



Consulting Civil Engineers

Surface Water Drainage Report

The Porton Hotel, Porton

For

Spruce Town Planning

Rev - P

Reference **C2910**

Date **13th December 2023**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	13/12/2023	Initial Issue	KCK	CS

Contents

1	INTRODUCTION	3
2	EXECUTIVE SUMMARY:	4
3	SITE GEOLOGY	4
4	EXISTING DRAINAGE	5
5	PROPOSED DRAINAGE STRATEGY	6
6	MAINTENANCE	11
7	SUMMARY AND CONCLUSIONS	14
8	APPENDICES	15

1 Introduction

- 1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at The Porton Hotel, Porton.
- 1.1.2 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere.
- 1.1.3 The existing site consists classified as an undeveloped Greenfied land. The proposed development will consist of the erection 3 dwellings with driveways. The proposed development is located as OS Grid Reference **SU 19214 36342** and has the post code **SP4 0LA**.
- 1.1.4 The proposed site plan can be found in **Appendix A**.



Fig 1. Site Location

2 Executive Summary:

- 2.1.1 The Surface water will be discharged to ground through the use of geocellular soakaways. All roof areas are to be collected into a positive drainage network. Whilst all hard paved areas are to be constructed from permeable surface to allow runoff to freely drain to ground via infiltration. The network will make use of geocellular soakaways in order to cater for the 1 in 100-year +45% storm.

3 Site Geology

3.1 British Geological Survey information

- 3.1.1 The British Geological Survey confirms the bedrock geology to be made up Seaford Chalk Formation- Chalk. At the time of writing the British Geological Survey website does not have any recorded information of the Superficial deposits on site.
- 3.1.2 The British Geological survey also holds records of historical boreholes near the site which give some insight into the ground geology.
- Borehole SU13NE4 (Located approx. 786m North of the site) – Ground geology (Gravel, Chalk.)
- 3.1.3 The Borehole Logs can be found in **Appendix B**.

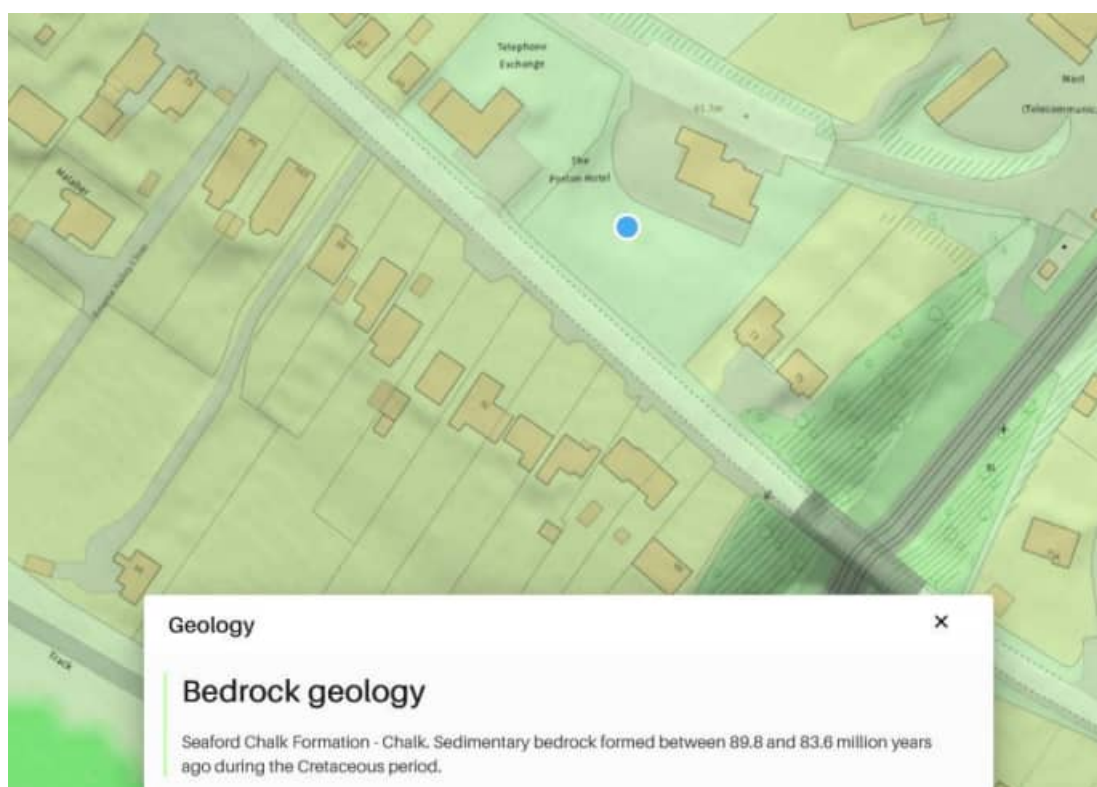


Fig 2. British Geological Survey

Snippet from BGS Website showing Bedrock geology/superficial deposits <http://mapapps.bgs.ac.uk/geologyofbritain/home.html?>



Fig 3. British Geological Survey

Snippet from BGS Website showing the Historical Borehole Log location

3.2 Geological Assessment

- 3.2.1 No intrusive ground investigation testing has been carried out, however based on the available information on Planning Portal and BGS Portal it is confirmed that proposed development is located within the area underlain by soils with good infiltration potential. An infiltration test to BRE 365 has however been undertaken.
- 3.2.2 Whilst the proposed site is indicated to be located in the area underlain by Seaford Chalk Formation, the onsite infiltration test to BRE365 method indicated site being underlain by gravelly and sandy Clay. If during the detail design chalk layer is being confirmed, consultation should be undertaken with a GI specialist to establish Chalk type and whether the proposed soakaway can be located < 10m and < 5m from the proposed buildings. An onsite infiltration test has been carried out by CGS Civils Ltd. The BRE365 Infiltration Test result can be found in **Appendix C**

4 Existing Drainage

- 4.1.1 As the proposed site is undeveloped it is presumed that all surface water runoff is discharged into ground via infiltration

5 Proposed Drainage Strategy

5.1 SuDS Hierarchy

- 5.1.1 All options for the destination of run-off generated on site have been assessed in line with the SuDS hierarchy as set out in Building Regulations Part H document and DEFRA's Draft National Standards for SuDS.

Table 1. SuDS Hierarchy

Discharge Destination	
Rainwater Harvesting	N/A
Discharge to Ground	Surface Water and porous paving based on recorded infiltration rate of 5.60×10^{-5} m/s.
Discharge to Watercourse	N/A
Discharge to Surface Water Sewer	N/A
Discharge to Other Sewer	N/A

5.2 Proposed Hydraulic Calculation Specifications:

Table 2. SuDS Hierarchy

Hydraulic Calculations Settings (Soakaway):	
Rainfall Methodology	FEH-22
Volumetric Run-off Coefficient Cv	1.0
CV Winter and Summer	1.0
Additional Storage (m ³ / ha)	0.0
Infiltration	Recorded worst-case infiltration
Soakaway Design	Base Coefficient (m/hr): 0.20160
	Side Coefficient (m/hr): 0.20160
	Factor of Safety: 2.0
	Porosity: 95%
	Time to Half Empty (mins): 136-163

5.3 Surface Water Drainage

- 5.3.1 An onsite BRE365 infiltration test was carried out by CGS Civils in December 2023. Which confirmed infiltration varies between 6.38×10^{-5} m/s (test 1) – 5.60×10^{-5} m/s (test 3).
- 5.3.2 Groundwater was not encountered during the infiltration testing.
- 5.3.3 It is proposed that surface water runoff from the roof areas is collected via a positive drainage network and discharged into onsite geocellular soakaways. The proposed soakaways have been designed using the recorded infiltration rate of 5.6×10^{-5} m/s.
- 5.3.4 All the proposed permeable areas are to be freely drained to ground via porous construction. All infiltration features on site have been designed to a recorded infiltration of 5.6×10^{-5} m/s and to cater for the 1 in 100-year +45% storm.
- 5.3.5 Proposed Contributing Area Plan, Proposed Surface Water Drainage Plan, Proposed Construction Details and Hydraulic calculations can be found at **Appendix D**.
- 5.3.6 EA Magic Maps can be found at **Appendix E**.

5.4 Water Quality

- 5.4.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.
- 5.4.2 Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals, and various organic and inorganic contaminants) Therefore the first 5-10mm of rainfall should be adequately treated with SuDS.
- 5.4.3 The new SuDS Manual (Ciria C753, November 2015) introduces slightly different approach compared to the previous version for the water quality management of surface water. The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:
- The pollution hazard at a particular site (i.e., the pollution source)
 - The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
 - The sensitivity of the receiving environment
- 5.4.4 The EA website indicates that the site does not lie within a Source Protection Zone.
- 5.4.5 The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

Table 26.1 from SuDS manual. Approaches to Water Quality Risk Management

Table 26.1 Approaches to Water Quality Risk Management			
Design method	Hazard Characterisation	Risk Reduction	
		For Surface Water	For Groundwater
Simple Index Approach	Simple pollution hazard indices based on land use (Table 26.2)	Simple SuDS hazard mitigation indices (Table 26.3)	Simple SuDS hazard mitigation indices (Table 26.4)
Risk Screening	Factors characterising traffic density and extent of infiltration likely to occur (Table 26.5)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (Table 26.5)
Detailed Risk Assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in even mean discharge concentrations and total annual load reductions delivered by the system	

- 5.4.6 As per Table 26.1 Simple Index approach will be used as a design method for this site.
- 5.4.7 Table 26.2 will provide hazard classification of different land uses. The land uses for the surface water drainage for this site are.
- Residential Roofs
 - Individual Property driveways and residential car parks
 - Low traffic roads
- 5.4.8 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index $\geq$ pollution hazard index

5.4.9 Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual;

Table 26.2 from SuDS manual. Pollution Hazard Indices for Different Land Use Classifications

Table 26.2 Pollution hazard indices for different land use classifications				
Land Use	Pollution Hazard Level	Total Suspended solids (TSS)	Metals	Hydro-Carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (Typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

5.4.10 From Table 26.2 the following information is tabulated in Table 1

Table 3: Pollution hazard index and destination of runoff for the proposed site

Table 3: Pollution Hazard Index and Destination of runoff for the proposed Site					
Land Use	Destination of Runoff	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roof	Ground Water	Very Low	0.2	0.2	0.05
Individual driveways,	Ground water	Low	0.5	0.4	0.4

5.4.11 The SuDS mitigation index will be obtained from Table 26.4 (for groundwater) of the SuDS manual.

Table 26.4 from SuDS manual. Indicative SuDS Mitigation Indices for discharges to ground waters.

5.4.12 SuDS mitigation index are tabulated in Table 5 as followed.

Table 26.4 Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good containment attenuation potential of at least 300mm in depth	0.6	0.5	0.6
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e., graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth.	0.4	0.4	0.4
Constructed permeable pavement (where a suitable filtration later is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

Table 4: SuDS mitigation index

Table 4 Mitigation Indices						
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual driveways, residential car parks and low traffic roads	Ground water	Table 26.4 (for ground waters)	Permeable Pavement	0.7	0.6	0.7

5.4.13 The above analysis demonstrates that the SuDS devices within the design will mitigate any pollution present within the surface water system.

5.5 Construction Phase Drainage

- 5.5.1 It is an offence to cause or knowingly permit the entry of any polluting, poisonous or noxious material in the water environment. If the pollution is serious enough to lower the ecological status of the water body as set out in terms by the Water Framework Directive (2000/60/EC) then prosecution may occur.
- 5.5.2 Remediation of any damage caused will not require the polluter to be prosecuted first. If the water pollution is serious enough to be classed as environmental damage, the damage will require to be remediated such that the area is returned to the condition it would have been in if the damage had not occurred.
- 5.5.3 If any pollution has not been reported or the polluter has not taken actions to prevent any further damage; they would then be causing an offence. Third parties (e.g., Private water supply users, landowners, recreation users and the public) who may be affected by possible damage may also report the risk of any environmental damage to the enforcing authority.
- 5.5.4 The principles of SuDS (Sustainable Drainage Systems) shall be applied to all components of design and construction regarding surface water management. Any design or site works that may impact on the site drainage or the water quality shall:
- Soakaway where soils allow
 - Consider and manage erosion
 - Remove pollutants in surface water
 - Retain any silts on site and prevent silts from discharging to watercourses or drains
 - Keep runoff rates at existing greenfield runoff
 - Prevent accidental spillages reaching watercourse
- 5.5.5 As infiltration on site is viable, the temporary drainage for the development will be in the form of land drains which will discharge into the ground.
- 5.5.6 Pollution will be controlled via the use of catchpit manholes and geotextiles.
- 5.5.7 Any potential hazardous substances will be within a controlled compound with a separate drainage system that will contain a penstock valve / containment kit in the event of a spillage.

6 Maintenance

6.1 Introduction

- 6.1.1 During construction, the Contractor will be responsible for maintaining the drainage and SuDS (Sustainable Drainage Systems). The occupier will take on the responsibility of these duties as laid out in this report.
- 6.1.2 The maintenance schedule for the proposed development will be split down into two separate categories; SuDS features and regular private drainage.

6.2 SuDS at The Porton Hotel, Porton

- 6.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be **Soakaways, Permeable paving**.
- 6.2.2 The SuDS features have been designed for easy maintenance and comprise:
- Regular Day-to-Day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS features
 - Occasional tasks – checking the SuDS features and removing any silt that builds up in the SuDS feature
 - Remedial work – repairing damage where necessary

6.3 SuDS Drainage Maintenance Specification

6.3.1 Soakaway

In order to maintain the functioning of the attenuation tanks, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for attenuation storage tanks		
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 it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from per-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, 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 inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

6.3.2 Permeable Paving

In order to maintain the functioning of the permeable paving, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for permeable paving		
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 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, 48h after large storms in first six months
	Inspect silt accumulation rate and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6.4 General Drainage Maintenance Specification

6.4.1 Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to allow free flow through the SuDS
- Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage. Trim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly
Inspection Chambers and below ground control chambers. Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in Autumn	Annually
Occasional Maintenance Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work Repair physical damage if necessary	As required

6.4.2 Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
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 it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

7 Summary and Conclusions

- 7.1.1 CGS Civils has been instructed by to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for 3 residential units.
- 7.1.2 The Surface Water runoff will be collected and discharged into the ground via geocellular tank soakaways and permeable paving. The proposed Surface Water drainage has been designed using an recorded infiltration rate of 5.6×10^{-5} m/s and to account for the Critical 1 in 100 + 45% climate change rainfall event.
- 7.1.3 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water drainage can be achieved for the proposed development.

8 Appendices

8.1 Appendix A – Site Plan

NOTES:
THIS DRAWING IS COPYRIGHT OF THE ARCHITECTS AND
MUST NOT BE USED WITHOUT THEIR PERMISSION. ALL
DIMENSIONS TO BE CHECKED ON SITE. DISCREPANCIES AND
OMISSIONS TO BE REPORTED IMMEDIATELY TO THE
ARCHITECT.

EXISTING TREE

PROPOSED TREE

TREE TO BE REMOVED

ROOT PROTECTION AREA

NO DIG AREA

SITE BOUNDARY

The diagram is a detailed architectural site plan for three proposed houses. It shows the layout of the plots, including gardens, terraces, and house footprints. Key features include:

- Plot 1:** Features a house with 'PLAIN CLAY TILES' and an adjacent 'UPPER GARDEN' with a 'TERRACE'. Dimensions include 8.4m, 77.80, 1.9m, and 3.4m.
- Plot 2:** Features a house with 'NATURAL SLATE TILES' and an adjacent 'UPPER GARDEN' with a 'TERRACE'. Dimensions include 9.2m, 3.7m, and 2.4m.
- Plot 3:** Features a house with 'PLAIN CLAY TILES' and an adjacent 'UPPER GARDEN' with a 'TERRACE'. Dimensions include 6.6m, 5.7m, 14.7m, and 2.4m.
- Common Features:** 'PROPOSED RETAINING WALLS' are shown along the top boundary. 'PROPOSED DRAINAGE CHANNELS' are indicated at the bottom. 'VEHICLE MANOEUVRING AREA TO BE KEPT CLEAR (SHARED DRIVE)' is shown at the bottom left. 'BONDED FREE DRAINING GRAVEL (NON MIGRATORY)' is shown in the central access area. 'PROPOSED HEDGE PLANTING' is indicated along the bottom boundary. 'DROP KERBS SHOWN THUS' are marked at the bottom corners.
- Context:** The site is bounded by 'WINTERSLOW ROAD' to the south and 'PORTON HOTEL' to the north.
- Other:** A north arrow points towards the top right. A scale bar is located at the bottom left.

0 2 4 6 8 10 12m
Scale 1:100 @ A1 - 1:200 @ A3

DWG. NO. 20/3332/200

PROPOSAL FOR 3 NEW HOUSES TO REAR OF PORTON HOTEL, PORTON
PROPOSED PLANS, SECTION & PRINCIPAL ELEVATIONS, SCALE 1:200 @ A3, © R.R.P.L, JUNE 2023.

8.2 **Appendix B – BGS Historical Borehole Logs**

1065 Wt. 22438.0384 10M 7/45 (51) F.B.S.

RECORD OF WELL (SHAFT OR BORE)

At AMESBURY R.D.C.,
HOREFIELD* COUNCIL ESTATE

Town or Village JD MISTON

County WILTS Six-inch quarter sheet 615w/w

For Mr. Borthan & Brown

Exact site of well SU 1925 3712

(For Survey use only) N. 1914

1-inch Map Registered No.

298/282

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface
above sea level (O.D.) + 233 ft.

If well-top is not at ground level, state how far ...

(above; _____ ft.)
(below; _____ ft.)

SHAFT	ft. : diameter	ft. Details of headings
1	12	12
2	12	12
3	12	12
4	12	12
5	12	12
6	12	12
7	12	12
8	12	12
9	12	12
10	12	12
11	12	12
12	12	12
13	12	12
14	12	12
15	12	12
16	12	12
17	12	12
18	12	12
19	12	12
20	12	12
21	12	12
22	12	12
23	12	12
24	12	12
25	12	12
26	12	12
27	12	12
28	12	12
29	12	12
30	12	12
31	12	12
32	12	12
33	12	12
34	12	12
35	12	12
36	12	12
37	12	12
38	12	12
39	12	12
40	12	12
41	12	12
42	12	12
43	12	12
44	12	12
45	12	12
46	12	12
47	12	12
48	12	12
49	12	12
50	12	12
51	12	12
52	12	12
53	12	12
54	12	12
55	12	12
56	12	12
57	12	12
58	12	12
59	12	12
60	12	12
61	12	12
62	12	12
63	12	12
64	12	12
65	12	12
66	12	12
67	12	12
68	12	12
69	12	12
70	12	12
71	12	12
72	12	12
73	12	12
74	12	12
75	12	12
76	12	12
77	12	12
78	12	12
79	12	12
80	12	12
81	12	12
82	12	12
83	12	12
84	12	12
85	12	12
86	12	12
87	12	12
88	12	12
89	12	12
90	12	12
91	12	12
92	12	12
93	12	12
94	12	12
95	12	12
96	12	12
97	12	12
98	12	12
99	12	12
100	12	12

BORE 100 ft.; diameter of bore: at top _____ ins.; at bottom _____ ins. Lengths,

diameters, perforations, etc., of lining tubes 75 ft. of 6" tubes
26 ft. of 5" tubes

Water struck at depths below well top, of (feet)

Rest-level of water 26 ft. ^{above}/_{below} well-top. Suction at _____ ft. Yield on _____ hours' pumping, 600 gal. _____ days' _____

per hour with depression to 44 ft. below well-top, Capacity of pump _____ g.p.h. Recovery to _____

rest level in _____ mins.
_____ hours Date of measurements _____

Date of well April 1948

Quality of water (attach copy of analysis if available)

Well made by J. Wallis Titt & Co. Ltd

Information from *ditto*

Additional notes in space overleaf.

(For Survey use only)		NATURE OF STRATA	THICKNESS		DEPTH	
GEOLOGICAL CLASSIFICATION			Feet	In.	Feet	In.
If measurements start below ground surface, e.g., from bottom of an existing shaft, state how far						
2 ft. a chalk	Gravel		17		17	
	Gravel	}	28		45	
	Burning chalk					
	Chalk & flints					
	Chalk & flints		47		902	
	Chalk & flints - middle chalk		8		100	
Visited - site corrected.						
In use. Beckie pump. Pumphouse locked.						
OD + 233.						
Drift Upper chalk } 100 ft. J.D. 9/1/78						
L.C.J. 21/10/58.						
Continued over leaf						

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

Date received _____

Correspondence File No.

1" N. & Map No.	1" O. & Map No.
--------------------	--------------------

Site marked (use symbol)	
on 1" Map	on 6" Map

20.5.48

298

6

[illegible]



(For Survey use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA (Continued)

THICKNESS

DEPTH

Feet

Ins.

Feet

Ins.

ADDITIONAL NOTES

298/282
SU13/55

Visited. The council removed the pump house something more
than a year ago. The house is on mains supply.

298
282

JAA 1st 6.78

298/282

SU 13/55

Drift
Upper chalk } to 100 ft

G.B.
9/1/78

8.3 **Appendix C – BRE365 Infiltration Test**

Site Photographs - Infiltration Test



Job: The Porton Hotel, Porton- Test 1

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} = 1.47 m/squared

t_{p75-25} = 1440 seconds

V_{p75-25} = 0.135 m/cubed

F = 6.38E-05

Job: The Porton Hotel, Porton - Test 2

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} = 1.47 m/squared

t_{p75-25} = 1530 seconds

V_{p75-25} = 0.135 m/cubed

F = 6E-05

Job: The Porton Hotel, Porton - Test 3

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} = 1.47 m/squared

t_{p75-25} = 1640 seconds

V_{p75-25} = 0.135 m/cubed

F = 5.6E-05

8.4 **Appendix D – Proposed Contributing Area Plan, Proposed Surface Water Drainage Plan, Proposed Construction Details and Hydraulic Calculations**



- STANDARD DRAINAGE NOTES
- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
 - ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
 - THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
 - ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
 - BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
 - ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT. THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
 - COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
 - ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA.
 - ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS. TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911:PART 1.
 - ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
 - ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION Laid DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
 - ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
 - THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
 - STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
 - IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
 - NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
 - ALL EXISTING MANHOLE COVER'S, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
 - UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION.
 - MANHOLE AND CHAMBER COVER GRADES:
- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
 - 'B125' IN ALL DRIVEWAYS
 - 'C250' IN PRIVATE PARKING AREAS
 - 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefix to drawing numbers shall signify the following:-

PL = PLANNING	Shall not be used for contract or construction purposes
P = PRELIMINARY	Shall not be used for contract or construction purposes
T = TENDER	Shall not be used for construction purposes
C = CONSTRUCTION	These are the <u>only</u> drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

P-	13.12.23	PRELIMINARY ISSUE	KCK	TZ	CS
REV	DATE	DESCRIPTION	BY	CHK	APP

 Consulting Civil Engineers							
CLIENT	SPRUCE TOWN PLANNING						
ARCHITECT	RELPHROSS						
JOB TITLE	THE PORTON HOTEL, PORTON, SP4 0LA						
DRAWING TITLE	PROPOSED CONTRIBUTING AREA PLAN						
DRAWN	KCK	ENGINEER	TZ	CHECKED	CS	APPROVED	CS
DATE	DECEMBER 2023		SCALE @ A1		1:100		
JOB No.	C2910	STATUS	P	DRAWING No.	201	REV.	P-

FOR PLANNING ONLY



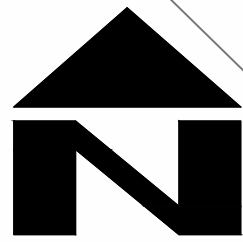
CONTRIBUTING AREA PLAN (1:100)



Proposed roof drainage area: 0.0348 ha

Proposed permeable driveway and car parking area

Proposed footpath area (self-draining area- excluded from drainage calculations)



DRAINAGE LEGEND

PROPOSED FEATURES

- Surface Water Drainage
- ACO Channel drain
- Rainwater pipe
- Storm water access chamber (3000)
- Storm water inspection chamber (4500)
- Storm water catchpit chamber (4500)
- Storm water rodding eye
- Extent of permeable paving with porous sub-base
- 'NO DIG' Construction
- Proposed Bio-Retention units
- Finished floor level (assumed)
- Masonry retaining wall
- Proposed surface level (Shown indicatively only. Final Levels to be confirmed at detail design stage.)
- Fall in surface and gradient
- Pipe info - diameter, length, gradient, bedding type
- ABBREVIATIONS
- MH - MANHOLE
 - IC - INSPECTION CHAMBER
 - AC - ACCESS CHAMBER
 - CP - CATCHPIT
 - BC - BRAKE CHAMBER
 - RE - RODDING EYE
 - IL - INVERT LEVEL
 - SL - SUMP LEVEL
 - RA - RESTRICTED ACCESS COVER
 - CL - COVER LEVEL
 - TL - TOP OF CELLULAR SA
 - BL - BASE OF CELLULAR SA
 - FL - FORMATION LEVEL
- Site Boundary (as taken from Relphross Partnership Architects' Location Plan Drawing Number 20/3332/LOC1 C.)

STANDARD DRAINAGE NOTES

- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
- ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
- BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
- ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT. THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
- COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
- ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA.
- ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911-PART 1.
- ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
- ALL ADAPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
- ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
- THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
- STUB CONNECTIONS TO ADAPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
- IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
- NO PRIVATE AREAS ARE TO DRAIN ONTO ADAPTABLE AREAS AND VICE VERSA.
- ALL EXISTING MANHOLE COVER'S, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
- UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION.
- MANHOLE AND CHAMBER COVER GRADES:

- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
- 'B125' IN ALL DRIVEWAYS
- 'C250' IN PRIVATE PARKING AREAS
- 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	Shall not be used for contract or construction purposes
P = PRELIMINARY	Shall not be used for contract or construction purposes
T = TENDER	Shall not be used for construction purposes
C = CONSTRUCTION	These are the <u>only</u> drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

Site Specific Notes

- Proposed SW drainage designed based on desktop study, available BGS Historical Borehole Logs, Topographical Survey and on site infiltration test to BRE365 Method.
- Proposed soakaway designed based on the recorded infiltration rates of 5.60×10^{-5} m/s. Infiltration testing as undertaken by CGS Civils Ltd. in December 2023.
- Groundwater was not encountered within at the time of testing.
- Proposed external levels assumed. External levels to be designed by others.
- The proposed *CL and IL inspection chambers final levels will be designed during detail design and are shown indicatively only for drainage purposes only.
- The infiltration system has been designed based to cater the Critical 1 in 100 year + 45% climate change event.

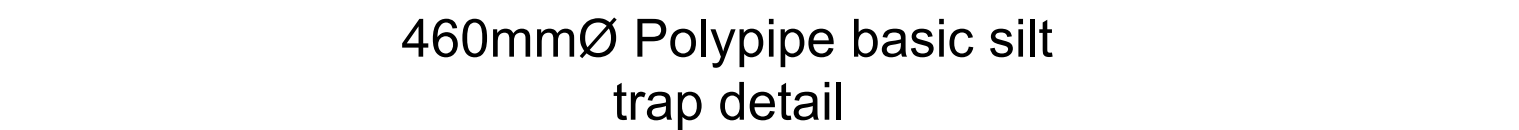
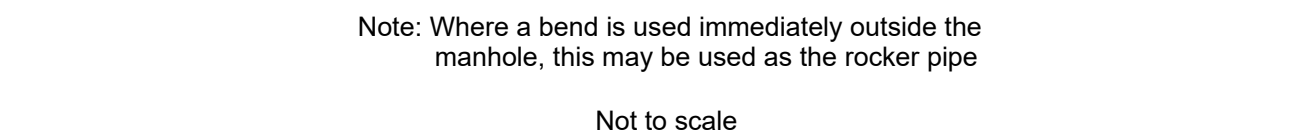
DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
ORDINARY WATERCOURSE APPROVAL
LOCATION AND DEPTH OF EXISTING UTILITIES
ROOT PROTECTION AREAS
EXTERNAL LEVELS (BY OTHERS)

FOR PLANNING ONLY

P-	13.12.23	PRELIMINARY ISSUE	KCK	TZ	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
 Consulting Civil Engineers					
CLIENT SPRUCE TOWN PLANNING					
ARCHITECT RELPHROSS					
JOB TITLE THE PORTON HOTEL, PORTON, SP4 0LA					
DRAWING TITLE PROPOSED DRAINAGE STRATEGY					
DRAWN	KCK	ENGINEER	TZ	CHECKED	CS
DATE	DECEMBER 2023	SCALE @ A1	1:100	APPROVED	CS
JOB No.	C2910	STATUS	P	DRAWING No.	101
REV.					P-

Depth from cover level to soffit of pipe up to 2 m
Flexible material construction



P-	13.12.23	PRELIMINARY ISSUE	KCK	TZ	C
REV	DATE	DESCRIPTION	BY	CHK	A

 Consulting Civil Engineers			
CLIENT SPRUCE TOWN PLANNING			
ARCHITECT RELPHROSS			
JOB TITLE THE HOTEL, PORTON, SP4 0LA			
DRAWING TITLE PROPOSED TYPICAL CONSTRUCTION DETAILS			
DRAWN KKK	ENGINEER TZ	CHECKED CS	APPROVED CS
DATE DECEMBER 2023		SCALE @ A1 AS SHOWN	
JOB No. C2910	STATUS P	DRAWING No. 501	REV. P-

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	Cover Level (m)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
SA1	0.025	72.865	450	1825.048	-752.893	1.450
SA2	0.010	72.890	450	1842.364	-766.747	1.450
PP1	0.015	72.650	450	1826.728	-751.660	0.510
PP2	0.009	72.650	450	1844.833	-766.676	0.510

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0	100	0	0	0
30	0	0	0	100	45	0	0
30	40	0	0				

Node SA1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.20160	Porosity	0.95	Pit Width (m)	5.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.20160	Invert Level (m)	71.415	Pit Length (m)	3.500	Number Required	1
Safety Factor	2.0	Time to half empty (mins)	163	Depth (m)	0.800		

Node SA2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.20160	Porosity	0.95	Pit Width (m)	3.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.20160	Invert Level (m)	71.440	Pit Length (m)	2.000	Number Required	1
Safety Factor	2.0	Time to half empty (mins)	136	Depth (m)	0.800		

Node PP1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.20160	Porosity	0.30	Width (m)	15.000	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.20160	Invert Level (m)	72.140	Length (m)	10.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	9	Slope (1:X)	15.0		

Node PP2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.20160	Porosity	0.30	Width (m)	9.400	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.20160	Invert Level (m)	72.140	Length (m)	10.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	9	Slope (1:X)	15.0		

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SA1	58	71.684	0.269	4.2	4.4653	0.0000	OK
60 minute summer	SA2	55	71.753	0.313	2.4	1.7857	0.0000	OK
30 minute summer	PP1	21	72.413	0.273	5.0	1.3392	0.0000	OK
30 minute summer	PP2	21	72.404	0.264	3.0	0.7974	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute winter	SA1	Infiltration	0.6
60 minute summer	SA2	Infiltration	0.3
30 minute summer	PP1	Infiltration	1.9
30 minute summer	PP2	Infiltration	1.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SA1	59	71.792	0.377	5.5	6.2601	0.0000	OK
60 minute summer	SA2	60	71.873	0.433	3.2	2.4680	0.0000	OK
30 minute summer	PP1	22	72.462	0.322	6.5	1.8627	0.0000	OK
30 minute summer	PP2	22	72.454	0.314	3.9	1.1166	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute winter	SA1	Infiltration	0.7
60 minute summer	SA2	Infiltration	0.3
30 minute summer	PP1	Infiltration	2.2
30 minute summer	PP2	Infiltration	1.4

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SA1	60	71.970	0.555	7.7	9.2325	0.0000	OK
60 minute winter	SA2	60	72.085	0.645	3.1	3.6767	0.0000	OK
30 minute summer	PP1	22	72.539	0.399	9.1	2.8449	0.0000	OK
30 minute summer	PP2	22	72.525	0.385	5.5	1.6713	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute winter	SA1	Infiltration	0.8
60 minute winter	SA2	Infiltration	0.3
30 minute summer	PP1	Infiltration	2.8
30 minute summer	PP2	Infiltration	1.7

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SA1	60	71.917	0.502	7.1	8.3486	0.0000	OK
60 minute winter	SA2	60	72.017	0.577	2.8	3.2885	0.0000	OK
30 minute summer	PP1	22	72.514	0.374	8.3	2.5112	0.0000	OK
30 minute summer	PP2	22	72.504	0.364	5.0	1.4966	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute winter	SA1	Infiltration	0.7
60 minute winter	SA2	Infiltration	0.3
30 minute summer	PP1	Infiltration	2.6
30 minute summer	PP2	Infiltration	1.6

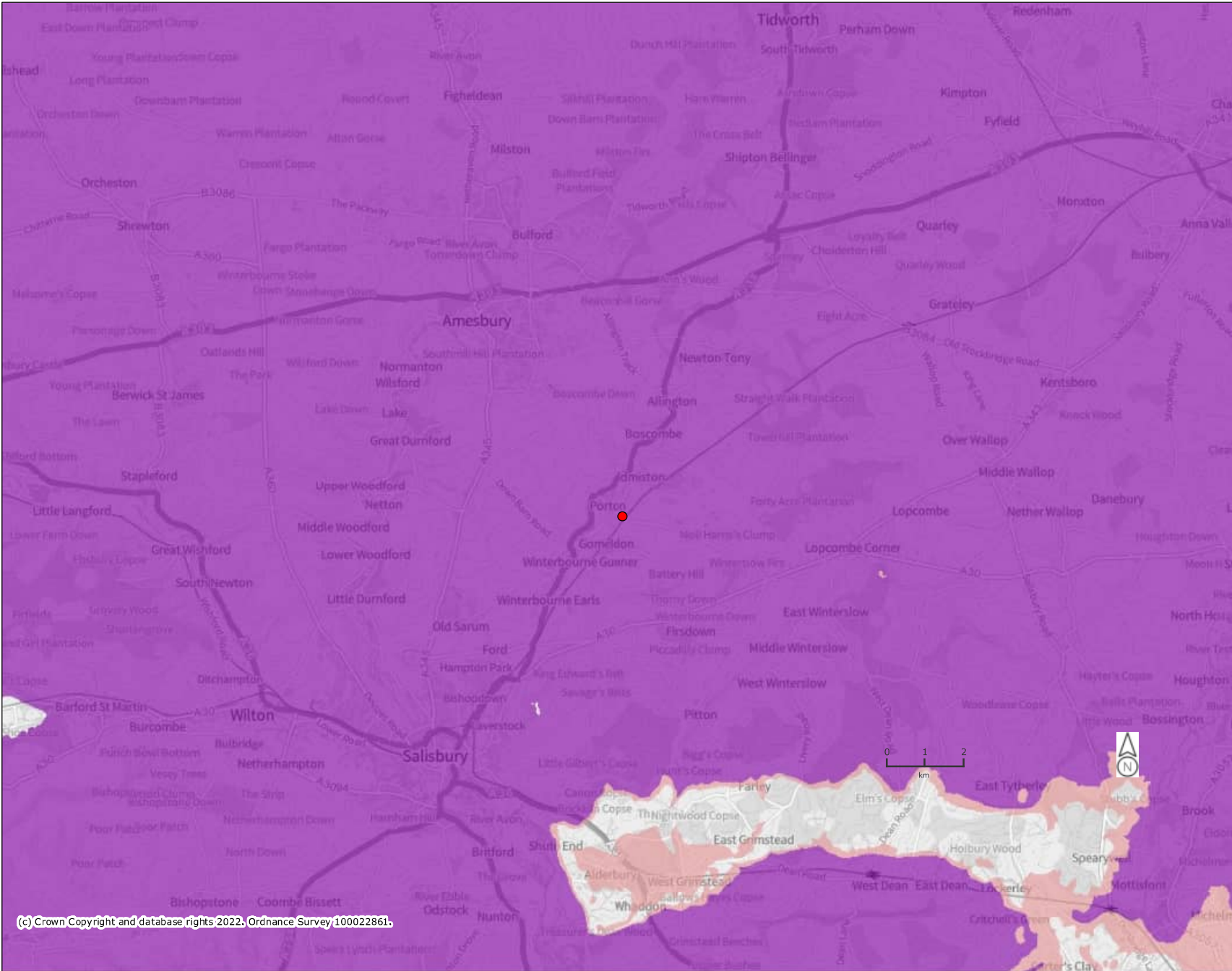
Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SA1	60	72.178	0.763	10.3	12.6914	0.0000	OK
60 minute winter	SA2	60	72.648	1.208	4.1	4.5629	0.0000	OK
30 minute summer	PP1	22	72.610	0.470	12.0	3.9397	0.0000	OK
30 minute summer	PP2	22	72.596	0.456	7.2	2.3338	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute winter	SA1	Infiltration	0.9
60 minute winter	SA2	Infiltration	0.4
30 minute summer	PP1	Infiltration	3.3
30 minute summer	PP2	Infiltration	2.0

8.5 **Appendix E- Magic Map from Environment Agency**

Aquifer Designation Map (Bedrock)



(c) Crown Copyright and database rights 2022, Ordnance Survey 100022861.

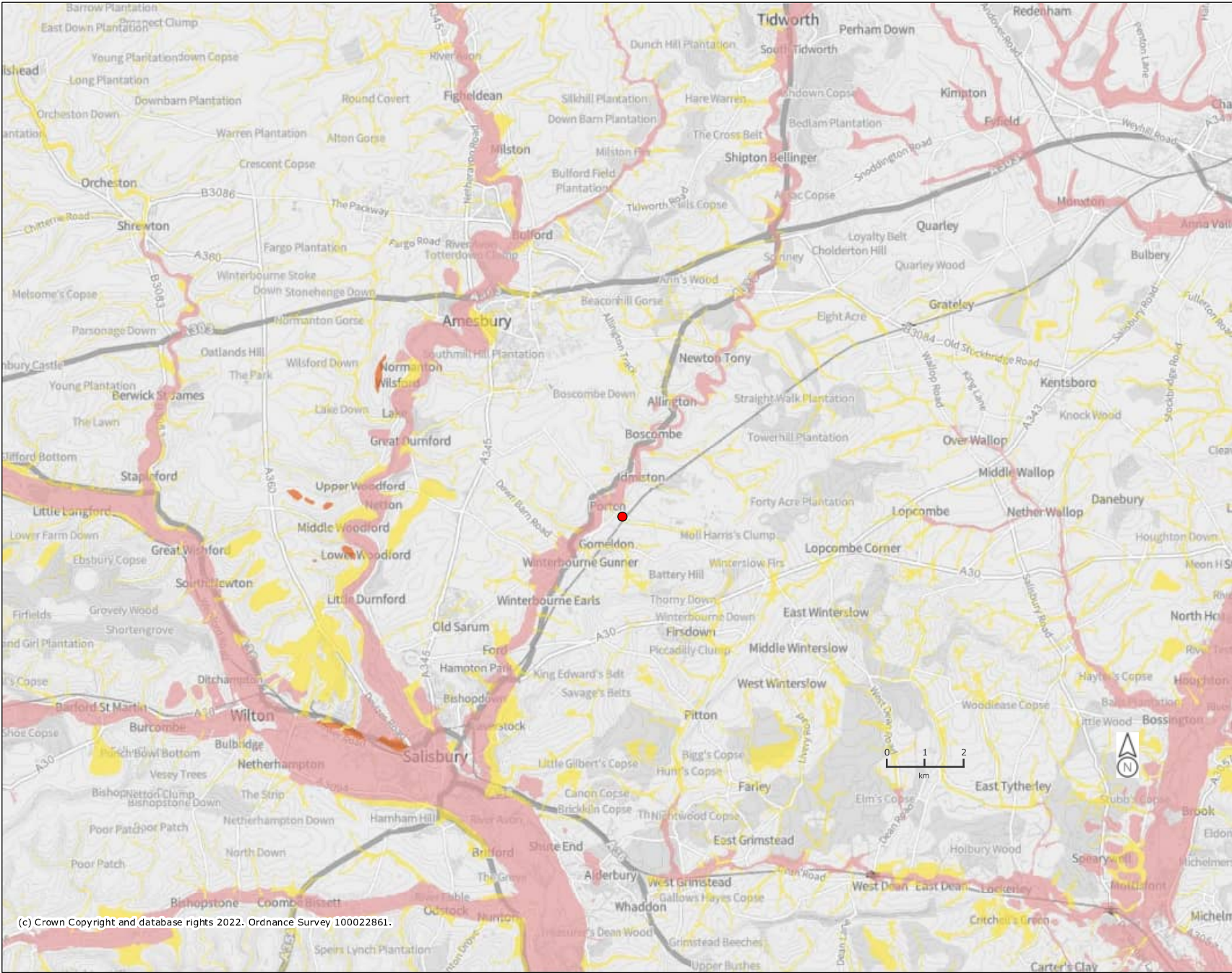
Legend
Aquifer Designation
Map (Bedrock)
(England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

Projection = OSGB36
xmin = 393700
ymin = 124600
xmax = 444500
ymax = 149600

Map produced by MAGIC on 30 November, 2023.
Copyright resides with the data suppliers and the map must not be reproduced without their permission. Some information in MAGIC is a snapshot of the information that is being maintained or continually updated by the originating organisation. Please refer to the metadata for details as information may be illustrative or representative rather than definitive at this stage.

Aquifer Designation Map (Superficial Drift)



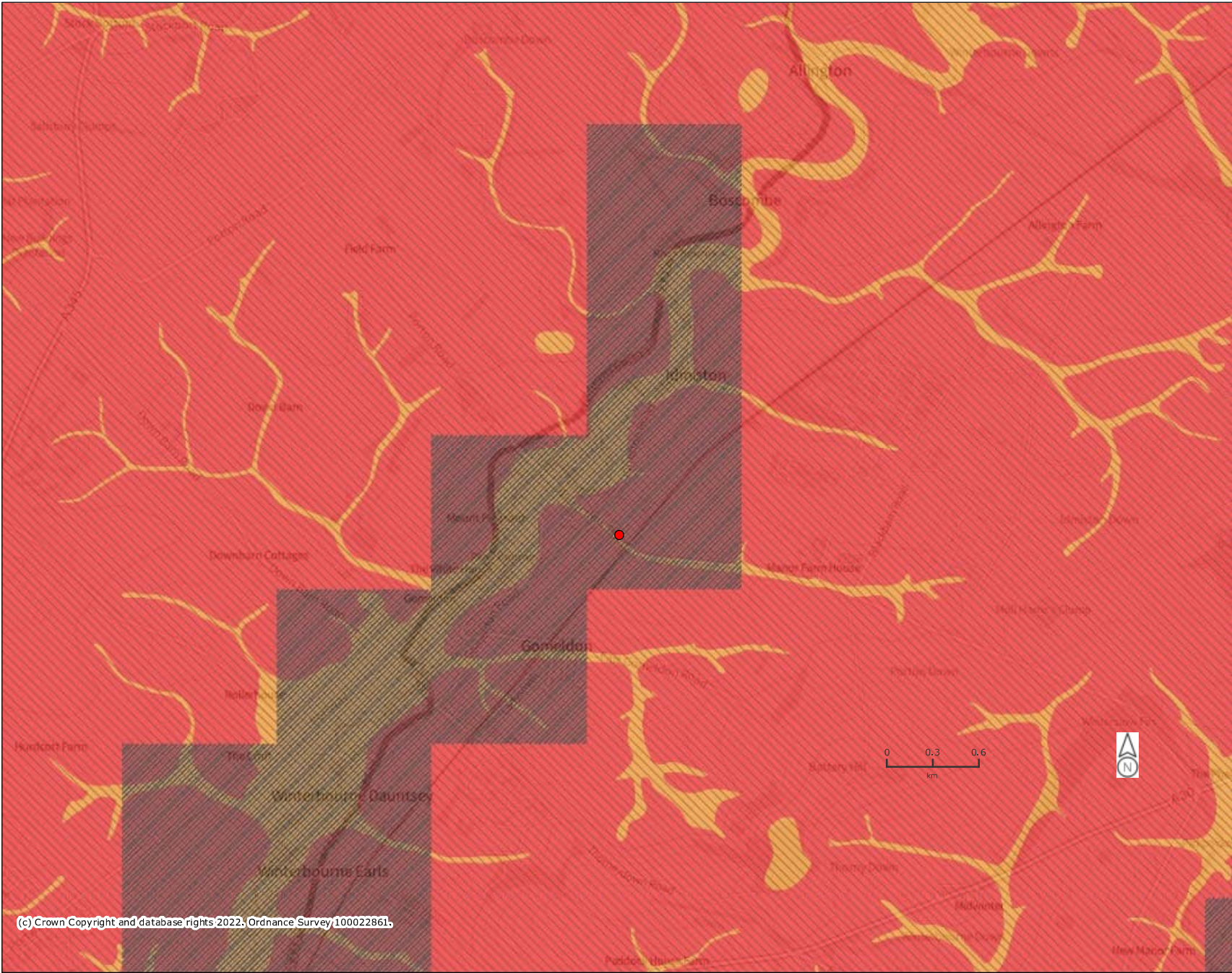
(c) Crown Copyright and database rights 2022. Ordnance Survey 100022861.

Legend
Aquifer Designation
Map (Superficial
Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

Projection = OSGB36
xmin = 393700
ymin = 124600
xmax = 444500
ymax = 149600
Map produced by MAGIC on 30 November, 2023.
Copyright resides with the data suppliers and the map
must not be reproduced without their permission. Some
information in MAGIC is a snapshot of the information
that is being maintained or continually updated by the
originating organisation. Please refer to the metadata for
details as information may be illustrative or representative
rather than definitive at this stage.

Groundwater Vulnerability Map

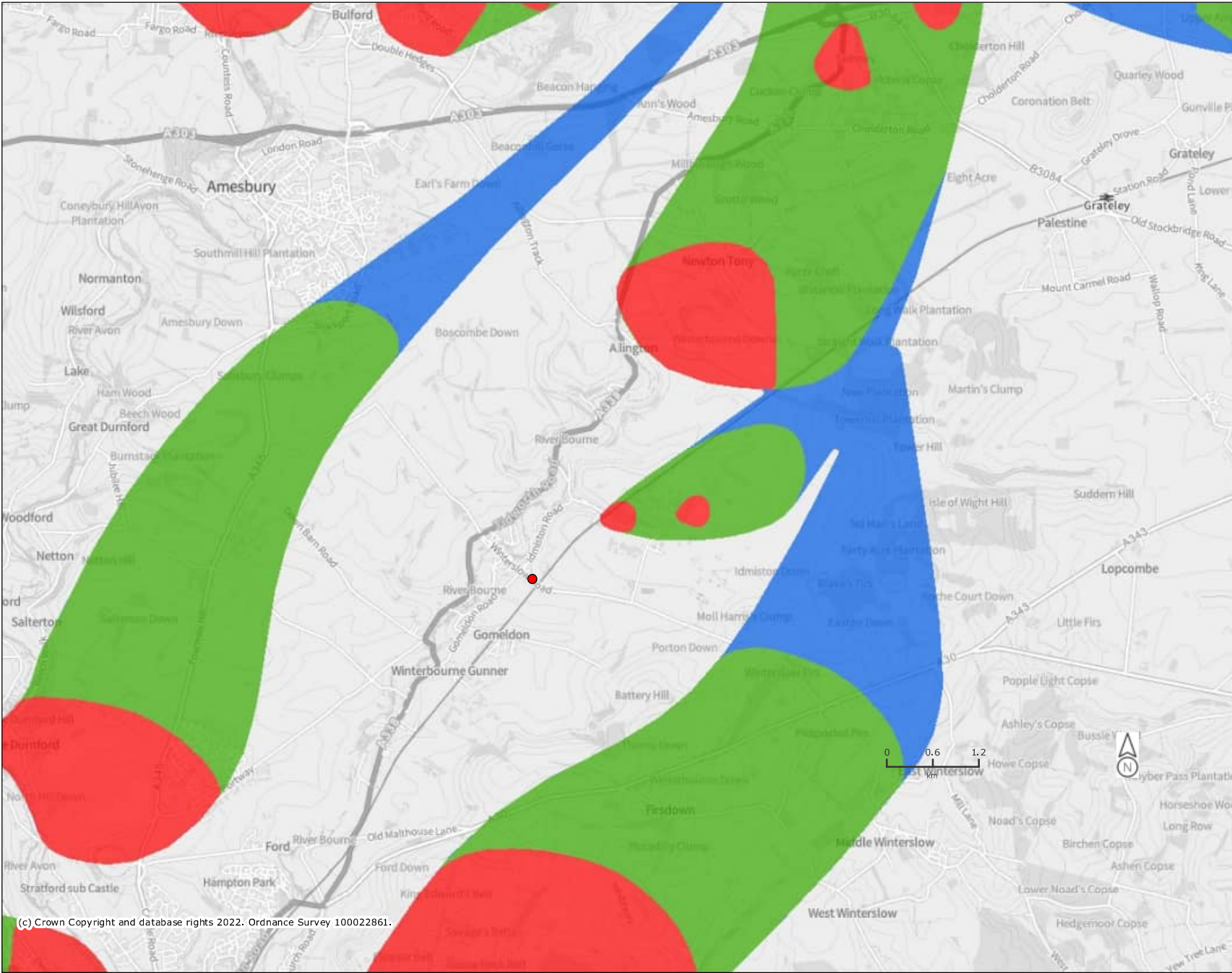


Legend
Groundwater
Vulnerability Map
(England)

- Local Information
- Soluble Rock Risk
- High
- Medium - High
- Medium
- Medium - Low
- Low
- Unproductive

Projection = OSGB36
xmin = 412800
ymin = 133500
xmax = 425500
ymax = 139800
Map produced by MAGIC on 30 November, 2023.
Copyright resides with the data suppliers and the map must not be reproduced without their permission. Some information in MAGIC is a snapshot of the information that is being maintained or continually updated by the originating organisation. Please refer to the metadata for details as information may be illustrative or representative rather than definitive at this stage.

Source Protection Zones merged



(c) Crown Copyright and database rights 2022. Ordnance Survey 100022861.

Legend

Source Protection Zones merged (England)

- Zone I - Inner Protection Zone
- Zone I - Subsurface Activity
- Zone II - Outer Protection Zone
- Zone II - Subsurface Activity
- Zone III - Total Catchment
- Zone III - Subsurface Activity
- Zone of Special Interest

Projection = OSGB36
xmin = 407600
ymin = 131300
xmax = 433000
ymax = 143800

Map produced by MAGIC on 30 November, 2023.
Copyright resides with the data suppliers and the map must not be reproduced without their permission. Some information in MAGIC is a snapshot of the information that is being maintained or continually updated by the originating organisation. Please refer to the metadata for details as information may be illustrative or representative rather than definitive at this stage.