

Summer Lodge, Copyhold Lane, Cuckfield

Drainage Strategy and Maintenance Schedule



Document Ref: 25187-HOD-XX-XX-RP-C-5800

Document Control

Document Reference	25187-HOD-XX-XX-RP-C-5800
Project Name	Huf Haus Smith
Location	Summer Lodge, Copyhold Lane, Cuckfield, Haywards Heath, RH17 5EB
Client	Eclipse Group
Title	Drainage Strategy and Maintenance Schedule

Revision	Purpose	Date	Author	Checked	Authorised
Z01	Initial issue	08/08/25	JOD	RR	

1 Introduction

- 1.1.1 Hodel Ltd have been instructed by Eclipse Group to prepare a foul and surface water drainage strategy to supplement a planning application at Summer Lodge, Copyhold Lane, Cuckfield.
- 1.1.2 This strategy has been undertaken in accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG).
- 1.1.3 This report has been produced in consultation with relevant authorities, and referenced to established data, documents and guidance that is published by the Environment Agency (EA), the Lead Local Flood Authority (LLFA) and the Local Planning Authority (LPA), the Water Authority and the Internal Drainage Board (IDB).

2 Existing Site

2.1 Description

- 2.1.1 The site is located at Summer Lodge, Copyhold Lane, near Haywards Heath - National Grid Ref 530956E, 123609N. A copy of the site location plan is shown in Figure A.



Figure A - Site Location Plan

- 2.1.2 The site comprises of an existing residential property and garden which form a rectangular plot. There are residential properties located to the East and West, fields to the South and a private road (Copyhold Lane) located along the northern boundary. The site area measures approximately 0.75ha.

2.2 Topography

- 2.2.1 A topographical survey has been undertaken, this survey shows that the existing ground levels range from circa 64.60mAOD at the southeastern end of the site, to circa 80.00mAOD at site access on the northeastern boundary. There is a general fall across the site from north to south.

2.3 Existing Drainage

Sewer records for the site, purchased from Southern Water, show there are no sewers in the local area. An extract of the sewer records and CCTV survey can be found in Appendix A. Although a site

visit has not been undertaken at this stage, based on the available information it appears that foul drainage discharges to a septic tank, and surface water down pipes discharge to ground.

3 Proposed Surface and Foul Water Drainage

3.1 Proposed Development

- 3.1.1 It is proposed to demolish the existing dwelling and construct a replacement in a similar location. The proposed drawings are provided within Appendix B. It is noted that the existing garage building is to be retained.

3.2 Foul Water

- 3.2.1 Foul drainage is proposed to connect to a new Foul Package Treatment Plant with an outfall to a drainage field/mound. The proposed drainage strategy can be found in Appendix C.

3.3 Surface Water

- 3.3.1 Onsite infiltration testing has not yet been undertaken and therefore a conservative infiltration rate has been used to size a soakaway that drains roof water to ground.
- 3.3.2 Hardstanding areas proposed to be constructed of permeable construction.
- 3.3.3 If at detailed design stage, once ground infiltration testing has been undertaken, it is found that ground conditions are not suitable for infiltration, then other options will be investigated, such as connection to a local watercourse. If a discharge offsite is required, then it is proposed that a flow rate be limited to 1.0 litre per second for all modelled events up to and including a 1 in 100 year plus 45% climate change allowance. As the site is located within the Adur and Ouse Management Catchment, a 45% climate change allowance has been utilised based on the 2070s epoch upper end allowance for a 1 in 100 year return period.
- 3.3.4 The proposed drainage strategy can be found in Appendix C for an infiltration option. Hydraulic calculations have been produced and can be found in Appendix D for a soakaway dealing with roof water.
- 3.3.5 If an offsite connection is required, then an attenuation tank of dimensions 3.5m, long, 2.0m wide, and 1.2m deep will be required. It is assumed that a hydrobrake will be used to control the flow rate.

4 Drainage System Maintenance

- 4.1.1 The below ground surface water drainage system at the site comprises of a traditional piped system, which is supported by the implementation of SuDS.
- 4.1.2 The pipework has been designed to be self-cleansing and as such should require no maintenance. If a blockage occurs, the system has been designed so that easy rodding or jetting can take place.
- 4.1.3 Inspections should be undertaken after any adverse weather event with the required maintenance or remediation works undertaken to ensure the system remains fully operational.

4.2 Responsibility for maintenance

- 4.2.1 As per the Defra document “Delivering Sustainable Drainage Systems” dated September 2014, maintenance responsibility can reside with several parties.

Service management companies

Responsible for the maintenance of public spaces within new developments inclusive of, the maintenance of sustainable drainage systems. Under this option householders and premises occupiers would pay for sustainable drainage systems maintenance as part of the annual service charge. Developers will need to ensure that any requirement to pay fees is binding.

Water and sewerage companies

If a Company and a developer agreed, the developer could build (or contribute towards the construction of) a sustainable drainage system that the Company would subsequently own. The sustainable drainage system would be included within a Water and Sewerage Company's ordinary charging scheme, and maintenance costs would be funded through the surface water drainage element of household water bills

Local government

Some local authorities may wish to take on responsibility for the maintenance of sustainable drainage systems as part of their wider public open space and amenity management function and/or where the sustainable drainage system provides advantages for the wider community.

Private Individuals: property owners or occupiers

The owners/occupiers of properties drained by sustainable drainage systems that do not also drain other properties to maintain their own sustainable drainage system.

4.3 Maintenance Schedule

4.3.1 Below is a table setting out the various elements of the drainage system and maintenance requirements. The list of actions is not exhaustive and some actions may not always be required.

Drainage Feature	Inspection Frequency / Requirement	Maintenance Requirement	Responsibility
Gullies/channels	Every 6 months, for silt and debris.	Silt and debris to be cleared from gully pots.	Private Individuals / property owners or occupiers
Rainwater Downpipes	Every 12 months, for silt and leaves.	Silt to be cleared from gully pot, leaves to be cleared from gutters and downpipes.	Private Individuals / property owners or occupiers
Pipework	If a problem occurs, by CCTV survey.	As recommended by CCTV survey company.	Private Individuals / property owners or occupiers
Catchpits/sumps	First 3 months	Soon after site works have completed, a large amount of build-up is normally expected within the drainage system. Lift the cover to the silt trap chamber and assess any silt build up. Any build up should be removed and disposed of.	Private Individuals / property owners or occupiers
	Every 6 months, for silt and debris.	Silt and debris to be cleared.	Private Individuals / property owners or occupiers
Hydro-Brake	As per manufacturer's requirements.	As per manufacturer's requirements.	Private Individuals / property owners or occupiers
Attenuation Storage Tanks	Refer to Section 4.4		Private Individuals / property owners or occupiers
Pervious Pavement Systems	Refer to Section 4.5		Private Individuals / property owners or occupiers
Soakaways	Refer to Section 4.6		Private Individuals / property owners or occupiers

Table A - Drainage Maintenance Schedule

4.4 Attenuation Storage Tanks

- 4.4.1 Operations and maintenance requirements for attenuation storage tanks as per Table 21.3 of the CIRIA SuDS Manual 2015

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months then annually.
	Remove debris from the catchment surface (where is may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays	Annually or as required.
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey the inside of the tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Table B - Attenuation Tank Maintenance Schedule

4.5 Pervious Pavement Systems

4.5.1 Operations and maintenance requirements for pervious pavement systems as per Table 20.15 of the CIRIA SuDS Manual 2015

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (Standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required - once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table C - Pervious Paving Maintenance Schedule

4.6 Soakaways

4.6.1 Operations and maintenance requirements for soakaways as per Table 13.1 of the CIRIA SuDS Manual 2015

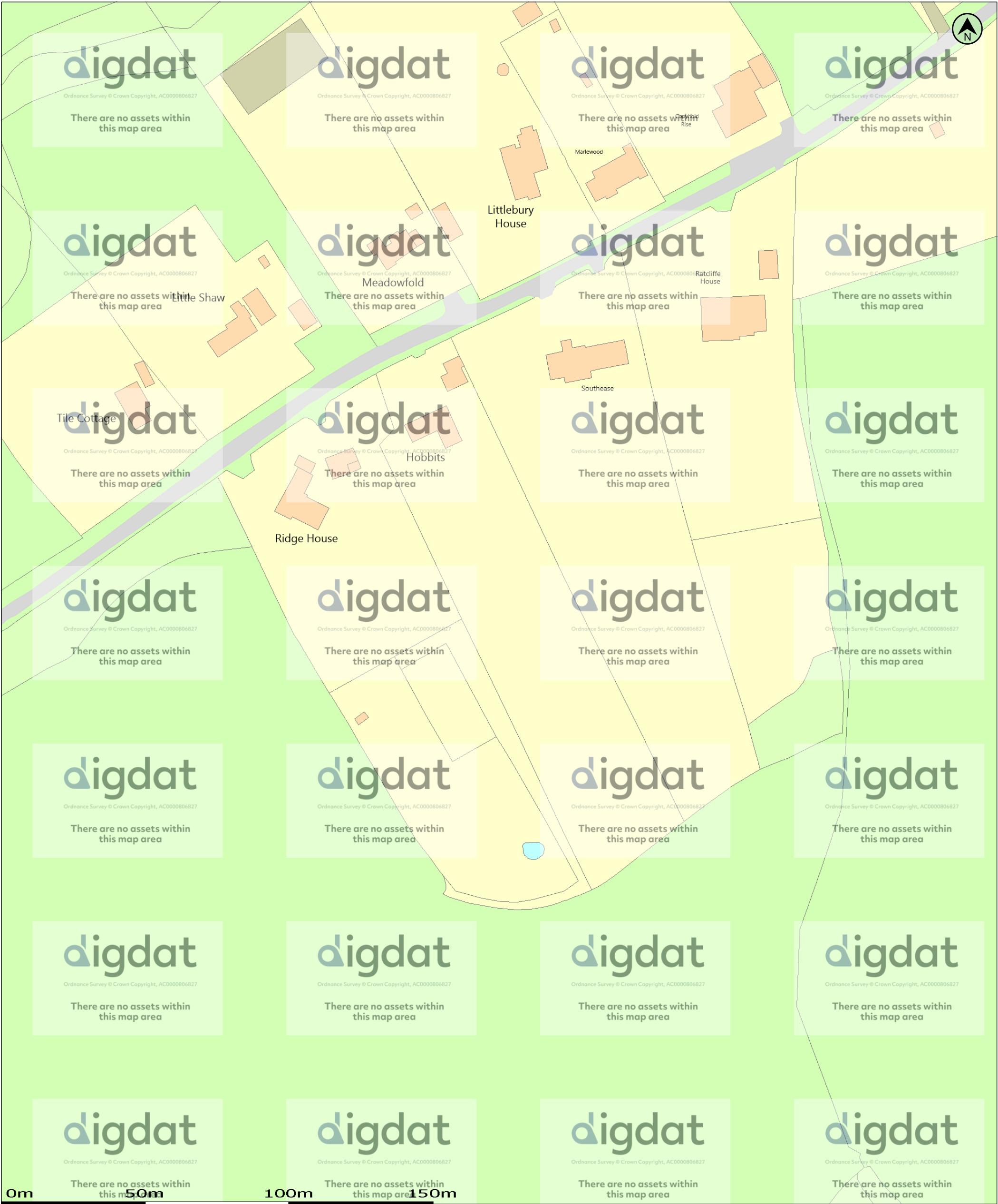
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes.	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings.	As required based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required.
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required.
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually.
	Check Soakaway to ensure emptying is occurring.	Annually

Table D - Soakaway Maintenance Schedule

5 Conclusions and Recommendations

- 5.1.1 Foul water generated onsite is to discharge to a new Foul Package Treatment Plant with an outfall to a drainage field/mound.
- 5.1.2 New hardstanding areas are to be of permeable construction. A soakaway has been proposed based on a conservative infiltration rate. Should soakaways be found to not be viable, then a connection offsite at a restricted rate has been proposed.

Appendix A - Sewer Records



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122
Data updated: 23/07/25

Scale: 1:1250
Map Centre: 530978,123548

Date: 08/08/25
Our Ref: 1846774 - 1

Wastewater Plan A3
Powered by digdat

 Foul Gravity Sewer

 Combined Gravity Sewer

 Culverted Water Course or Treated Effluent

 Surface Water Gravity Sewer

 Rising Main, Vacuum or Syphon

 Combined Outfall

 Foul Outfall

 Surface Water Outfall

 Surface Water Inlet

 Combined Pumping Station

 Surface Water Pumping Station

 Foul Pumping Station

 Water Treatment Works Section 104 Area

 Building Over Agreement Area

 Foul Manhole

 Combined Manhole

 Surface Water Manhole

 Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway

mail@hodel.uk

25187



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 . This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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

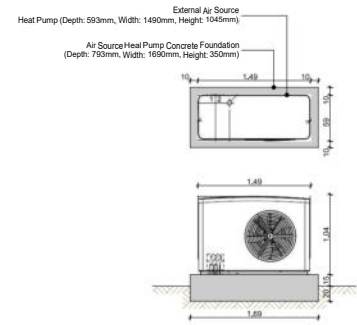
Appendix B - Proposed Drawings



Ridge House

Southease

Air Source Heat Pump Details



1:50 @ A1

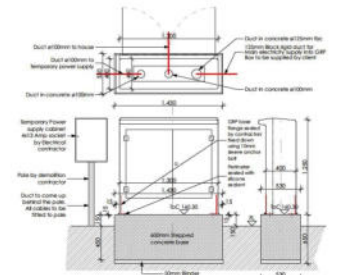


Type	WPL 25 AS
Part no.	232492
Output at A2/W35 (EN 14511)	8.32 kW
Output at A-7/W35 (EN 14511)	13.05 kW
Coefficient of performance at A2/W35 (EN 14511)	3.96
Coefficient of performance at A-7/W35 (EN 14511)	2.98

Technical data

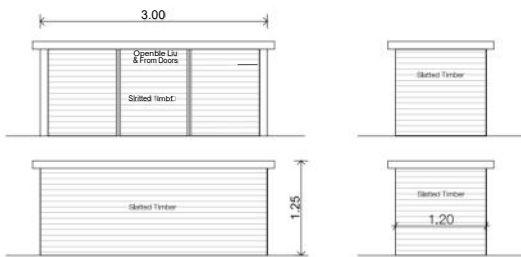
Energy efficiency class, heat pump W35	A++
Energy efficiency class, W55 heat pump	A++
Energy efficiency class, composite system (heat pump + controller) W35	A+++
Energy efficiency class, composite system (heat pump + controller) W55	A++
Sound power level (EN 12102)	56 dB(A)
Sound pressure level at 5 m distance in a free field	34 dB(A)
Rated compressor voltage	230 V
Rated voltage, emergency/booster heater	230 V
Max. application limit on the heating side	65 °C
Height	1045 mm
Width	1490 mm
Depth	593 mm
Weight	175 kg

Utilities Cabinet



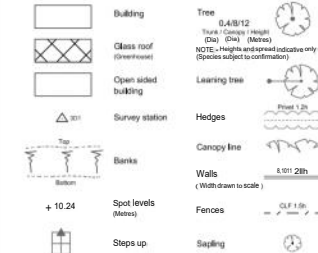
1:50 @ A1

Enclosed Refuse & Recycling Storage



1:50 @ A1

Site Plan



Abbreviations (where applicable)

Bollard	BOL	Letter box	LB
British Telecom box	BTB	Manhole	MH
British Telecom IC	BT	Marker	MR
Cable television box	CTB	Notice board	NB
Cable television IC	CTV	Overhead cables	OHC
Concrete	CONC	Parking meter	PM
Change point	CP	Rodding eye	RE
Concrete paving slabs	CPS	Road name plate	RNP
Cover level	CL	Road sign	RS
Damp proof course	DPC	Rainwater pipe	RWP
Electricity pole	EP	Stop cock	SC
Earth rod	ER	Structural slab level	SSL
Flower bed	FB	Stop valve	SV
Finished floor level	FFL	Telephone call box	TCB
Fire hydrant	FH	Traffic lights	TL
Gas valve	GV	Top of wall	TOW
Gully	G	Telegraph pole	TP
IC	IC	Unknown	UNK
Inspection cover	IL	Unable to lift	UTL
Invert level	INV	Vent pipe	VP
Pipe invert level	PIP	Water meter	WM
45° to outlet	LP	Wash out	WO
Lamp post			

Fences

Barbed wire	BWF	Beech	BE
Closed board	CBF	Birch	BI
Chain link	CLF	Conifer	CON
Chestnut paling	CPF	Cypress	CYP
Chicken wire	CWF	Elder	EL
Iron rail	IRF	Hawthorn	HAW
Interwoven	IWF	Hornbeam	HB
Larch lap	LLF	Horse Chestnut	HC
Open board	OFB	Multi-Boled	MB
Post & chain	PCF	Sweet Chestnut	SWC
Post & rail	PRF	Sycamore	SYC
Post & wire	PWF	Silver Birch	SB
Wire mesh	WMF	Willow	WL

DATUM USED : ALL LEVELS BASED ON OS DATUM. HORIZONTAL GRID IS BASED ON OS COORDINATES. ALL INFORMATION CREATED BY GPS DATA.



Status: ISSUE

D	15/07/2025	EF	PH	PA	GR	Drawing Status Changed to Issue
C	14/07/2025	EF	PH	PA	GR	Red Cullage Amended
B	15/07/2025	EF	PH	PA	GR	Site Information Updated
A	08/07/2025	EF	PH	PA	GR	Site Information Updated
	05/07/2025	EF	PH	PA	GR	Planning Application Prepared
Rev	Date Drawn	Drawn By	Checked By			Project Notes

PETER HUF
ARCHITECTURE

The Control Tower | 112 De Havilland Drive | Brooklands
Weybridge | Surrey | UK | T0181 606 1000

Title: **PLANNING APPLICATION
SELF-BUILT
REPLACEMENT DWELLING**

Client: **Lance & Fiona Smith**

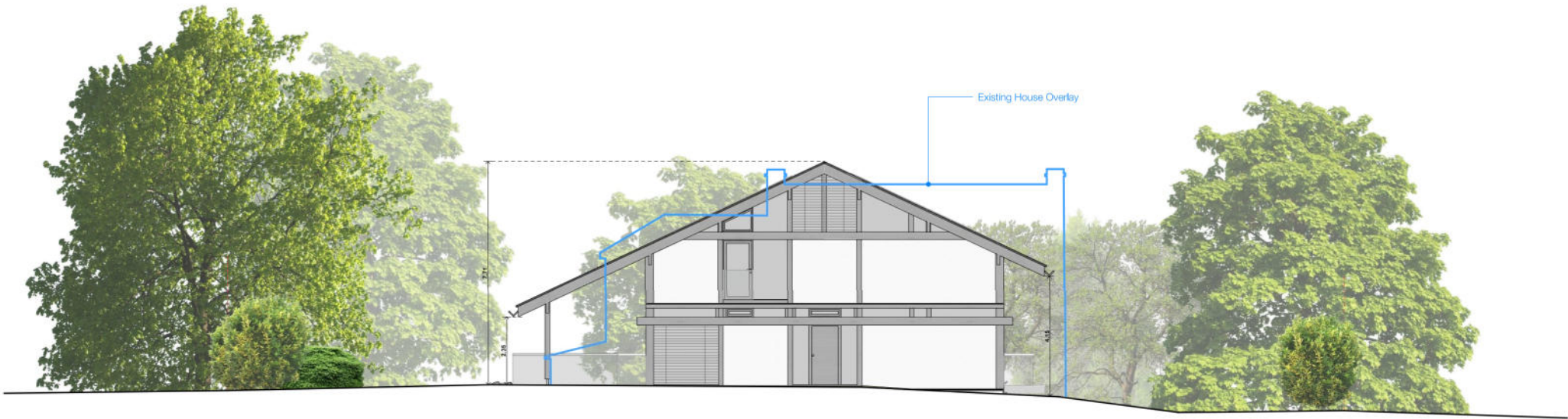
Site Address: **Bummer Lodge
Copyhold Lane
Cuckfield
Haywards Heath
RH17 5EB**

Architect: **Peter Huf** M.Arch, Dip. Ing. (B.C.)

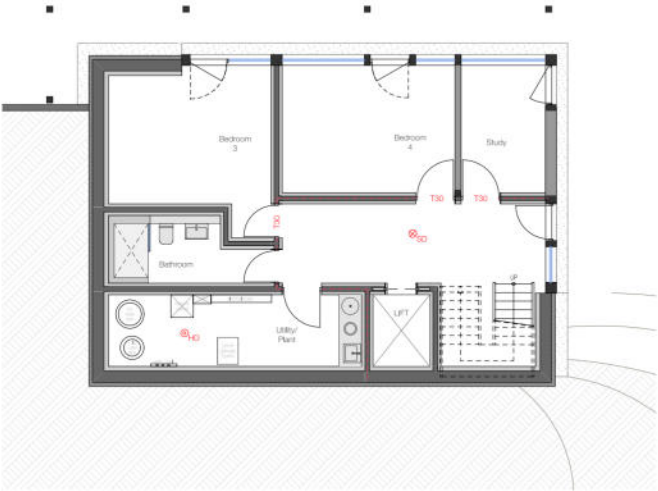
Plan: Proposed Site Plan

Scale: 1:200A1

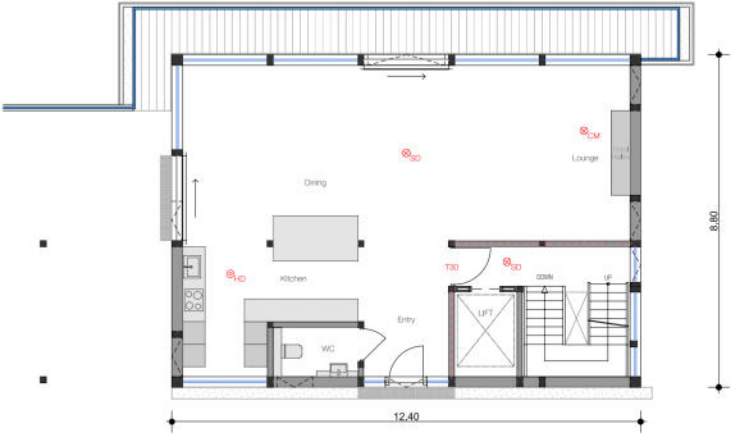
Drawing No.: b120d



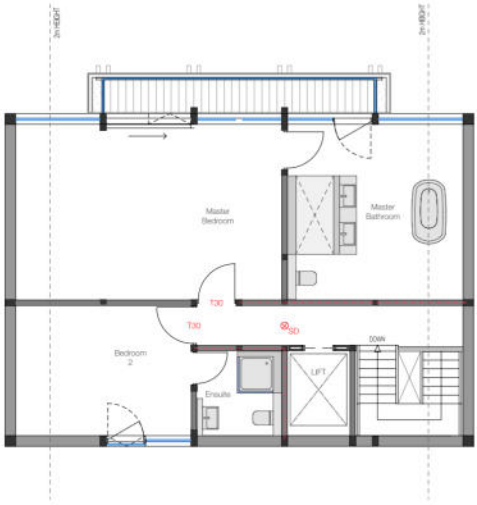
Front NW Elevation



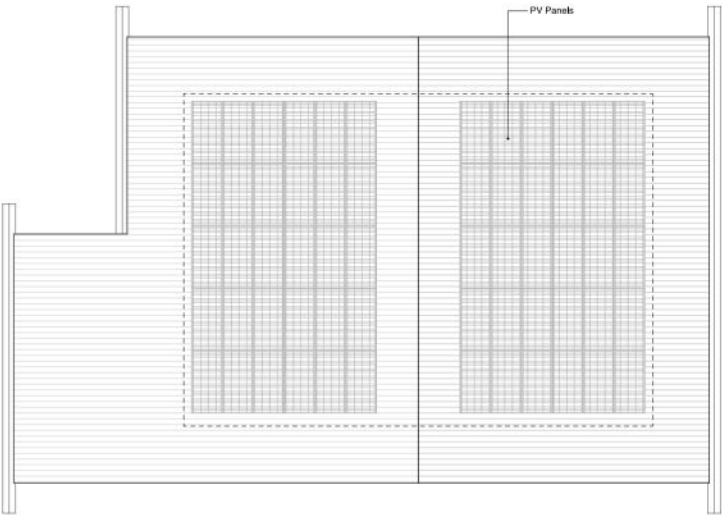
Basement / Lower level



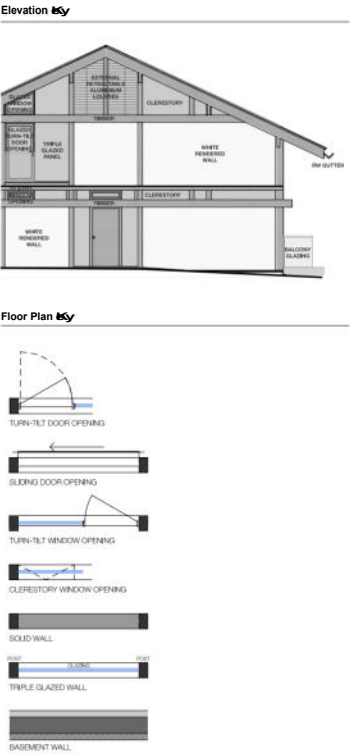
Ground Floor



First Floor



Roof Plan



Area Schedule:

GEA (Gross External Area):	
Ground Floor	109.12 m ²
First Floor	109.12 m ²
Basement	108.34 m ²
Total	326.58 m ²

GIA (Gross Internal Area):	
Ground Floor	97.56 m ²
First Floor	97.56 m ²
Basement	91.17 m ²
Total	286.29 m ²



Status: **ISSUE**

Rev	Date Drawn	Drawn By	Checked By	Project Notes
C	15/07/2025	EF	PH PA GR	Drawing Status Changed to Issue
B	10/07/2025	EF	PH PA GR	House Amendments & PV Added
A	08/07/2025	EF	PH PA GR	House Amendments
	03/07/2025	EF	PH PA GR	Planning Application Prepared

PETER HUF
ARCHITECTURE

The Control Tower | 12 De Havilland Drive | Brooklands
Weybridge | Surrey | **TK13** OYP

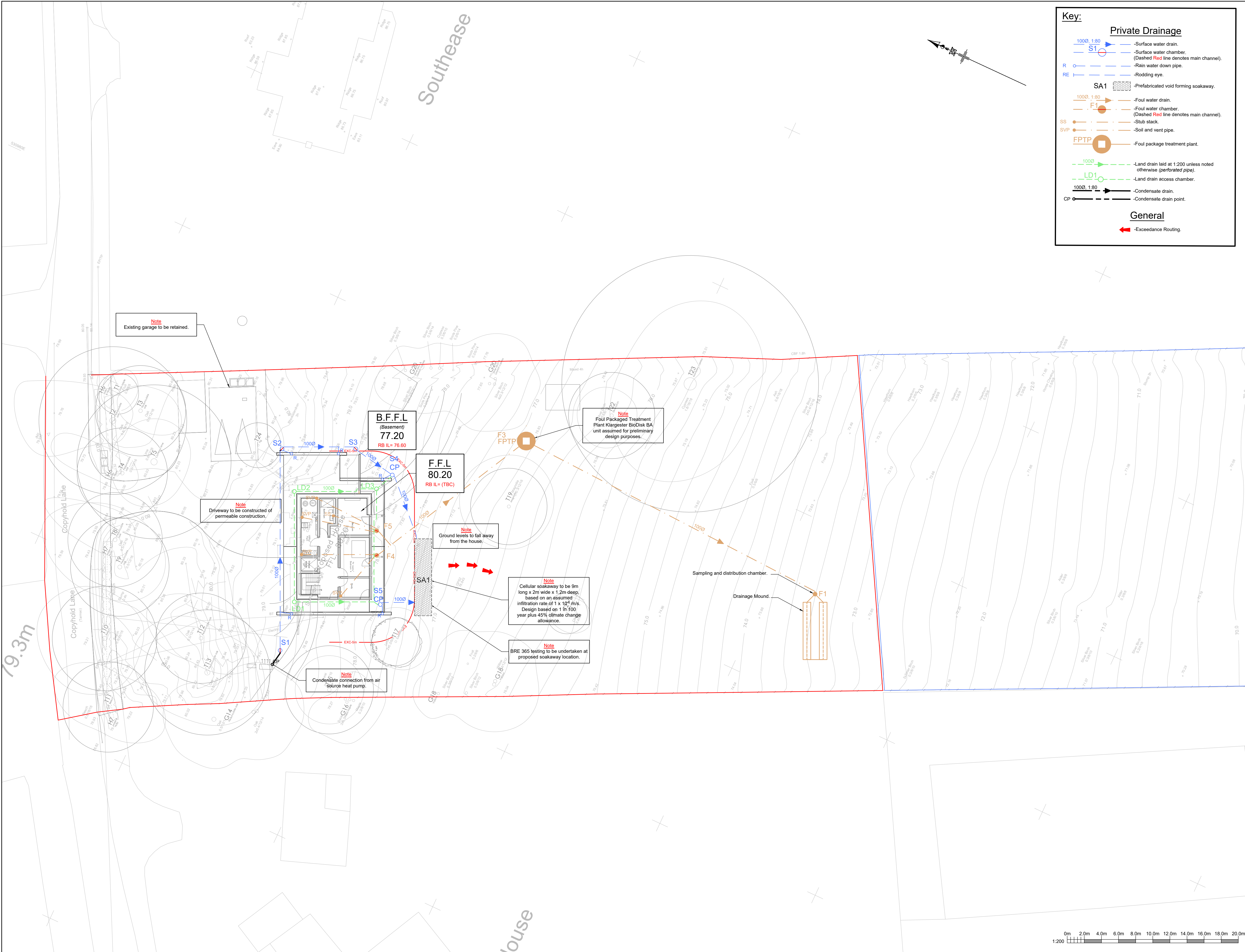
Title: **PLANNING APPLICATION
SELF-BUILT
REPLACEMENT DWELLING**

Client: Lance & Fiona Smith
Site Address: **Summer Lodge**
Copyhold Lane
Cuckfield
Haywards Heath
RH17 5EB

Architect: Peter Huf M.Arch. Dip.L-Ing. (FH)

Plan: Proposed Floor Plans & Front Elevation
Scale: 1:100A1
Drawing No.: b100c

Appendix C – Engineering Layout



Key:

Private Drainage

- 1000, 1.80 S1 - Surface water drain.
- 1000, 1.80 F1 - Surface water chamber. (Dashed Red line denotes main channel).
- R - Rain water down pipe.
- RE - Rodding eye.
- SA1 - Prefabricated void forming soakaway.
- 1000, 1.80 F1 - Foul water drain.
- 1000, 1.80 F1 - Foul water chamber. (Dashed Red line denotes main channel).
- SS - Stub stack.
- SVP - Soil and vent pipe.
- FPTP - Foul package treatment plant.
- 1000 - Land drain laid at 1:200 unless noted otherwise (perforated pipe).
- LD1 - Land drain access chamber.
- 1000, 1.80 - Condensate drain.
- CP - Condensate drain point.

General

- Exceedance Routing.

NOTES

- Do not scale this drawing unless for Planning Permission purposes only.
- This drawing is to be read in conjunction with all other relevant Engineer's and Architect's drawings and specifications.

Sheet 1/2

Sheet 2/2

Master Plan (NTS)

Drawings References:

Drawing:	Drawing no:	Rev:	Date:
Proposed Site Plan	b1204	D	15/07/25
Tree Root Protection	Summer L0006 ADT TCP 01_25.07_BOUND		July '25
Proposed Basement	Smith B		28/07/25
Proposed Ground Floor	Smith GF		28/07/25

RISK ASSESSMENT

Residual Risks Identified

- None currently identified (08/08/25)

Contractor's General Risk Items

(List is not exhaustive but includes commonly raised issues)

- Location of all buried services.
- Existing drainage:
 - i) Gases, confined spaces, diseases.
 - ii) Maintain flow in drains during works.
- Manual lifting of heavy objects; manhole covers, drainage pipes, concrete rings, kerbs etc.
- Excavation for drainage trenches and manholes.
- Security:
 - Keep site secure from members of the public.
 - maintain public safety when accessing site.

P01	08/08/25	DR	JOD	Preliminary issue.
Rev	Date	By	Chkd	Revision notes

Job Title

Huf Smith, Copyhold Lane,
Cuckfield, Haywards Heath,
RH17 5EB.

Drawing Title

Engineering Layout.
Sheet 1 of 2.

Client

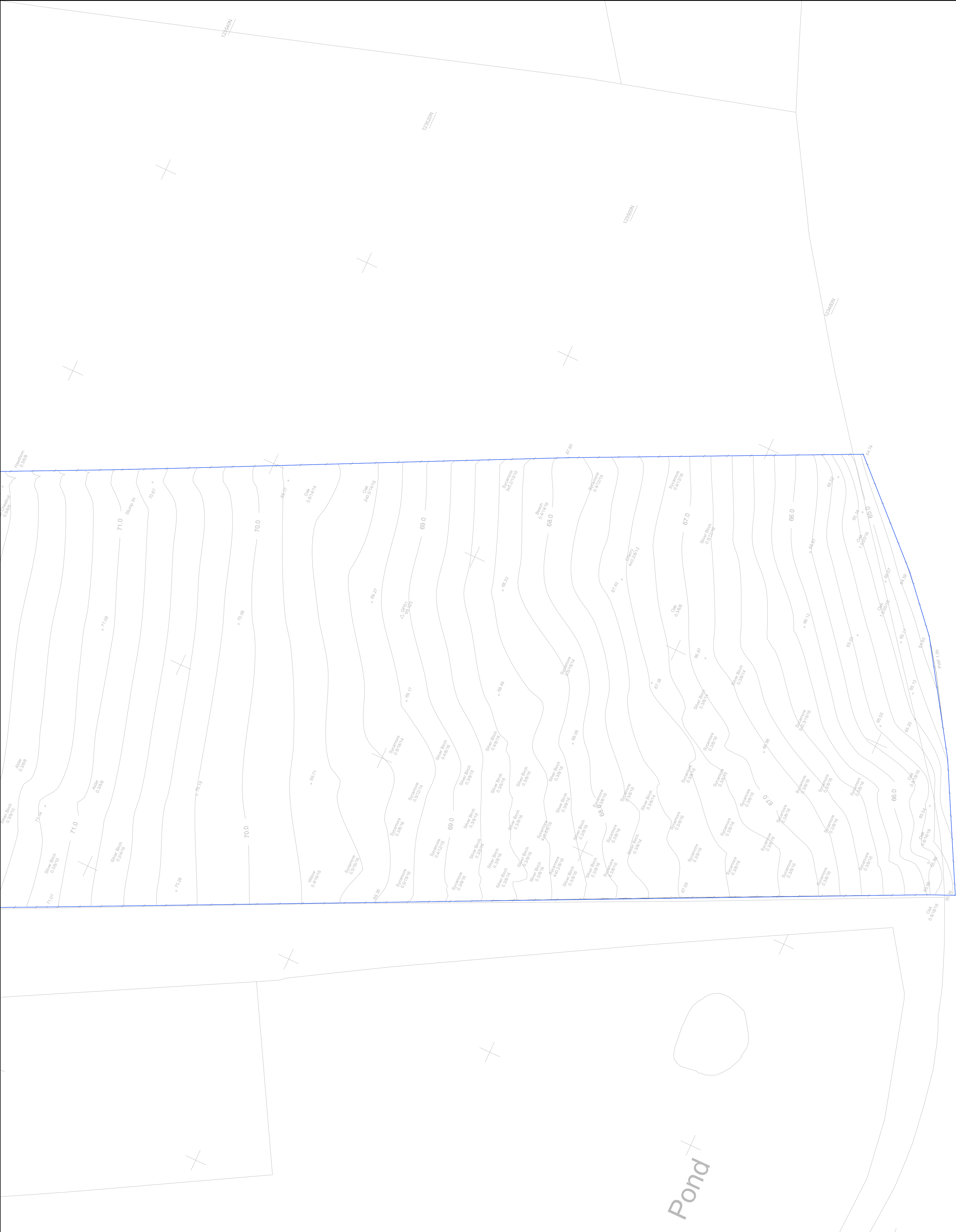
Eclipse

HODEL
CONSULTING
ENGINEERS
01732 617555 mail@hodel.uk

Scale at A1: 1:200	Status: PRELIMINARY	
Drawn: DR	Checked: JOD	Approved: -
Date: Aug '25	Date: Aug '25	Date: xxx

Document Reference: 25187-HOD-XX-ZZ-DR-C-5100

Revision: P01



Key:

Private Drainage

1000, 1:80

S1

R

RE

SA1

F1

SS

SVP

FPTP

LD1

1000, 1:80

CP

-Surface water drain.

-Surface water chamber.
(Dashed Red line denotes main channel).

-Rain water down pipe.

-Rodding eye.

-Prefabricated void forming soakaway.

-Foul water drain.

-Foul water chamber.
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Sheet 1/2

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ii) Maintain flow in drains during works.

3. Manual lifting of heavy objects; manhole covers, drainage pipes, concrete rings, kerbs etc.

4. Excavation for drainage trenches and manholes.

5. Security:

Keep site secure from members of the public.

maintain public safety when accessing site.

P01	08/08/25	DR	JOD	Preliminary issue.
Rev	Date	By	Chkd	Revision notes
Job Title				

Huf Smith, Copyhold Lane,
Cuckfield, Haywards Heath, RH17 5EB.

Drawing Title

Engineering Layout.
Sheet 2 of 2.

Client

Eclipse

HODEL

CONSULTING ENGINEERS

01732 617555 mail@hodel.uk

Scale at A1: 1:200

Status: PRELIMINARY

Drawn: DR

Checked: JOD

Approved: -

Date: Aug '25

Date: Aug '25

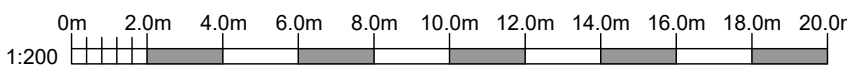
Date: xxx

Document Reference:

Revision:

25187-HOD-XX-ZZ-DR-C-5101

P01



Appendix D – MicroDrainage Calculations and Results

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 9762 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	8.536	0.236	0.0	5.0	O K
30 min Summer	8.619	0.319	0.0	6.8	O K
60 min Summer	8.710	0.410	0.0	8.8	O K
120 min Summer	8.808	0.508	0.0	10.9	O K
180 min Summer	8.865	0.565	0.0	12.1	O K
240 min Summer	8.905	0.605	0.0	12.9	O K
360 min Summer	8.967	0.667	0.0	14.2	O K
480 min Summer	9.011	0.711	0.0	15.2	O K
600 min Summer	9.047	0.747	0.0	16.0	O K
720 min Summer	9.076	0.776	0.0	16.6	O K
960 min Summer	9.121	0.821	0.0	17.6	O K
1440 min Summer	9.184	0.884	0.0	18.9	O K
2160 min Summer	9.240	0.940	0.0	20.1	O K
2880 min Summer	9.273	0.973	0.0	20.8	O K
4320 min Summer	9.305	1.005	0.0	21.5	O K
5760 min Summer	9.312	1.012	0.0	21.6	O K
7200 min Summer	9.308	1.008	0.0	21.6	O K
8640 min Summer	9.302	1.002	0.0	21.4	O K
10080 min Summer	9.295	0.995	0.0	21.3	O K
15 min Winter	8.564	0.264	0.0	5.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	134.623	0.0	19
30 min Summer	91.060	0.0	34
60 min Summer	58.739	0.0	64
120 min Summer	36.495	0.0	124
180 min Summer	27.161	0.0	184
240 min Summer	21.892	0.0	244
360 min Summer	16.168	0.0	364
480 min Summer	13.017	0.0	484
600 min Summer	10.992	0.0	604
720 min Summer	9.568	0.0	724
960 min Summer	7.678	0.0	964
1440 min Summer	5.620	0.0	1442
2160 min Summer	4.104	0.0	2164
2880 min Summer	3.278	0.0	2880
4320 min Summer	2.384	0.0	4320
5760 min Summer	1.901	0.0	5760
7200 min Summer	1.597	0.0	6848
8640 min Summer	1.385	0.0	7432
10080 min Summer	1.228	0.0	8168
15 min Winter	134.623	0.0	19

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	8.657	0.357	0.0	7.6	O K
60 min Winter	8.760	0.460	0.0	9.8	O K
120 min Winter	8.869	0.569	0.0	12.2	O K
180 min Winter	8.934	0.634	0.0	13.5	O K
240 min Winter	8.979	0.679	0.0	14.5	O K
360 min Winter	9.048	0.748	0.0	16.0	O K
480 min Winter	9.099	0.799	0.0	17.1	O K
600 min Winter	9.139	0.839	0.0	17.9	O K
720 min Winter	9.172	0.872	0.0	18.6	O K
960 min Winter	9.224	0.924	0.0	19.7	O K
1440 min Winter	9.296	0.996	0.0	21.3	O K
2160 min Winter	9.362	1.062	0.0	22.7	O K
2880 min Winter	9.402	1.102	0.0	23.6	O K
4320 min Winter	9.444	1.144	0.0	24.5	O K
5760 min Winter	9.460	1.160	0.0	24.8	O K
7200 min Winter	9.463	1.163	0.0	24.9	O K
8640 min Winter	9.457	1.157	0.0	24.7	O K
10080 min Winter	9.446	1.146	0.0	24.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.060	0.0	34
60 min Winter	58.739	0.0	64
120 min Winter	36.495	0.0	124
180 min Winter	27.161	0.0	182
240 min Winter	21.892	0.0	242
360 min Winter	16.168	0.0	362
480 min Winter	13.017	0.0	480
600 min Winter	10.992	0.0	598
720 min Winter	9.568	0.0	716
960 min Winter	7.678	0.0	954
1440 min Winter	5.620	0.0	1428
2160 min Winter	4.104	0.0	2136
2880 min Winter	3.278	0.0	2824
4320 min Winter	2.384	0.0	4196
5760 min Winter	1.901	0.0	5536
7200 min Winter	1.597	0.0	6848
8640 min Winter	1.385	0.0	8128
10080 min Winter	1.228	0.0	9272

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Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000	Winter Storms	Yes	Shortest Storm (mins)	15
Return Period (years)	100	Ratio R	0.336	Cv (Summer)	0.750	Longest Storm (mins)	10080
Region	England and Wales	Summer Storms	Yes	Cv (Winter)	0.840	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.020

Time (mins)		Area
From:	To:	(ha)
0	4	0.020

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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.300 Infiltration Coefficient Side (m/hr) 0.00360 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00360 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	22.5	22.5	1.200	22.5	50.1	1.201	0.0	50.1

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 74 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	8.951	0.651	0.0	0.8	0.8	4.3	O K
30 min Summer	9.120	0.820	0.0	0.8	0.8	5.5	O K
60 min Summer	9.219	0.919	0.0	0.9	0.9	6.1	O K
120 min Summer	9.227	0.927	0.0	0.9	0.9	6.2	O K
180 min Summer	9.192	0.892	0.0	0.9	0.9	5.9	O K
240 min Summer	9.148	0.848	0.0	0.9	0.9	5.6	O K
360 min Summer	9.063	0.763	0.0	0.8	0.8	5.1	O K
480 min Summer	8.980	0.680	0.0	0.8	0.8	4.5	O K
600 min Summer	8.902	0.602	0.0	0.7	0.7	4.0	O K
720 min Summer	8.830	0.530	0.0	0.7	0.7	3.5	O K
960 min Summer	8.693	0.393	0.0	0.7	0.7	2.6	O K
1440 min Summer	8.441	0.141	0.0	0.7	0.7	0.9	O K
2160 min Summer	8.332	0.032	0.0	0.6	0.6	0.2	O K
2880 min Summer	8.308	0.008	0.0	0.5	0.5	0.1	O K
4320 min Summer	8.300	0.000	0.0	0.4	0.4	0.0	O K
5760 min Summer	8.300	0.000	0.0	0.3	0.3	0.0	O K
7200 min Summer	8.300	0.000	0.0	0.3	0.3	0.0	O K
8640 min Summer	8.300	0.000	0.0	0.2	0.2	0.0	O K
10080 min Summer	8.300	0.000	0.0	0.2	0.2	0.0	O K
15 min Winter	9.041	0.741	0.0	0.8	0.8	4.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	134.623	0.0	5.0	17
30 min Summer	91.060	0.0	6.8	31
60 min Summer	58.739	0.0	8.8	56
120 min Summer	36.495	0.0	10.9	88
180 min Summer	27.161	0.0	12.2	124
240 min Summer	21.892	0.0	13.1	158
360 min Summer	16.168	0.0	14.6	228
480 min Summer	13.017	0.0	15.6	294
600 min Summer	10.992	0.0	16.5	362
720 min Summer	9.568	0.0	17.2	428
960 min Summer	7.678	0.0	18.4	558
1440 min Summer	5.620	0.0	20.2	766
2160 min Summer	4.104	0.0	22.2	1104
2880 min Summer	3.278	0.0	23.6	1464
4320 min Summer	2.384	0.0	25.8	0
5760 min Summer	1.901	0.0	27.4	0
7200 min Summer	1.597	0.0	28.7	0
8640 min Summer	1.385	0.0	29.9	0
10080 min Summer	1.228	0.0	30.9	0
15 min Winter	134.623	0.0	5.7	17

Summary of Results for 100 year Return Period (+45%)

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
30 min Winter	9.242	0.942	0.0	0.9	0.9	6.3	O K
60 min Winter	9.373	1.073	0.0	1.0	1.0	7.1	O K
120 min Winter	9.384	1.084	0.0	1.0	1.0	7.2	O K
180 min Winter	9.328	1.028	0.0	0.9	0.9	6.8	O K
240 min Winter	9.259	0.959	0.0	0.9	0.9	6.4	O K
360 min Winter	9.126	0.826	0.0	0.9	0.9	5.5	O K
480 min Winter	9.001	0.701	0.0	0.8	0.8	4.7	O K
600 min Winter	8.886	0.586	0.0	0.7	0.7	3.9	O K
720 min Winter	8.777	0.477	0.0	0.7	0.7	3.2	O K
960 min Winter	8.513	0.213	0.0	0.7	0.7	1.4	O K
1440 min Winter	8.334	0.034	0.0	0.6	0.6	0.2	O K
2160 min Winter	8.301	0.001	0.0	0.5	0.5	0.0	O K
2880 min Winter	8.300	0.000	0.0	0.4	0.4	0.0	O K
4320 min Winter	8.300	0.000	0.0	0.3	0.3	0.0	O K
5760 min Winter	8.300	0.000	0.0	0.2	0.2	0.0	O K
7200 min Winter	8.300	0.000	0.0	0.2	0.2	0.0	O K
8640 min Winter	8.300	0.000	0.0	0.2	0.2	0.0	O K
10080 min Winter	8.300	0.000	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	91.060	0.0	7.6	31
60 min Winter	58.739	0.0	9.9	58
120 min Winter	36.495	0.0	12.3	94
180 min Winter	27.161	0.0	13.7	134
240 min Winter	21.892	0.0	14.7	170
360 min Winter	16.168	0.0	16.3	244
480 min Winter	13.017	0.0	17.5	316
600 min Winter	10.992	0.0	18.5	386
720 min Winter	9.568	0.0	19.3	456
960 min Winter	7.678	0.0	20.6	562
1440 min Winter	5.620	0.0	22.7	752
2160 min Winter	4.104	0.0	24.8	1100
2880 min Winter	3.278	0.0	26.4	0
4320 min Winter	2.384	0.0	28.8	0
5760 min Winter	1.901	0.0	30.7	0
7200 min Winter	1.597	0.0	32.2	0
8640 min Winter	1.385	0.0	33.5	0
10080 min Winter	1.228	0.0	34.6	0

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Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000	Winter Storms	Yes	Shortest Storm (mins)	15
Return Period (years)	100	Ratio R	0.336	Cv (Summer)	0.750	Longest Storm (mins)	10080
Region	England and Wales	Summer Storms	Yes	Cv (Winter)	0.840	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.020

Time (mins)		Area
From:	To:	(ha)
0	4	0.020

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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.300 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	7.0	7.0	1.200	7.0	20.2	1.201	0.0	20.2

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0044-1000-1250-1000 Objective Minimise upstream storage Invert Level (m) 8.250
Design Head (m) 1.250 Application Surface Minimum Outlet Pipe Diameter (mm) 75
Design Flow (l/s) 1.0 Sump Available Yes Suggested Manhole Diameter (mm) 1200
Flush-Flo™ Calculated Diameter (mm) 44

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.250	1.0	Flush-Flo™	0.196	0.7	Kick-Flo®	0.394	0.6	Mean Flow over Head Range	-	0.8

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.7	0.500	0.7	1.200	1.0	2.000	1.2	3.000	1.5	5.000	1.9	7.000	2.2	9.000	2.5
0.200	0.7	0.600	0.7	1.400	1.0	2.200	1.3	3.500	1.6	5.500	2.0	7.500	2.3	9.500	2.5
0.300	0.7	0.800	0.8	1.600	1.1	2.400	1.3	4.000	1.7	6.000	2.0	8.000	2.3		
0.400	0.6	1.000	0.9	1.800	1.2	2.600	1.4	4.500	1.8	6.500	2.1	8.500	2.4		