Appendix D HR Wallingford Greenfield Runoff Rate Estimation Tool Outputs

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

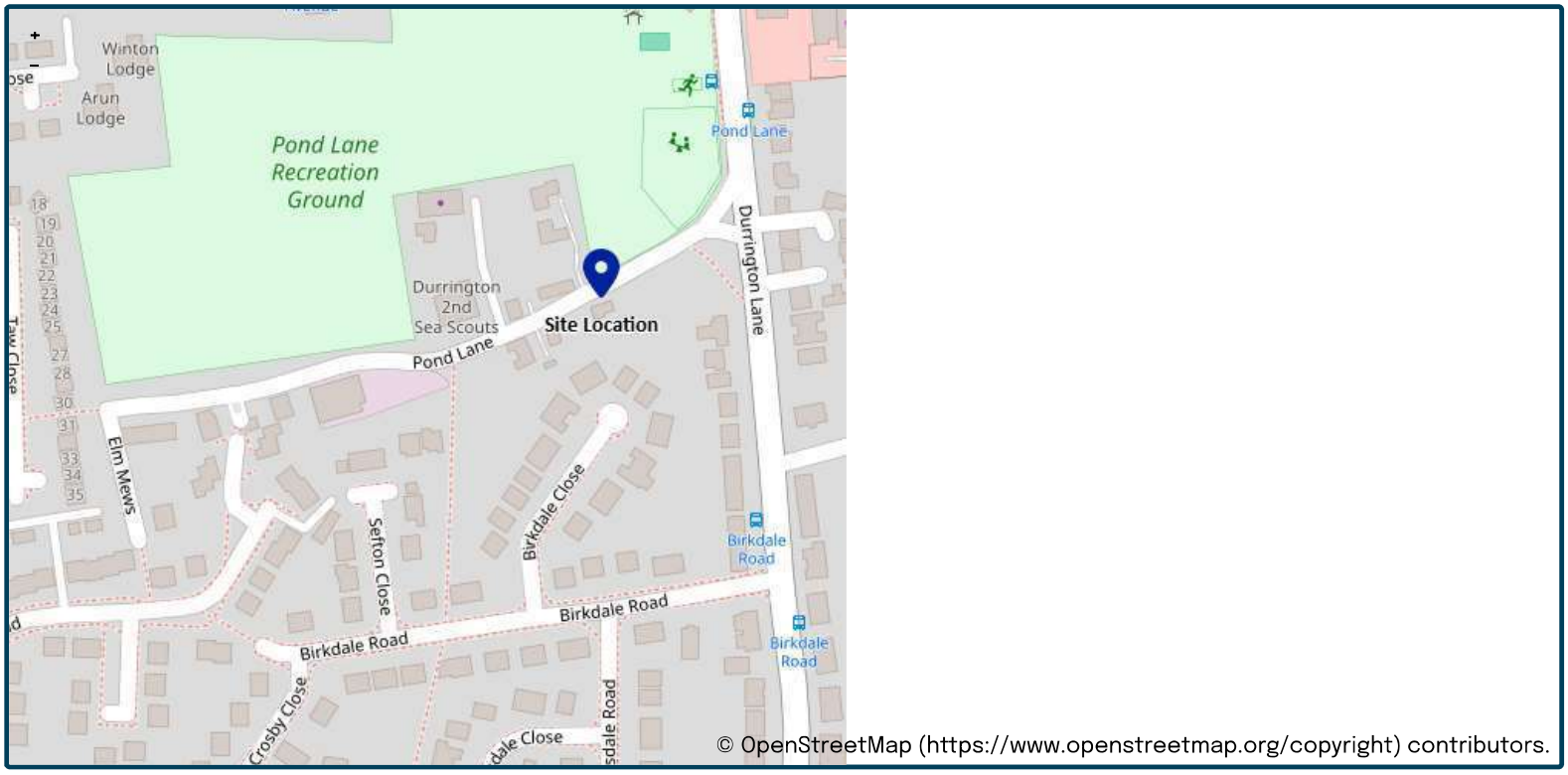
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	21/11/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Thatch Cottage
Site location	Pond Lane, Worthing



Site easting (British National Grid)	511830
Site northing (British National Grid)	105046

Site details

Total site area (ha)	0.09414 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	762 mm		762
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	0.2 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	IH124	
Flow rate 1 year (l/s)	0.2	l/s
Flow rate 2 year (l/s)	0.2	l/s
Flow rate 10 years (l/s)	0.3	l/s
Flow rate 30 years (l/s)	0.4	l/s
Flow rate 100 years (l/s)	0.6	l/s
Flow rate 200 years (l/s)	0.7	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

Greenfield runoff rate estimation tool

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.

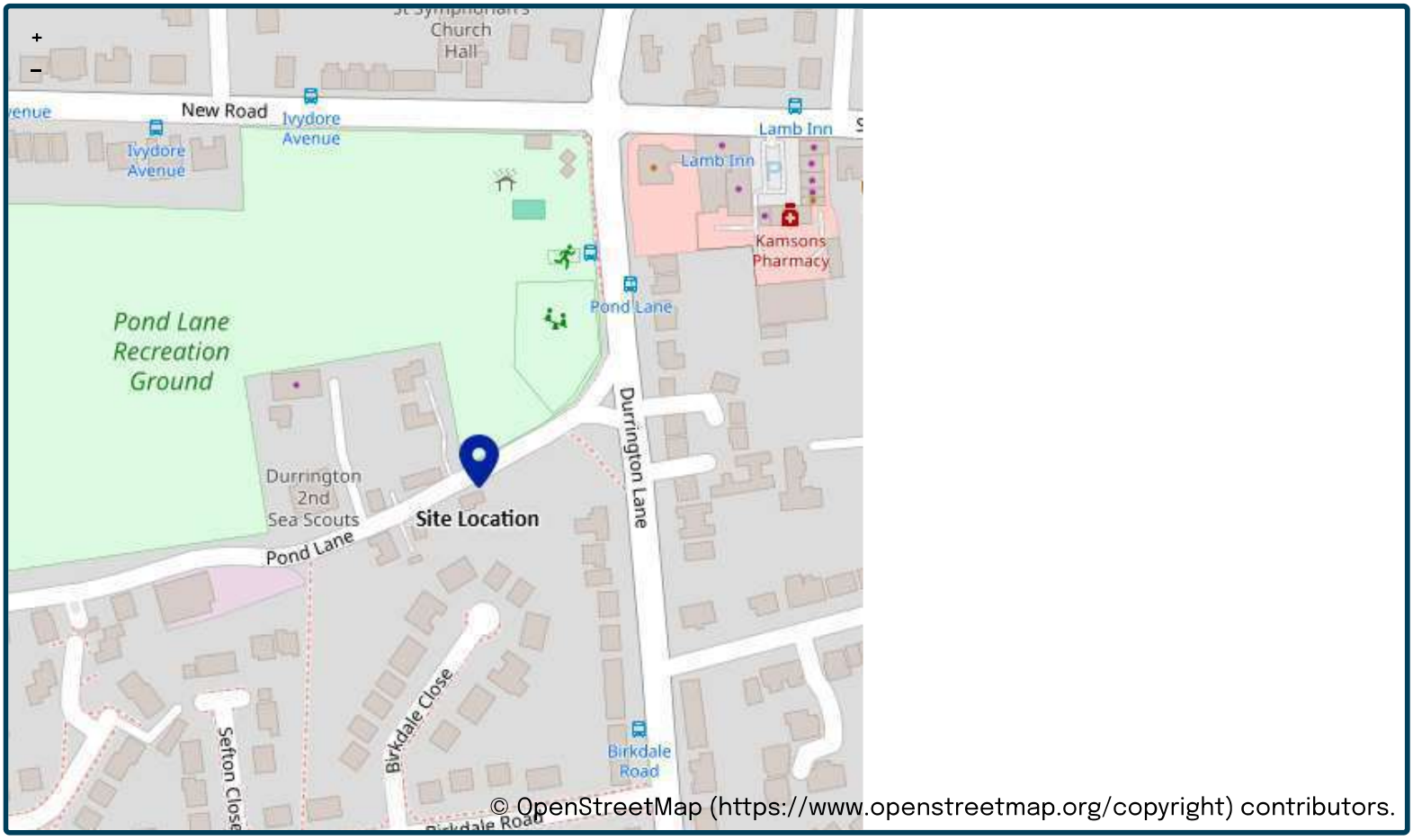
Project details

Date	21/11/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name: Thatch Cottage Only

Site location: Pond Lane, Worthing



Site easting (British National Grid): 511834

Site northing (British National Grid): 105046

Site details

Total site area (ha): 0.05698 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	762 mm		762
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	0.1 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	IH124	
Flow rate 1 year (l/s)	0.1	l/s
Flow rate 2 year (l/s)	0.1	l/s
Flow rate 10 years (l/s)	0.2	l/s
Flow rate 30 years (l/s)	0.3	l/s
Flow rate 100 years (l/s)	0.4	l/s
Flow rate 200 years (l/s)	0.4	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

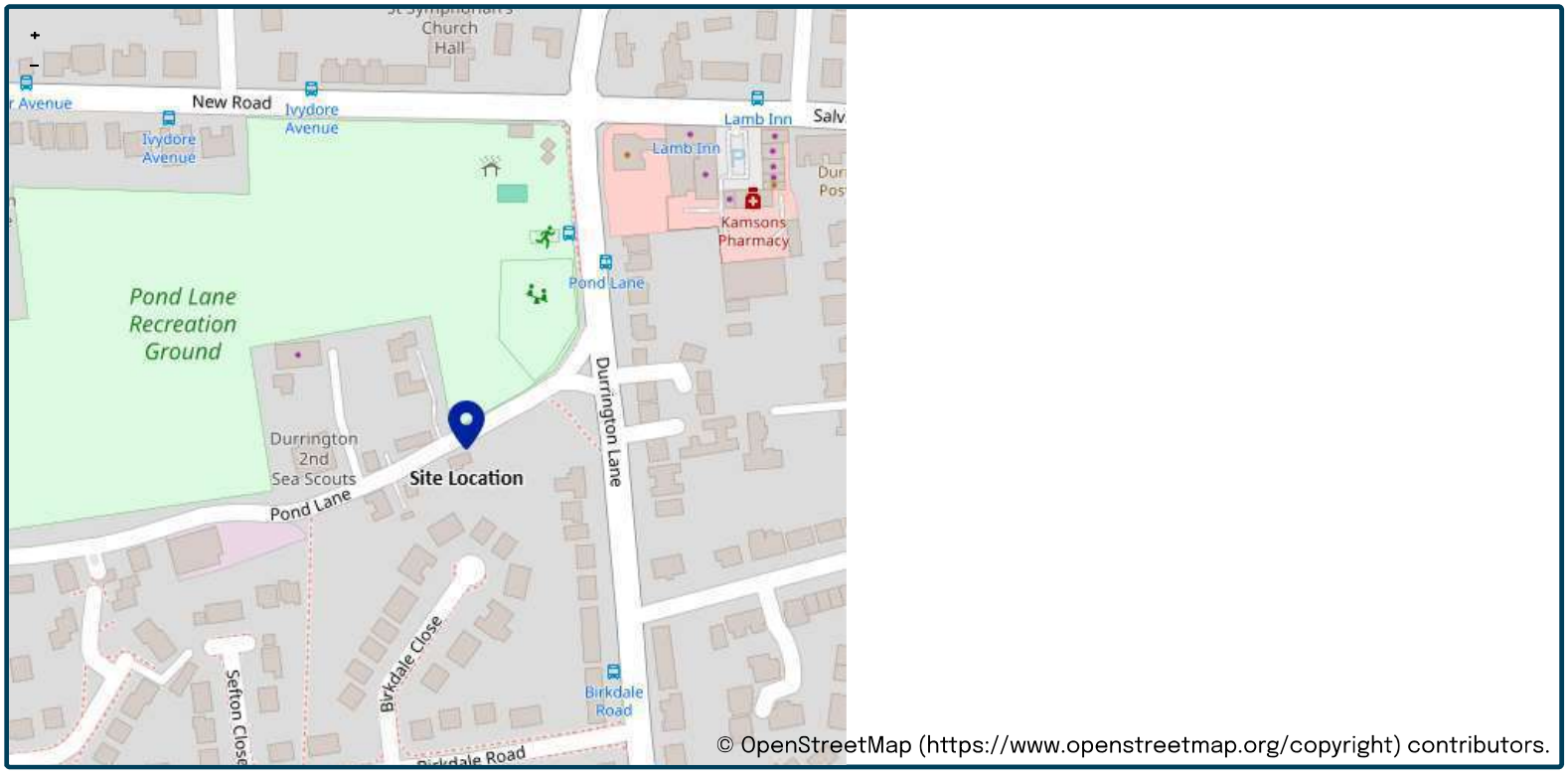
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	21/11/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Thatch Cottage New Builds
Site location	Pond Lane, Worthing



Site easting (British National Grid)	511834
Site northing (British National Grid)	105046

Site details

Total site area (ha)	0.03716 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	762 mm		762
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	0.1 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	IH124	
Flow rate 1 year (l/s)	0.1	l/s
Flow rate 2 year (l/s)	0.1	l/s
Flow rate 10 years (l/s)	0.1	l/s
Flow rate 30 years (l/s)	0.2	l/s
Flow rate 100 years (l/s)	0.2	l/s
Flow rate 200 years (l/s)	0.3	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

Appendix E HR Wallingford Surface Water Storage Volume Design Tool Outputs

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

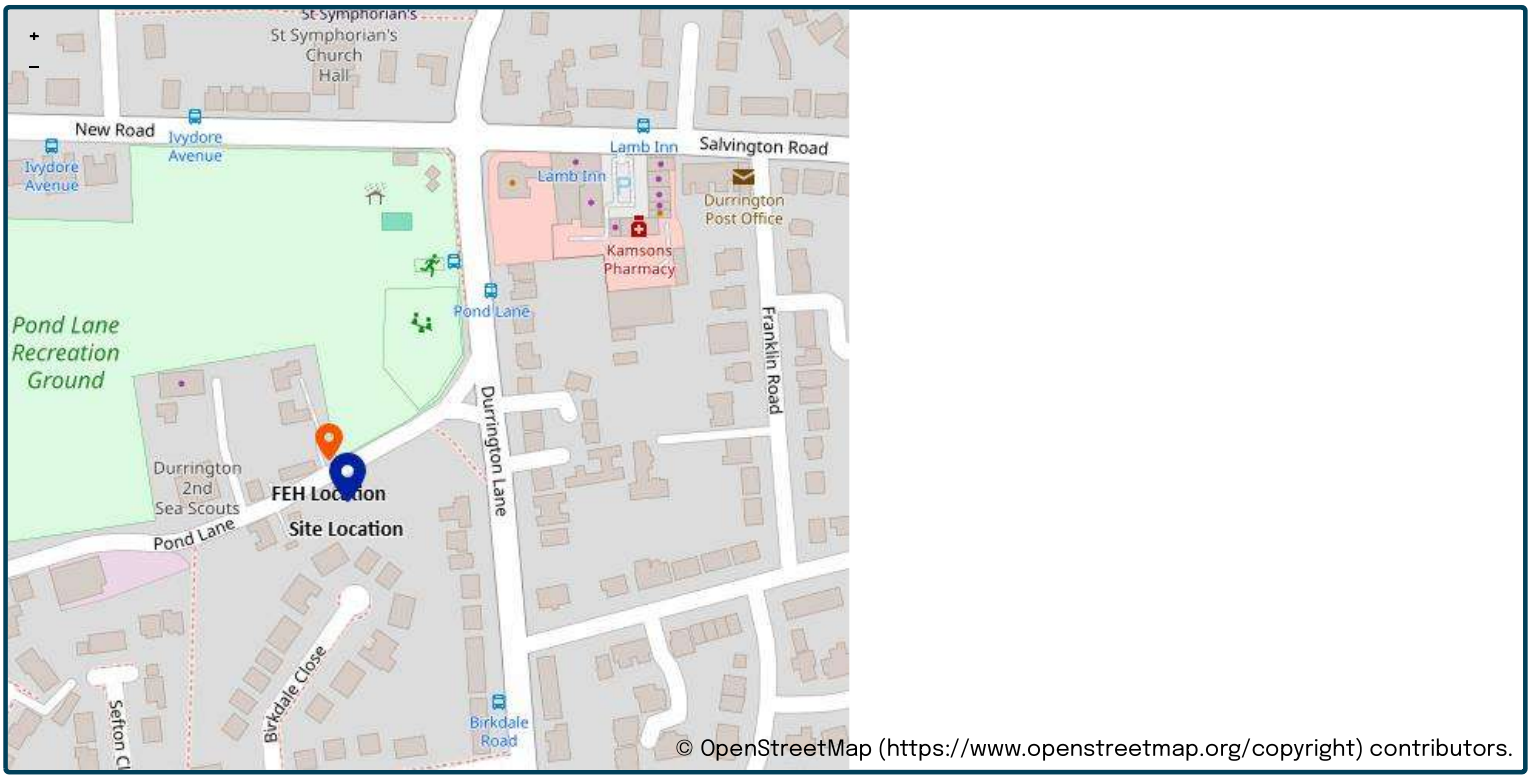
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	21/11/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Thatch Cottage Only
Site location	Pond Lane, Worthing



Site easting (British National Grid)	511833
Site northing (British National Grid)	105035

Site areas

Total site area (ha)	0,056977	ha

Roof area

Total roof area (ha)	0.005147	ha
Contributing roof area (ha)	0.005147	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	0.019695	ha
Contributing paved area (ha)	0.019695	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	0.032135	ha
Contributing grass / vegetated area (ha)	0	ha
Non-contributing grass / vegetated area (ha)	0.03213	ha

Total area

Total contributing area (ha)	0.02484	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	0.00515	ha
Contributing paved area (adjusted for urban creep) (ha)	0.0197	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	0.6	m
Storage side slope (1 in x)	Vertical sided	
Storage voids ratio (%)	90% (e.g. geocellular crate systems)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Previously developed
Specify the method	IH124 + relaxation

IH124

	My value		Map/default value
SAAR (mm)	762 mm		762
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
Total area for greenfield runoff calculation (ha)	0.05698 ha		0.05698
QBar (l/s)	0.1 l/s		
Hydrological region	7		7
Return period (years)	Qbar (1:2.3 years)		
Growth curve factor	1		
Flow rate (IH124) (l/s)	0.1 l/s		
Relaxation factor	1x		

Final discharge rate

Runoff calculation method	IH124 + relaxation
Design flow rate (l/s)	0.1 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	24 mm		24
Flow rate of orifice (l/s)	0.92 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_POT_511824_105049.csv
Distance from FEH location to site (km)	0 km
Climate change allowance factor	145%
Specify the runoff method from grass / vegetated areas	Fixed percentage - equal to SPR

	My value	Map value
How should SPR be derived?	WRAP soil type	

WRAP soil type	2		2
SPR	0.3		

Model results

- **Maximum discharge flow rate:** 0.9 (l/s)
- **Outflow orifice diameter:** 24 (mm)
- **Storage base length:** 9.5 (m)
- **Storage base width:** 3.2 (m)
- **Storage base area:** 30 (m^2)
- **Storage total volume:** 18 (m^3)
- **Storage total water volume:** 16 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	240	0.5	0.16	4.5	5.0
2	240	0.6	0.22	6.0	6.7
10	180	0.7	0.36	9.9	11
30	180	0.8	0.47	13	14
100	180	0.9	0.60	16	18
200	180	1.0	0.67	19	21

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m^3 value, unless storage volumes are less than 10 m^3, in which case, storage volumes are provided to 1 decimal place.

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

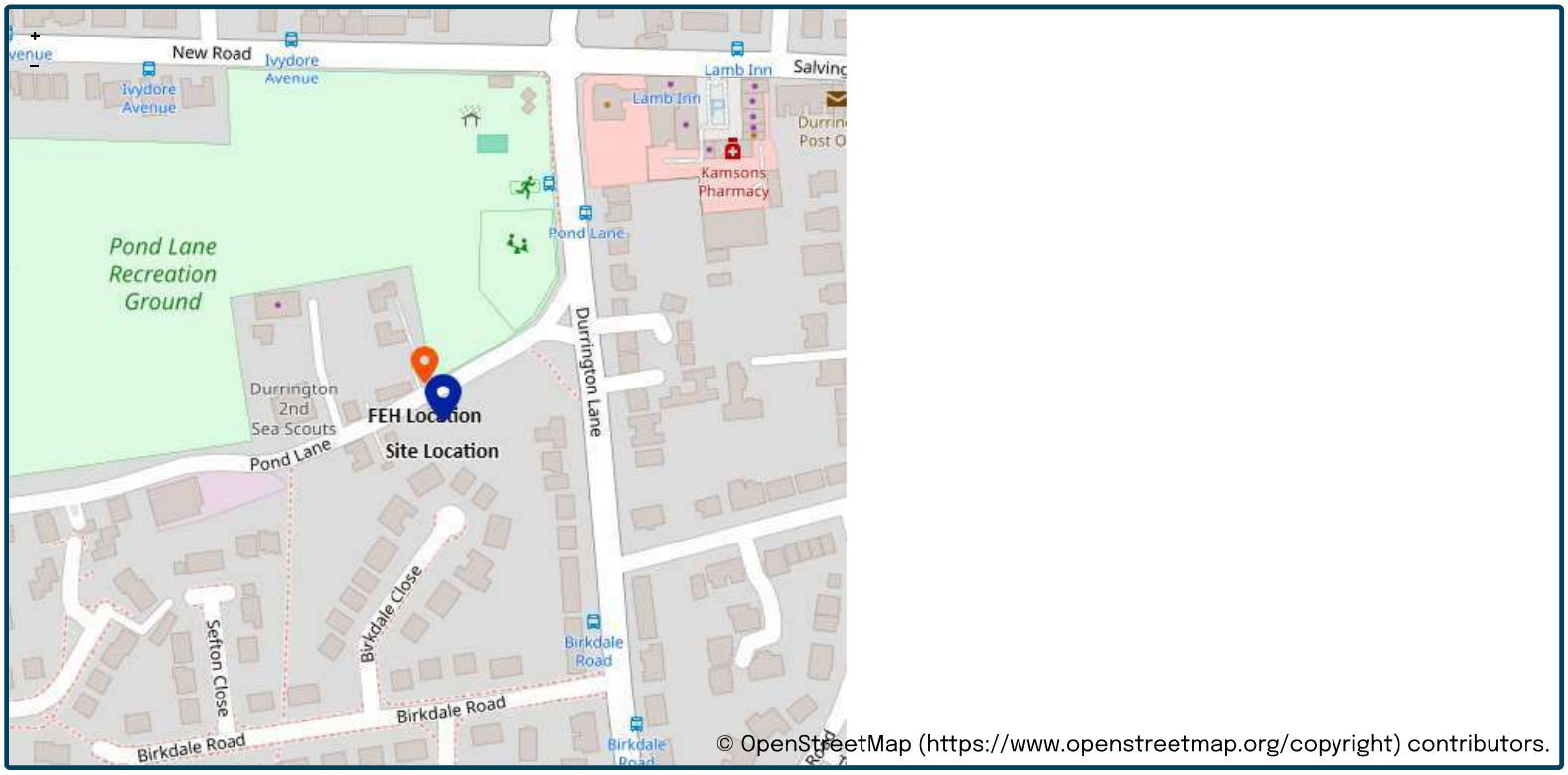
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	21/11/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Thatch Cottage - new builds
Site location	Pond Lane, Worthing



Site easting (British National Grid)	511833
Site northing (British National Grid)	105035

Site areas

Total site area (ha)	0.03716	ha

Roof area

Total roof area (ha)	0.011234	ha
Contributing roof area (ha)	0.011234	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	0.008356	ha
Contributing paved area (ha)	0.007884	ha
Non-contributing paved area (ha)	0.00047	ha

Grass / vegetated area

Total grass / vegetated area (ha)	0.017569	ha
Contributing grass / vegetated area (ha)	0	ha
Non-contributing grass / vegetated area (ha)	0.01757	ha

Total area

Total contributing area (ha)	0.01912	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	0.01123	ha
Contributing paved area (adjusted for urban creep) (ha)	0.00788	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	0.6	m
Storage side slope (1 in x)	Vertical sided	
Storage voids ratio (%)	90% (e.g. geocellular crate systems)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	IH124

IH124

	My value		Map/default value
SAAR (mm)	762 mm		762
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
Total area for greenfield runoff calculation (ha)	0.03716 ha		0.03716
QBar (l/s)	0.1 l/s		
Hydrological region	7		7
Return period (years)	Qbar (1:2.3 years)		
Growth curve factor	1		
Flow rate (IH124) (l/s)	0.1 l/s		

Final discharge rate

Runoff calculation method	IH124
Design flow rate (l/s)	0.1 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	24 mm		24
Flow rate of orifice (l/s)	0.92 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file

FEH_Point_Rainfall_FEH22_POT_511824_105049.csv

Distance from FEH location to site (km)	0 km
Climate change allowance factor	145%
Specify the runoff method from grass / vegetated areas	Fixed percentage - equal to SPR

My value	Map value

How should SPR be derived?	WRAP soil type	
WRAP soil type	2	2
SPR	0.3	

Model results

- **Maximum discharge flow rate:** 0.9 (l/s)
- **Outflow orifice diameter:** 24 (mm)
- **Storage base length:** 7.9 (m)
- **Storage base width:** 2.6 (m)
- **Storage base area:** 21 (m^2)
- **Storage total volume:** 13 (m^3)
- **Storage total water volume:** 12 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	240	0.5	0.16	3.0	3.3
2	180	0.5	0.21	4.1	4.6
10	180	0.7	0.36	6.9	7.7
30	180	0.8	0.47	9.0	10.0
100	120	0.9	0.60	12	13
200	180	1.0	0.68	13	14

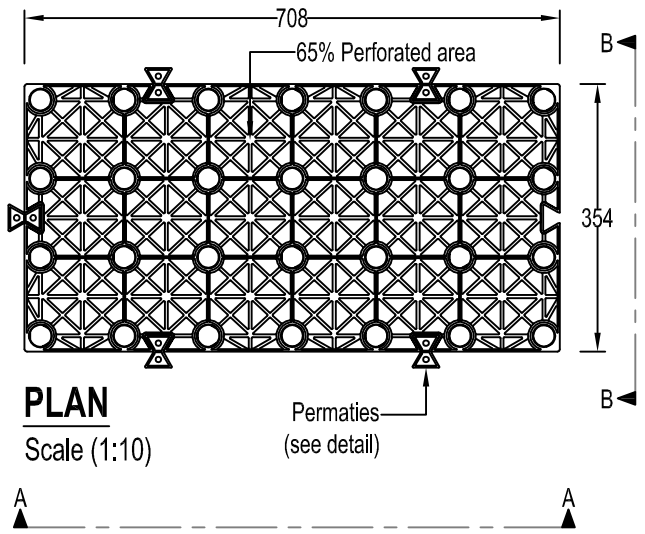
Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m^3 value, unless storage volumes are less than 10 m^3, in which case, storage volumes are provided to 1 decimal place.

Disclaimer

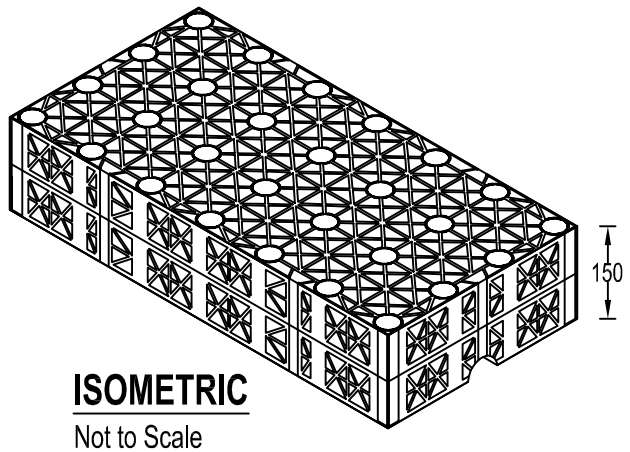
Appendix F Reference Standard Detail Drawing of Permavoid Geocellular Units

PERMAVOID 150mm UNIT

Product Code: (PVPP150)



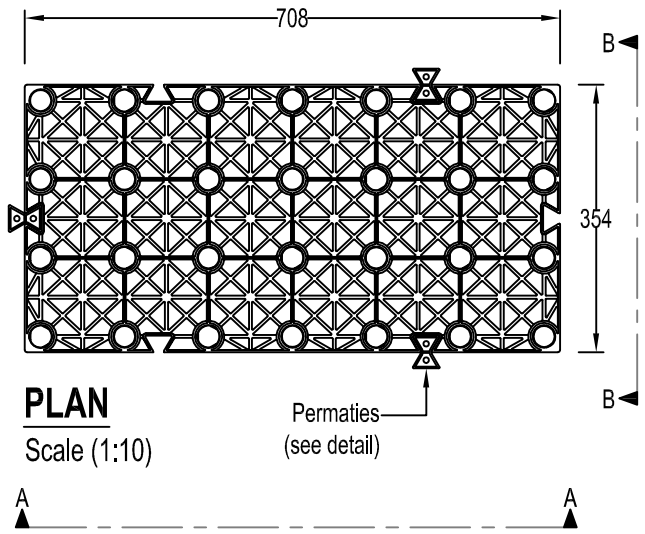
PLAN
Scale (1:10)



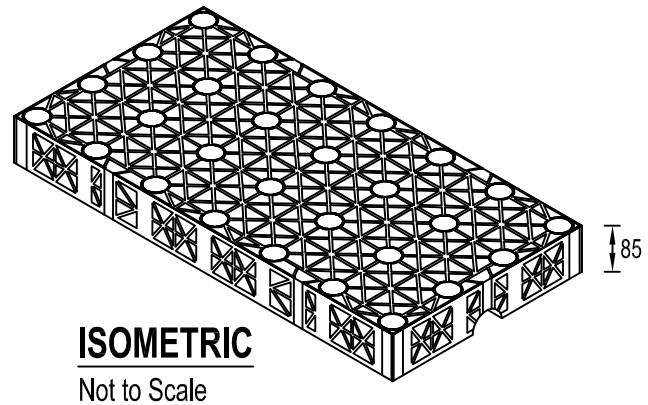
ISOMETRIC
Not to Scale

PERMAVOID 85mm UNIT

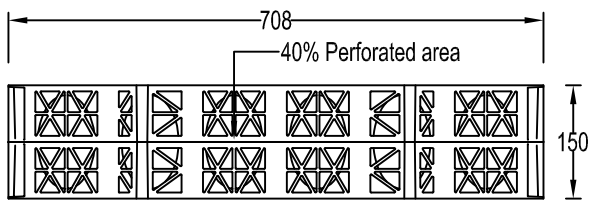
Product Code: (PVPP85)



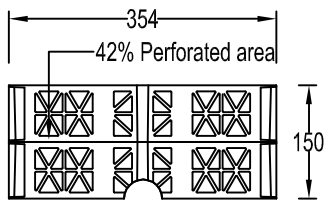
PLAN
Scale (1:10)



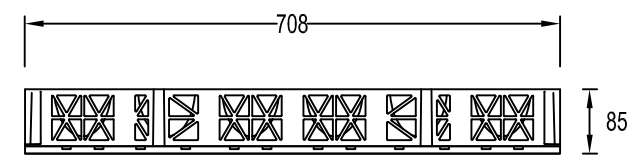
ISOMETRIC
Not to Scale



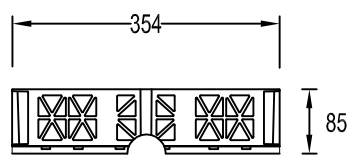
ELEVATION A-A
Scale (1:10)



ELEVATION B-B
Scale (1:10)



ELEVATION A-A
Scale (1:10)



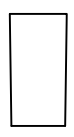
ELEVATION B-B
Scale (1:10)

PERMATIE DETAIL

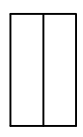
Scale (1:5)

TOP
Scale (1:5)

BOTTOM
Scale (1:5)



SIDE
Scale (1:5)



SIDE
Scale (1:5)

NOTE:
5 per 150mm Permavoid Unit
3 per 85mm Permavoid Unit
— Permaties sold separately

NOTES

1. All dimensions in millimetres, unless otherwise stated.
2. All dimensions are nominal and may vary within manufacturing tolerances.
3. All site temporary and enabling works by others.
4. Permavoid units to be installed in accordance with Polypipe Civils recommendations (refer to Polypipe technical guidance for further information); giving due consideration to the requirements of the organisation who will be taking ultimate ownership of the installation.
5. This drawing is intended for guidance only. Confirmation of the information contained within this document should be sought from the consulting engineers before final design or construction activities commence.

REV	AMENDMENT	DATE

Polypipe Civils
Charnwood Business Park,
North Road, Loughborough,
Leicestershire. LE11 1LE
Tel: 01509 615100
Fax: 01509 615215
www.polypipe.com/civils
www.polypipe.com/wms

PROJECT: PERMAVOID STANDARD DETAIL

TITLE: GEOCELLULAR COMPONENTS

STATUS	FOR INFORMATION
DATE	27/10/15
DRAWN BY	BM
ORIGINAL SIZE	A3
SCALE	AS SHOWN
DRAWING No.	PV_SD_CD_001
REV.	

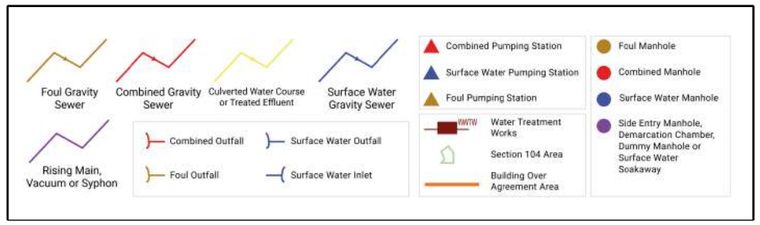
Appendix G Southern Water Sewer Records

(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 | Date: 19/08/25 | Scale: 1:1250 | Map Centre: 511829,105052 | Data updated: 23/07/25 | Our Ref: 1855369 - 1 | Wastewater Plan A3 Powered by digdat

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.



alam@hilsonmoran.com

Thatch Cottage

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0001	F	13.43	10.42	
0002	F	13.57	10.54	
0003	F	12.71	10.95	
0004	F	12.85	11.06	
0005	F	12.72	11.11	
0006	F	0.00	0.00	
0007	F	0.00	0.00	
0101	F	13.53	0.00	
0901	F	13.50	10.88	
0903	F	13.75	11.38	
0904	F	13.63	11.13	
0905	F	13.68	11.36	
6904	F	0.00	0.00	
6905	F	0.00	0.00	
6906	F	0.00	0.00	
7001	F	11.86	10.20	
7002	F	10.78	9.84	
7003	F	10.49	9.28	
7004	F	10.50	9.45	
7101	F	13.08	11.81	
7901	F	10.75	9.67	
7903	F	10.77	0.00	
7904	F	0.00	0.00	
7907	F	0.00	0.00	
7908	F	0.00	0.00	
7909	F	0.00	0.00	
8101	F	11.19	9.21	
8901	F	11.19	9.79	
8902	F	11.82	9.15	
8906	F	11.53	9.45	
9001	F	10.62	8.71	
9002	F	10.64	8.58	
9003	F	0.00	0.00	
9004	F	0.00	0.00	
9005	F	0.00	0.00	
9103	F	0.00	0.00	
9901	F	13.15	0.00	
9902	F	11.37	8.42	
9903	F	11.97	8.26	
9906	F	12.91	0.00	
9907	F	12.86	0.00	
9910	F	0.00	0.00	
9911	F	0.00	0.00	
0051	S	13.43	10.92	
0052	S	0.00	0.00	
0053	S	13.51	11.04	
0054	S	13.23	0.00	
0055	S	12.81	0.00	
0056	S	12.75	11.27	
0151	S	12.93	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0951	S	13.48	11.18	
0953	S	13.78	11.50	
0954	S	13.60	11.34	
6950	S	0.00	0.00	
6951	S	10.25	8.68	
6954	S	0.00	0.00	
7050	S	11.95	9.78	
7051	S	10.78	8.44	
7052	S	10.36	7.48	
7150	S	13.08	11.12	
7151	S	12.13	0.00	
7152	S	12.27	9.14	
7950	S	10.74	9.38	
7951	S	11.19	9.19	
7952	S	10.20	7.43	
8052	S	10.92	8.28	
8053	S	10.37	7.70	
8054	S	10.33	7.61	
8151	S	11.22	9.09	
8152	S	13.14	10.90	
8950	S	11.21	9.04	
8953	S	12.34	10.93	
9050	S	0.00	0.00	
9051	S	10.58	8.59	
9052	S	10.70	9.67	
9053	S	10.52	8.28	
9054	S	10.55	9.58	
9055	S	10.82	10.04	
9056	S	10.74	9.80	
9950	S	13.08	10.67	
9951	S	11.39	10.14	
9952	S	11.92	9.90	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix H Topographical Survey

NOTES
Survey accurate at time of site attendance. Do not scale from printed drawings except for planning purposes.

Grid is based on ordnance survey national grid fixed by GPS satellite active network.
Levels are related to the ordnance survey GPS active Network and transformed using the OSGM15 & OSTN15 model.

Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.

Tree species (where shown) should be treated with caution and expert identification is advised.

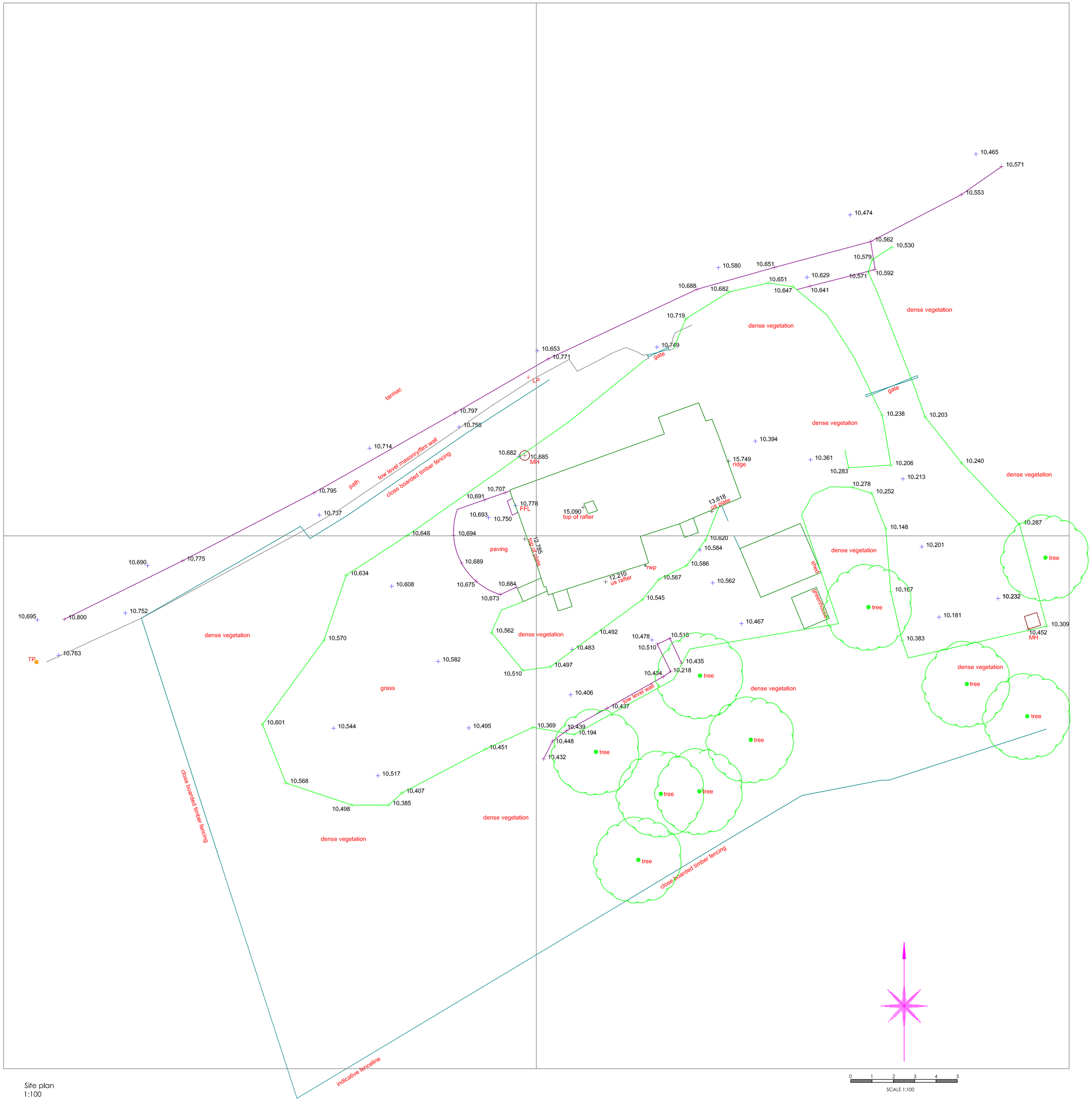
Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphicall scale of mapping as specified. Care should be exercised when working to larger scales.

Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.

Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.

Areas of dense undergrowth cannot be surveyed in detail, these areas will be shown in outline only and marked as 'dense undergrowth' on the plan.

Kerb levels have been taken on the top of the channel.



Site plan
1:100

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07717 205 388

project:	Thatch Cottage, Pond Lane, Worthing		
client:	Manorwood	job ref:	S1832
title:	Topographic survey	scale	1:100 @A1
date	July 2023	dwg no:	EX01 rev:

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