



Cole Easdon

DRAINAGE STRATEGY

Proposed Development at The Stables, Pump Lane,
Long Newnton, Tetbury, Gloucestershire

Date: December 2023
Issue No. 1



DOCUMENT ISSUE RECORD

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Project: **Proposed Development at The Stables, Pump Lane, Long Newton**

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Cellular Soakaway Calculations (100yr+45%CC)

1.0 INTRODUCTION

1.1 This *Drainage Strategy (DS)* has been prepared by Cole Easdon Consultants Limited (CE) on behalf of the property owner in relation to the proposed redevelopment at The Stables, Pump Lane, Long Newton, please refer to drawing 2312-PP.01 [*Site Location Plan*] (by F & GS Architects) in Appendix 1.

Development Proposals

1.2 The development proposal comprises the demolition/conversion of the existing stable block and the construction of a new 3-bedroom dwelling. Refer to Drawing No. 2312-PP.03 [*Layout Plan*] (by F & GS Architects) in Appendix 1.

Need for Study

1.3 This Study discusses how surface water runoff and foul water discharge from the development can be managed in a sustainable manner in line with the *National Planning Policy Framework (NPPF)* and its associated *Planning Practice Guidance (PPG)*. The proposal also considers the requirements of the Environment Agency and Lead Local Flood Authority.

Scope of Study

1.4 In Section 2.0 we describe the characteristics of the development site and surrounding area. In Section 3.0 we discuss drainage proposals, and conclusions are presented in Section 4.0.

1.5 The following publicly available documents have also been reviewed as part of this assessment:

- *National Planning Policy Framework (July 2021)*;
- *Planning Practice Guidance – Flood Risk and Coastal Change (August 2021)*;
- *CIRIA C753 The SuDS Manual (November 2015)*;
- *DEFRA's Non Statutory Technical Standard for SuDS (March 2015)*;
- *Sewerage Sector Guidance Appendix C – Design and Construction Guidance V2*;

1.6 The following abbreviations have been used in this Report:

- AOD Above Ordnance Datum;
- BGS British Geological Survey;
- EA Environment Agency;
- LLFA Lead Local Flood Authority;
- NPPF National Planning Policy Framework;
- PPG Planning Practice Guidance; and
- SuDS Sustainable Drainage Systems.

2.0 THE EXISTING SITE

Site Location and Topography

- 2.1 The application site is located at The Stables, Pump Lane, Long Newton, Tetbury, GL8 8RN. Refer to drawing 2312-PP.01 [*Site Location Plan*] (by F & GS Architects) in Appendix 1.
- 2.2 The application site includes approximately 570m² (0.057 hectares) of land which consists of stable buildings, outdoor stores and concrete hardstanding. The site is accessed directly from Pump Lane.
- 2.3 The application site is located in a rural area, the surroundings consisting of several properties and open fields
- 2.4 The site falls gently towards its south east corner. Levels fall from approximately 51.00m AOD in the north west of the site to 49.00mAOD within the eastern region of the site. A topographical survey undertaken by South West Surveys dated February 2019 was made available for this study. This survey is incorporated within CE Drawing No. 9646/501 [*Foul and surface water drainage strategy*] in Appendix 2 of this Report.

Nearby Watercourses/Drainage Features

- 2.5 There is a unnamed watercourse with flows adjacent with Pump Lane on its eastern side and is assumed to flow south towards the Tetbury Avon to the south.

Existing Drainage/Sewers

- 2.6 There are no public sewers located in the vicinity of the site.
- 2.7 The topographical survey shows some existing private drainage on the site but it is not clear as to where this discharges.

Existing Ground Conditions

- 2.8 The British Geological Survey (BGS) geological mapping shows that site is underlain by Forest Marble Formation Mudstone. There is no information available for superficial deposits in this area.
- 2.9 The bedrock and superficial deposits beneath the area are classed as a 'Secondary A' aquifer, comprising potentially permeable layers capable of supporting local water supplies or base flows to rivers. The site is located in a zone 1 groundwater protection zone.

3.0 DRAINAGE PROPOSALS

3.1 This Section details how surface water and foul flows arising from the development site will be managed in line with related national and local guidance, namely *NPPF*, *PPG* and the *Non Statutory Technical Standards for SuDS*.

Surface Water Drainage Proposal

3.2 The new dwelling will comprise approximately 156m² (0.016ha) of roof area. The concrete hardstanding will be replaced with a permeable driveway surface.

3.3 Surface water runoff generated from the redeveloped site will be managed utilising sustainable drainage measures offering a significant improvement over the existing situation, as discussed below.

3.4 Based on the Environment Agency's flood mapping (in Appendix 3), the site is located in Flood Zone 1 with low risk of fluvial flooding, however it is shown as being at high risk from surface water flooding. Based on the *NPPF/PPG*, the existing and proposed site usage associated with 'residential' use, classed as 'more vulnerable' usage, is considered acceptable in Flood Zone 1.

3.5 Overland flow routes are indicated to the east of the site via Pump Lane and also to the west of the site through the site. This eastern flow route will be maintained where levels will be adjusted on site, where required to ensure the route is maintained and therefore buildings are protected.

3.6 Drainage proposals for the site have been developed in line with national and local guidance, Sustainable Drainage Systems (SuDS) principles and Building Regulations guidelines.

3.7 Infiltration testing to BRE 365 methodology was completed in July 2022 and yielded positive results. Three tests were completed in the same trial pit which produced an average infiltration rate of 1.022x10⁻⁶ m/s, refer to soakaway test records in Appendix 2.

3.8 It is therefore proposed that surface water from the new dwelling discharges to ground via a cellular soakaway system located under the soft landscaped area adjacent to the proposed gravel driveway. Refer to CE Drawing No. 9646/501 [*Foul and surface water drainage strategy*] in Appendix 2.

- 3.9 The soakaway be sized to accommodate the 1:100year + 40% event considering the climate change impact. Accordingly, 18.5m³ of storage will be required within the sub-base. Refer to calculations in Appendix 4. An infiltration rate of 1.022x10⁻⁶ m/s has been used to size the permeable sub-base. The half drain time of this soakaway have been checked to ensure the 1 in 30year event half drains in less than 24 hours.

Residual Flood Risk

- 3.10 Floodwaters, in the event of design exceedance or drainage failure, will be contained within the permeable driveway and the grassed garden or will follow the existing overland flow route to the south via Pump Lane.

Water Quality

- 3.11 Roof runoff is considered fairly uncontaminated. All water will flow into the through a catchpit before entering the cellular soakaway to remove any sediment or debris.

Adoption & Maintenance

- 3.12 All drainage and SuDS components will be managed privately by the site owner.
- 3.13 The regular maintenance of the proposed SuDS devices should be carried out in line with the *CIRIA C753 The SuDS Manual* or as per manufacturer's specification, as discussed below.

Cellular Soakaway

- 3.14 The cellular soakaway should be inspected regularly for blockages and silt/ debris removed as necessary.

Table 3.1: Maintenance Schedule for Cellular Soakaway

Drainage Element	Schedule	Maintenance Requirement	Frequency
Cellular Soakaway	Regular	<ul style="list-style-type: none"> ▪ Inspect for sediment and debris in pre-treatment devices and floor of inspection tube or chamber ▪ Cleaning of gutters and any filters and downpipes ▪ Trimming any roots that may be causing blockages 	Annually, or as required based on inspection
	Occasional	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber	As required
	Remedial	<ul style="list-style-type: none"> ▪ Reconstruct soakaways and/or replace or clean fill, if performance deteriorates or failure occurs ▪ Replacement of clogged geotextile 	As required
	Monitoring	Inspect silt traps and note sediment accumulation rate	Monthly in the first year and then annually
Check soakaways to ensure emptying is occurring		Annually	

Foul Water Proposal

- 3.15 Due to the current use of the site it is assumed that there is no existing foul drainage present.
- 3.16 There are no public foul sewers in the area and it is not feasible to discharge flows to a drainage field due to the site being located in a groundwater protection zone. It is therefore proposed that foul water from the new dwelling is discharged to a cesspool located south of the building. This should have a minimum volume of 31,600 litres assuming there are 4 people living at the property as per Building Regulations requirements.

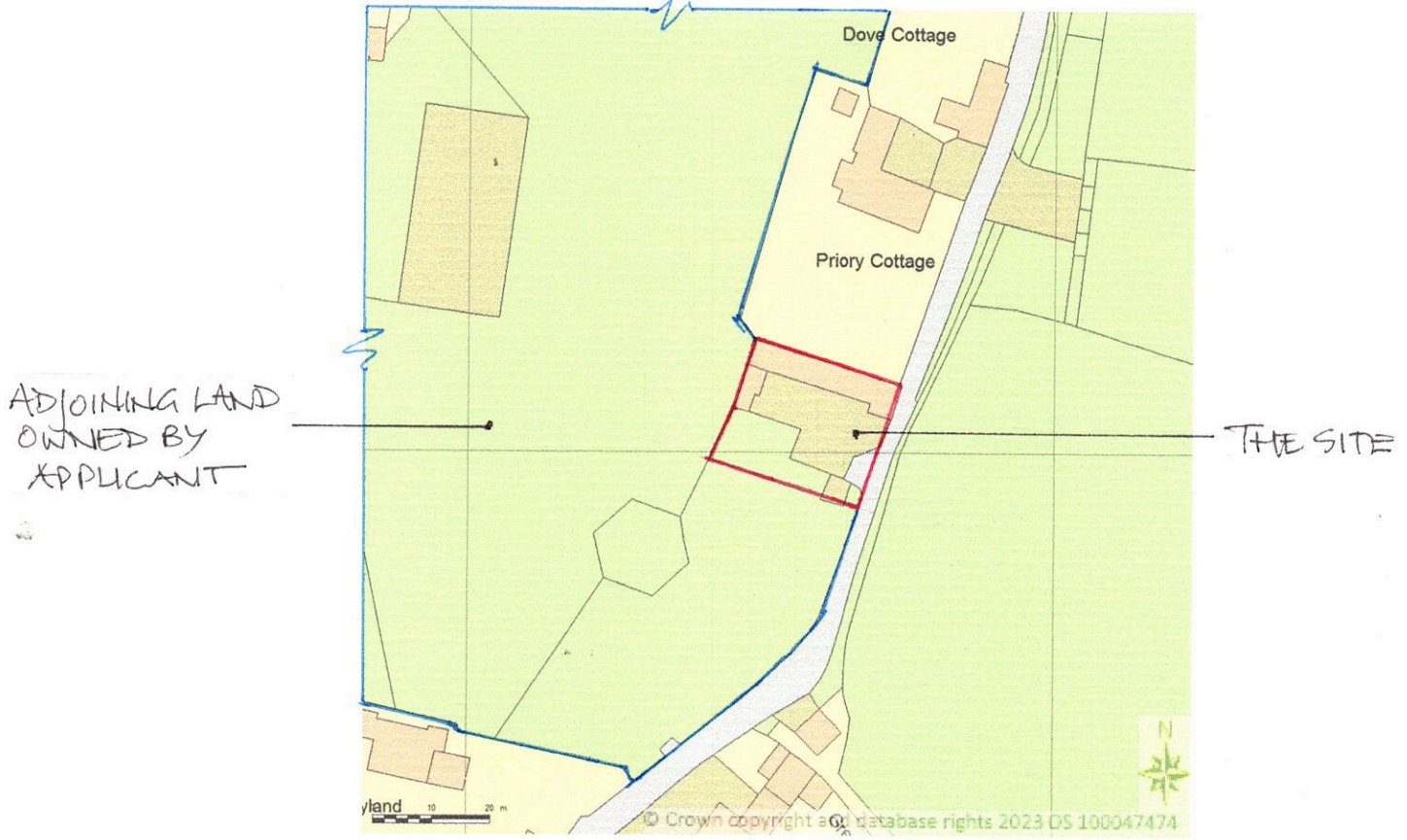
4.0 DISCUSSIONS AND CONCLUSIONS

- 4.1 This Report discusses foul and surface water drainage proposals in relation to the redevelopment of The Stables, Pump Lane, Long Newton. The study considers the requirements of guidance contained within the *NPPF* and *PPG*.
- 4.2 The development site is located within Flood Zone 1, but is at high risk of flooding from surface water. The *NPPF/PPG* guidance considers all types of development suitable in Flood Zone 1.
- 4.3 The development is on previously developed land. The development will include drainage and SuDS provision to reduce surface water runoff, thereby offering betterment and reducing flood risk over the existing situation.
- 4.4 The development will discharge surface water runoff to a cellular soakaway system designed for the 1:100 year + 45% event. Residual flood risk will be contained within the permeable driveway area and the grassed garden area.
- 4.5 The new dwelling will discharge foul water to a cesspool due to there being no other viable method of discharge.
- 4.6 All drainage and SuDS components will be maintained privately by the site owner. SuDS devices will be constructed and maintained in line with *The SuDS Manual* or manufacturer's specification.
- 4.7 The drainage proposals as presented above will manage surface and foul water arising from the development in a sustainable manner in line with the local and national policies, and therefore should be considered acceptable.

Cole Easdon Consultants Limited
December 2023

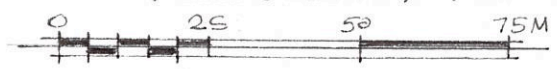
Appendix 1

SITE LOCATION PLAN
AREA 2 HA
SCALE 1:1250 on A4
CENTRE COORDINATES: 391153, 192005

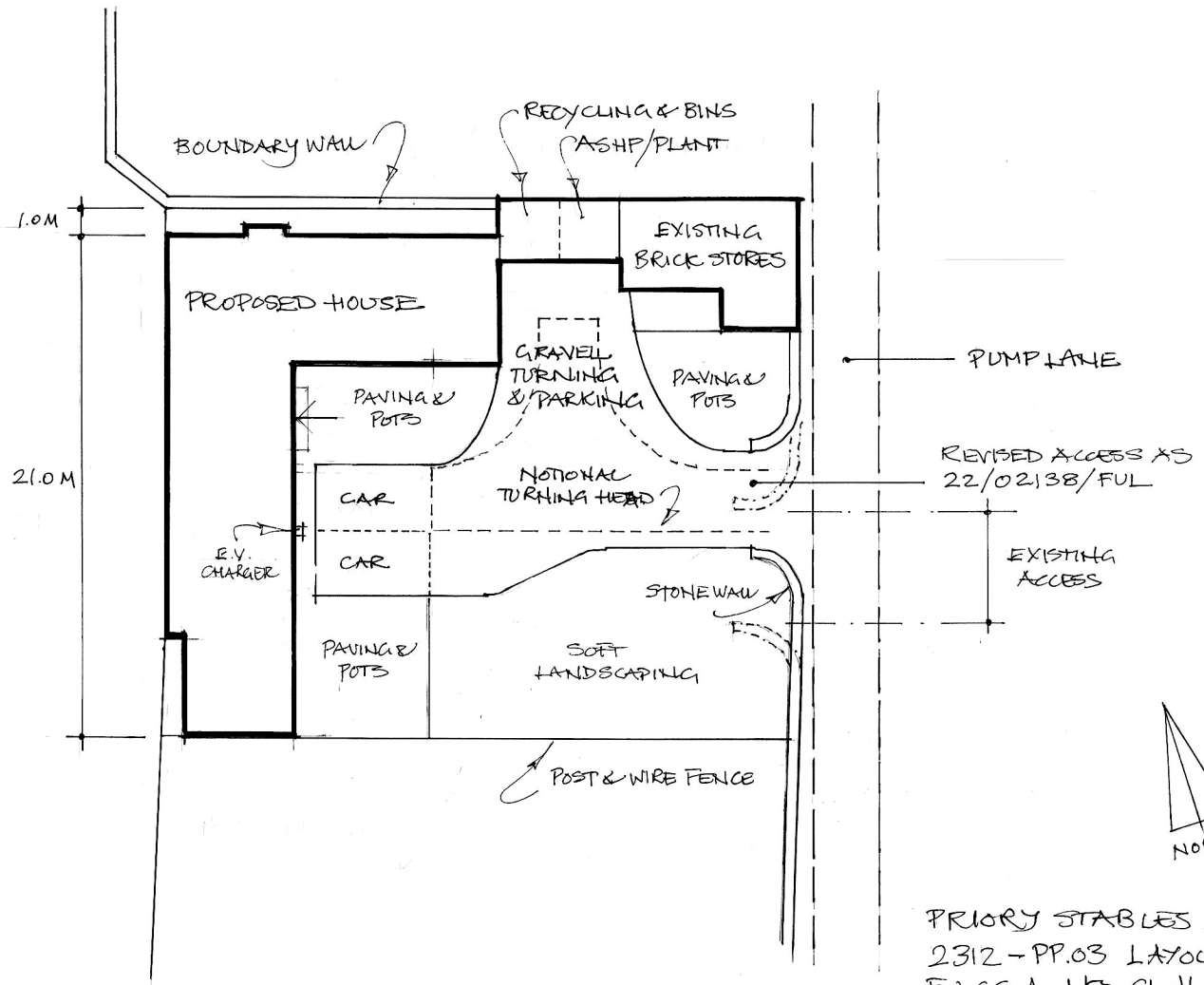


Supplied by Streetwise Maps Ltd
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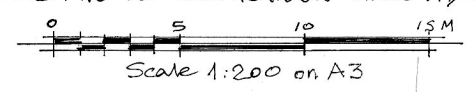
PRIORY STABLES LONG NEWNTON
2312-PP.01 LOCATION PLAN 11.23
FRAS ARCHTS Cheltenham GLSO 1HX



Scale 1:1250 on A4



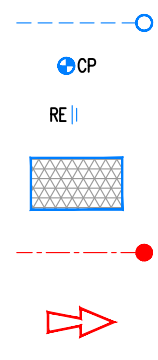
PRIORY STABLES LONG NEWNTON
 2312 - PP.03 LAYOUT PLAN 11.23
 F&GS ARCHT'S Cheltenham GLO HX



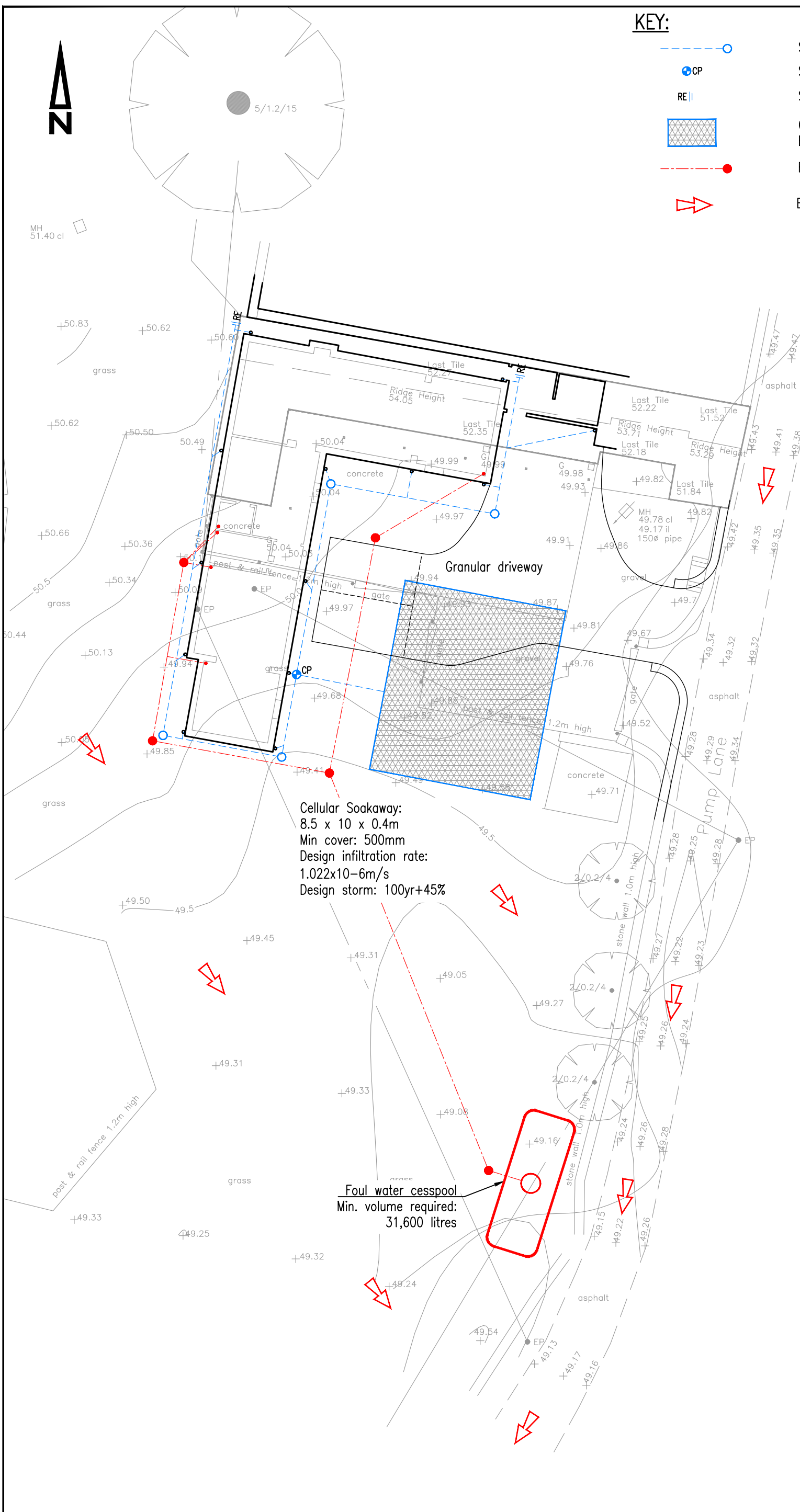
Appendix 2



KEY:



- SW DRAIN & INSPECTION CHAMBER
- SW CATCHPIT
- SW RODDING EYE
- CELLULAR SOAKAWAY – AQUACELL ECO OR SIMILAR APPROVED
- FW DRAIN & INSPECTION CHAMBER
- EXCEEDENCE FLOW ROUTE



Cellular Soakaway:
 8.5 x 10 x 0.4m
 Min cover: 500mm
 Design infiltration rate:
 1.022x10⁻⁶m/s
 Design storm: 100yr+45%

Foul water cesspool
 Min. volume required:
 31,600 litres

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Client
 LPC (Trull) Ltd

Job Title
 The Stables
 Pump Lane
 Long Newton
 Tetbury
 GL8 8RN

Drawing Title
 Foul and surface water drainage strategy

Drawing Status:
 FOR COMMENT FOR PLANNING FOR TENDER FOR APPROVAL FOR CONSTRUCTION AS BUILT

CONSTRUCTION AT CLIENT / CONTRACTOR RISK

Designed by: JG Drawn by: JG Checked by: RB

Date: December 2023 Scale: 1:200 @ A3

Dep. No.: 9646/501 Rev.: -

Appendix 3

Flood map for planning

Your reference
9646 Floodmap

Location (easting/northing)
391159/192007

Created
15 Dec 2023 12:45

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

Flood map for planning


Your reference
9646 Floodmap

Location (easting/northing)
391159/192007

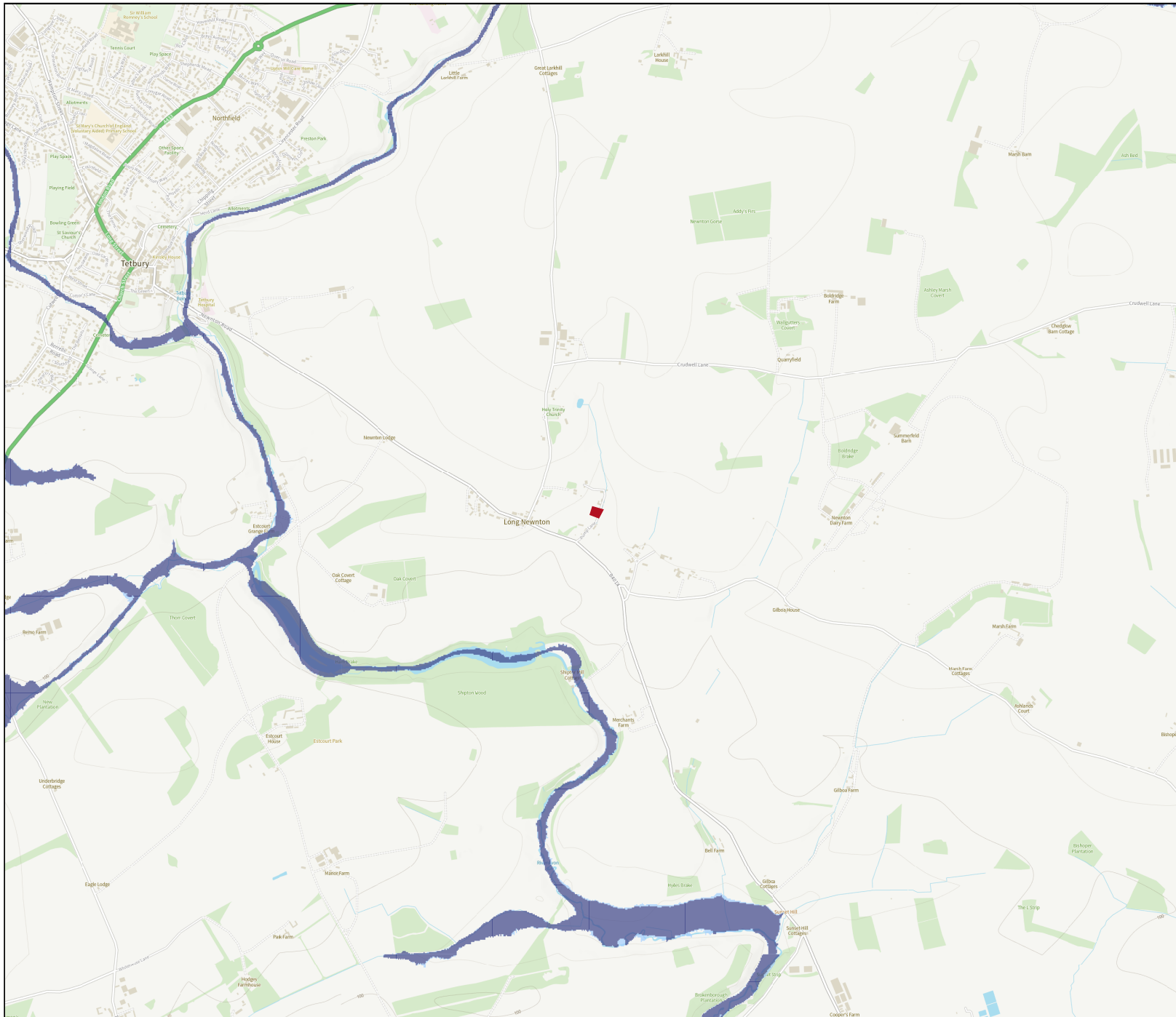
Scale
1:25000

Created
15 Dec 2023 12:45


-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area


0 200 400 600m

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Appendix 4


Cole Easdon Consultants		Page 1
York House Edison Park Dorcan Way Swindon SN3 3RB	The Stables Pump Lane Long Newton	
Date 15/12/2023 11:56 File 9646 - Soakaway Design.SRCX	Designed by JG Checked by RB	
Elstree Computing Ltd		Source Control 2020.1

Summary of Results for 30 year Return Period

Half Drain Time : 1396 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	48.629	0.029	0.0	2.3	O K
30 min Summer	48.637	0.037	0.0	3.0	O K
60 min Summer	48.646	0.046	0.0	3.7	O K
120 min Summer	48.655	0.055	0.0	4.5	O K
180 min Summer	48.661	0.061	0.0	4.9	O K
240 min Summer	48.664	0.064	0.0	5.2	O K
360 min Summer	48.668	0.068	0.0	5.5	O K
480 min Summer	48.671	0.071	0.0	5.8	O K
600 min Summer	48.673	0.073	0.0	5.9	O K
720 min Summer	48.674	0.074	0.0	6.0	O K
960 min Summer	48.675	0.075	0.0	6.1	O K
1440 min Summer	48.676	0.076	0.0	6.1	O K
2160 min Summer	48.675	0.075	0.0	6.1	O K
2880 min Summer	48.674	0.074	0.0	6.0	O K
4320 min Summer	48.670	0.070	0.0	5.6	O K
5760 min Summer	48.665	0.065	0.0	5.3	O K
7200 min Summer	48.661	0.061	0.0	4.9	O K
8640 min Summer	48.656	0.056	0.0	4.6	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	73.074	0.0	19
30 min Summer	47.885	0.0	34
60 min Summer	30.026	0.0	64
120 min Summer	18.280	0.0	124
180 min Summer	13.528	0.0	182
240 min Summer	10.878	0.0	242
360 min Summer	7.977	0.0	362
480 min Summer	6.399	0.0	482
600 min Summer	5.390	0.0	602
720 min Summer	4.683	0.0	720
960 min Summer	3.750	0.0	932
1440 min Summer	2.738	0.0	1142
2160 min Summer	1.996	0.0	1532
2880 min Summer	1.594	0.0	1932
4320 min Summer	1.160	0.0	2764
5760 min Summer	0.925	0.0	3528
7200 min Summer	0.776	0.0	4320
8640 min Summer	0.672	0.0	5096

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York House Edison Park Dorcan Way Swindon SN3 3RB	The Stables Pump Lane Long Newton	
Date 15/12/2023 11:56 File 9646 - Soakaway Design.SRCX	Designed by JG Checked by RB	
Elstree Computing Ltd		Source Control 2020.1

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
10080 min Summer	48.653	0.053	0.0	4.3	O K
15 min Winter	48.632	0.032	0.0	2.6	O K
30 min Winter	48.642	0.042	0.0	3.4	O K
60 min Winter	48.652	0.052	0.0	4.2	O K
120 min Winter	48.662	0.062	0.0	5.0	O K
180 min Winter	48.668	0.068	0.0	5.5	O K
240 min Winter	48.672	0.072	0.0	5.8	O K
360 min Winter	48.677	0.077	0.0	6.2	O K
480 min Winter	48.681	0.081	0.0	6.5	O K
600 min Winter	48.683	0.083	0.0	6.7	O K
720 min Winter	48.684	0.084	0.0	6.8	O K
960 min Winter	48.686	0.086	0.0	6.9	O K
1440 min Winter	48.686	0.086	0.0	7.0	O K
2160 min Winter	48.685	0.085	0.0	6.8	O K
2880 min Winter	48.682	0.082	0.0	6.6	O K
4320 min Winter	48.675	0.075	0.0	6.1	O K
5760 min Winter	48.668	0.068	0.0	5.5	O K
7200 min Winter	48.661	0.061	0.0	4.9	O K
8640 min Winter	48.655	0.055	0.0	4.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
10080 min Summer	0.595	0.0	5752
15 min Winter	73.074	0.0	19
30 min Winter	47.885	0.0	33
60 min Winter	30.026	0.0	62
120 min Winter	18.280	0.0	122
180 min Winter	13.528	0.0	180
240 min Winter	10.878	0.0	240
360 min Winter	7.977	0.0	356
480 min Winter	6.399	0.0	472
600 min Winter	5.390	0.0	586
720 min Winter	4.683	0.0	700
960 min Winter	3.750	0.0	924
1440 min Winter	2.738	0.0	1330
2160 min Winter	1.996	0.0	1648
2880 min Winter	1.594	0.0	2108
4320 min Winter	1.160	0.0	2984
5760 min Winter	0.925	0.0	3808
7200 min Winter	0.776	0.0	4608
8640 min Winter	0.672	0.0	5352

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York House Edison Park Dorcan Way Swindon SN3 3RB	The Stables Pump Lane Long Newton	
Date 15/12/2023 11:56 File 9646 - Soakaway Design.SRCX	Designed by JG Checked by RB	
Elstree Computing Ltd	Source Control 2020.1	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	48.650	0.050	0.0	4.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.595	0.0	5960

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York House Edison Park Dorcan Way Swindon SN3 3RB	The Stables Pump Lane Long Newton	
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Elstree Computing Ltd	Source Control 2020.1	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.385	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.017

Time (mins)		Area
From:	To:	(ha)
0	4	0.017

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York House Edison Park Dorcan Way Swindon SN3 3RB	The Stables Pump Lane Long Newton	
Date 15/12/2023 11:56 File 9646 - Soakaway Design.SRCX	Designed by JG Checked by RB	
Elstree Computing Ltd	Source Control 2020.1	


Model Details

Storage is Online Cover Level (m) 49.500

Cellular Storage Structure

Invert Level (m) 48.600 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00368 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00368

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	85.0	85.0	0.401	0.0	99.8
0.400	85.0	99.8			


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York House Edison Park	The Stables	
Dorcan Way	Pump Lane	
Swindon SN3 3RB	Long Newton	
Date 15/12/2023 11:55	Designed by JG	
File 9646 - Soakaway Design.SRCX	Checked by RB	
Elstree Computing Ltd	Source Control 2020.1	

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

Half Drain Time : 2639 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	48.654	0.054	0.0	4.4	O K
30 min Summer	48.671	0.071	0.0	5.7	O K
60 min Summer	48.689	0.089	0.0	7.2	O K
120 min Summer	48.707	0.107	0.0	8.7	O K
180 min Summer	48.718	0.118	0.0	9.5	O K
240 min Summer	48.725	0.125	0.0	10.1	O K
360 min Summer	48.734	0.134	0.0	10.8	O K
480 min Summer	48.740	0.140	0.0	11.3	O K
600 min Summer	48.745	0.145	0.0	11.7	O K
720 min Summer	48.748	0.148	0.0	12.0	O K
960 min Summer	48.753	0.153	0.0	12.3	O K
1440 min Summer	48.756	0.156	0.0	12.6	O K
2160 min Summer	48.755	0.155	0.0	12.5	O K
2880 min Summer	48.752	0.152	0.0	12.3	O K
4320 min Summer	48.747	0.147	0.0	11.8	O K
5760 min Summer	48.740	0.140	0.0	11.3	O K
7200 min Summer	48.733	0.133	0.0	10.7	O K
8640 min Summer	48.725	0.125	0.0	10.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	137.323	0.0	19
30 min Summer	90.795	0.0	34
60 min Summer	57.224	0.0	64
120 min Summer	34.842	0.0	124
180 min Summer	25.708	0.0	184
240 min Summer	20.591	0.0	244
360 min Summer	15.004	0.0	362
480 min Summer	11.986	0.0	482
600 min Summer	10.063	0.0	602
720 min Summer	8.718	0.0	722
960 min Summer	6.947	0.0	962
1440 min Summer	5.036	0.0	1440
2160 min Summer	3.644	0.0	2008
2880 min Summer	2.894	0.0	2308
4320 min Summer	2.088	0.0	3068
5760 min Summer	1.654	0.0	3872
7200 min Summer	1.380	0.0	4688
8640 min Summer	1.190	0.0	5528

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York House Edison Park	The Stables	
Dorcan Way	Pump Lane	
Swindon SN3 3RB	Long Newton	
Date 15/12/2023 11:55	Designed by JG	
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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
10080 min Summer	48.719	0.119	0.0	9.6	O K
15 min Winter	48.660	0.060	0.0	4.9	O K
30 min Winter	48.680	0.080	0.0	6.4	O K
60 min Winter	48.700	0.100	0.0	8.1	O K
120 min Winter	48.720	0.120	0.0	9.7	O K
180 min Winter	48.732	0.132	0.0	10.7	O K
240 min Winter	48.740	0.140	0.0	11.3	O K
360 min Winter	48.751	0.151	0.0	12.2	O K
480 min Winter	48.758	0.158	0.0	12.8	O K
600 min Winter	48.763	0.163	0.0	13.2	O K
720 min Winter	48.767	0.167	0.0	13.5	O K
960 min Winter	48.773	0.173	0.0	14.0	O K
1440 min Winter	48.778	0.178	0.0	14.4	O K
2160 min Winter	48.779	0.179	0.0	14.4	O K
2880 min Winter	48.775	0.175	0.0	14.1	O K
4320 min Winter	48.766	0.166	0.0	13.4	O K
5760 min Winter	48.757	0.157	0.0	12.7	O K
7200 min Winter	48.746	0.146	0.0	11.8	O K
8640 min Winter	48.736	0.136	0.0	11.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
10080 min Summer	1.049	0.0	6344
15 min Winter	137.323	0.0	19
30 min Winter	90.795	0.0	34
60 min Winter	57.224	0.0	64
120 min Winter	34.842	0.0	122
180 min Winter	25.708	0.0	182
240 min Winter	20.591	0.0	240
360 min Winter	15.004	0.0	358
480 min Winter	11.986	0.0	476
600 min Winter	10.063	0.0	594
720 min Winter	8.718	0.0	710
960 min Winter	6.947	0.0	942
1440 min Winter	5.036	0.0	1400
2160 min Winter	3.644	0.0	2056
2880 min Winter	2.894	0.0	2680
4320 min Winter	2.088	0.0	3324
5760 min Winter	1.654	0.0	4216
7200 min Winter	1.380	0.0	5120
8640 min Winter	1.190	0.0	5968

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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
10080 min Winter	48.725	0.125	0.0	10.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.049	0.0	6856

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Shortest Storm (mins)	15
Ratio R	0.385	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.017

Time (mins)		Area
From:	To:	(ha)
0	4	0.017

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Model Details

Storage is Online Cover Level (m) 49.500

Cellular Storage Structure

Invert Level (m) 48.600 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00368 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00368

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	85.0	85.0	0.401	0.0	99.8
0.400	85.0	99.8			