

MERIDIAN

CIVIL ENGINEERING CONSULTANCY

THE LAKE HOUSE,
ROWFANT,
CRAWLEY DOWN RH10 4TB

FOUL AND SURFACE WATER DRAINAGE STRATEGY

JULY 2024

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Client : Planit Consulting

Rev	Date	Prepared by	Checked by	Approved by
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1.0 INTRODUCTION

- 1.1 Meridian Civil Engineering Consultancy LTD (MCEC) has been instructed by Planit Consulting to prepare a Foul and Surface Water Drainage Strategy for the development at The Lake House, Rowfant, Crawley, RH10 4TB
- 1.2 It is understood the proposed development is for the construction of a single replacement dwelling.
- 1.3 According to the British Geological Survey (BGS) Geology Viewer, bedrock geology on site is of the Upper Tunbridge Wells Sand, consisting of sandstone and siltstone.
- 1.4 The Environment Agency (EA) mapping for Flood Risk (Figure 3), shows the site to be located largely within Flood Zone 1 (Low risk of fluvial or tidal flooding indicating a less than 0.1% annual probability of flooding).
- 1.5 In accordance with the NPPF, developments are required to use SuDS to reduce both the volume and runoff rates to the drainage system.
- 1.6 Current local Sustainable drainage guidance is to reduce the peak runoff rate to the QBAR greenfield rate, or as close as practical in line with Mid Sussex District Council.
- 1.7 As this site is small the pre-development greenfield rates are very low. As such, it is impracticable to have a flow control device to limit to these rates as the orifice would be too small and would pose a blockage risk. Therefore, a Hydro-brake orifice diameter of 50mm (as defined in the Ciria SuDS Manual C753) is proposed, which would reduce runoff rates to a maximum of 1.3l/s for all events up to and including the 1 in 100year +40%CC storm event.
- 1.8 This drainage strategy proposes that all attenuation will be provided by a Geocellular tank. This is proposed to be discharged through an existing surface water outfall into the adjacent watercourse.
- 1.9 It is proposed the foul water be treated on site in a self-contained treatment plant. The existing foul water treatment is proposed to be reused if it is still compliant and in good condition. A CCTV survey will be required to check the condition of the existing foul network.
- 1.10 This report has been produced broadly in accordance with the National Planning Policy Framework (NPPF), the Ciria SuDS manual, Mid Sussex County Council SFRA

2.0 POLICY COMPLIANCE

- 2.1 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding, as per the:
 - National Planning Policy Framework
 - Ciria SuDS Manual
 - Mid Sussex District Council SFRA
 - British Water code of Practice

3.0 SITE LOCATION

- 3.1 The proposed development location is at The Lake House, Rowfant, Crawley, RH10 4TB The site location is outlined within Figure 1 below.



Figure 1 - Site location within red line boundary

- 3.2 It is understood the proposed development is for the construction of a replacement to an existing dwelling.

4.0 GEOLOGY AND INFILTRATION POTENTIAL

- 4.1 According to the British Geological Survey (BGS) Geology Viewer, bedrock geology on site is of the Upper Tunbridge Wells Sand, consisting of sandstone and siltstone.
- 4.2 The SFRA for mid Sussex (extracted below) states Soils in the area are generally poor to moderately drained.

Settlement/Area	FRA guidance	SuDS guidance
Copthorne and land east of Crawley (within Mid Sussex)	Fluvial flood risk is the main flood risk issue in this locality. Within Copthorne and to the west of the village are significant areas of Flood Zone 2 and 3 that are associated with a number of tributaries within the River Mole catchment. Any proposed development within these areas will need to be accompanied by a FRA. These aforementioned flood zone areas and other areas at risk from all forms of flooding are also to the south of the village. Development in this location will need to ensure that it does not compromise the ability to implement the River Mole Flood Alleviation Strategy. Proposals for development in the north west of Copthorne Common (outside Flood Zone 2 and 3, but has historically flooded) will need to be accompanied by a FRA, which will need to address fluvial and pluvial flood risk.	Due to the risk of flooding in areas downstream (i.e. parts of Crawley and Horley, including Gatwick Airport) care needs to be taken to avoid exacerbating downstream flood risk and therefore any discharge of surface waters into watercourses in the area needs to be carefully controlled. Bearing this in mind and the fact that the soils in the area are generally poor to moderately drained (as demonstrated by the number of ponds and surface water ditches in the area) in most instances attenuation type SuDS will need to be implemented. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.

- 4.3 The driveway area may be able to be a permeable surface depending on the infiltration potential.

5.0 SOURCES OF FLOODING

5.1 Tidal and Fluvial

- 5.1.1 The Environment Agency (EA) mapping for Flood Risk (Figure 3), shows the site to be located largely within Flood Zone 1 (Low risk of fluvial or tidal flooding indicating a less than 0.1% annual probability of flooding).

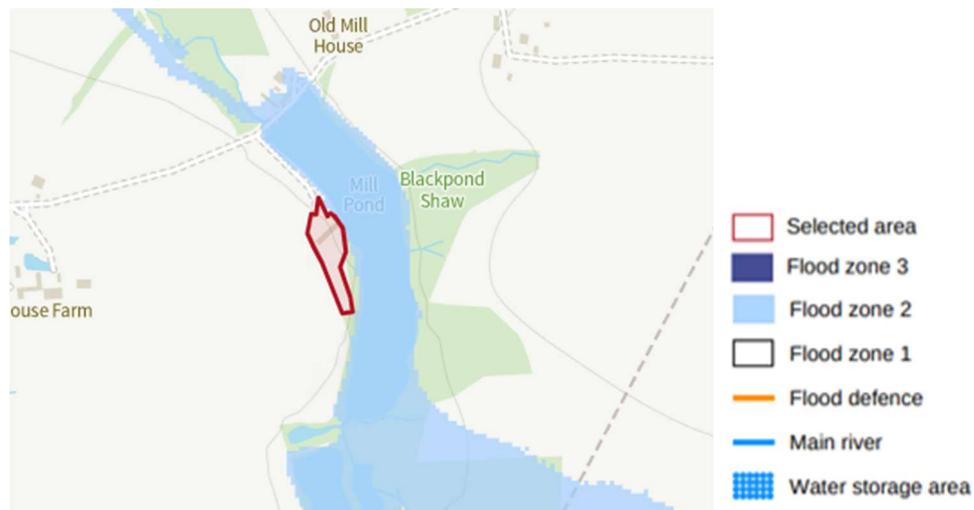


Figure 3 - EA Flood Map for planning Extract

5.2 Surface water

5.2.1 The Environment agency (EA) mapping for Flood risk (figure 4) shows the site to be at very low risk low risk of surface water flooding. This means the area has a less than 0.1% chance of flooding each year.

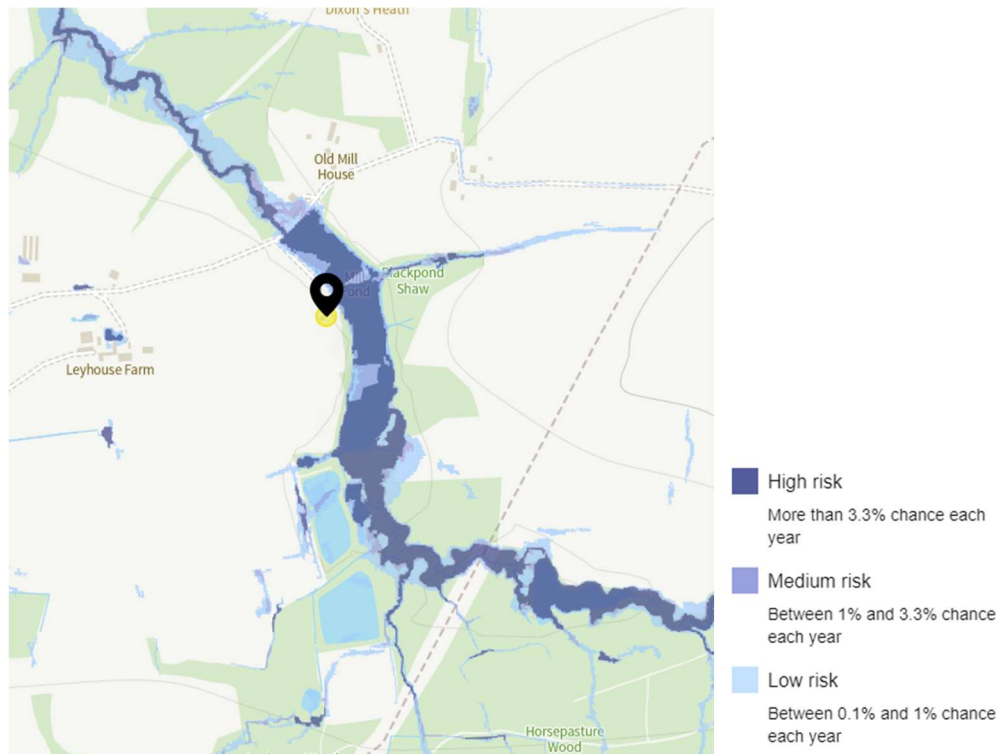


Figure 4 - EA surface water risk map

6.0 CLIMATE CHANGE ALLOWANCES

- 6.1 Making an allowance for climate change in the design of surface water drainage systems will help to minimise vulnerability and provide resilience to flooding and coastal change in the future. Climate Change allowances vary across the UK subject to catchment conditions and are based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere.
- 6.2 Climate change allowances were recently updated by the EA and the climate change allowances are now defined by River Catchment peak rainfall allowances and peak river flow allowances.
- 6.3 The data published on the DEFRA database shows the site located within the Hole Management Catchment and for this residential development (lifespan 100yrs) an upper end allowance of 40% should be applied to rainfall events as the climate change allowance within this region.
- 6.4 As the site is located in close proximity to Flood Zone 2 it would be necessary to apply the central peak flow allowance for 100-year return period 12% should watercourse modelling be necessary.

7.0 SUSTAINABLE URBAN DRAINAGE (SUDS) ASSESSMENT

7.1 In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development.

7.2 The management of surface water has been considered in respect to the SuDS hierarchy below as detailed in the CIRIA 753 'The SUDS Manual', Section 3.2.3:

SUDS DRAINAGE HIERARCHY				
			Suitability	Comment
	1.	Store rainwater for later use	✓	Rainwater harvesting should be considered by the developer.
	2.	Use infiltration techniques, such as porous surfaces in non-clay areas	x	The Driveway area may be able to be a permeable surface depending on infiltration potential
	3.	Attenuate rainwater in ponds or open water features for gradual release	x	Not proposed due to steepness of site.
	4.	Attenuate rainwater by storing in tanks or sealed water features for gradual release	✓	Geocellular attenuation is necessary to reduce runoff rates to a maximum of 1.3l/s
	5.	Discharge rainwater direct to a watercourse	✓	Surface water to discharge into the adjacent Mill pond
	6.	Discharge rainwater to a surface water sewer/drain	x	Unnecessary due to management further up hierarchy
	7.	Discharge rainwater to Combined Sewer	x	Unnecessary due to management further up hierarchy

7.3 Following the SuDS drainage hierarchy, infiltration has been considered to not be viable as a way of managing runoff from the main building roof. The driveway area may be able to be a permeable surface depending on the infiltration potential. In the Mid Sussex SFRA it is stated of the land east of Crawley in the Copthorne area that "Soils in the area are generally

poor to moderately drained” ... “In most instances attenuation type SuDS will need to be implemented.”

- 7.4 The suitability of SuDS components has been assessed in order to provide a sustainable means of providing the required attenuation volumes. The following components have been assessed as follows in Table 2, below.

SUITABILITY OF SUDS		
SuDS Component	Comment	Suitability
Infiltrating SuDS	The driveway area may be able to be a permeable surface depending on the infiltration potential.	x
Permeable Pavement	Permeable pavement recommended for the reshaped driveway areas	✓
Green / Blue Roofs	Not proposed in this instance	x
Rainwater Harvesting	It is recommended that Water Butts be implemented, where feasible and where there is space to do so.	✓
Swales	Insufficient space to implement such conveyancing SuDS techniques	x
Rills and Channels	These could be provided in landscaping areas for amenity but would overall provide little benefit to the required storage volumes.	✓
Bioretention Systems	These could be provided in landscaping areas for amenity but would overall provide little benefit to the required storage volumes.	✓
Retention Ponds and Wetlands	Retention ponds/ wetlands have not been recommended due to the steep gradient.	x
Detention Basins	Detention basins have not been recommended due to the steep gradient on site.	x
Geocellular Systems	Permavoid tank is proposed in order to provide necessary attenuation to reduce runoff rates in line with local guidance	✓
Proprietary Treatment Systems	Unnecessary due to management further up the hierarchy	x
Filter Drains and Filter Strips	Unnecessary due to management further up the hierarchy	x

Table 2: Suitability of SuDS Components

7.5 Rainwater harvesting

- 7.5.1 The standard position taken by regulators, is that the storage provided within water butts or rainfall harvesting measures does not normally count towards the attenuation storage requirements as there is no guarantee that these devices would be empty at the time that a rainfall event occurs. The principle which allows rainwater systems to be designed to provide surface water control (prevent runoff) is based on demand being greater (on average over a period of time) than the supply to it. As such, rainwater harvesting can be

considered around the site in the form of water butts, but has been excluded from any storage calculations.

7.6 Geocellular storage

7.6.1 Geocellular systems can be used to control and manage rainwater surface water runoff either as a soakaway or a storage tank. In this instance it is used as a tank to provide attenuation.

7.6.2 The modular/honeycomb nature of Geocellular systems means that they can be tailored to suit the specific requirements of any site. The maintenance of Geocellular crates consists of regular inspection of silt traps, manholes, pipework and pre-treatment devices, with removal of sediment and debris as required.

7.6.3 Guidance about proper use, installation and maintenance of any proprietary system should be provided by the supplier and incorporated into the site proposals at detailed design stage.

8.0 SURFACE WATER DRAINAGE STRATEGY

8.1 In accordance with the NPPF, developments are required to use SuDS to reduce both the volume and runoff rates to the drainage system.

8.2 Current local Sustainable drainage guidance is to reduce runoff rates to the pre development greenfield rate, or as close as practical, for all events up to and including the 1 in 100 year storm event.

8.3 As a conservative estimate the drained area used is 600m². This accounts for the full building footprint and the area of the driveway that is graded towards the house. This requires a 40m² Geocellular tank situated to the east of the house.

8.4 The driveway area may be able to be a permeable surface depending on the infiltration potential. But to be conservative this has been considered to drain to the storage network at this time.

8.5 A Hydro-brake would reduce discharge from the Geocellular tank to a maximum of 1.3l/s for all events up to and including the 1 in 100 year+40%CC event. This represents a betterment of at least 81% over brownfield runoff rates for all events.

8.6 Proposed surface water runoff rates have been calculated in Causeway Flow and are shown in the table below. A proposed storm drainage strategy plan layout is included in Appendix II.

SURFACE WATER DISCHARGE RATES SUMMARY					
	Area (ha)	Discharge Rates (l/s)			
		2 year/Q _{BAR}	30 year	100 year	100 year +40%CC
Greenfield Rates (0.1ha)	0.1	0.58	1.34	1.85	-
Greenfield Rates (site area)	0.06	0.0348	0.0804	0.1110	-
Existing Brownfield Rates (existing building and hardstanding)	0.06	9.2	23.4	28.9	39.5
Proposed Runoff Rates (proposed hardstanding)	0.6	1.0	1.0	1.0	1.3
Betterment		89%	96%	97%	97%

- 8.7 It is proposed the water be discharged through existing infrastructure if feasible. Otherwise, a new headwall and service manhole is proposed to be installed.
- 8.8 According to Causeway Flow calculations (Appendix III) and site plans, the Geocellular tank is to have an area of 40m² with a depth of 0.6m and a porosity of 95% giving a volume of 22.8m³. The half drain time will be 368 minutes.
- It is assumed the gravel access road and driveway drain as existing. Areas that are being changed are proposed to drain through permeable paving into the attenuation tank.
- 8.9 It may be necessary to pump the lower ground floor subject to detail design.

9.0 FOUL WATER DRAINAGE STRATEGY

- 9.1 Foul water generated by the new development is to discharge into the adjacent lake after going through a suitable treatment plant.
- 9.2 If the existing treatment plant is still compliant with current regulations it can be reused. Otherwise, a newer system may be required.
- 9.3 Should the current system not be compliant with current regulations the new System is to be specified by specialist. The new treatment plant should be designed to accommodate a minimum population of 11. As defined in the British water code of practice for sizing waste treatment plants.
- 9.4 The calculated populations conservatively assumes that the second floor above the garage can be utilised as an annex.

10.0 WATER QUALITY

- 10.1 The primary risk to water quality is from the trafficked areas. The plans included in Appendix II and III shows permeable pavement proposed to be provided to treat surface water runoff.
- 10.2 The Pollution Hazard Indices are summarised in Table 4 – Summary of Pollution Hazard Indices for different Land Use below (based on Table 26.2 of The SuDS Manual):

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
LAND USE	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Carparks	Low	0.5	0.4	0.4
Residential roofs	Very low	0.2	0.2	0.05
MAXIMUM POLLUTION HAZARD INDEX		0.5	0.4	0.4

Table 4: Summary of Pollution hazard Indices for different Land Use

- 10.3 When designing suitable treatment trains to deliver adequate treatment prior to discharging to sewers, watercourse or groundwater, consideration of the treatment properties of each SuDS component specified should be reviewed. With the total mitigation potential of a SuDS treatment train determined by:

$$SuDS_1 + 0.5 * SuDS_2 + 0.5 * SuDS_3 \dots = Total\ SuDS\ Mitigation\ Index$$

- 10.4 The Mitigation Indices of the proposed SuDS techniques are summarised in Table 6 below.

INDICATIVE SuDS MITIGATION INDICES FOR DISCHARGES TO SURFACE WATER			
SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving/Proprietary Treatment	0.7	0.6	0.7
TOTAL SUDS MITIGATION INDEX	0.7	0.6	0.7

Table 5: Indicative SuDS Mitigation Indices.

- 10.5 The gravel path functions as a permeable pavement treating the runoff before it enters the wider network through a filter drain. This area has been excluded from providing storage due to its gradient.
- 10.6 It can be seen that the Total SuDS Mitigation Index $\geq$ Pollution Hazard Index therefore the water treatment provided by this SuDS train is enough to remove the potential pollutants.

11.0 SCHEDULE OF MAINTENANCE

- 11.1 All onsite SuDS and drainage systems will be privately maintained. The property owner will be responsible for the management and maintenance of SuDS devices. A long-term maintenance regime should be agreed with the site owners before adoption.
- 11.2 In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction. Typical key suds components operation and maintenance activities are provided below.

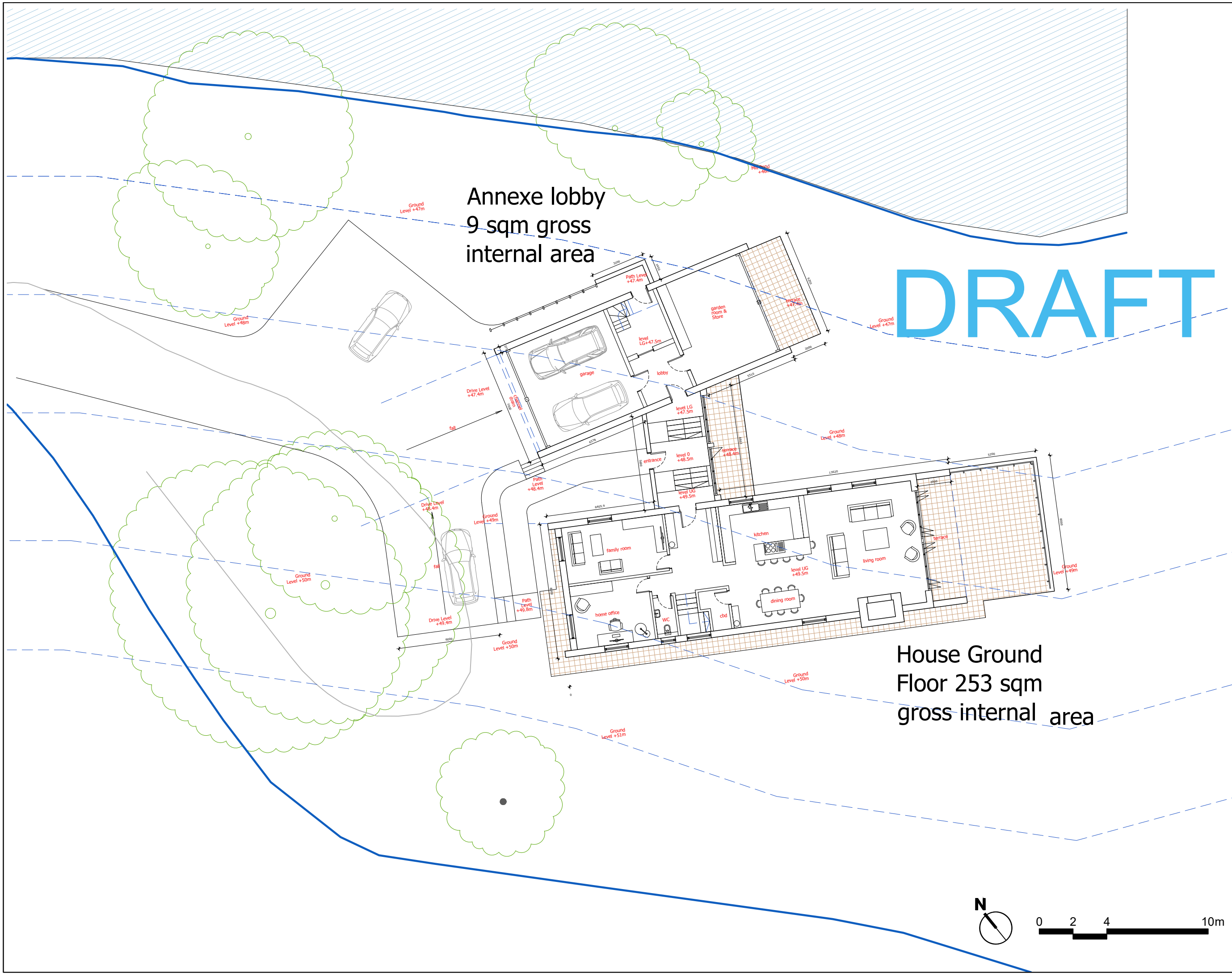
PROPOSED SCHEDULE OF MAINTENANCE FOR BELOW GROUND DRAINAGE				
Item	Visual Inspection	Cleanse / De-sludge	CCTV Survey	Comments
Surface Water Drainage System (pipework, chambers etc.)	5 years	10 years	10 years	Cleansing to be carried as necessary
Gullies/Channels	1 year	1 year	N/A	Cleansing to be carried as necessary
Permeable Paving	1 year	'Swept' clean of debris every 2 years.	N/A	Lift surfacing and remove sand bedding and replace and re-bed surfacing – refer to individual manufacturers recommendations.
Geocellular crates	6 months	As required		Following any significant storm event, the flow control to be inspected to ensure no blockage
Hydrobrake	0.5 year	As required	N/A	Following any significant storm event, the flow control to be inspected to ensure no blockage
Wastewater treatment plant	0.5 year			Cleansing to be carried as manufacturers requirements

Table 11: Schedule of Maintenance for Below Ground Drainage

12.0 CONCLUSION

- 12.1 Meridian Civil Engineering Consultancy LTD (MCEC) has been instructed by Planit Consulting to prepare a Foul and Surface Water Drainage Strategy for the development at The Lake House, Rowfant, Crawley, RH10 4TB
- 12.2 It is understood the proposed development is for the construction of a single replacement dwelling.
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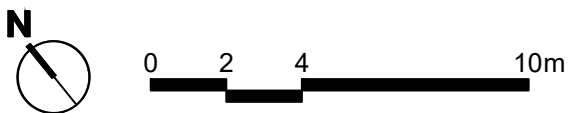
APPENDIX I Architects plans



Annexe lobby
9 sqm gross
internal area

DRAFT

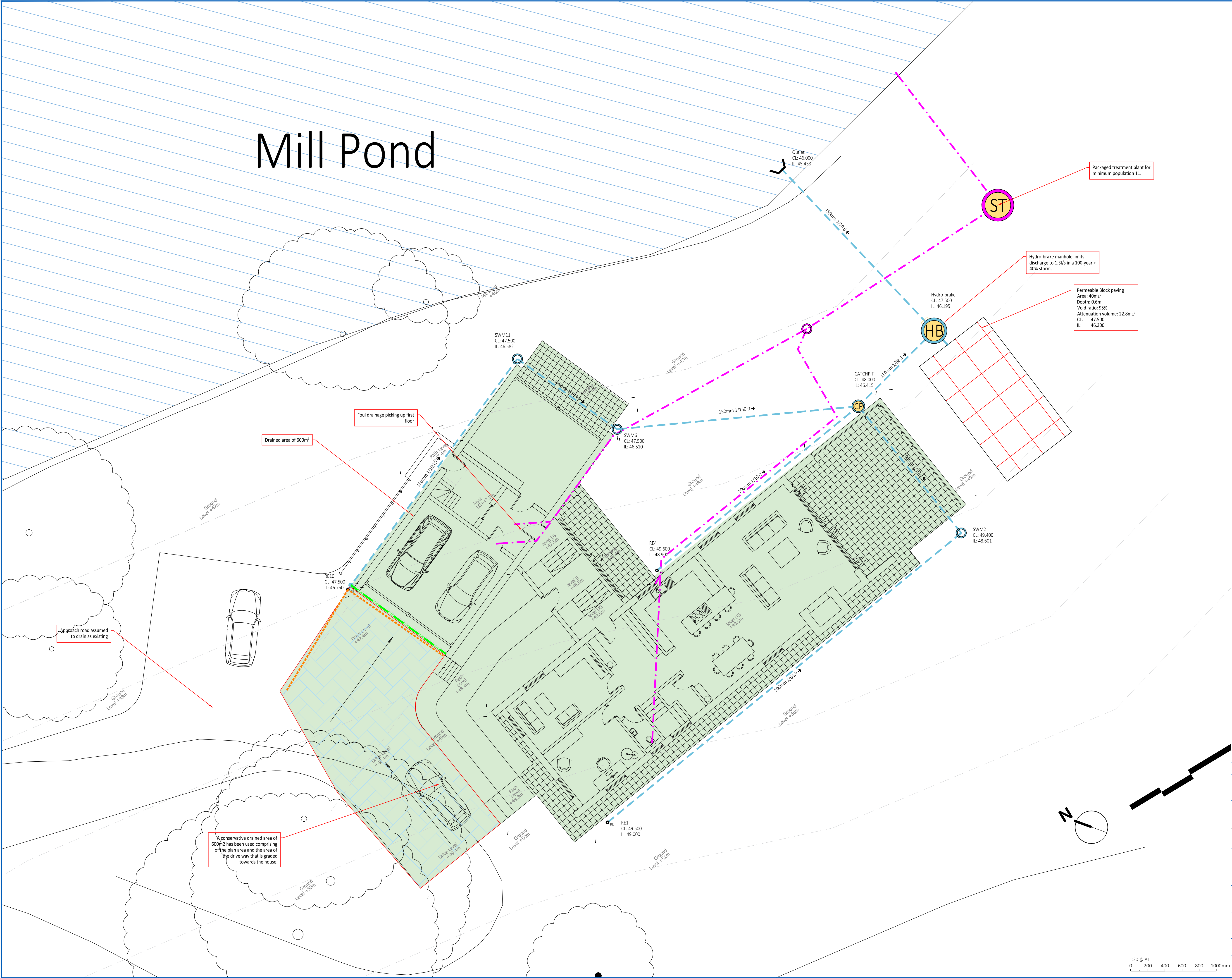
House Ground
Floor 253 sqm
gross internal area



NOTES:			
1. THESE DRAWINGS ARE FOR PLANNING PURPOSES ONLY			
2. BUILDING CONTRACTORS SHOULD NOT SCALE FROM THESE DRAWINGS			
BY	DATE	DESCRIPTION	REV
PLANIT CONSULTING			
TOWN PLANNING & PROPERTY ADVISERS			
T. 01483 415753 E. info@planitconsulting.co.uk			
www.planitconsulting.co.uk			
CLIENT:			
Mr P. Williams			
PROJECT:			
The Lake House, Rowfant			
DRAWING TITLE:			
Proposed Ground Floor Plan			
STATUS:			
Draft For Information			
SCALE:	DATE:		
1:200 @ A3	07/06/2024		
DRAWN BY:	DRAWING NUMBER:	REVISION:	
AC		-	

APPENDIX II Proposed Drainage Layout

Mill Pond



1. GENERAL

a. THIS DRAWING IS NOT TO BE SCALED, WORK TO FIGURED DIMENSIONS ONLY, CONFIRMED ON SITE.

b. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS, DETAILED SPECIFICATIONS WHERE APPLICABLE AND ALL ASSOCIATED DRAWINGS IN THIS SERIES.

c. ANY DISCREPANCY ON THIS DRAWING IS TO BE REPORTED IMMEDIATELY TO THE PARTNERSHIP FOR CLARIFICATION.

d. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND FOR THE STABILITY OF THE WORKS IN PROGRESS.

e. CDM REGULATIONS 2015. ALL CURRENT DRAWINGS AND SPECIFICATIONS MUST BE READ IN CONJUNCTION WITH THE DESIGNER'S HAZARD RISK AND ENVIRONMENT ASSESSMENT RECORD. DESIGN HAS BEEN PRODUCED BASED ON INFORMATION PROVIDED BY THE CLIENT/PRINCIPLE DESIGNER AVAILABLE AT TIME OF ISSUE. CONTRACTOR TO REVIEW DRAWING AND SPECIFICATION IN CONTEXT WITH THE WIDER SITE AND SPECIFIC SITE INVESTIGATION, CONTAMINATION ASSESSMENT, ASBESTOS SURVEY, ENVIRONMENTAL SURVEY, UXO SURVEY AND ANY OTHER RELEVANT INFORMATION AND MANAGE RISKS RELATING TO THE WORKS OUTLINED IN THE DRAWINGS AND SPECIFICATION. PRINCIPLE CONTRACTOR TO MAKE DESIGNER AND CLIENT AWARE OF SITE SPECIFIC RISKS THAT MAY AFFECT THE DRAWING AND SPECIFICATION.

f. CDM REGULATIONS 2015. FOR GENERIC MAINTENANCE AND MANAGEMENT RISKS REFER TO CHAPTER 36 OF CIRIA 752 SUDS MANUAL. FOR PROPRIETARY SYSTEMS SEE MANUFACTURER'S MANAGEMENT AND MAINTENANCE DETAILS AND RISK ASSESSMENT WITH REGARDS TO MAINTENANCE OF PROPRIETARY SYSTEMS.

2. CONSTRUCTION NOTE

a. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.

b. THE MAIN CONTRACTOR IS RESPONSIBLE FOR ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.

c. ANY INFORMATION GIVEN REGARDING EXISTING UNDERGROUND SERVICES IS GIVEN IN GOOD FAITH AFTER CONSULTATION WITH THE RELEVANT AUTHORITY, HOWEVER ACCURACY IS NOT CERTAIN. THE MAIN CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL INFORMATION ON SITE PRIOR TO WORK COMMENCING AND TAKING DUE CARE AND ATTENTION WHILST UNDERTAKING THE WORKS.

d. THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.

e. ALL PRODUCTS SPECIFIED SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS. IF THERE ARE DISCREPANCIES BETWEEN THAT INFORMATION AND THE DETAILS ON ANY MERIDIAN DRAWINGS, THE MANUFACTURER'S INSTRUCTIONS MUST BE USED.

3. BELOW GROUND DRAINAGE

a. UPVC-U PIPES TO BS 4660 : 2000 AND PLASTIC INSPECTION CHAMBERS AND FITTINGS TO BS EN 13598-1:2020. CLAY PIPES TO BS EN 295-1:2013. CONCRETE MANHOLE AND INSPECTION CHAMBERS TO BS EN 1917:2002.

b. ALL ADAPTABLE DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE App C - DESIGN AND CONSTRUCTION GUIDANCE AND THE RELEVANT COUNCIL DESIGN GUIDE.

c. ALL PRIVATE FOUL WATER SEWERS TO BE LAID AT 1 IN 40 AT THE HEAD OF PIPE RUNS AND 1 IN 80 ELSEWHERE UNLESS OTHERWISE STATED.

d. ALL PRIVATE FOUL SEWER PIPES TO BE 100mm DIAMETER FROM SOIL STACKS UNLESS OTHERWISE STATED ON THE DRAWING AND 150mm WHERE SERVING MORE THAN 9 PROPERTIES.

e. ALL PRIVATE SURFACE WATER SEWERS TO BE LAID AT 1 IN 100 UNLESS OTHERWISE STATED ON THE DRAWING.

f. ALL PRIVATE SURFACE WATER SEWER PIPES TO BE 100mm DIAMETER FROM DOWNPIPES AND 150mm DIAMETER ELSEWHERE UNLESS OTHERWISE STATED ON THE DRAWING.

g. ALLOW FOR RODDING ACCESS ABOVE GROUND WHERE RAINWATER DOWNPIPES OR SOIL STACKS DO NOT HAVE A DIRECT CONNECTION TO AN INSPECTION CHAMBER.

h. EXISTING SEWER PIPE TO BE RE-USED TO BE SURVEYED AND LEVELED PRIOR TO COMMENCEMENT OF THE DRAINAGE WORKS AND REFURBISHED IF NECESSARY.

i. CONNECTIONS TO AN ADOPTED SEWER ONLY TO BE MADE FOLLOWING APPROVAL FROM THE RELEVANT ADOPTING AUTHORITY.

j. ALL DRAINS, SEWER PIPES AND MANHOLES TO BE CLEANED AND TESTED FOR WATER TIGHTNESS ON COMPLETION OF CONSTRUCTION.

4. MANHOLE COVERS AND FRAMES

a. MANHOLE COVERS TO BE CLASS D400 IN HIGHWAYS, CLASS B125 IN FOOTWAYS AND VERGES, CLASS A15 IN NON-TRAFFICKED AREAS.

b. MANHOLE COVER AND FRAME TO BE BEDDED AND SURROUNDED IN 1:3 MORTAR.

LEGEND

PROPOSED TYPE 3 SW INSPECTION CHAMBER

PROPOSED SW PIPE RUN

PROPOSED PERFORATED SW DRAIN

HYDRO-BREAK MANHOLE

PACKAGED TREATMENT PLANT

CATCHPIT CHAMBER/MANHOLE

PROPOSED SW RODDING EYE

PROPOSED FW PIPE RUN

GEOCELLULAR ATTENUATION - TANKED

DRAINED AREA

PROPOSED TYPE 3 FW INSPECTION CHAMBER

P01

Drainage and foul strategy for planning.

DF

19/06/24

REV:

DESCRIPTION:

BY:

DATE:

STATUS:

Preliminary

CLIENT:

Planit

SITE:

The Lake House

TITLE:

Drainage strategy

SCALE AT A1:

1:100

DATE:

10/06/2024

DRAWN:

DF

CHECKED:

MN

PROJECT NO:

MC0478

DRAWING NO:

CIV01

REVISION:

P01

APPENDIX III Calculations

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		4.00	49.500	100	57.300	58.019	0.500
2	0.027	4.00	49.400	450	77.972	74.930	0.799
Hydrobreak			47.500	1200	75.556	87.590	1.305
4	0.004	4.00	49.600	100	60.187	72.736	0.700
5			48.000	1200	71.955	82.334	1.585
6			47.500	450	57.748	80.761	0.990
10	0.016	4.00	47.500	150	41.842	71.689	0.750
11	0.013	4.00	47.500	450	52.026	85.099	0.918
Outlet			46.000	1200	65.461	98.336	0.542
12			47.500		77.206	85.903	1.178

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	10	11	16.839	0.600	46.750	46.582	0.168	100.0	150	4.28	50.0
1.001	11	6	7.180	0.600	46.582	46.510	0.072	100.0	150	4.40	50.0
1.002	6	5	14.294	0.600	46.510	46.415	0.095	150.0	150	4.69	50.0
2.000	1	2	26.708	0.600	49.000	48.601	0.399	66.9	100	4.47	50.0
2.001	2	5	9.541	0.600	48.601	47.647	0.954	10.0	100	4.54	50.0
3.000	4	5	15.186	0.600	48.900	47.381	1.519	10.0	100	4.10	50.0
1.003	5	12	6.349	0.600	46.415	46.322	0.093	68.3	150	4.78	50.0
1.004	12	Hydrobreak	2.360	0.600	46.322	46.195	0.127	18.6	150	4.79	50.0
1.005	Hydrobreak	Outlet	14.744	0.600	46.195	45.458	0.737	20.0	150	4.90	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.005	17.8	3.1	0.600	0.768	0.016	0.0	42	0.757
1.001	1.005	17.8	5.6	0.768	0.840	0.029	0.0	58	0.891
1.002	0.818	14.5	5.6	0.840	1.435	0.029	0.0	65	0.766
2.000	0.942	7.4	0.0	0.400	0.699	0.000	0.0	0	0.000
2.001	2.458	19.3	5.1	0.699	0.253	0.027	0.0	35	2.067
3.000	2.458	19.3	0.7	0.600	0.519	0.004	0.0	14	1.188
1.003	1.219	21.5	11.4	1.435	1.028	0.060	0.0	78	1.236
1.004	2.347	41.5	11.4	1.028	1.155	0.060	0.0	54	2.007
1.005	2.262	40.0	11.4	1.155	0.392	0.060	0.0	55	1.955

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	1440	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Hydrobreak Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	46.195	Product Number	CTL-SHE-0050-1000-0750-1000
Design Depth (m)	0.750	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	46.322
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	368

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	0.0	0.600	40.0	0.0	0.601	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	49.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	2	10	48.633	0.032	4.1	0.0052	0.0000	OK
120 minute winter	Hydrobreak	94	46.432	0.237	6.0	0.2677	0.0000	SURCHARGED
15 minute winter	4	10	48.912	0.012	0.6	0.0001	0.0000	OK
15 minute summer	5	10	46.487	0.072	9.1	0.0814	0.0000	OK
15 minute winter	6	10	46.567	0.057	4.5	0.0091	0.0000	OK
15 minute winter	10	10	46.788	0.038	2.5	0.0007	0.0000	OK
15 minute winter	11	10	46.637	0.055	4.5	0.0087	0.0000	OK
15 minute summer	Outlet	1	45.458	0.000	1.0	0.0000	0.0000	OK
120 minute winter	12	92	46.428	0.106	7.6	4.2477	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	1	2.000	2	0.0	0.000	0.000	0.0294	
15 minute winter	2	2.001	5	4.1	1.906	0.212	0.0205	
120 minute winter	Hydrobreak	Hydro-Brake®	Outlet	1.0				9.1
15 minute winter	4	3.000	5	0.6	1.102	0.031	0.0082	
15 minute summer	5	1.003	12	9.1	1.802	0.421	0.0374	
15 minute winter	6	1.002	5	4.4	0.614	0.306	0.1038	
15 minute winter	10	1.000	11	2.5	0.541	0.141	0.0783	
15 minute winter	11	1.001	6	4.5	0.747	0.252	0.0431	
120 minute winter	12	1.004	Hydrobreak	6.0	0.473	0.145	0.0365	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	49.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	2	10	48.657	0.056	10.5	0.0089	0.0000	OK
120 minute winter	Hydrobreak	118	46.664	0.469	4.7	0.5303	0.0000	SURCHARGED
15 minute winter	4	10	48.919	0.019	1.5	0.0002	0.0000	OK
120 minute winter	5	118	46.664	0.249	7.4	0.2816	0.0000	SURCHARGED
120 minute winter	6	118	46.664	0.154	3.6	0.0245	0.0000	SURCHARGED
15 minute winter	10	10	46.812	0.062	6.4	0.0011	0.0000	OK
15 minute winter	11	10	46.682	0.100	11.5	0.0160	0.0000	OK
15 minute summer	Outlet	1	45.458	0.000	1.0	0.0000	0.0000	OK
120 minute winter	12	118	46.664	0.342	9.1	13.6770	0.0000	SURCHARGED

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	1	2.000	2	0.0	0.000	0.000	0.0604	
15 minute winter	2	2.001	5	10.5	2.412	0.544	0.0415	
120 minute winter	Hydrobreak	Hydro-Brake®	Outlet	1.0				20.8
15 minute winter	4	3.000	5	1.5	1.446	0.078	0.0157	
120 minute winter	5	1.003	12	7.1	1.130	0.328	0.1118	
120 minute winter	6	1.002	5	3.6	0.595	0.249	0.2516	
15 minute winter	10	1.000	11	6.4	0.665	0.360	0.1635	
15 minute winter	11	1.001	6	11.5	0.888	0.646	0.0937	
120 minute winter	12	1.004	Hydrobreak	4.7	0.477	0.112	0.0415	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	49.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	2	10	48.667	0.066	13.3	0.0105	0.0000	OK
120 minute winter	Hydrobreak	118	46.774	0.579	5.3	0.6551	0.0000	SURCHARGED
15 minute winter	4	10	48.922	0.022	1.9	0.0002	0.0000	OK
120 minute winter	5	118	46.774	0.359	9.0	0.4066	0.0000	SURCHARGED
120 minute winter	6	118	46.775	0.265	4.6	0.0421	0.0000	SURCHARGED
15 minute winter	10	10	46.821	0.071	8.1	0.0013	0.0000	OK
15 minute winter	11	11	46.789	0.207	14.5	0.0330	0.0000	SURCHARGED
15 minute summer	Outlet	1	45.458	0.000	1.0	0.0000	0.0000	OK
120 minute winter	12	118	46.774	0.452	8.8	18.0916	0.0000	SURCHARGED

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	1	2.000	2	0.0	0.000	0.000	0.0732	
15 minute winter	2	2.001	5	13.3	2.531	0.689	0.0501	
120 minute winter	Hydrobreak	Hydro-Brake®	Outlet	1.0				26.1
15 minute winter	4	3.000	5	1.9	1.549	0.098	0.0186	
120 minute winter	5	1.003	12	8.5	1.184	0.395	0.1118	
120 minute winter	6	1.002	5	4.4	0.603	0.306	0.2516	
15 minute winter	10	1.000	11	8.1	0.688	0.456	0.2172	
15 minute winter	11	1.001	6	13.5	0.903	0.762	0.1264	
120 minute winter	12	1.004	Hydrobreak	-5.3	0.579	-0.128	0.0415	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	49.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	2	10	48.696	0.095	18.6	0.0151	0.0000	OK
180 minute winter	Hydrobreak	172	47.444	1.249	3.8	1.4131	0.0000	FLOOD RISK
15 minute winter	4	10	48.926	0.026	2.7	0.0002	0.0000	OK
180 minute winter	5	172	47.445	1.030	8.7	1.1650	0.0000	SURCHARGED
180 minute winter	6	172	47.445	0.935	4.3	0.1487	0.0000	FLOOD RISK
180 minute winter	10	172	47.446	0.696	2.6	0.0125	0.0000	FLOOD RISK
180 minute winter	11	172	47.446	0.863	4.6	0.1373	0.0000	FLOOD RISK
15 minute summer	Outlet	1	45.458	0.000	1.0	0.0000	0.0000	OK
180 minute winter	12	172	47.445	1.123	8.5	24.0200	0.0000	FLOOD RISK

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	1	2.000	2	0.0	0.000	0.000	0.1023	
15 minute winter	2	2.001	5	18.4	2.619	0.953	0.0680	
180 minute winter	Hydrobreak	Hydro-Brake®	Outlet	1.3				40.6
15 minute winter	4	3.000	5	2.7	1.712	0.140	0.0240	
180 minute winter	5	1.003	12	8.5	1.125	0.396	0.1118	
180 minute winter	6	1.002	5	4.0	0.547	0.279	0.2516	
180 minute winter	10	1.000	11	2.6	0.564	0.146	0.2964	
180 minute winter	11	1.001	6	4.3	0.718	0.240	0.1264	
180 minute winter	12	1.004	Hydrobreak	3.8	0.543	0.092	0.0415	