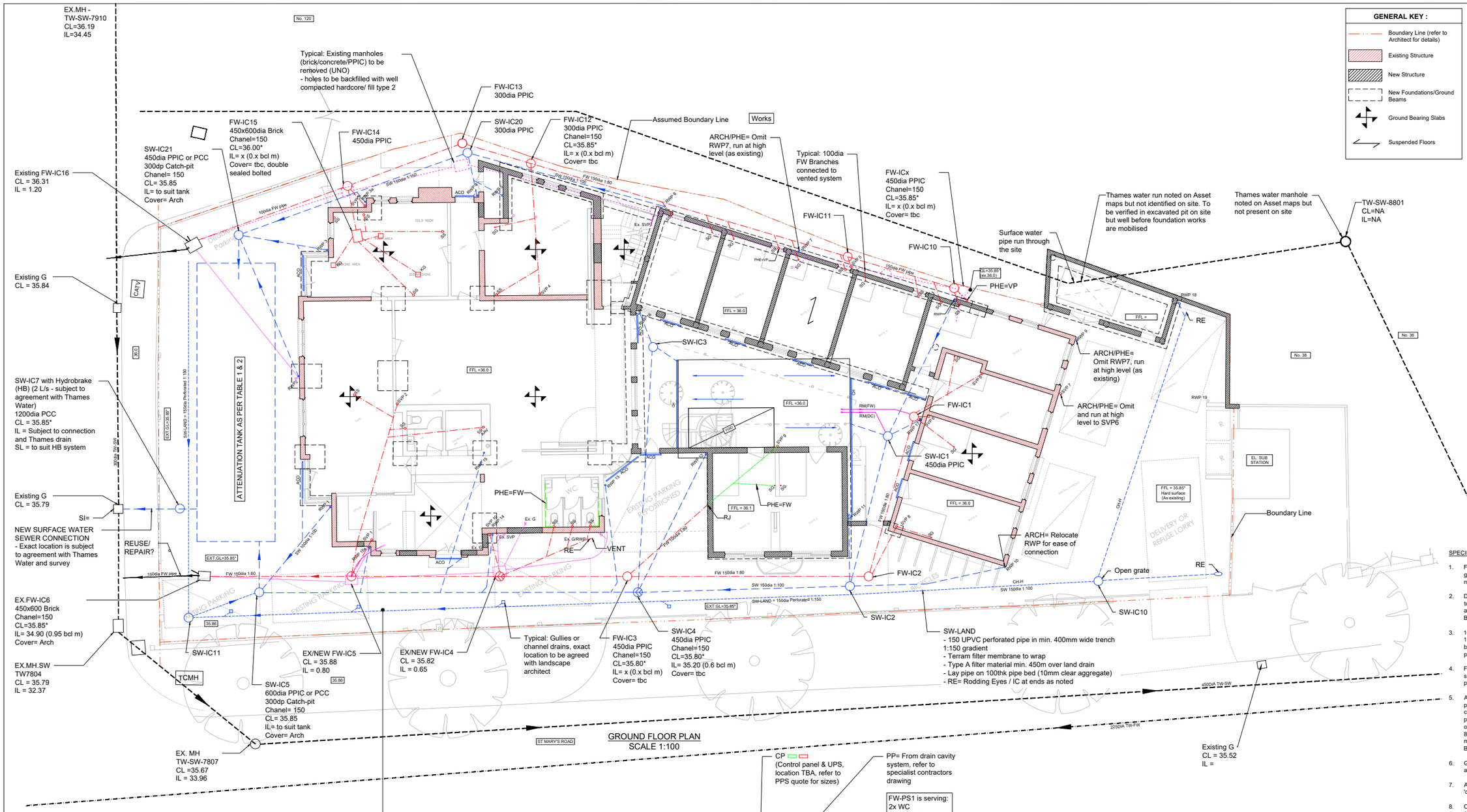
Underground Attenuation	
Task	**Frequency**
Inspection of catch pits, manholes and pipework, and remove any sediment/debris	Quarterly or as required
Jetting of attenuation tank to remove sediment build up	Annually or as required

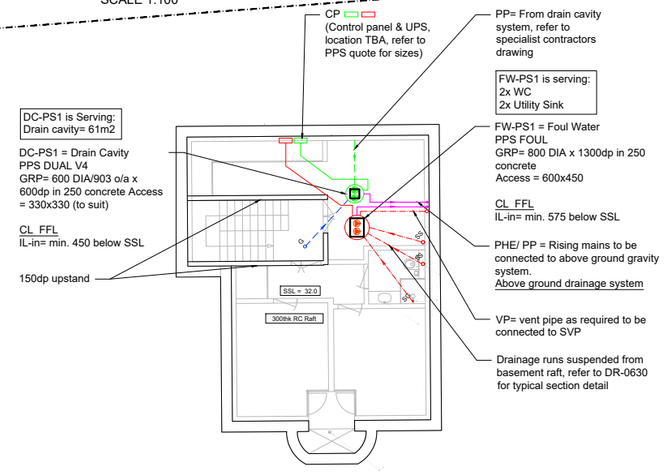
Maintenance Plan for Permeable Paving (where required)

Permeable Paving	
Task	**Frequency**
Inspect system for surface water ponding, debris/blockages and potential pollutants	Quarterly or As required
Brush and remove dirt from all hard surfaces	Monthly
Brush and vacuum to prevent silt blockages	Annually
Monitor for ponding or reduced effectiveness, may require reinstatement of the top layers or specialist cleaning	Quarterly or As required

APPENDIX A

DRAINAGE LAYOUTS AND SYSTEM DETAILS





BASEMENT PLAN
SCALE 1:100

GENERAL KEY :

- Boundary Line (refer to Architect for details)
- Existing Structure
- New Structure
- New Foundations/Ground Beams
- Ground Bearing Slabs
- Suspended Floors

NOTES:

1. If in doubt please ask.
2. Do not scale this drawing.
3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications. Any discrepancy is to be reported to the engineer immediately.
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5. All materials and workmanship are to comply with the relevant current British Standards.

DRAINAGE NOTES

NOTATION KEY

MH: MANHOLE
SIC: SHALLOW INSPECTION CHAMBER
SVP: SOIL AND VENT PIPE
RWP: RAIN WATER PIPE
SS: STUB STACK
YG: YARD GULLY (ANTI-FLOOD)
FG: FLOOR GULLY
SG: SHOWER GULLY
BD: BACK DROP
CL: COVER LEVEL
IL: INVERT LEVEL
RM: RISING MAINS (WITH ANTI-FLOOD LOOP) TO SPECIALISTS / PHE DETAILS
CH: CHANNEL DRAIN
SW: SURFACE WATER
FW: FOUL WATER
PS: PUMPING STATION (BY CONTRACTOR)
SfA7: SEWERS FOR ADOPTION 7th EDITION
PHE: PUBLIC HEALTH ENGINEER (ABOVE GROUND DRAINAGE DESIGNER)

- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING DRAINS AS PER CCTV
- DRAIN CAVITY TO CONTRACTORS DESIGN AND DETAILS SHOWN INDICATIVELY
- FOUL WATER PIPE RUN (FW)
- FOUL WATER MANHOLE OR INSPECTION CHAMBER (IC)
- SURFACE WATER PIPE RUN (SW)
- SURFACE WATER LAND
- SURFACE/FOUL WATER RISING MAIN
- SURFACE WATER MANHOLE OR CHAMBER (IC)
- SURFACE/ FOUL/ DRAIN CAVITY WATER SUMP PUMP CHAMBER

SPECIFICATION NOTES

1. Foul drains are to be 100mm nominal diameter laid at a gradient not flatter than 1:80 (1:40 IF NO WC). Where 150mm nominal diameter is specified then to be laid to 1:150 U.N.O.
2. Drains are to be constructed using UPVC or vitrified clay pipes to BS 65 with flexible joints bedded and backfilled in accordance with the manufacturers recommendations and/or BS 8301 of cast iron to BS 4660.
3. 100mm rigid pipes with less than 300mm cover or pipes of 150mm or greater diameter with less than 600mm cover are to be surrounded by 150mm of concrete with movement joints provided at every pipe joint.
4. Flexible pipes with less than 600mm cover are to be surrounded with concrete or to have concrete paving slabs laid as bridging above the pipe.
5. Access to drain may provided by vitrified clay, GRP or polypropylene inspection chamber to BS 7158, or manhole constructed using class B engineering bricks to BS 3921, or precast concrete sections to BS 5911, surrounded with 150mm of concrete minimum dimension to conform to table 8 of BS 8301. Covers and frames for manholes/inspection chamber must comply with the appropriate loading grade of BS 497 or BS 5911 = refer to schedule
6. Gullies, SVPs and RWP`S should be provided with roddable access.
7. All pipes that connect to main run drainage manhole to be fixed 'crowns adjacent'
8. Concrete bedding & surrounded to be mix type GEN 1 to table 6 of BS 5328-PART 2 unless noted on details. If a different 'GEN' mix is specified it will be to the above table.
9. All RWP`s to connect into roddable gullies.
10. All drainage once completed is to be tested on site in the presence of the Building Control officer for the sign off.

TABLE 1:
ATTENUATION TANK DESIGN PARAMETERS:

CATCHMENTS: AS NOTED 21144-SK-DR-021 B1 Proposed BGD
1. To SW-IC = 592m2
- Roofs (via downpipes)
- Basement Lightwell (via pumping)
- Hardstanding (over basement) = 91m2

2. To SW-IC = 495m2
- Hardstanding - Existing car park =
- Hardstanding 2 - Re-covered car park - Permeable paving (at 30% voids)
- Hardstanding 3 / soft landscaping - front garden
- Landscaping 3 - remaining soft landscaping and localised hardstanding

SOIL= Clay/Made ground over (1.5m) over permeable Sands&Gravels

System designed for 1 in 100 year return storm with 40% for CC

TABLE 2: STORM WATER ATTENUATION TANK
CDP= PS= Geocellular Modular Units.
- Designed to accommodate surface water run-off, rainwater down pipes as per Table 1 and DSN-01.
- Catchments area - As per Table 1
- Capacity required = Provisionally allow for 60m3 (for 2l/s discharge) (subject to negotiation and approval with Thames Water)
- Allow for Geolight 400 by SDS or similar approved, size 0.75m thick x 15m x 4.5m (28.5m3 inc. 95% void) or equivalent
- Min. 0.5m cover (locally 0.45m) with granular material&finishes.
- To be installed in accordance with manufacturer guidance.
- Exact location to be agreed on site
- Accessories: Inspection chamber, ventilation=VP and raising pieces to suit levels
- Access covers and frames: As supplier and architects specification

PERMEABLE PAVING ATTENUATION

CATCHMENTS: AS NOTED 21144-SK-DR-021

Capacity required = 160m2 with 350mm thick 30% voided sub-base below paving and sand
Location: Exact locaation to be agreed on site, refer to SK-DR-021 for proposed location
System: refer to DR-D-0630 for typical sections and details, land drains as per notes on plan
Access covers and frames: As supplier and architects specification

CP
(Control panel & UPS, location TBA with architect, refer to PPS quote for sizes). Allow for cable ducts from pumps (refer to M&E for details)

ALL INSPECTION CHAMBERS TO BE 450DIA PPIC UNLESS NOTED OTHERWISE
REFER TO MANHOLE SCHEDULE FOR FURTHER DETAILS
- REFER TO DR-D-630 FOR TYPICAL DETAILS

ALL LEVELS SHOWN INDICATIVELY, REFER TO ARCHITECTS DRAWINGS FOR DETAILS.

EXACT SETTING OUT OF PUMPING STATIONS TO ARCHITECTS INFORMATION

CP = (CONTROL PANEL & UPS, LOCATION TBA WITH ARCHITECT, REFER TO PPS QUOTE FOR SIZES).
ALLOW FOR CABLE DUCTS FROM PUMPS (REFER TO M&E FOR DETAILS)

PP = ALL PUMPING STATIONS AND RISING MAINS (INCLUDING CONNECTION TO EXISTING SYSTEM) TO SPECIALIST'S CONTRACTORS DESIGN AND DETAILS

PP = ALLOW FOR BATTERY BACKED UP REMOTE ALARMS AND CONTROLS TO WARN OF PUMP FAILURE TO CONTRACTORS PROPOSALS. FINAL LOCATION AS PER ARCHITECTS AND MEP DRAWINGS

Rev	Date	Amendments	By	Chk'd
B1	02.09.2022	Issued for Building Control	SW	AP

BUILDING CONTROL

AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
FOUNTAIN HOTEL, UB3 2LW, HAYES

Drawing title:
DRAINAGE LAYOUT ON GROUND FLOOR

Date:	Scale at A1:	Scale at A3:
09/2022	1:100	-
Drawn by: MD	Designed by: AP	Chk'd by: AP

Drawing No: **21144-ASL-DR-D-0600** Revision: 10 B1

NOTES:

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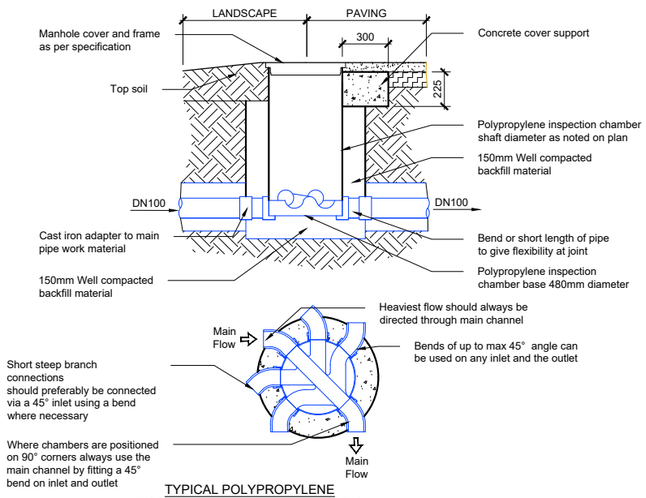

TYPICAL POLYPROPYLENE INSPECTION CHAMBER DETAIL PPIC
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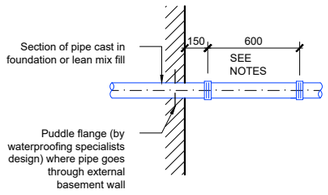

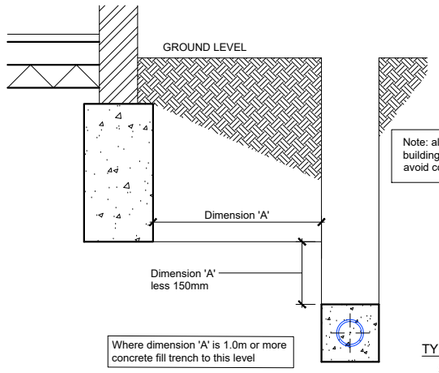

TYPICAL DETAIL OF PIPE RUNS ADJACENT TO BUILDINGS
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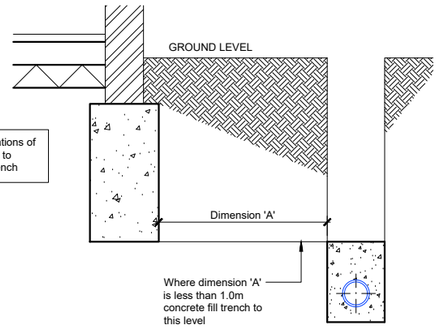
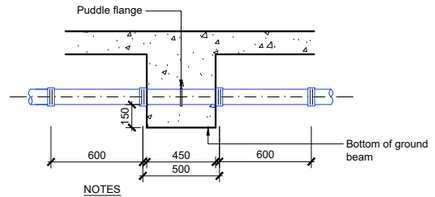
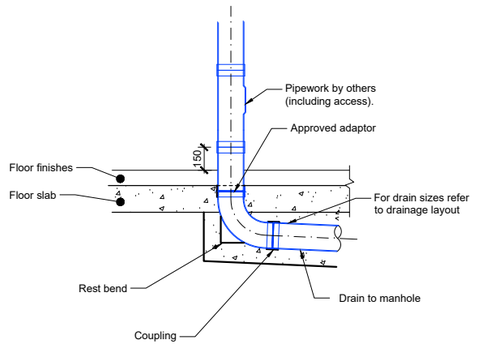




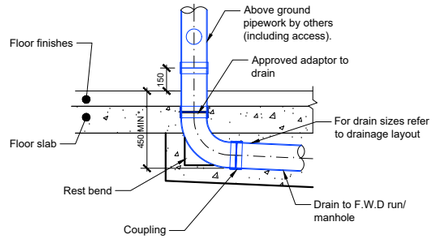
NOTES
Pipes up to and including 450DIA:
- 1st flexible joint to be 150mm from face of MH/structure
- 2nd Flexible joint to be 600mm from 1st flexible joint (rocker pipe)

For pipes above 450mm DIA
- Rocker pipe should be 1000mm long

TYPICAL DETAIL OF JOINTS WHERE PIPES CAST THROUGH RC GROUND BEAM
Scale 1:20



TYPICAL RAINWATER PIPE (RWP DETAIL)
Scale 1:20



SOIL VENT PIPE OR STUB STACK (SVP/SS) DETAIL
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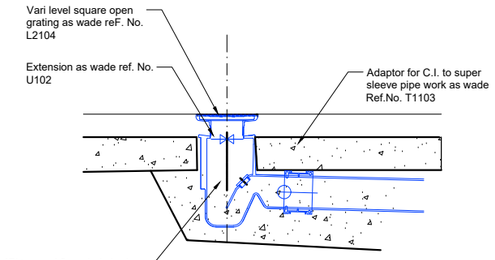
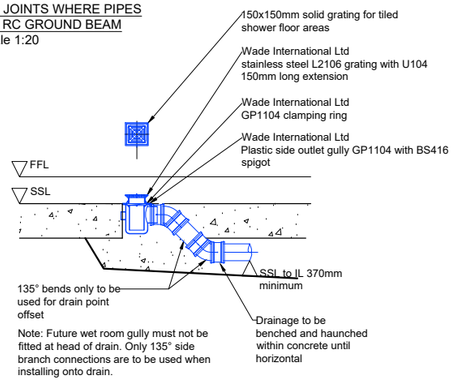
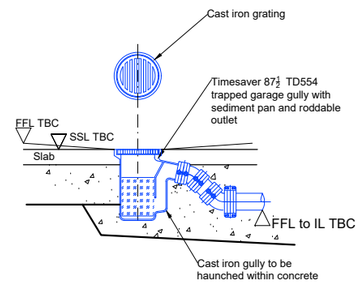


TYPICAL WADE TYPE FLOOR GULLY
Scale 1:20



FUTURE WET ROOM SHOWER GULLY TO 100Ø DRAIN POINT
Scale 1:20



REFUSE/BIKE STORE GULLY TO 100Ø DRAIN POINT
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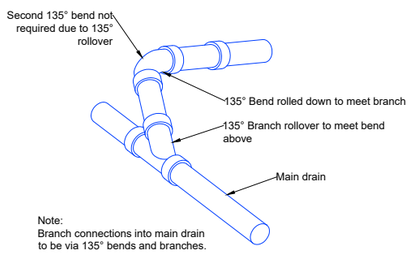
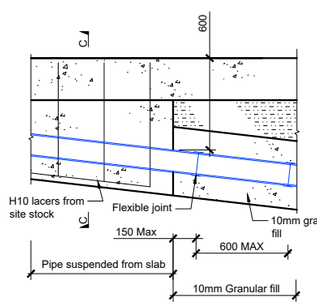
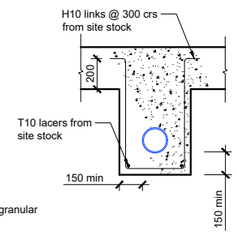


TYPICAL DETAIL OF ROLLOVER BRANCH CONNECTION
Scale 1:20



INTERNAL BEDDING DETAILS
Scale 1:20



SECTION C-C
Scale 1:20

Rev	Date	Amendments	By	Chk'd
B1	02.09.2022	Issued for Building Control	SW	AP

BUILDING CONTROL

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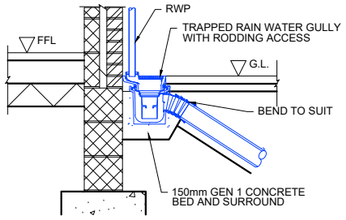
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
FOUNTAIN HOTEL, UB3 2LW, HAYES

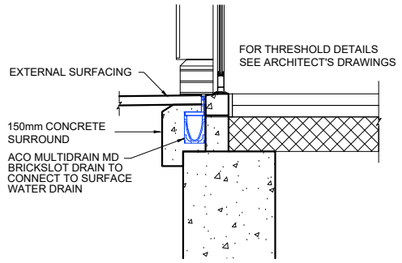
Drawing title:
TYPICAL DRAINAGE DETAILS

Date:	Scale at A1:	Scale at A3:
09/2022	As indicated	-
Drawn by: DS	Designed by: AP	Chk'd by: AP

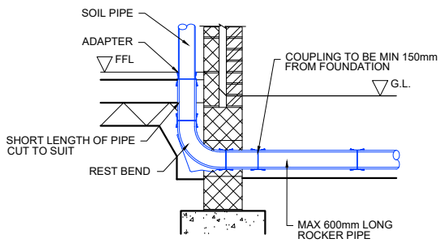
Drawing No: **21144-ASL-DR-D-0630** Revision: 11 B1



INLET GULLY RWP CONNECTOR
Scale 1:20



ACO BRICK SLOT DRAIN
Scale 1:20



SVP / SS CONNECTION
(THROUGH FOUNDATION)
Scale 1:20

NOTES:

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3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications. Any discrepancy is to be reported to the engineer immediately.
4. Do not scale from, this drawing, use figured dimensions only, do not take dimensions from electronic copies without reference to Axiom Structures in every instance
5. All materials and workmanship are to comply with the relevant current British Standards, and where required by the employer.

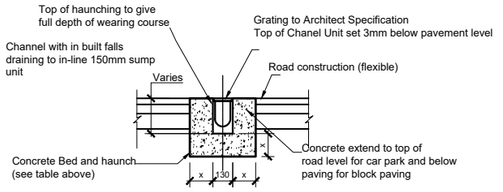
TYPE 3&4 CHAMBER TYPES, SIZES AND DEPTH				
MAX INVERT DEPTH (m)	0.6 – 2.01	0.6 – 2.01	1.2 – 3.02	1.2 – 3.02
BASE/SHAFT DIA (mm)	200	315	450	600
NO OF INLETS 1	4	4	3 – 4	3 – 4
SFA7 TYPE	Y	Y	Y	Y
1 TO 3	-	Y	Y	Y
4 TO 5	–	–	Y	–
INLET SIZES (mm)	110/160	110/160	110/160	150/225/300
MAX DEPTH(mm)	600	600	1200	3000
FOR DEPTH GREATER THAN 1200mm RESTRICT ACCESS TO 450mm DIAMETER				

LIMITS OF COVER FOR BELOW ROUND DRAINAGE (GUIDE ONLY)			
NOMINAL SIZE	LAID IN FIELDS	LAID IN LIGHT ROADS	LAID IN MAIN ROADS
THERMOPLASTIC PIPES			
100mm - 300mm	0.6m - 7m	0.9m - 7m	0.9m - 7m
CLAY PIPES			
100mm	0.6m - 8+m	1.2m - 8+m	1.2m - 8m
225mm	0.6m - 5m	1.2m - 5m	1.2m - 4.5m
400mm	0.6m - 4.5m	1.2m - 4.5m	1.2m - 4m
600mm	0.6m - 4.5	1.2m - 4.5m	1.2m - 4m
CONCRETE PIPES			
300mm	0.6m - 3m	1.2m - 3m	1.2m - 2.5m
450mm	0.6m - 3.5m	1.2m - 3.5m	1.2m - 2.5m
600mm	0.6m - 3.5m	1.2m - 3.5m	1.2m - 2.5m

1. Pipe depths based on Class 120 (Clay), Class M (Concrete), Class SN4 (Plastic) with Class B bedding factor = 1.9
2. Where pipe depths exceed or cover levels are less than those above, concrete surround (Class Z) or alternative pipe class may be required.
3. Alternative designs using different pipe strengths and.or bedding may be appropriate, refer to BS 1295
4. In bad ground conditions, where the migration of the pipe granular surround into the ground may occur or fines may be moved from the surround material into the bedding material causing a lack of support of the bedding, the surround shall be wrapped in geotextile membrane (see BS 9295:2010 Clouse A.13, Figures A.5 and A.6).
5. The above are a guide only refer to Building Regulations Part H and relevant BS EN Standards, for adoptable drainage refer to Sewers for Adoption 7th Ed

Alternative detail using Internal Adaptor retro - fitted in pipe finished flush with screed (waste pipes only)

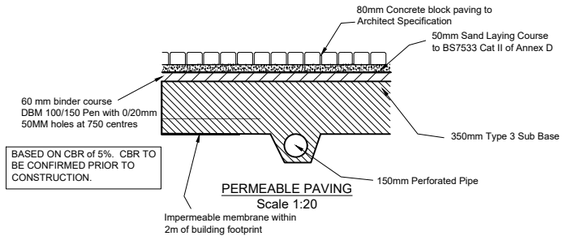
Class	Dimension 'X' (mm)	Concrete Grade (N/mm2)
A15	100	25
B125	125	25
C250	150	25
D400	200	30
E600	200	30
F900	200	35



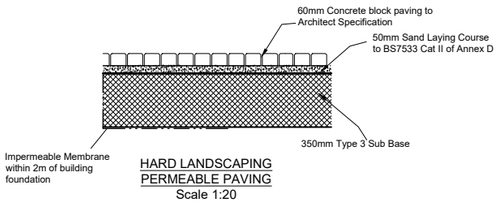
CHANNEL DRAIN DETAIL
(Flexible Carriageway Construction)
Scale 1:20

DRAIN CHANNEL NOTES:

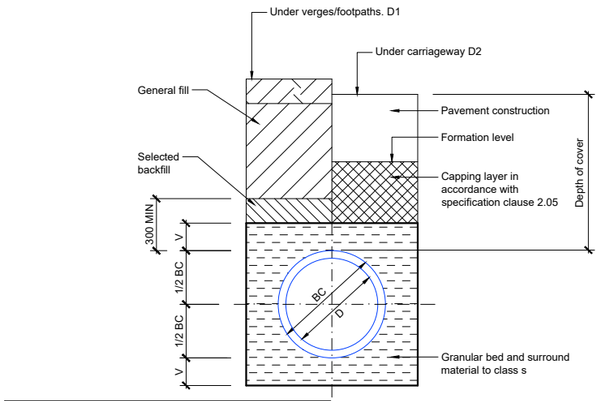
1.SURFACE CHANNEL SYSTEM TO COMPRISE MD100 RANGE CHANNEL AND REINFORCED GALVANISED STEEL FRAME AND GRATING BY ACO TECHNOLOGOIES OR SIMILAR APPROVED.
2. MD100 CHANNEL TO HAVE 0.6% IN-BUILT GRADIENT, WHERE REQUIRED.
3.SUMP UNITS AS MANUFACTURED BY ACO TECHNOLOGIES.
4.CHANNEL TO BE LAID IN ACCORDANCE TO MANUFACTURER'S INSTRUCTION.
5.DESIGN OF THE CHANNEL DRAINAGE SYSTEM AND SCHEDULE TO BE CARRIED OUT BY THE CONTRACTOR.
6.MINIMUM 3MM, MAXIMUM 5MM, OVERBUILD TO THE CHANNEL PERMITTED.
7.TO MAINTAIN FLEXIBILITY OF THE CHANNEL, JOINTS SHALL BE PROVIDED AT 6M CENTRES. JOINT DETAIL SHALL BE IN ACCORDANCE TO MANUFACTURER'S INSTRUCTION.
8.THE CONTRACTOR SHALL PROVIDE PROTECTION TO CHANNEL DURING CONSTRUCTION.



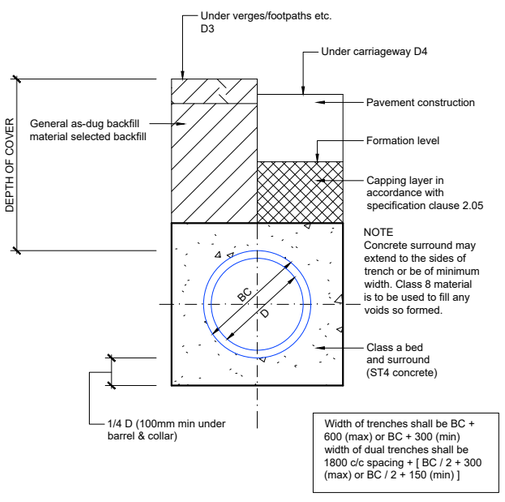
PERMEABLE PAVING
Scale 1:20



HARD LANDSCAPING
PERMEABLE PAVING
Scale 1:20



DESIGN D1 (UNDER VERGES/FOOTPATHS - >900 COVER)
DESIGN D2 (UNDER CARRIAGEWAYS - >1200 COVER)



DESIGN D3 (UNDER VERGES/FOOTPATHS - <900 COVER)
DESIGN D4 (UNDER CARRIAGEWAYS - <1200 COVER)

Rev	Date	Amendments	By	Chk'd
B1	02.09.2022	Issued for Building Control	SW	AP

BUILDING CONTROL

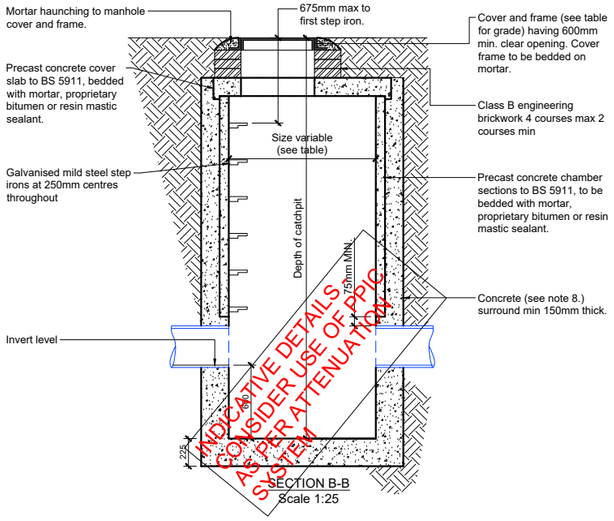
AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
FOUNDATION HOTEL, UB3 2LW, HAYES

Drawing title:
TYPICAL DRAINAGE DETAILS

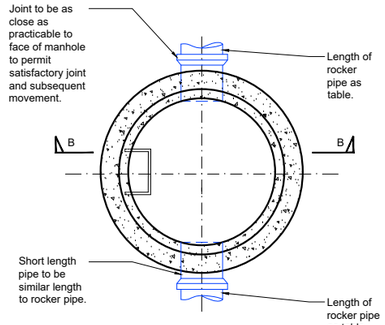
Date:	Scale at A1:	Scale at A3:
09/2022	As indicated	-
Drawn by: DS	Designed by: AP	Chk'd by: AP

Drawing No: **21144-ASL-DR-D-0631** 12 Revision: B1



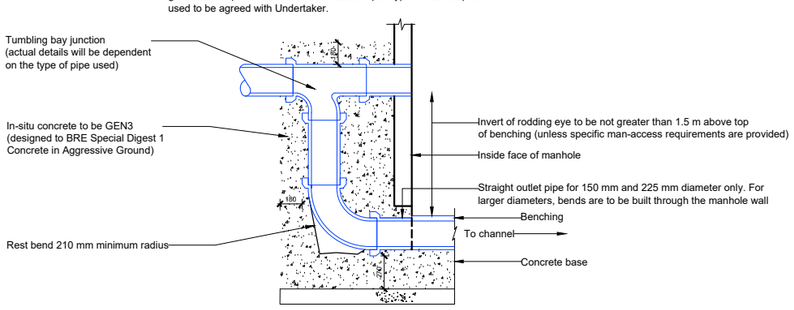
SECTION B-B
Scale 1:25

SURFACE WATER CATCHPIT DETAIL
WITH 600mm SUMP
Scale 1:25

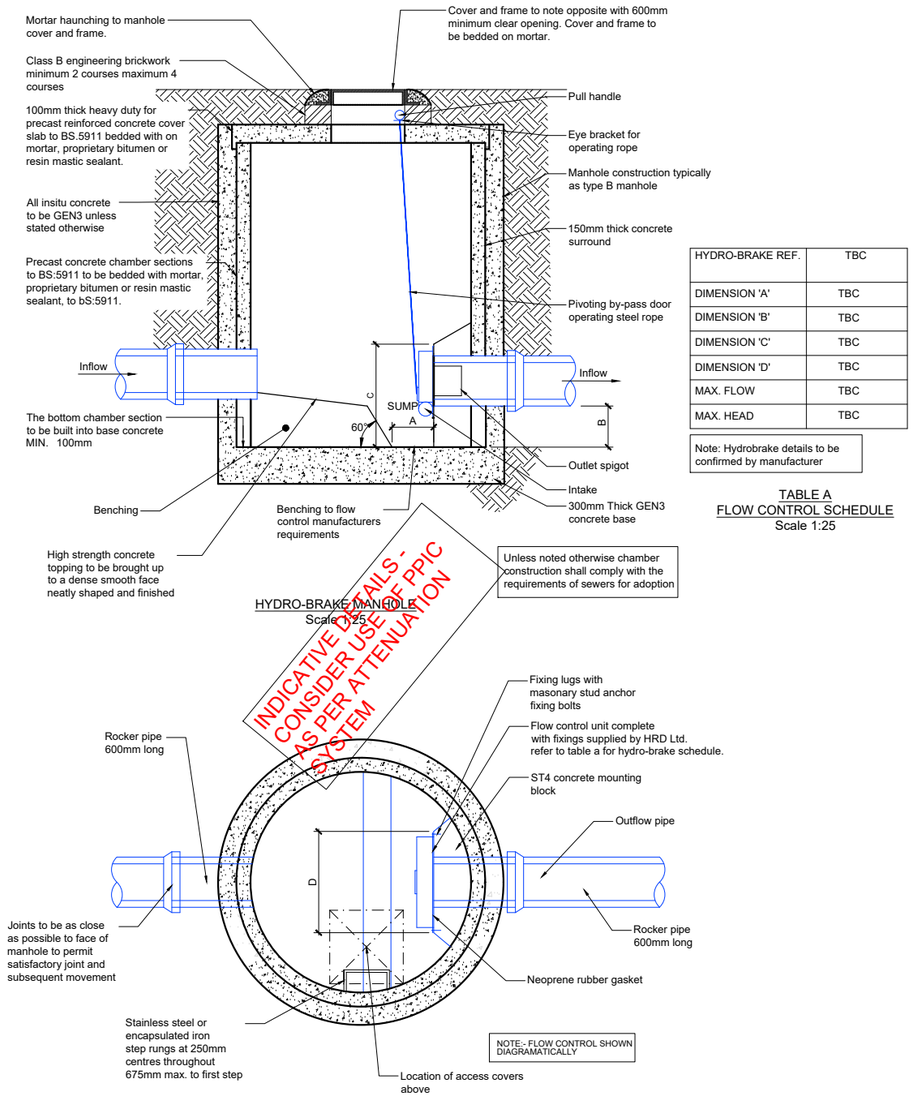


Chambers with outgoing pipes greater than 600mm DIA. Shall be fitted with guard bars safety chains or other safety devices.

FIGURE B.15
TYPICAL VERTICAL AND RAMPED BACKDROP DETAIL Note: Steeper gradients are preferred to the use of backdrops. Type of backdrop to be used to be agreed with Undertaker.



EXTERNAL VERTICAL BACKDROP
Scale NA



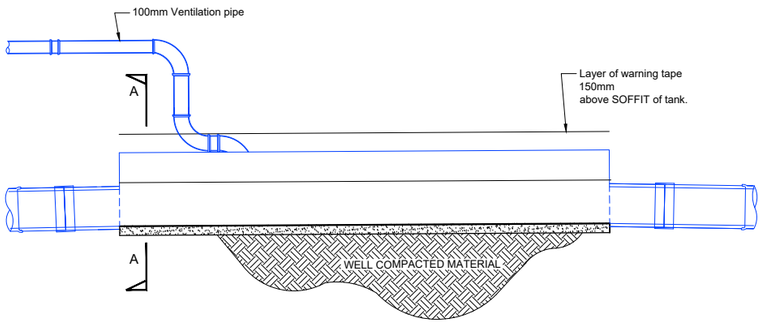
HYDRO-BRAKE REF.	TBC
DIMENSION 'A'	TBC
DIMENSION 'B'	TBC
DIMENSION 'C'	TBC
DIMENSION 'D'	TBC
MAX. FLOW	TBC
MAX. HEAD	TBC

Note: Hydrobrake details to be confirmed by manufacturer

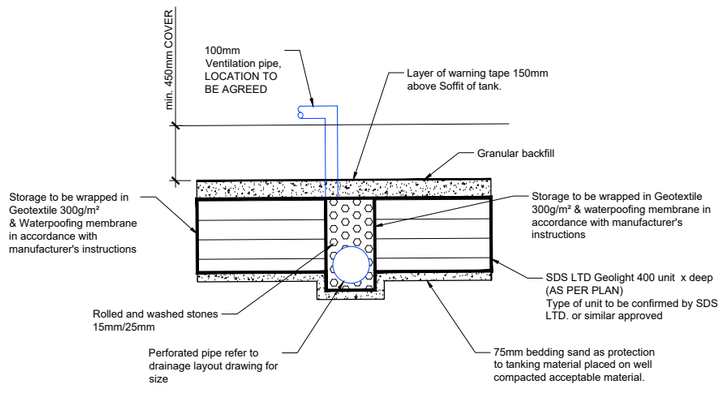
TABLE A
FLOW CONTROL SCHEDULE
Scale 1:25

Unless noted otherwise chamber construction shall comply with the requirements of sewers for adoption

HYDRO-BRAKE MANHOLE
Scale 1:25



ATTENUATION TANK
LONGITUDINAL SECTION
Scale 1:20



ATTENUATION TANK
SECTION A-A
Scale 1:20

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BUILDING CONTROL

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Project:
FOUNTAIN HOTEL, UB3 2LW, HAYES

Drawing title:
TYPICAL DRAINAGE DETAILS

Date:	Scale at A1:	Scale at A3:
09/2022	As indicated	-
Drawn by: DS	Designed by: AP	Chk'd by: AP

Drawing No: 13
21144-ASL-DR-D-0632 Revision: B1

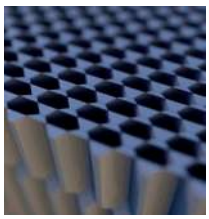
Water Infrastructure Systems

SDS GEOlight®

Stormwater Management System

Product Profile

SDS GEOlight® is an ultra lightweight honeycombed modular structure made from recycled PVC. The ready to install units are preformed to provide an underground stormwater storage facility, for the application of stormwater attenuation or infiltration.



The high void rate (>95%), high compressive strength (to 1000KN/m^2) and low resistance to water flow makes SDS GEOlight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS GEOlight® Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m^3 reservoir, completed in one week.
- Light and easy to handle.
- Excellent hydraulic characteristics.
- The honeycomb structure is highly permeable, offering low resistance to water flow.
- SDS GEOlight®'s unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Modular format offers design flexibility to overcome topographical contraints and architectural requirements.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist separation and filtration technology such as SDS Aqua-Swirl™ and SDS Aqua-Filter™.
- Design service available, including calculations.

APPLICATIONS

RETAIL

INFRASTRUCTURE

INDUSTRIAL

RESIDENTIAL

COMMERCIAL

PUBLIC SECTOR

sdslimited.com

SDS Ltd, Clearwater House, Castlemills, Biddisham, Somerset, BS26 2RE

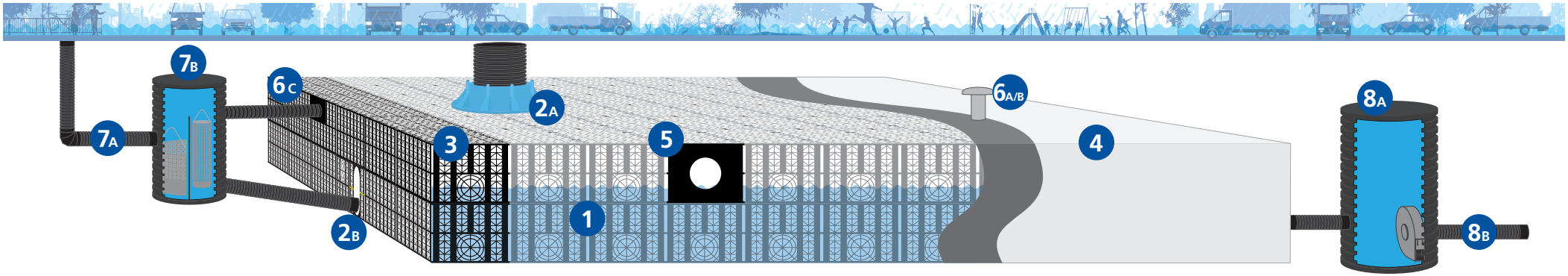
T: +44 (0)1934 751303
E: info@sdslimited.com

SDS GEOlight® 400	SDS GEOlight® 600	SDS GEOlight® 800
APPLICATIONS		
Stormwater Management		
Attenuation / Infiltration		
Bacterial filter-bed for biological treatment		
Hydrocarbon Separation		
Filtration and Separation Units		
SPECIFICATIONS		
Material	Recycled Rigid PVC	
Colour	Dark grey to black	
Standard length of a block	2000 mm	2000 mm	2000 mm
Standard width of a block	500 mm	500 mm	500 mm
Standard height of a block*	750 mm	750 mm	750 mm
*Other block sizes available on request		
Void Ratio	> 95%	> 95%	> 95%
Compressive Strength	420 kN/m²	610 kN/m²	800 kN/m²
ADVANTAGES		
Highly cost effective		
Reduced excavation costs		
High void capacity		
Good UV resistance		
Good hydrocarbon resistance		

SDS Ltd, Clearwater House, Castlemills,
Biddisham, Somerset, BS26 2RE

T: +44 (0)1934 751303
E: info@sdslimited.com

An 8 step guide to a total Polystorm system



1 Select modular cell

Polystorm Lite
Product code: PSM2
Vertical compressive strength: 20 tonne/m²

Landscaped/pedestrian

Polystorm Lite has been specifically designed for non-trafficked, landscaped and pedestrian ap

Poly
Prod
Vertica
61 ton

Trafficked

The standard Poly
and loaded applic
has the added ben
material content.

Polystorm
Product code: PSM1
Vertical compressive strength: 44 tonne/m²

Trafficked

The Polystorm cell, made of virgin material, is ideally suited for trafficked and loaded applications at greater depths.

Polystorm Xtra
Product code: PSM3
Vertical compressive strength: 83 tonne/m²

Heavily trafficked or reduced cover

Designed for use in heavily trafficked areas for shallow, non sub-base applications where reduced cover is required.

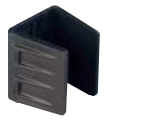
eep
: PSM5
ve strength: 61 tonne/m²

ep and hybrid tanks

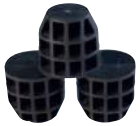
has been designed
cked applications such
nd industrial access
buried deeper than any
cell and can be value
part of a hybrid system.

ALTERNATIVE
COMPELTE SYSTEM TO
SDS LIGHT
FINAL SYSTEM TO BE
AGREED WITH
CONTRACTOR

Connection accessories



- Clips
  Product code: PSMCLIP
- Shear Connectors
  Product code: PSMSC



- Brick Bond Connectors
  Product code: PSMBBSC

Note: Clips and shear connectors are supplied with all Polystorm units.

2 Select access if maintenance and inspection is required

2A

Polystorm Access
Polystorm Access provides a 1m x 0.5m vertical shaft within a Polystorm geocellular structure to enable surface access for remote camera inspection and maintenance activities such as flushing and rodding.

2B

Polystorm Inspect
Product code: PSM4

Polystorm Inspect provides a tunnel along the length of a fully installed Polystorm system to enable horizontal access for inspection and maintenance. It can also be used in conjunction with Polystorm Access.

3 Select if treatment is required

Permavoid Medium Duty with Biomat

Product code: PSM1BM

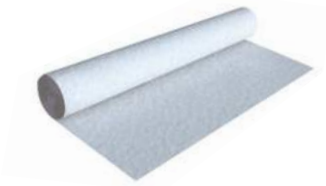
Comprising of a high strength, low density, oil treating geosynthetic floating mat for use with the Polystorm range of modular geocellular units.

For multi-stage oil interception the Permavoid Medium Duty with Biomat can be used in conjunction with Permatreat or Permachannel (linear treatment) or a pre-fabricated RIDGISTORMSeparate-X4 Chamber (point treatment).

4 Select wrap

Geomembrane for retention and attenuation

An impermeable membrane for encapsulating geocellular structures to form watertight tanks. This is then wrapped in Permatex 300 to protect the geomembrane from puncture.



Permatex 300 for protection

A non-woven protective geotextile used externally to a geomembrane for added protection.

Polystorm Soakaway Geotextiles for infiltration

Available as standard (PVTS1000) or heavy duty (PVTS2000), non-woven infiltration geotextiles for encapsulating geocellular structures to form soakaway tanks.

Permafilter Geotextile for treatment and infiltration

This geotextile has been specifically designed to remove hydrocarbon pollution, treating the captured water before infiltrating it into the ground.

5 Pipe Connections

A flange adaptor is attached at both the inlet and outlet points to allow water to enter and exit the tank via connecting pipes.

Polystorm cell with Ridgidrain Flange Connection

Flange Adaptor to EN1401

- Polystorm cells with Flange Connections to Ridgidrain drainage pipes: PSMCRD225 (225mm), PSMCRD300 (300mm)
- Polystorm Inspect cells with Flange Connections to Ridgidrain drainage pipes: PSM4CRD225 (225mm), PSM4CRD300 (300mm)
- Flange Adaptor to EN1401: PSMFA110 (110mm), PSMFA160 (160mm)
- Flange Adaptor to Ridgidrain: PSMFA150 (150mm), PSMFA225 (225mm), PSMFA300 (300mm), PSMFA375 (375mm), PSMFA400 (400mm),PSMFA450 (450mm), PSMFA500 (500mm), PSMFA600 (600mm)

6 Venting

Every attenuation tank requires at least one vent to maximise hydraulic performance and reduce stress on encapsulating geomembranes. This can be done by installing either a Vent Cowl or a connection pipe to vent air directly into an upstream chamber.

6A

Vent Cowl

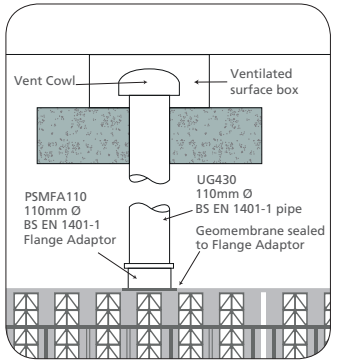
Product code: SCV40

To vent air above ground.

6B

BS EN1401-1 pipe

Product code: UG430



6C

150mm Ridgidrain pipe

Product code: RD150X6PE

For ventilation into the upstream chamber.

Polypipe

7 Associated upstream products

7A

Ridgidrain

Ridgidrain can be utilised within a Polystorm system by conveying captured surface water to the attenuation or infiltration tank.

7B

Polystorm Catchpits & RIDGISTORMSeparate Chambers

Polystorm Catchpits and RIDGISTORMSeparate Chambers are easily maintainable and prevent the ingress of debris, silt, organic and other particles into the Polystorm structure, extending its useful life.

Polystorm Catchpits

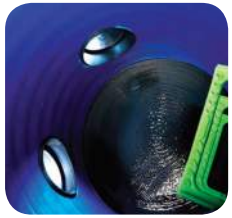
A pre-fabricated 600mm diameter catchpit with three inlet/outlet sizes available in 150mm, 225mm and 300mm.

Silt Traps

320 - 460mm Silt traps are available from the RIDGISTORMSeparate Silt Traps range.

Mini & Basic Catchpits

450 - 3000mm diameter bespoke catchpits are available from the RIDGISTORMSeparate range.



Advanced Catchpits

In addition to silt traps and catchpits, we also offer RIDGISTORMSeparate Advanced Catchpits with additional treatment features.

8 Associated downstream products

8A

RIDGISTORMCheck

A choice of Vortex or Orifice Plate Flow Control Chambers for precise control of site discharge rates.

RIDGISTORMControl

Pre-fabricated structured wall chambers which feature 'in-line' system components such as penstocks, gate valves or flap valves to control system flows and facilitate maintenance.

Penstock

Gate valve

Flap valve

8B

Ridgidrain

Ridgidrain can be utilised to drain away stored water from a Polystorm attenuation tank.

For full datasheets of products in the Polystorm system, please visit our website www.polypipe.com/civils-technical-hub

Polypipe Civils Head Office, Charnwood Business Park, North Road, Loughborough, LE11 1LE
Tel: +44 (0)1509 615100 Fax: +44 (0)1509 610215 Email: civils@polypipe.com
www.polypipe.com

APPENDIX B

- EXISTING PLANS

- RAINWATER, DRAINAGE PLANS AND AREAS
- ATTENUATION CALCULATION

SURVEY CONTROL

THE SURVEY GRID AND LEVELS ARE BASED ON ORDNANCE SURVEY NATIONAL GRID COORDINATES (OPS)

TOPOGRAPHICAL LEGEND

NOTES

SERVICES
WHILST ALL REASONABLE CARE HAS BEEN TAKEN IN LOCATING THE UNDERGROUND SERVICES SHOWN ON THIS PLAN, THE COMPLETENESS OR ACCURACY OF THE INFORMATION CANNOT BE GUARANTEED.

USERS ARE ADVISED TO SATISFY THEMSELVES CONCERNING THE TYPE, SIZE AND ROUTE OF SERVICES BEFORE PROCEEDING WITH GROUND WORK.

TREES
TREE SPREADS ARE AVERAGES UNLESS OTHERWISE INDICATED AND CANOPY SPREADS SHOWN TO SCALE. IF TREE TYPES ARE CRITICAL VERIFICATION BY A SPECIALIST MUST BE UNDERTAKEN.

MULTI-BOLE TREES ARE INDICATED WITH (MB).

0.2 / 6 / 10
Dia of Bole / Dia of Spread / Ht. of Tree

BUILDING LEGEND

COORDINATE TABLE

STATION	DESC'N	EASTING	NORTHING	LEVEL
S1	PK NAIL	509804.717	180847.298	35.720
S2	PK NAIL	509750.836	180888.358	35.947
S3	PK NAIL	509790.018	180869.744	35.853

N

callidus
Callidus Surveys
Dukes House
40 Windsor Avenue
London SW19 2RR

Project:

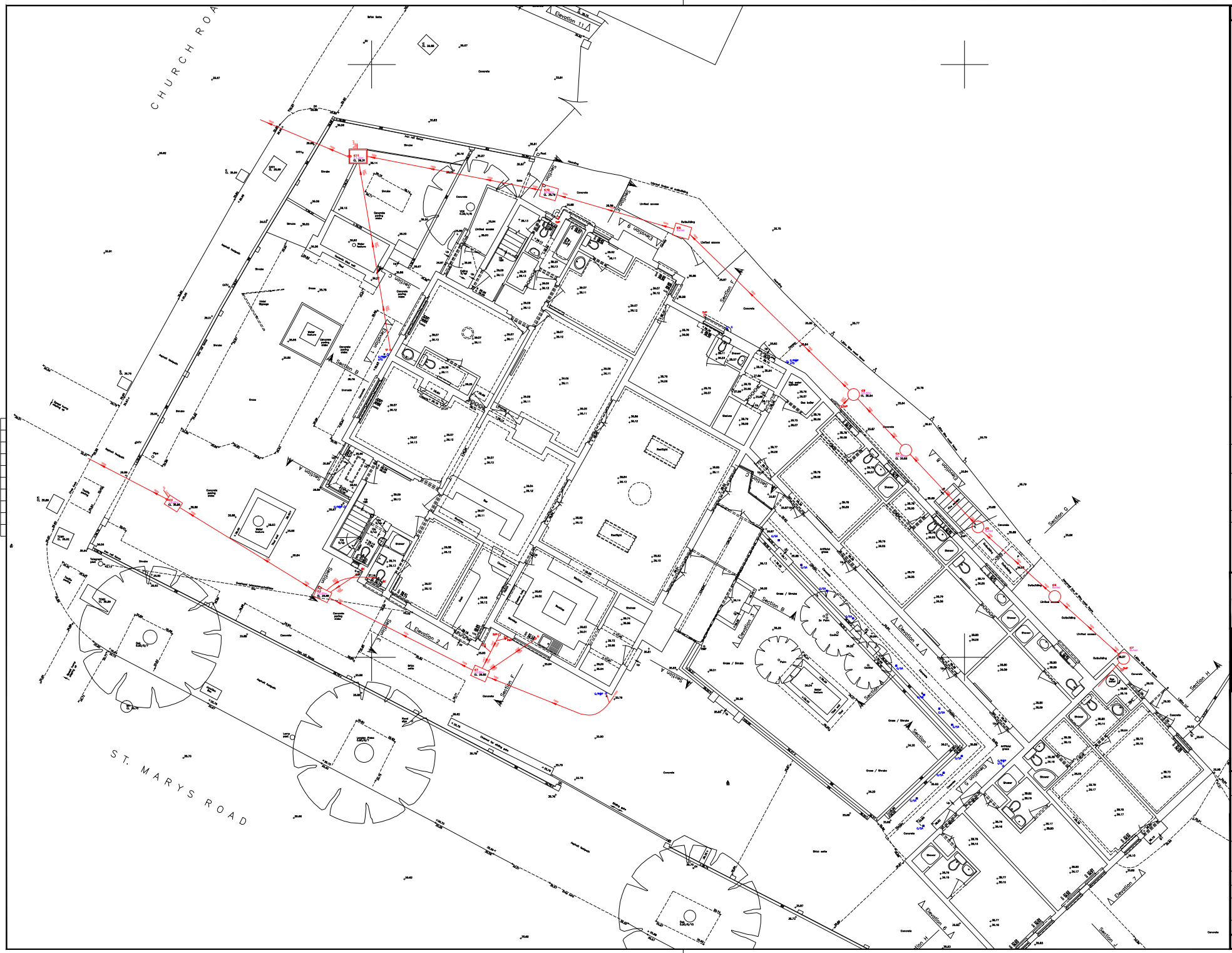
FOUNTAIN HOUSE HOTEL
116-118 CHURCH ROAD
HAYES
UB3 2LW
GROUND FLOOR PLAN

Client:

PTP ARCHITECTS LTD
WALMER COURTYARD
225 WALMER ROAD
LONDON
W11 4EY

Job No:	21010	Drawing I.D:	PGF
Drawn:	JD/MA	Scale:	1:100 @A0
Checked:	JH	Date:	16/02/21

T (020) 8543 8884
F (020) 8543 8884
E info@callidussurveys.co.uk
W www.callidussurveys.co.uk



JOB No. 11130

LEGEND

FW MH/IC

SW MH/IC

INTERCEPTOR

FW GULLY
SW GULLY
ST/VP:STACK
RWP

SW:SURFACE WATER
SURFACE WATER ROUTE

FW:FOUL WATER
FOUL WATER ROUTE

BUILDING OUTLINE

OVERHEAD BUILDING LINE

BOUNDARY LINE

ROAD

PROPOSED

BANK

BANK SYMBOL

UTS: Unable to Survey
UTL: Unable to Lift

TREE

W/C

NOT TO SCALE

Drawing Notes

Rev.	Date	Description	By

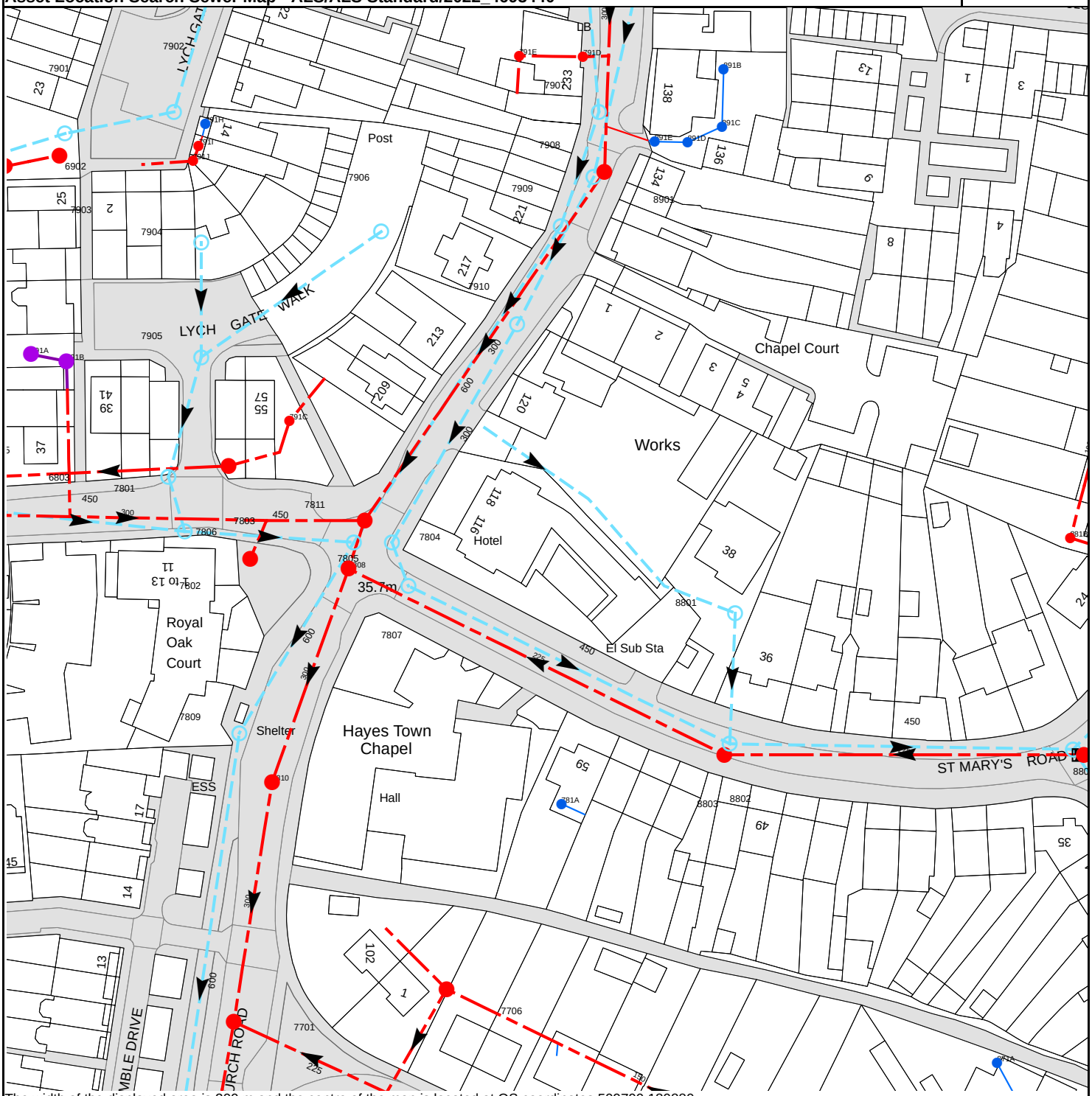
EXPRESS SOLUTIONS GROUP

Head Office:
152-154 Commercial Road
Staines-Upon-Thames
Surrey
TW18 2QW
Tel 020 8979 5444
VAT 851970604
Company No 04935559

Client	Axiom Structures
Site Address	Fountain Hotel 116-118 Church Road Hayes London UB3 2LW
Drawing title	Plan
Scales	NOT TO SCALE
Surveyor	DP
Drawn By	EA
Date	26.11.2021

JOB No. 11130

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4693440



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 509790,180880

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7801	35.61	33.98
7803	35.8	34.5
791C	n/a	n/a
791B	n/a	n/a
7905	36.16	34.16
691A	n/a	n/a
7904	36.4	34.9
7906	36.3	34.8
6902	37.03	34.28
791J	n/a	n/a
7903	37.02	34.38
791I	n/a	n/a
7901	37.03	34.83
791H	n/a	n/a
7902	36.48	34.98
7706	n/a	n/a
7910	36.19	34.45
791E	n/a	n/a
7909	36.23	34.05
781A	n/a	n/a
791D	n/a	n/a
7908	n/a	n/a
7907	36.21	34.18
8901	n/a	n/a
891E	n/a	n/a
891D	n/a	n/a
891C	n/a	n/a
891B	n/a	n/a
8803	n/a	n/a
8802	n/a	n/a
8801	n/a	n/a
881B	n/a	n/a
8804	34.98	33.53
8806	n/a	n/a
7701	35.56	32.04
7810	n/a	n/a
7809	35.75	33.57
7807	35.67	33.96
7808	35.81	32.42
7806	n/a	n/a
7811	n/a	n/a
7805	35.68	34.23
7802	35.69	34.06
7804	35.79	32.37
871A	n/a	n/a

Percussion Drilling Log

Project Name: Fountain House Hotel	Client: Axiom Structures Ltd	Date: 05/07/2022 - 13/07/2022
Location: 116-118 Church Road, Hayes UB3 2LW	Contractor:	
Project No. : GWPR4864	Crew Name: KDS	Drilling Equipment: Dando Terrier.

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS2	WS		AS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20			0.25			MADE GROUND. Dark brown gravelly fine to coarse SAND. Gravel is fine to coarse angular to sub-angular flint (70%) and brick (30%).
		0.50						MADE GROUND. Dark brown sandy fine to coarse angular to sub-rounded GRAVEL of brick (70%), concrete (20%) and flint (10%). Sand is fine to coarse.
		0.80			0.90			
		1.00						
		1.00	SPT	N=28 (4,5/5,7,8,8)				Orangish brown mottled with brownish grey slightly gravelly sandy silty CLAY. Gravel is fine sub-rounded of flint. Sand is fine. (LYNCH HILL GRAVEL MEMBER)
		1.50			1.60			
		2.00						Yellowish brown fine and medium SAND. (LYNCH HILL GRAVEL MEMBER)
		2.00	SPT	N=49 (9,9/10,11,14,14)				
		2.50			2.70			End of Borehole at 2.700m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

Trial hole carried out to a depth of 2.70m bgl where refusal on dense soils was encountered. Hole terminated with Fresh roots noted to 1.50m bgl. No groundwater encountered. Dynamic probing carired out through the base of the borehole to a depth of 8.00m bgl.

Existing soft landscaping area
- discharge of SW at source

Existing soft landscaping area
- discharge of SW at source

Existing Buildings downpipes
- discharge of soakaways and Foul Water drainage
- soakaway blocked

Existing foul water drains
- often blocks (to be relayed)

Foul Thames Sewer

Existing Building downpipes
- discharge of soakaways or foul water system

Existing foul water drains
- often blocks (to be relayed)

Existing partially paved area
- Does not appear to have clear discharge SW strategy in place

- discharge of SW to some minor soft landscaping or gaps between paving

Existing paved area
- Does not appear to have clear discharge SW strategy in place

- discharge of SW to some minor soft landscaping and main road or gaps between paving

EXISTING SURFACE WATER ANTICIPATED DISCHARGE
- BASED ON CCTV SURVEY, VISUAL INSPECTION, TRIAL PITS
- SHOWN ON EXISTING TOPO SURVEY

Existing paved area
- Does not appear to have clear discharge SW strategy in place

- discharge of SW to some minor soft landscaping and main road or some gullies

AXIOM STRUCTURES LIMITED
FOUNDATINS HOUSE HOTEL

Existing Below Ground Drainage

21144-SK-DR-020 B1

28.08.2022 AP

office@axiom-structures.co.uk
T: 020 3637 2751

Permeable paving / Soft landscaping:
- permeable paving 129m2 + 32m2 = 161m2
- discharge to Surface-water sewer via attenuation tank
- consideration for partial infiltration to ground is subject to site testing

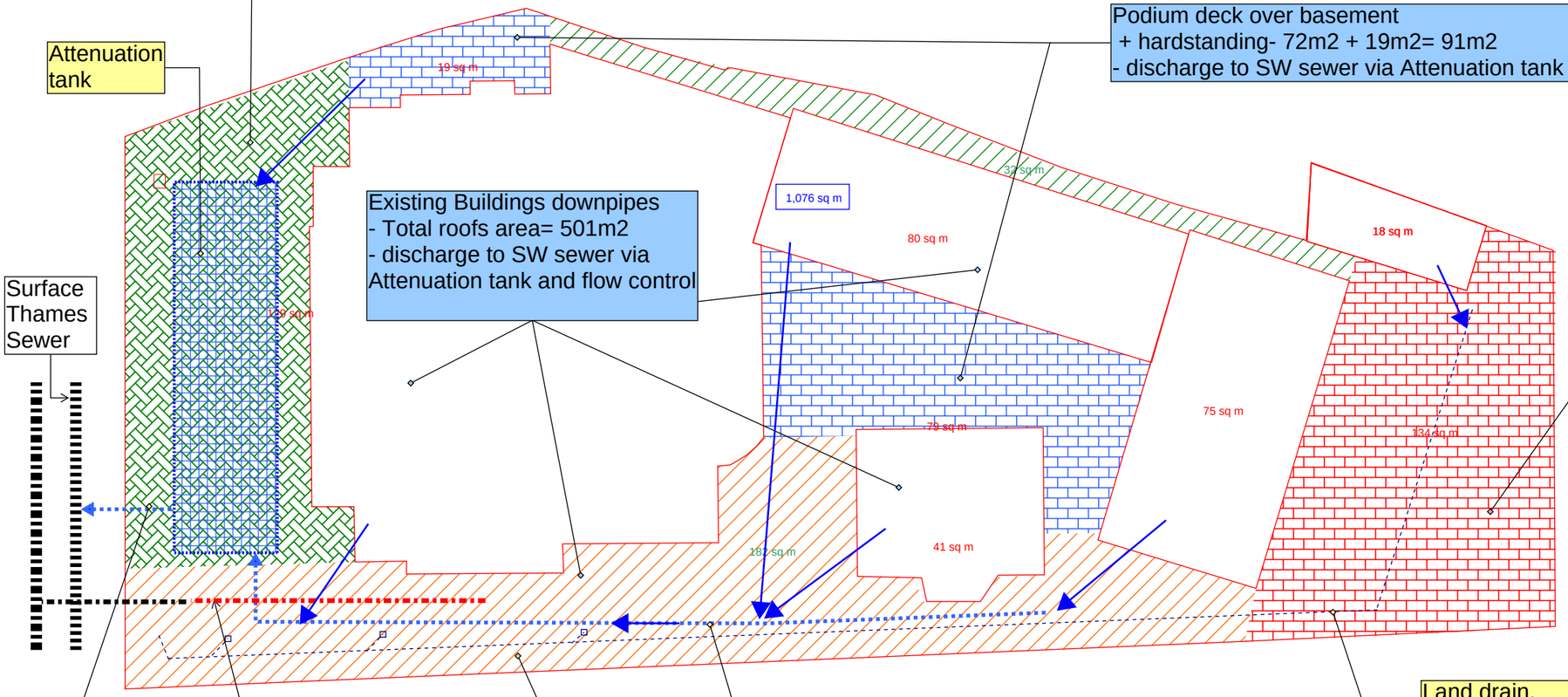
Attenuation tank

Podium deck over basement
+ hardstanding- 72m2 + 19m2= 91m2
- discharge to SW sewer via Attenuation tank and flow control

Existing Buildings downpipes
- Total roofs area= 501m2
- discharge to SW sewer via Attenuation tank and flow control

Surface Thames Sewer

Existing hard-standing+roof over plantroom
- 134+18 = 152m2
- discharge to SW sewer via filter drain to attenuation tank and flow control



Flow control + SW sewer connection

Existing foul water drains
- IMPROVED

SW run

PROPOSED SURFACE WATER STRATEGY
- SHOWN ON PROPOSED DRAINAGE PLAN

Land drain, performated pipe in gravel trench

Permeable paving:
- permeable paving 182m2
- discharge to Surface-water sewer via attenuation tank and flow control
- consideration for partial infiltration to ground is subject to site testing

AXIOM STRUCTURES LIMITED
FOUNDATINS HOUSE HOTEL

Proposed Below Ground Drainage

21144-SK-DR-021 B1

28.08.2022 AP

office@axiom-structures.co.uk
T: 020 3637 2751

Print | Close Report

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Andrzej Plocieniak
Site name:	Fountain House Hotel
Site location:	

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

Site Details

Latitude:	51.51619° N
Longitude:	0.4189° W
Reference:	1574903673
Date:	Aug 28 2022 11:02

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.11

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	618	618
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.46	0.46
1 in 1 year (l/s):	0.39	0.39
1 in 30 years (l/s):	1.06	1.06
1 in 100 year (l/s):	1.46	1.46
1 in 200 years (l/s):	1.72	1.72

	Fountain House Hotel SW Attenuation Design	
Date 01/09/2022 10:19 File 220831 FHH.CASX	Designed by HNC Checked by AP	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for 220831 FHH CP.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	220831 FHH TANK.SRCX	(None)

Half Drain Time : 38 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	35.561	0.241	0.0	3.9	3.9	11.3	Flood Risk
30 min Summer	35.614	0.294	0.0	4.2	4.2	13.9	Flood Risk
60 min Summer	35.626	0.306	0.0	4.3	4.3	14.5	Flood Risk
120 min Summer	35.602	0.282	0.0	4.2	4.2	13.3	Flood Risk
180 min Summer	35.572	0.252	0.0	4.0	4.0	11.9	Flood Risk
240 min Summer	35.543	0.223	0.0	3.8	3.8	10.4	Flood Risk
360 min Summer	35.492	0.172	0.0	3.6	3.6	8.0	O K
480 min Summer	35.452	0.132	0.0	3.3	3.3	6.1	O K
600 min Summer	35.421	0.101	0.0	3.1	3.1	4.6	O K
720 min Summer	35.395	0.075	0.0	2.9	2.9	3.4	O K
960 min Summer	35.359	0.039	0.0	2.6	2.6	1.6	O K
1440 min Summer	35.323	0.003	0.0	2.3	2.3	0.0	O K
2160 min Summer	35.320	0.000	0.0	1.7	1.7	0.0	O K
2880 min Summer	35.320	0.000	0.0	1.3	1.3	0.0	O K
4320 min Summer	35.320	0.000	0.0	1.0	1.0	0.0	O K
5760 min Summer	35.320	0.000	0.0	0.7	0.7	0.0	O K
7200 min Summer	35.320	0.000	0.0	0.6	0.6	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.231	0.0	14.9	22
30 min Summer	91.066	0.0	19.6	32
60 min Summer	56.713	0.0	24.8	50
120 min Summer	34.120	0.0	30.0	84
180 min Summer	25.012	0.0	32.9	118
240 min Summer	19.949	0.0	34.9	152
360 min Summer	14.458	0.0	38.1	216
480 min Summer	11.506	0.0	40.5	276
600 min Summer	9.631	0.0	42.3	338
720 min Summer	8.325	0.0	44.0	398
960 min Summer	6.610	0.0	46.5	512
1440 min Summer	4.768	0.0	50.2	736
2160 min Summer	3.433	0.0	54.1	0
2880 min Summer	2.717	0.0	56.9	0
4320 min Summer	1.952	0.0	61.0	0
5760 min Summer	1.542	0.0	63.9	0
7200 min Summer	1.284	0.0	66.1	0

Fountain House Hotel
SW Attenuation Design

Date 01/09/2022 10:19
File 220831 FHH.CASX

Designed by HNC
Checked by AP

Innovyze

Source Control 2019.1

Cascade Summary of Results for 220831 FHH CP.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	35.320	0.000	0.0	0.5	0.5	0.0	O K
10080 min Summer	35.320	0.000	0.0	0.5	0.5	0.0	O K
15 min Winter	35.594	0.274	0.0	4.1	4.1	12.9	Flood Risk
30 min Winter	35.659	0.339	0.0	4.4	4.4	16.0	Flood Risk
60 min Winter	35.676	0.356	0.0	4.5	4.5	16.8	Flood Risk
120 min Winter	35.637	0.317	0.0	4.3	4.3	15.0	Flood Risk
180 min Winter	35.592	0.272	0.0	4.1	4.1	12.8	Flood Risk
240 min Winter	35.549	0.229	0.0	3.9	3.9	10.7	Flood Risk
360 min Winter	35.478	0.158	0.0	3.5	3.5	7.3	O K
480 min Winter	35.426	0.106	0.0	3.1	3.1	4.8	O K
600 min Winter	35.387	0.067	0.0	2.8	2.8	3.0	O K
720 min Winter	35.358	0.038	0.0	2.6	2.6	1.6	O K
960 min Winter	35.323	0.003	0.0	2.3	2.3	0.0	O K
1440 min Winter	35.320	0.000	0.0	1.7	1.7	0.0	O K
2160 min Winter	35.320	0.000	0.0	1.2	1.2	0.0	O K
2880 min Winter	35.320	0.000	0.0	1.0	1.0	0.0	O K
4320 min Winter	35.320	0.000	0.0	0.7	0.7	0.0	O K
5760 min Winter	35.320	0.000	0.0	0.5	0.5	0.0	O K
7200 min Winter	35.320	0.000	0.0	0.4	0.4	0.0	O K
8640 min Winter	35.320	0.000	0.0	0.4	0.4	0.0	O K
10080 min Winter	35.320	0.000	0.0	0.3	0.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.105	0.0	67.9	0
10080 min Summer	0.973	0.0	69.4	0
15 min Winter	139.231	0.0	16.7	22
30 min Winter	91.066	0.0	22.1	33
60 min Winter	56.713	0.0	27.6	54
120 min Winter	34.120	0.0	33.6	90
180 min Winter	25.012	0.0	36.9	126
240 min Winter	19.949	0.0	39.3	160
360 min Winter	14.458	0.0	42.8	226
480 min Winter	11.506	0.0	45.4	288
600 min Winter	9.631	0.0	47.6	348
720 min Winter	8.325	0.0	49.3	404
960 min Winter	6.610	0.0	52.2	496
1440 min Winter	4.768	0.0	56.4	0
2160 min Winter	3.433	0.0	60.8	0
2880 min Winter	2.717	0.0	64.0	0
4320 min Winter	1.952	0.0	68.6	0
5760 min Winter	1.542	0.0	71.9	0
7200 min Winter	1.284	0.0	74.4	0
8640 min Winter	1.105	0.0	76.5	0
10080 min Winter	0.973	0.0	78.2	0

Cascade Model Details for 220831 FHH CP.SRCX

Storage is Online Cover Level (m) 35.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	44.4	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	35.320	Membrane Depth (m)	130

Orifice Outflow Control

Diameter (m) 0.056 Discharge Coefficient 0.600 Invert Level (m) 35.170

	Fountain House Hotel SW Attenuation Design
Date 01/09/2022 10:16 File 220831 FHH.CASX	Designed by HNC Checked by AP
Innovyze	Source Control 2019.1

Cascade Summary of Results for 220831 FHH TANK.SRCX

Upstream Structures	Outflow To	Overflow To
220831 FHH CP.SRCX	(None)	(None)

Half Drain Time : 246 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	34.543	0.343	0.0	1.8	1.8	19.6	O K
30 min Summer	34.664	0.464	0.0	1.8	1.8	26.5	O K
60 min Summer	34.800	0.600	0.0	1.8	1.8	34.2	O K
120 min Summer	34.913	0.713	0.0	1.8	1.8	40.6	O K
180 min Summer	34.962	0.762	0.0	1.8	1.8	43.4	O K
240 min Summer	34.984	0.784	0.0	1.8	1.8	44.7	O K
360 min Summer	34.954	0.754	0.0	1.8	1.8	43.0	O K
480 min Summer	34.923	0.723	0.0	1.8	1.8	41.2	O K
600 min Summer	34.887	0.687	0.0	1.8	1.8	39.1	O K
720 min Summer	34.854	0.654	0.0	1.8	1.8	37.3	O K
960 min Summer	34.787	0.587	0.0	1.8	1.8	33.5	O K
1440 min Summer	34.648	0.448	0.0	1.8	1.8	25.5	O K
2160 min Summer	34.497	0.297	0.0	1.8	1.8	16.9	O K
2880 min Summer	34.402	0.202	0.0	1.7	1.7	11.5	O K
4320 min Summer	34.310	0.110	0.0	1.5	1.5	6.3	O K
5760 min Summer	34.280	0.080	0.0	1.3	1.3	4.5	O K
7200 min Summer	34.266	0.066	0.0	1.1	1.1	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.231	0.0	27.4	84
30 min Summer	91.066	0.0	35.9	106
60 min Summer	56.713	0.0	45.2	134
120 min Summer	34.120	0.0	54.5	174
180 min Summer	25.012	0.0	59.8	210
240 min Summer	19.949	0.0	63.6	246
360 min Summer	14.458	0.0	69.2	302
480 min Summer	11.506	0.0	73.6	358
600 min Summer	9.631	0.0	76.9	418
720 min Summer	8.325	0.0	79.9	488
960 min Summer	6.610	0.0	84.5	626
1440 min Summer	4.768	0.0	91.3	872
2160 min Summer	3.433	0.0	98.6	1224
2880 min Summer	2.717	0.0	103.9	1564
4320 min Summer	1.952	0.0	111.5	2248
5760 min Summer	1.542	0.0	117.1	2944
7200 min Summer	1.284	0.0	121.5	3672

Fountain House Hotel
SW Attenuation Design

Date 01/09/2022 10:16
File 220831 FHH.CASX

Designed by HNC
Checked by AP

Innovyze Source Control 2019.1

Cascade Summary of Results for 220831 FHH TANK.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	34.258	0.058	0.0	1.0	1.0	3.3	O K
10080 min Summer	34.252	0.052	0.0	0.9	0.9	3.0	O K
15 min Winter	34.589	0.389	0.0	1.8	1.8	22.2	O K
30 min Winter	34.731	0.531	0.0	1.8	1.8	30.3	O K
60 min Winter	34.880	0.680	0.0	1.8	1.8	38.8	O K
120 min Winter	35.004	0.804	0.0	1.8	1.8	45.9	O K
180 min Winter	35.061	0.861	0.0	1.8	1.8	49.1	O K
240 min Winter	35.090	0.890	0.0	1.8	1.8	50.7	O K
360 min Winter	35.073	0.873	0.0	1.8	1.8	49.7	O K
480 min Winter	35.029	0.829	0.0	1.8	1.8	47.3	O K
600 min Winter	34.983	0.783	0.0	1.8	1.8	44.6	O K
720 min Winter	34.935	0.735	0.0	1.8	1.8	41.9	O K
960 min Winter	34.840	0.640	0.0	1.8	1.8	36.5	O K
1440 min Winter	34.623	0.423	0.0	1.8	1.8	24.1	O K
2160 min Winter	34.421	0.221	0.0	1.7	1.7	12.6	O K
2880 min Winter	34.326	0.126	0.0	1.6	1.6	7.2	O K
4320 min Winter	34.273	0.073	0.0	1.2	1.2	4.2	O K
5760 min Winter	34.258	0.058	0.0	1.0	1.0	3.3	O K
7200 min Winter	34.250	0.050	0.0	0.8	0.8	2.9	O K
8640 min Winter	34.246	0.046	0.0	0.7	0.7	2.6	O K
10080 min Winter	34.242	0.042	0.0	0.6	0.6	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.105	0.0	125.1	4400
10080 min Summer	0.973	0.0	128.1	5112
15 min Winter	139.231	0.0	30.6	90
30 min Winter	91.066	0.0	40.4	115
60 min Winter	56.713	0.0	50.5	142
120 min Winter	34.120	0.0	61.1	184
180 min Winter	25.012	0.0	67.2	220
240 min Winter	19.949	0.0	71.4	256
360 min Winter	14.458	0.0	77.7	318
480 min Winter	11.506	0.0	82.4	372
600 min Winter	9.631	0.0	86.3	450
720 min Winter	8.325	0.0	89.5	526
960 min Winter	6.610	0.0	94.8	680
1440 min Winter	4.768	0.0	102.4	928
2160 min Winter	3.433	0.0	110.6	1260
2880 min Winter	2.717	0.0	116.5	1564
4320 min Winter	1.952	0.0	125.2	2212
5760 min Winter	1.542	0.0	131.5	2936
7200 min Winter	1.284	0.0	136.5	3672
8640 min Winter	1.105	0.0	140.6	4400
10080 min Winter	0.973	0.0	144.0	5144

	Fountain House Hotel SW Attenuation Design
Date 01/09/2022 10:16 File 220831 FHH.CASX	Designed by HNC Checked by AP
Innovyze	Source Control 2019.1

Cascade Model Details for 220831 FHH TANK.SRCX

Storage is Online Cover Level (m) 35.800

Cellular Storage Structure

Invert Level (m) 34.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	0.0	1.001	0.1	0.0
1.000	60.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	34.200
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0
Flush-Flo™	0.282	1.8
Kick-Flo®	0.573	1.4
Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.0	3.000	3.0	7.000	4.5
0.200	1.7	1.400	2.1	3.500	3.3	7.500	4.7
0.300	1.8	1.600	2.3	4.000	3.5	8.000	4.8
0.400	1.7	1.800	2.4	4.500	3.7	8.500	5.0
0.500	1.6	2.000	2.5	5.000	3.9	9.000	5.1
0.600	1.5	2.200	2.6	5.500	4.0	9.500	5.2
0.800	1.7	2.400	2.7	6.000	4.2		
1.000	1.8	2.600	2.8	6.500	4.4		