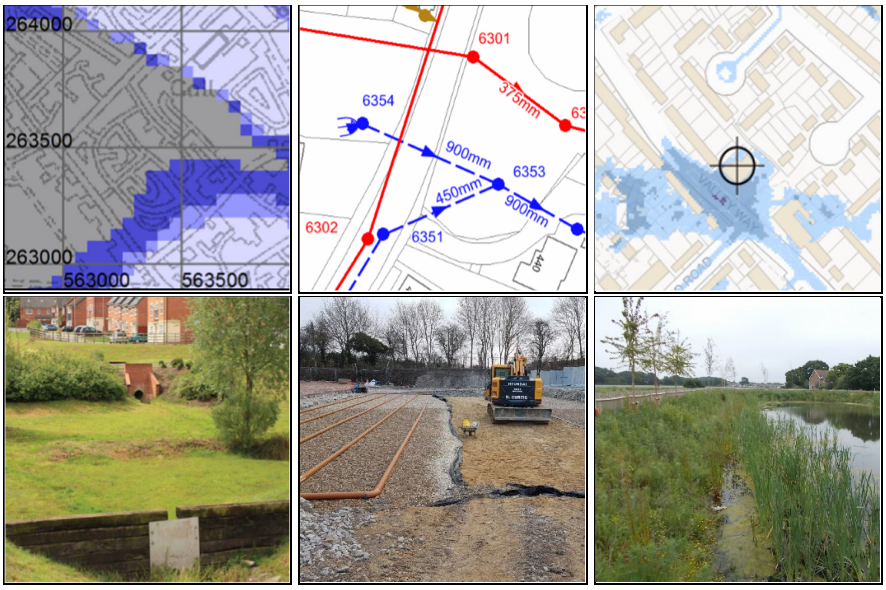

Drainage Strategy and Flood Risk Statement

Opposite Jubilee Cottage, Witt Road, Winterslow, Hants

Reference:	25168	
Issue:	**Date:**	
1	13/5/2026	
2	15/9 2026	Plot driveway layout revised

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3	Surface Water Discharge (Existing)
4	Surface Water Strategy
5	Flood Source-Pathway-Receptor Assessments
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7	Climate Change
8	Flood Risk Management Measures
9	Foul Water Strategy
10	Off Site Impacts
11	Residual Risks

Appendices

A	Existing & Proposed Site Layouts
B	EA Flood Mappings, Soils Information
C	Surface Water Assessment
D	Conditions & Limitations

1. Introduction

1.1 Instructions were received from Bryan Jezeph Consultancy to set out the Drainage Strategy (DS) and provide a Flood Risk Statement for a planning application for the development of 5 dwellings opposite Jubilee Cottage, Witt Road, Winterslow.

1.2 This assessment has been undertaken by A P Traves BSc CEng MIStructE MCIHT.

1.3 The client's attention is drawn to the conditions and limitations contained in Appendix D.

2. Development Description & Location

2.1 The site comprises a roughly rectangular approximately 0.43 Ha parcel opposite Jubilee Cottage, Witt Road, Winterslow, Wilts (grid ref 424750 132500). The existing topography is shown on LDS Survey drawing LDS-18472-TP1-C contained in Appendix A of this report.

2.2 It is proposed develop 5 dwellings on 0.36 ha of the land and to retain the remaining 0.07Ha in agricultural use including access. The proposed layout is identified on Bernard Cole site plan 9780-2-H contained in in Appendix A of this report

3. Surface Water Discharge (Existing)

3.1 The site is currently comprises a grass paddock and barn. The site falls north east to south west from some 112m AOD to some 109m AOD.

3.2 There are no surface water drainage assets presently on the site.

4. Surface Water Strategy

4.1 BGS mapping indicates the site is located on superficial Head deposits over Chalk bedrock of the Culver Chalk Formation.

4.2 Geotechnical investigations were undertaken by Soils Ltd in October 2025 including 3 boreholes made to 5mbgl. This determined gravelly Clay/clayey gravel made ground up to 1.3mbgl where the site has been previously raised and levelled around the barn, over sandy slightly gravelly Clay/Silt (Head Deposits) over Chalk bedrock at 1.6-1.8mbgl. A copy of the report is contained in Appendix B.

4.3 Groundwater Monitoring was undertaken over winter 2025/2026 and all holes remained dry ie GWL more than 5.0mbgl.

4.4 Permeability tests were undertaken immediately to the north (PL/2022/07116 test report 11/10/2019 refers) and determined a permeability of 4.05×10^{-5} m/sec.

4.5 The surrounding properties have Tier 1 (infiltration discharge) to soakaways. This strategy has been maintained for this parcel.

4.6 The applicant proposes a number of individual plot soakaways and permeable pavement. The proposed soakaway arrangement is shown on drawing ACC25168-01 contained in Appendix C along with the soakaway calculations. The geotechnical report does not make a definitive conclusion on chalk density at this site. There is spatial scope to move the proposed soakaways a little further down the gardens should this be required.

4.7 The surface water drainage system will be designed to accommodate a 1 in 100 year +45% climate change and 10% urban creep rainfall event.

4.8 The use comprises generally low and very low pollution hazard levels (C753 Table 26.2) and does not require groundwater risk screening.

4.9 Simple index approach calculations are contained in Appendix C.

4.10 Water butts should be installed to intercept roof water run-off. These will reduce the annual volume of surface water discharge but will not make a material contribution to regulation of critical run-off as these tend to be full during Winter months as there is minimal demand for irrigation in these months.

4.11 In summary source control will be provided by:

- Soakaways outlined in paragraph 4.6
- Provision of water butts as outlined in paragraph 4.10

4.12 The fall within the site is north east to south west across the site. The proposed development will maintain the north east to south west fall within the site.

4.13 The rear edge of the site (western edge) is located on the base of a dry valley and Environment Agency surface water flood mapping from LIDAR in conjunction with the site specific topographic survey has been used to inform the current 0.1%AEP surface water flood extents. This passes west around the northwest corner of the site at a flood level of some 110.8m AOD (approx. 0.05 m deep) and across the extreme southwest tip of the site and leaves the site close to the southwest corner at a flood level of some 19.2,m AOD (approx. 0.10m deep). Planning application PL/2022/07116 drainage and flood statement 13/8/2019 for the immediately adjacent land determined a 211 l/sec 1%AEP +CC flow rate for surface water flow down the valley at this point and formation of a grassed earth channel at the rear (western edge) of that development was proposed and permitted. The same approach is proposed on this site with a grassed earth channel formed at the rear edge of the site with a capacity of 900 l/sec (calculations contained in Appendix C). This being coupled with slight ground raising in the south west corner of the site such that in combination: Surface flow from north and west of the site is intercepted by the new channel and controlled/managed on the modified alignment, issuing back to the original pathway at the original level all at the existing rates. Ie the pathway is moved slightly to the western edge of the site and the is no change in flow path or flow rates or level outside the site. Within the site the proposed dwellings will be at very low risk of surface water flooding (<0.1% AEP) The proposed channel, ground levels, fall direction and flow path are indicated on drawing ACC25168-01-A.

4.14 The surface water strategy mimics the existing run-off regime. There will therefore be no adverse impact on flood flow rates outside the site.

4.15 A schedule of O&M maintenance requirements for the SuDS infrastructure is also contained in Appendix C. The maintenance of plot specific drainage will be undertaken by the owners. Shared drainage assets will be maintained by the estate management company.

5. Flood Source-Pathway-Receptor Assessments

5.1 The site is at an elevation of some 109-112 mAOD and is not susceptible to tidal flooding.

5.2 The EA flood mapping indicates that the site is wholly in Flood Zone (FZ) 1. The site is therefore at low risk of fluvial flooding (<0.1% AEP).

5.3 The EA mapping indicates a very low surface water risk (0.1%AEP) pathway across the south western tip of the site with the remainder of the site at <0.1%AEP surface water flood risk. (refer to paragraph 4.13).

5.4 The EA website indicates the site is not at risk of reservoir flooding and at groundwater flooding is considered unlikely.

5.5 The SFRA does not indicate any sewer flooding at the site.

5.6 The critical flood source is surface water flooding and run-off within the site and very low surface water flood risk pathway across the south west tip of the site. The site surface water system will accord with the principles of CIRIA C753.

5.7 The new flood receptors of the development would be:

- Residential dwellings
- Users of the residential dwellings

5.8 The proposed development and existing site classifications to NPPF Annex F Table 2 are as follows:

• Existing agricultural use	Less vulnerable
• Proposed dwellings	More vulnerable

5.9 Overall the proposed development is generally considered to be a low flood risk minded also that minor realignment and control of surface water flood risk is proposed (4.13 refers)

6. Flood Probability

6.1 The EA flood zones shown on the outputs and included in Appendix B represent current best estimates of zone 2 and zone 3 flooding. The flood zone definitions to NPPF Annex F Table 1 are as follows:

6.2

Zone 1	Low probability of flooding (<0.1% AEP)
Zone 2	Medium probability of tidal flooding (0.1-0.5% AEP)
	Medium probability of fluvial flooding (0.1-1% AEP)
Zone 3a	High probability of tidal flooding (>0.5% AEP)
	High probability of fluvial flooding (>1% AEP)
Zone 3b	Functional floodplain (>3.3% AEP probability of flooding)

The flood map does not differentiate between zones 3a and 3b.
Zone 3b is only considered appropriate for water-compatible development.
Zone 3a is additionally considered appropriate for less vulnerable uses.

6.3 The site is wholly in flood zone 1.

6.4 National Planning Policy Guidance was recently changed, particularly NPPG 7-027-202208025 revision 17-09-2025 relating to NPPF paragraph 175 Sequential Test. The NPPG states that *"Where a site specific FRA demonstrates clearly that the proposed layout, design and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risk identified e.g. by environment agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied."* The occupiers and users will be safe from current and future flood risk (4.13 refers) and NPPG 7-027=202208025 is met. The Sequential test is not applied.

7. Climate Change

7.1 The new climate change allowances for flood risk assessment GOV.UK 27 May 2022 update have been used. Climate change values for the site are:

- Peak rainfall intensity: Test catchment 1%AEP 2125 upper end +45%

7.2 Surface water drainage strategy is discussed in Chapter 4. The volumes and flows for this strategy have been derived in accordance with CIRIA C753 and include for climate change effects.

8. Flood Risk Management Measures

8.1 The source pathway receptor assessment is contained in Chapter 5.

8.2 The existing fall direction is maintained and the surface water flow path will be controlled (4.13 refers) avoiding the proposed dwellings.

8.3 A minimum FFL + 0.15m standard DPC clearance above ambient ground level should be provided.

9. Foul Water Strategy

9.1 The site is not currently connected to the public sewer.

9.2 There is a 225mm DN public foul sewer in Witt Road.

9.3 The proposed development will make connection to the 225mm DN public foul sewer running to the front of the site. The change in network foul water load is considered *de minimis*, but notwithstanding this the standing wastewater Infrastructure Charge (IC), which came into force from 1st April 2018, will be paid. Should any downstream reinforcement be required Southern Water will deliver this from the development ICs they will collect, this is however considered unlikely.

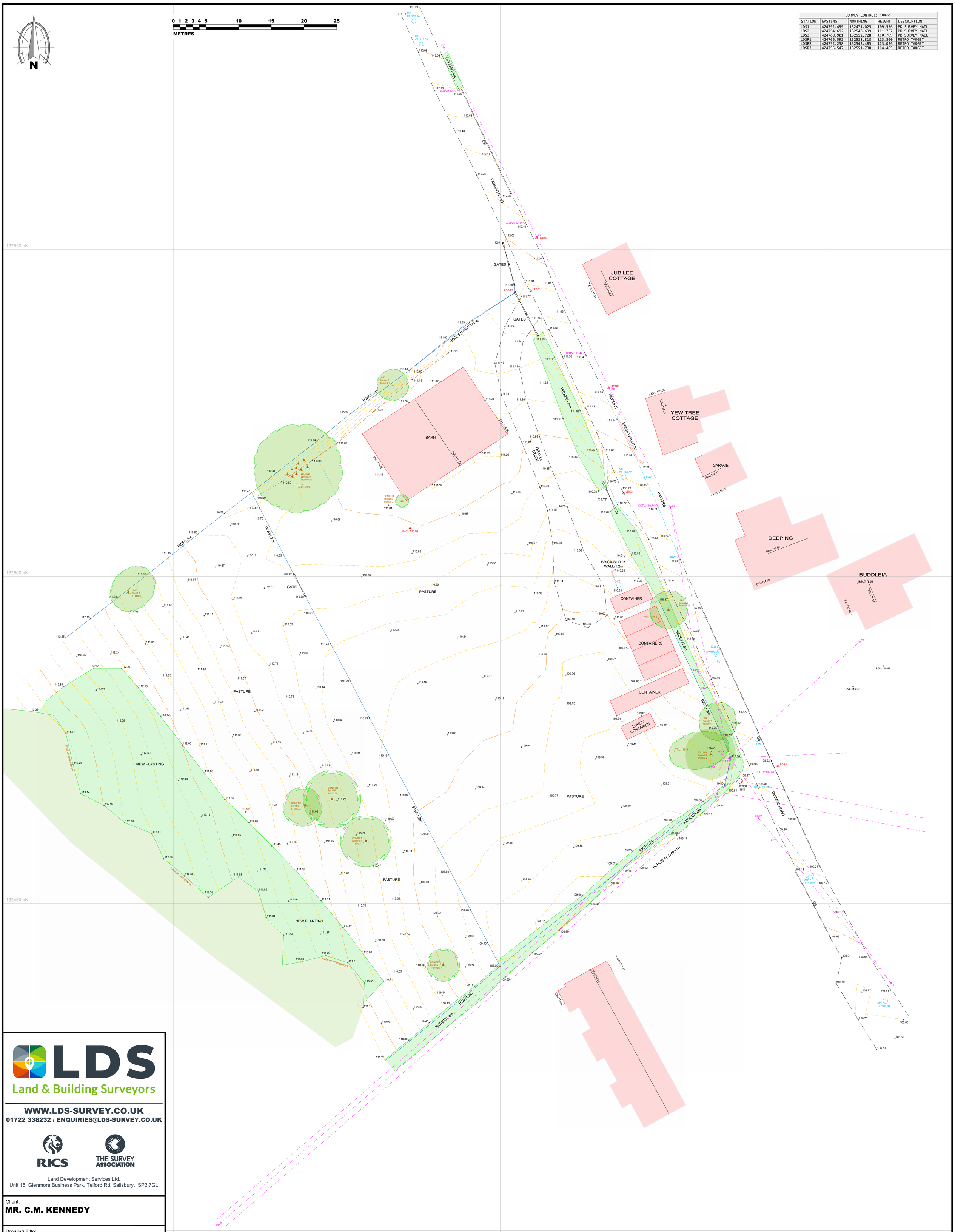
10. Off Site Impacts

10.1 The surface water strategy mimics the existing run-off regime. There will therefore be no adverse impact on flood flow rates outside the site.

11. Residual Risks

11.1 The proposed surface water strategy for the development provides for flood events up to 1:100 year 2026_{AD} + CC rainfall. The residual flood risk is therefore events in excess of 1:100 year 2026_{AD} + CC rainfall.

Appendix A



SURVEY CONTROL: 18472				
STATION	EASTING	NORTHING	HEIGHT	DESCRIPTION
LDS1	424792.499	132471.025	109.556	PK SURVEY NAIL
LDS2	424754.692	132543.699	111.757	PK SURVEY NAIL
LDS3	424768.901	132512.728	110.709	PK SURVEY NAIL
LDSR1	424766.592	132528.818	113.860	RETRO TARGET
LDSR2	424752.258	132543.485	113.036	RETRO TARGET
LDSR3	424755.547	132551.738	114.465	RETRO TARGET

LDS
Land & Building Surveyors

WWW.LDS-SURVEY.CO.UK
01722 338232 / ENQUIRIES@LDS-SURVEY.CO.UK

RICS
THE SURVEY ASSOCIATION

Land Development Services Ltd.
Unit 15, Glenmore Business Park, Telford Rd, Salisbury. SP2 7GL

Client:
MR. C.M. KENNEDY

Drawing Title:
TOPOGRAPHIC SURVEY

Project:
LAND OPP. JUBILEE COTTAGE
WITT ROAD
WINTERSLOW

Survey is to OS Grid, located via use of GPS positioning.

Level values in metres, related to Ordnance Datum Newlyn.

Scale:	Drawing No:	Revision:
1:250	**LDS/18472 TP1**	**C**
Plotted on A1		

© Land Development Services Ltd. 2024

Proposed Site Plan 1:200
Paper Size A1

1:200
4m 0 4m 8m 12m 16m 20m

REV:	DESCRIPTION:	DATE:
H	Carparking Layout Amendments	03/09/26
G	Carparking Layout Amendments	01/09/26
F	Various amendments	29/04/26
D	Amended Access	29/10/25
C	Amended Access	22/10/25
B	Amended housing design, added passing place and visibility splays	23/07/24

STATUS:

Bernard E Cole & Partner
8 Love Lane
Romsey
Hampshire
SO51 8DE
Tel: 01794 512264
Fax:01794 511919

SITE:

Land Opposite Jubilee Cottage,
Witt Road Winterslow.

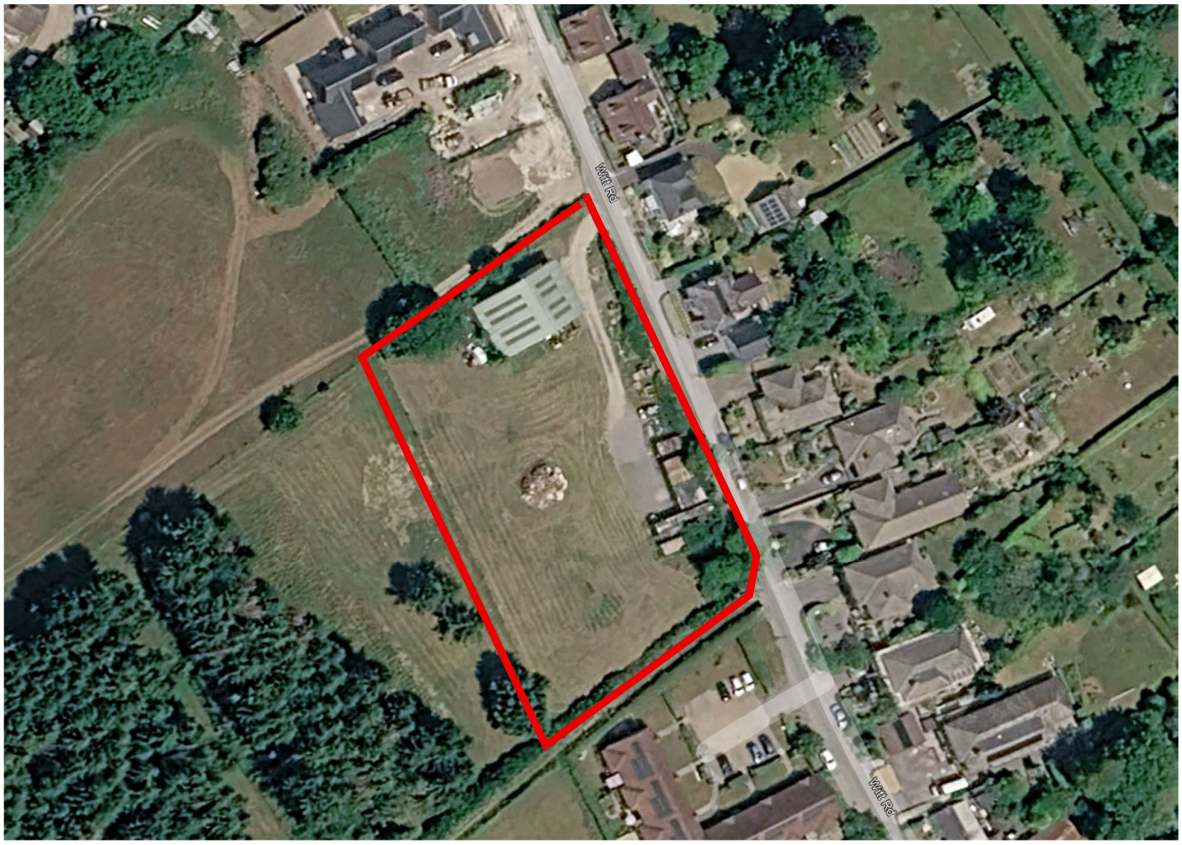
CLIENT:

Mr C Kennedy

TITLE:

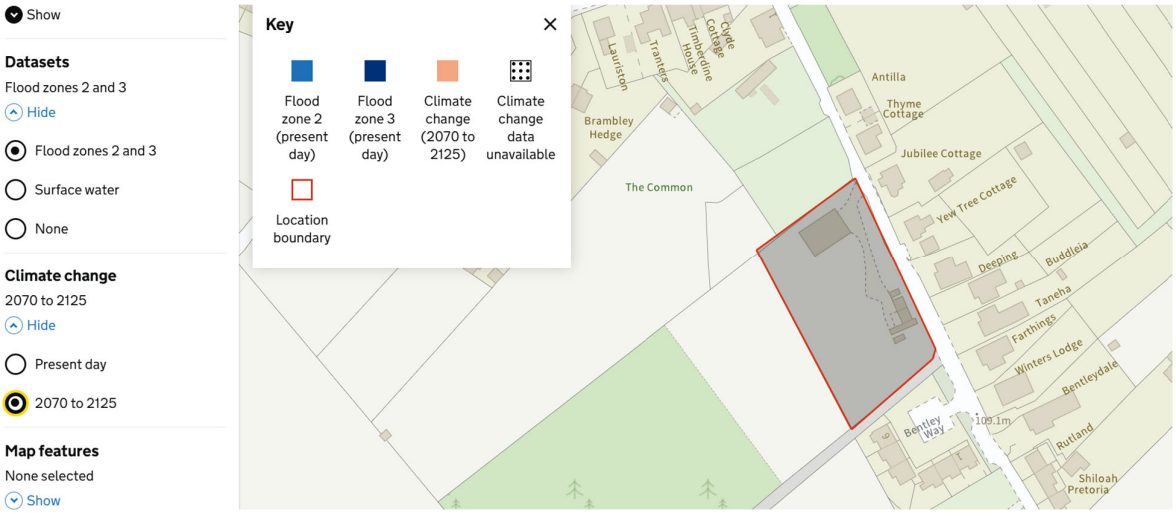
Proposed Site Plan

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	22/05/24	GJ	GLS
PROJECT NO: 9780	DRAWING NO: 2		REVISION: H

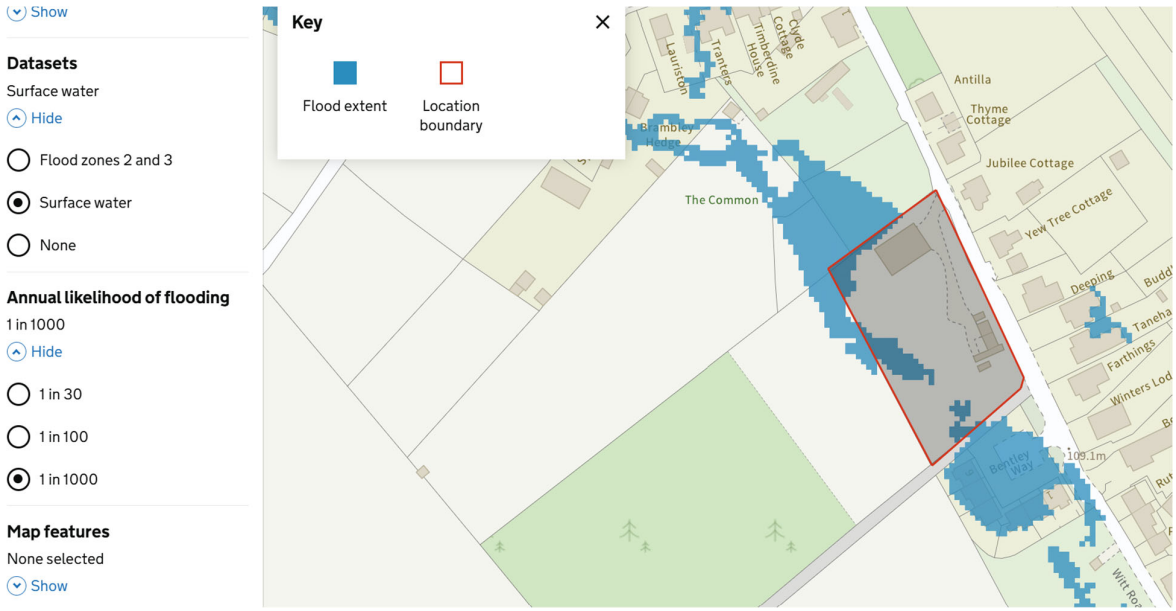


Aerial view of site

Appendix B



Flood Zones



0.1%AEP surface water flooding

Your selected location: Jubilee Cottage, Witt Road, Winterslow, Salisbury, SP5 1PL

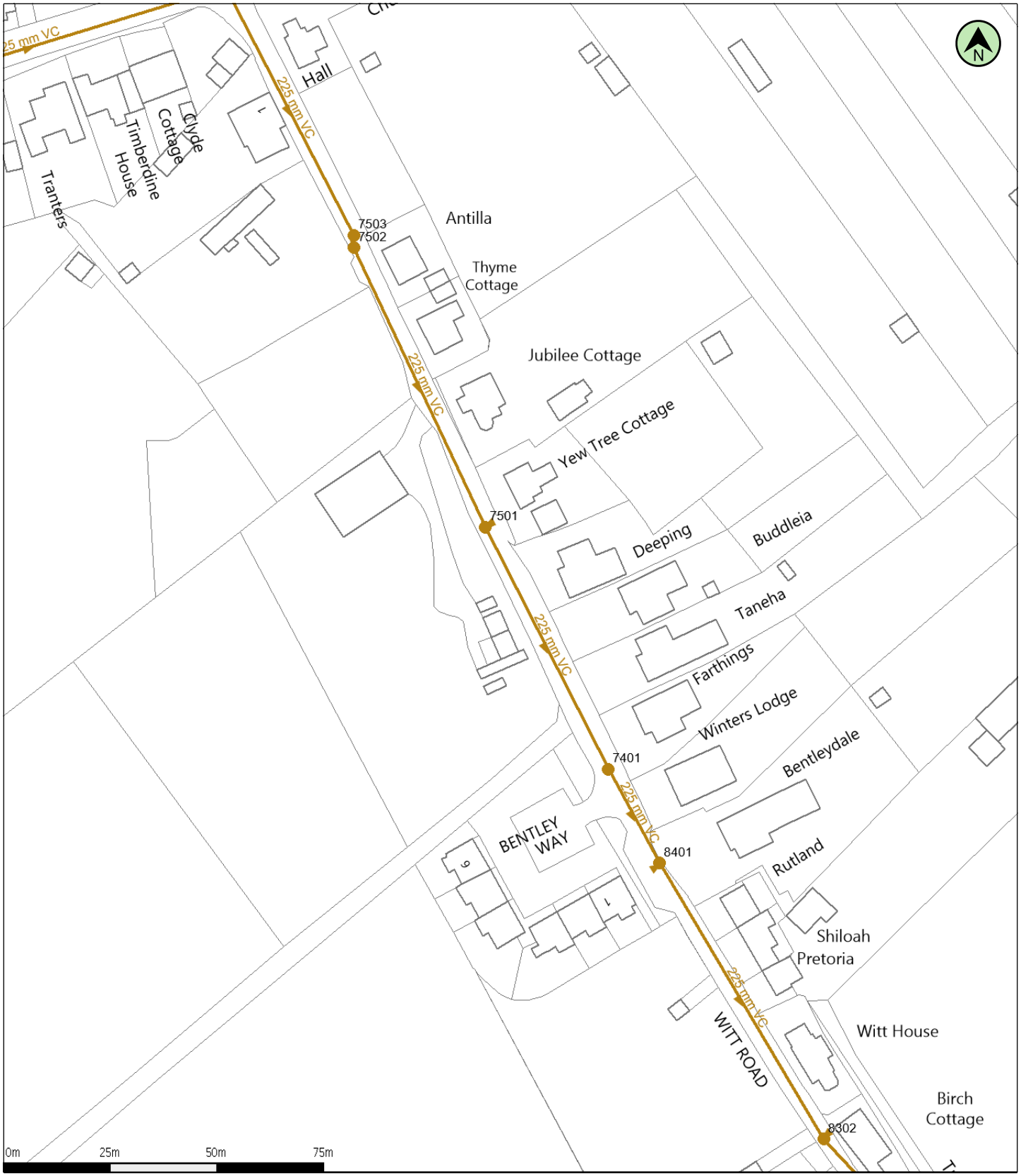
This information tells you the flood risk of the land around a building, not the building itself.

Groundwater

The location is outside of a groundwater flood alert area.

Reservoirs

Flooding from reservoirs is unlikely in this area.



(c) Crown copyright and database rights 2026 Ordnance Survey AC0000808122	Scale: 1:1250	Date: 07/04/26	Wastewater Plan A4
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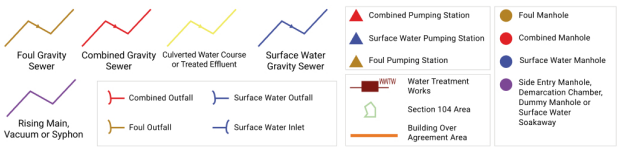

andytraves247@gmail.com

25168

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 2026 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.

soils LIMITED

Ground Water Monitoring Report

at
Land opposite Jubilee Cottage, Witt Road, Winterslow, Wiltshire SP5 1PL

for
LC Power Ltd

Reference: 22169/GWT Rev1.0
March 2026

Control Document

Project
Land opposite Jubilee Cottage, Witt Road, Winterslow, Wiltshire SP5 1PL

Document Type
Ground Water Monitoring Report

Document Reference
22169/GWT Rev 1.0

Document Status
FINAL

Date
March 2026

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

This document comprises the Ground Water Monitoring Report (GWT) and incorporates the results, discussion, and conclusions to intrusive works and monitoring.

Commission Record	
Client	LC Power Ltd
Site Name	Land opposite Jubilee Cottage, Witt Road, Winterslow, Wiltshire SP5 1PL
Grid Reference	SU 24755 32490
Soils Limited Quotation Ref	Q30477 dated 19th September 2025
Clients Purchase Order	Q30477 dated 6th October 2025

The record of revision to this document is presented below:

Record Of Revisions		
Revision	**Date**	**Reason**
1.0	March 2026	Original

Note(s): The latest revised document supersedes all previous revisions of the GWT produced by Soils Limited.

Documents associated with this development that must be referred to are given below.

Record Of Associated Documents			
Reference	**Type**	**Date**	**Creator**
9780 DR 2 Rev B	Proposed Site Plan	July 2024	Bernard E Cole & Partner

Limitations and Disclaimers

The report was prepared solely for the brief described in our quotation and Section 1.1 of this report. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of our engagement.

We have exercised all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and considering the resources devoted to us by agreement with the Client.

This report is a snapshot of the site and conditions taken only at the time of our investigation works and described in our reporting. The ground is a product of continuing natural and artificial processes and has variation by depth and location that cannot be determined absolutely. While a ground investigation will aim to understand and mitigate, risk cannot be eliminated.

Current regulations and good practice were used in the preparation of this report. Consideration of any subsequent changes to regulations or practice that may have occurred following issue of this report is the responsibility of the user.

If the term “competent person” is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post

graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is not a Ground Water Monitoring Report as defined by Eurocode 7.

Any reference to ground level relates to the site level at the time of the investigation, unless otherwise stated. Ground elevations and coordinates are only provided when this forms part of our engagement.

A survey of the possible presence or absence of invasive species including Japanese Knotweed is outside the scope of this investigation.

Copyright of all printed material including reports, survey data, drawings, laboratory test results, trial pit and borehole log sheets remains with Soils Limited.

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License for and reliance on this report is only valid once we have been paid in full for this engagement. In the event of non-payment, we reserve the right to notify parties other than the client of failure to pay and our cancellation of license and reliance.

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Section 1 Introduction

Objective of Investigation

The Client engaged Soils Limited for intrusive site works to install monitoring wells at two locations onsite indicated on a plan provided by the client, and to undertake a period of winter groundwater monitoring on site for 6 months from October 2025 – March 2026.

The investigation was to be made by means drilling 2No windowless sampler boreholes, in-situ geotechnical testing (dynamic probing), installation of 2No. groundwater monitoring wells, and subsequent logging, monitoring and reporting.

1.1 Site Description

During Siteworks (October 2025) the site comprised a rectangular field approximately 50 x 80m, which was oriented in a northeast to southwest alignment. Witt Road ran along the eastern boundary, and an unnamed road/track ran along the southern boundary to the southwest before terminating in farmland.

There was an open barn on the northern part of the site approximately 10 x 17m diameter, and a gravel topped track running within the eastern boundary from the entrance on the northeast corner terminating around three quarters of the way down the site at some metal storage containers. The majority of the site was grass topped. A pile of potentially future bonfire material (pallets, tree cuttings, wood) was evident in the centre of the grassed field area, measured on Google Earth™ at around 8m diameter. Some neatly stacked pallets and a waste skip were observed on the east of the site near the gravelled access.

There were mature trees on the northwest and southeast corners of the site, and hedges along the northern, eastern, and southern boundaries, with further mature trees outside the southwest corner of the site.

The site was at approximately 113 – 110m AOD, and sloped down to the south around 2˚. Land to the east and west of the site gently sloped to centre of the site by around 2˚.

A site location plan is given in Figure 1. An aerial photograph of the site and its close environs has been included in Figure 2.

1.2 Proposed Development

The proposal comprised the construction of five detached four bedroom houses with a combination of soft and hard landscaping set within private gardens and a shared access road from Witt Lane.

This report relies on the drawing referred to in the record of associated documents. Any changes require consultation with Soils Limited. Development plans are in Appendix C.

1.3 Anticipated Geology

The 1:50,000 BGS map showed the site to be located on the bedrock Culver Chalk Formation with overlying superficial deposits of Head.

1.3.1 Head

Head Deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands, gravels and chalk of local derivation.

1.4 Culver Chalk Formation

The Culver Chalk Formation comprises soft, white chalk that is relatively free of marl. There are flint seams with generally large flint that exist tabularly in the upper part of the formation. Thickness of the formation can vary from 65 to 90m but can be significantly less where synsedimentary channelling occurs.

Chalk is a weak rock and as such it should be noted that the drilling, excavating and sampling process is detrimental to its fabric and structure. Chalk samples that have been machine sampled will therefore appear to be of a lower descriptive grade, as given in CIRIA C574, than the in-situ chalk. Soil sampling and visual observations from open excavations i.e. trial pits would allow chalk description and classification in accordance with CIRIA 574 including commenting for any aperture and discontinuities in the chalk structure.

Erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are occasionally found in the chalk, sometimes manifesting themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

CIRIA C574 states that the presence of dissolution features should always be assumed when designing foundations for all sites underlain by calcium carbonate rich chalk.

Section 2 Site Works

2.1 Project Works

The project works were undertaken on 10th October 2025, with subsequent sample logging, monitoring, and reporting. The works comprised:

- Scanning exploratory holes with a cable avoidance tool (CAT & Genny)
- 2No. 5.00m deep windowless sampler boreholes (WS1-2)
- 2No. 5.00m deep monitoring well (WS1-2)
- 2No. 5.00m deep DPSH probes (DP1-2)
- Backfill with gravel / bentonite (WS1-2)

Figure 2 shows exploratory hole locations.

Soil cores were Engineer logged for description purposes.

Standpipes were installed in both boreholes for the purpose of winter groundwater monitoring.

2.2 Ground Conditions

The maximum depths of exploratory holes are given in Table 2.1. The depths presented were measured from ground level at the time of the investigation.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
WS1 [w]	5.00	DP1	5.00
WS2 [w]	5.00	DP2	5.00

Note(s): [w] - well installation. The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

Soils are classified as Topsoil if they contain organic material or result from natural weathering. Where soils have been altered by human activity or contain over 5% non-natural material, they are labelled as Made Ground.

For full details, see Appendix B. For discussion, the soil conditions found in the exploratory holes, from top to bottom, are summarised as follows:

Made Ground (MG)
Head (HEAD)
Culver Chalk Formation (CUCK)

The ground conditions are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
	Top	Bottom		
MG	0.00	0.70 – 1.30	1.00	Light greyish brown slightly silty slightly sandy clayey GRAVEL, or firm brown slightly silty slightly sandy gravelly CLAY. Gravel is subangular to subrounded, fine to coarse chalk, flint, and rinded flint. Sand is fine.
HEAD	0.70 – 1.30	1.60 – 1.80	0.70	Firm dark brown slightly sandy slightly gravelly clayey SILT. Or stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is angular to well-rounded fine to coarse flint, rinded flint, and chalk. Sand is fine to medium. Rare rootlets
CUCK	1.60 – 1.80	>5.00[1,2]	Not Proven[1,2]	Recovered as white subangular to subrounded fine to coarse gravel sized extremely to very weak chalk clasts in a comminuted silty matrix. Matrix is white mottled light greyish brown with rare orangish brown staining. Occasional coarse flint nodules. Grade Dm

Note(s): [1] Final depth of exploratory hole. [2] Base of strata not encountered. The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

2.3 Roots

Roots (including rootlets) were noted in the recovered samples to the depths shown in Table 2.3.

Table 2.3 Established Depth of Root Penetration

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
WS/DP1	1.80	WS/DP2	0.90

Note(s): The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

Observations from small diameter cores may not reflect maximum root depth and direct observation from a trial pit gives a better assessment.

Roots may extend to greater depths close to existing or removed trees.

The designer should reference other sources, including, but not limited to, local enquiry, Google Maps, Streetview and Google Earth Pro.

2.4 Groundwater

Groundwater was not encountered within either exploratory hole during siteworks.

Changes in groundwater level occur for reasons including seasonal effects and variations in drainage. The investigation was conducted in November (2026), when groundwater levels should be rising from their annual minimum (lowest) elevation, which

typically occurs around September to the annual maximum (highest) which typically occurs around March.

Further groundwater monitoring was conducted within the standpipes following completion of site works and has been presented in Table 2.4.

Table 2.4 Groundwater Monitoring

Exploratory Hole	Well Depth (m bgl)	Depth to Water (m bgl)					
		27.10.25	29.11.25	30.12.25	31.01.26	25.02.26	14.03.26
WS1	5.00	Dry	Dry	Dry	Dry	Dry	Dry
WS2	5.00	Dry	Dry	Dry	Dry	Dry	Dry

The bases of both wells were measured at 4.96m bgl at the end of the monitoring period, indicating limited silting up of the wells.

2.5 Groundwater Monitoring Conclusions

Groundwater was not recorded in either well, WS1 at a higher elevation and WS2 near the lower end of the site, between October 2025 and March 2026 despite a generally very wet winter with record levels of rainfall. It is concluded that the groundwater level onsite is >5.00m bgl and the site is free draining to the underlying aquifer.

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Appendix A Standards and Resources
Appendix B Field Work
Appendix B.1 Engineers Logs
Appendix C Information Provided by the Client

Figure 1 – Site Location Map

Job Number 22169	**Project** Land opposite Jubilee Cottage, Witt Road, Winterslow, SP5 1PL
Client Chris Kennedy	**Date** March 2026

Figure 2 – Aerial Photograph

Figure 3 – Exploratory Hole Plan

N

Job Number	Project
22169	Land opposite Jubilee Cottage, Witt Road, Winterslow, SP5 1PL
Client	**Date**
Chris Kennedy	March 2026

Appendix A Standards and Resources

The site works, soil descriptions and testing were undertaken in accordance with the following standards where applicable:

- BS 5930:2015+A1:2020 and BS EN ISO 22476-2 2005+A1:2011
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- CIRIA C574, Engineering in Chalk; 2002
- Google Earth
- British Geological Survey Website & iGeology App

Appendix B Field Work

Appendix B.1 Engineers Logs

Window Sampler

WS1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(1.30)		Light greyish brown slightly silty slightly sandy clayey GRAVEL. Gravel is subangular to subrounded, fine to coarse chalk, flint, and rinded flint. Sand is fine. MADE GROUND. *Rinded flint cobble. (0.40 - 0.45m)*
						1.30 (0.50) 1.80		Firm dark brown slightly sandy slightly gravelly clayey SILT. Gravel is subangular to subrounded fine to coarse flint, rinded flint, and chalk. Sand is fine. Rare dry rootlet fragments. [HEAD.]
						(1.30)		Recovered as white angular to subrounded fine to coarse gravel sized extremely weak chalk clasts in a comminuted silty matrix. Matrix is light brown. [Weathered CULVER CHALK FORMATION.]
						3.10 (1.30)		Recovered as white subangular to subrounded fine to coarse gravel sized extremely weak chalk clasts in a comminuted silty matrix. Matrix is light greyish brown mottled white. [Weathered CULVER CHALK FORMATION.]
						4.40 (0.60) 5.00		Recovered as white subangular to subrounded fine to coarse gravel sized extremely to very weak chalk clasts in a comminuted silty matrix. Matrix is white mottled light greyish brown with rare orangish brown staining. Grade Dm. [CULVER CHALK FORMATION.]

End of Borehole at 5.00m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
Rare rootlets to 1.80m bgl.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WS Premier 4

Logger
JM

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

Created using Pebble Geo

Window Sampler

WS1

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Remarks

Rare rootlets to 1.80m bgl.

Method, Plant, Stability, Dimensions		Logger
0.00 - 5.00m	WS Premier 4	JM

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

Created using Pebble Geo

Window Sampler

WS2

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Strata: Description
						(0.20) 0.20		Brownish grey slightly sandy, silty/clayey clayey GRAVEL. Gravel is angular to subangular fine to coarse chalk and flint. Sand is fine to coarse. Frequent rootlets. MADE GROUND.
						(0.50) 0.70		Firm brown slightly silty slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint, chalk, brick, and rare slag. Sand is fine to medium. Occasional rootlets. MADE GROUND. *Coarse brick. (0.47 - 0.50m)* *Brownish grey. (0.60 - 0.70m)*
						(0.90) 1.60		Stiff brown slightly silty slightly sandy slightly gravelly CLAY. Gravel is angular to well rounded fine to coarse flint, rinded flint, and chalk. Sand is fine to medium. Rare rootlets. [HEAD.] *Rare fine brick ash. (0.89 - 0.90m)*
						(0.60) 2.20		Recovered as white angular to subrounded fine to coarse gravel sized extremely weak chalk clasts in a comminuted silty matrix. Matrix is light brown. Occasional coarse flint nodules. [Weathered CULVER CHALK FORMATION.]
						(2.20) 4.40		Recovered as white subangular to subrounded fine to coarse gravel sized extremely weak chalk clasts in a comminuted silty matrix. Matrix is light greyish brown mottled white. [Weathered CULVER CHALK FORMATION.] *Rare yellowish brown staining. (2.35 - 2.40m)*
						(0.60) 5.00		Recovered as white subangular to subrounded fine to coarse gravel sized extremely to very weak chalk clasts in a comminuted silty matrix. Matrix is white mottled light greyish brown with rare yellowish brown staining. Grade Dm. [CULVER CHALK FORMATION.]

End of Borehole at 5.00m

Remarks
Rare rootlets to 0.90m bgl.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WS Premier 4

Logger
JM

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

Created using Pebble Geo

Window Sampler

WS2

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Remarks
Rare rootlets to 0.90m bgl.

Method, Plant, Stability, Dimensions		Logger
0.00 - 5.00m	WS Premier 4	JM

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

Created using Pebble Geo

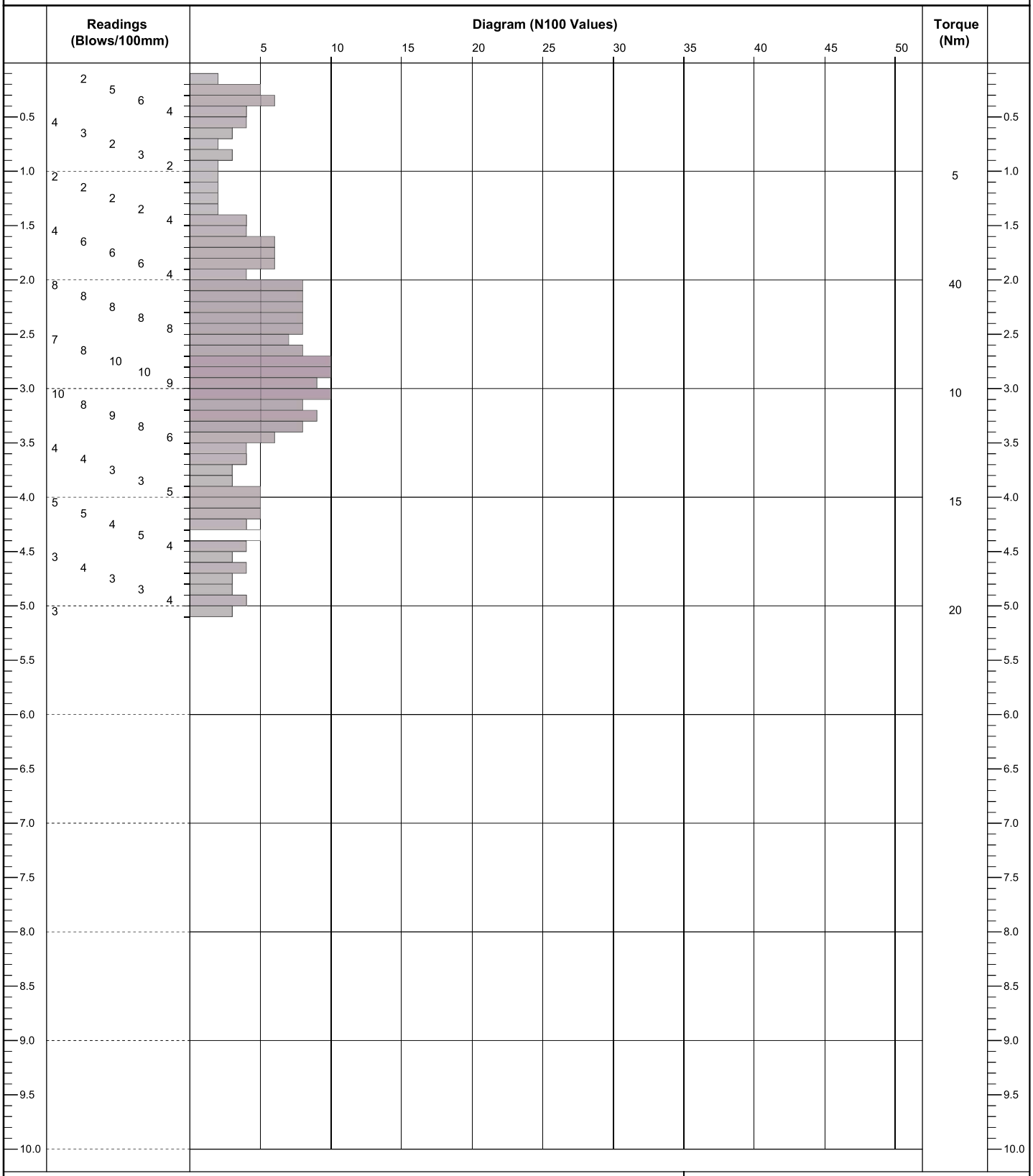
Dynamic Probe

DP1

Probe Type	Easting	Northing	Ground Level (m)	Scale
DPSH				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils



Remarks
Energy Ratio 90.85

Method, Plant
0.00 - 5.00m DP Premier 4

Logger
CF

Hammer Weight (kg)	63.5
Hammer Drop (mm)	760
Cone Diameter (mm)	55
Cone Angle	
Rod Diameter (mm)	
Damper	

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

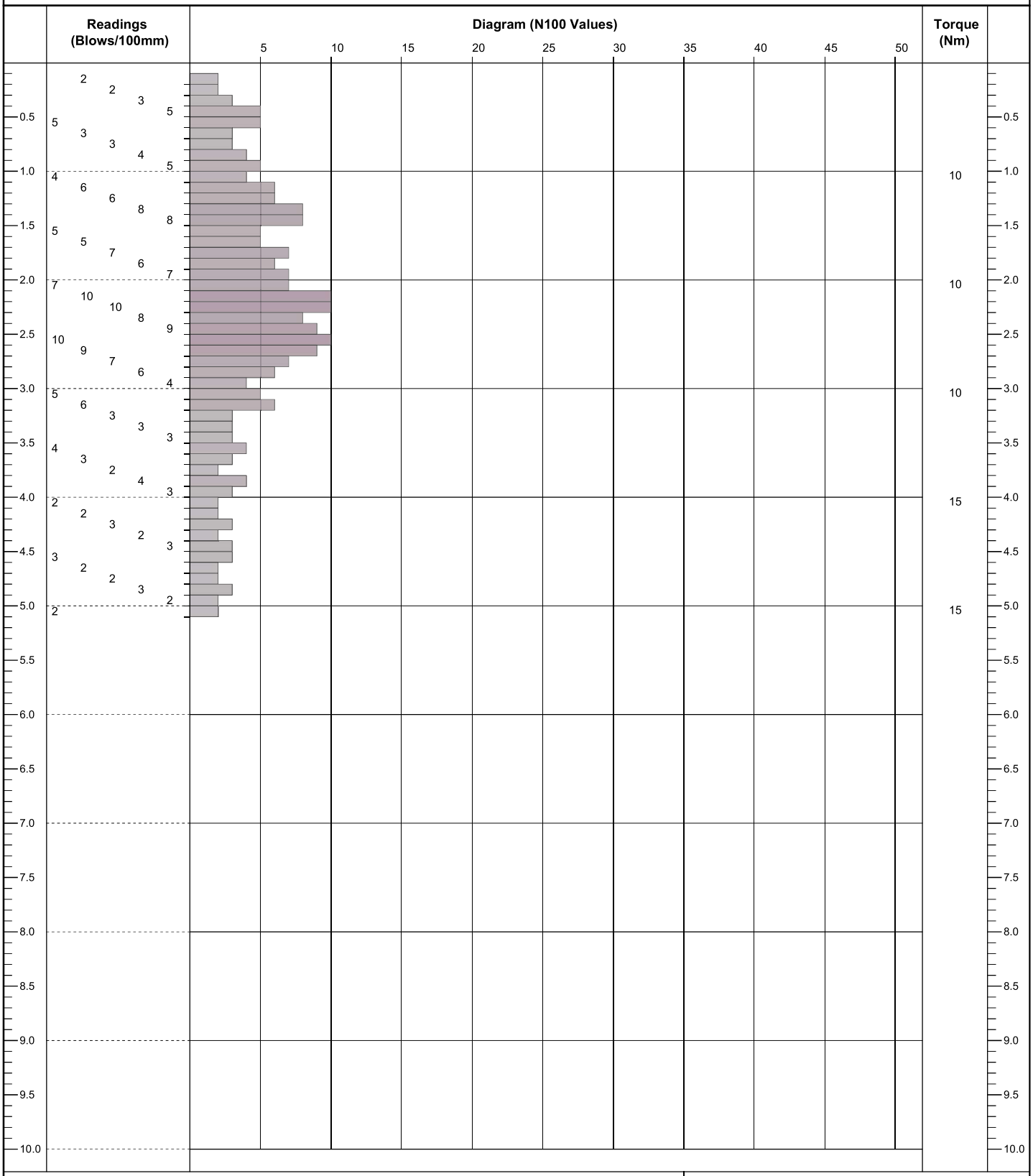
Dynamic Probe

DP2

Probe Type	Easting	Northing	Ground Level (m)	Scale
DPSH				1:50

Project Name	Project No.	Start Date	End Date
Land Opposite Jubilee Cottage	22169	2025-10-10	2025-10-10

Client	Consultant	Contractor
	DEE	Soils



Remarks
Energy Ratio 90.85

Method, Plant
0.00 - 5.00m DP Premier 4

Logger
CF

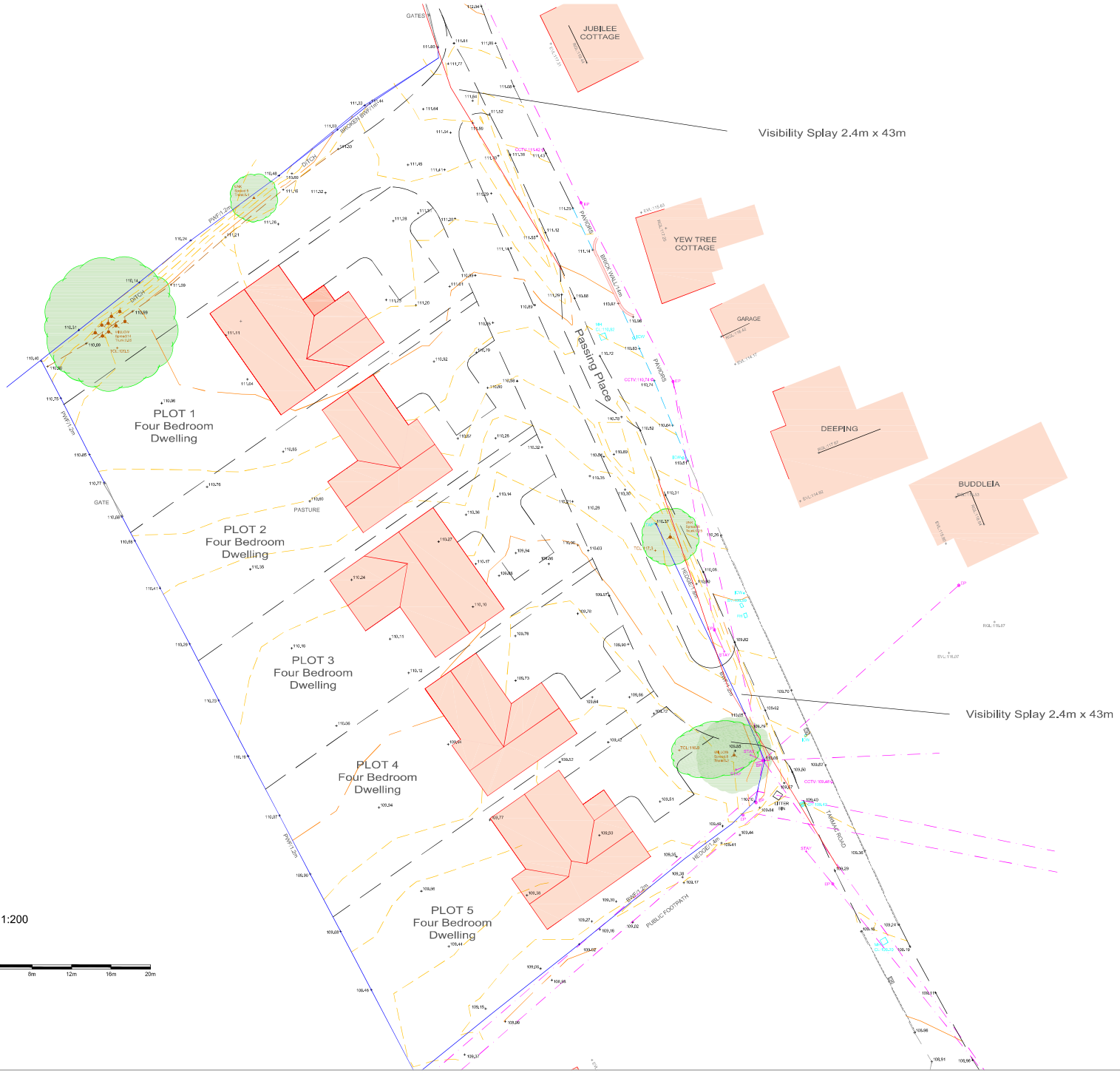
Hammer Weight (kg)	63.5
Hammer Drop (mm)	760
Cone Diameter (mm)	55
Cone Angle	
Rod Diameter (mm)	
Damper	

Checked By: DEE **Approved By:** DEE **Status:** FINAL

SPT N60 = N(raw) * (Hammer Energy Ratio / 60) to nearest whole number

Created using Pebble Geo

Appendix C Information Provided by the Client



Proposed Site Plan 1:200

1:200
4m 0 4m 8m 12m 16m 20m

B	Amended housing design, added passing place and visibility splays	23/07/24

REV:	DESCRIPTION:	DATE:
STATUS:		

Bernard E Cole & Partner
8 Love Lane
Romsey
Hampshire
SO51 8DE
Tel: 01794 512264
Fax:01794 511919

SITE:

Land Opposite Jubilee Cottage,
Witt Road Winterslow.

CLIENT:

Mr C Kennedy

TITLE:

Proposed Site Plan

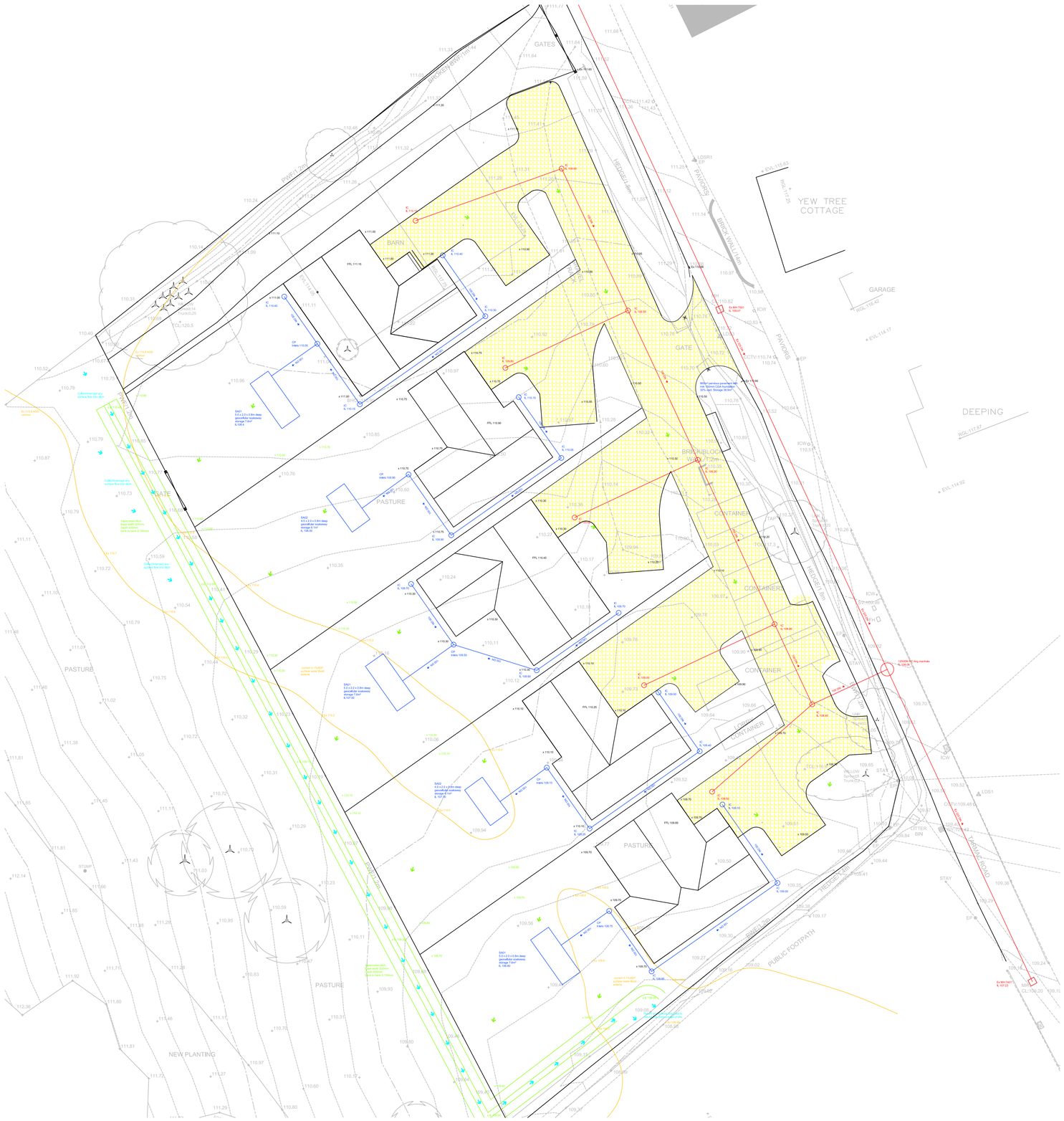
SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	22/05/24	GJ	GLS
PROJECT NO:	DRAWING NO:		REVISION:
9780	2		B

Soils Limited
Geotechnical & Environmental Consultants

Newton House
Cross Road, Tadworth
Surrey KT20 5SR

T 01737 814221
W soilslimited.co.uk

Appendix C



Rev.	Amendment	Date
A	Plot driveways updated	15-09-2026

Original Sheet Size A1 (841 x 594)

0 10 mm 50

Aqua Callidus CONSULTING
54 Common Lane
Titchfield
Hants
PO14 4BU
07717 759149

Project
Land opposite Jubilee Cottage
Witt Road
Winterslow

Subject
Drainage Layout

Scale	Project No.	Drawing No.	Sheet No.	Revision
1:200	25168	ACC-25168-01	na	A

Infiltration volume design tool

www.uksuds.com | Infiltration volume design tool (https://www.uksuds.com/)

This is an estimation of the infiltration volumes and drain-down time to half empty the infiltration system in line with the on CIRIA infiltration drainage R156 guidance (1996) and CIRIA SuDS manual (C753, 2015). This information may be used as the basis for designing an infiltration system for the drainage of surface water runoff from sites.

Project details

Date	08/04/2026
Calculated by	A Traves
Reference	25168 type SA01
Model version	2.2.3

Site details

Site name	Opposite Jubilee cottage
Site location	West Winterslow

Infiltration system

Infiltration system	Soakaway
Type	Rectangular soakaway with infiltration from sides and base

Geometry, porosity and infiltration

Width (m)	2	m
Length (m)	5	m
Infiltration coefficient (m/s)	0.00004	m/s
Porosity of fill material	95% eg. High void structure / geocellular structure	

Area to be drained

Total area (m²)	140	m^2
Factor of safety	3	

Rainfall

Rainfall input type	FEH22 CSV file
	25168 FEH_Point_Rainfall_FEH22_AM_424755_132506 (1).csv
Return period (years)	100
Climate change allowance factor	145%

Results

Soakaway minimum height (m)	0.8	m
Time for half-emptying (hours)	4.4	hours
Critical duration (hours)	2.0	hours

Please note storage volume estimation are subject to uncertainty. Infiltration system height and base area are reported to the nearest 1m or 1m² value when the height or base area are greater than 10m or 10m²; and reported to the nearest to 0.1m or 0.1m² value when the height or base area are less than 10m or 10m².

Disclaimer

This report was produced using the infiltration volume design tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate infiltration volumes and drain-down times. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

HR Wallingford are not responsible for any rainfall data shared that is subject to licensing terms imposed by UK Centre for Ecology & Hydrology's Flood Estimation Handbook web service (https://fehweb.ceh.ac.uk/Home/Terms (https://fehweb.ceh.ac.uk/Home/Terms)).

Infiltration volume design tool

www.uksuds.com | Infiltration volume design tool (https://www.uksuds.com/)

This is an estimation of the infiltration volumes and drain-down time to half empty the infiltration system in line with the on CIRIA infiltration drainage R156 guidance (1996) and CIRIA SuDS manual (C753, 2015). This information may be used as the basis for designing an infiltration system for the drainage of surface water runoff from sites.

Project details

Date	08/04/2026
Calculated by	A Traves
Reference	25168 type SA02
Model version	2.2.3

Site details

Site name	Opposite Jubilee cottage
Site location	West Winterslow

Infiltration system

Infiltration system	Soakaway
Type	Rectangular soakaway with infiltration from sides and base

Geometry, porosity and infiltration

Width (m)	2	m
Length (m)	4	m
Infiltration coefficient (m/s)	0.00004	m/s
Porosity of fill material	95% eg. High void structure / geocellular structure	

Area to be drained

Total area (m²)	110	m^2
Factor of safety	3	

Rainfall

Rainfall input type	FEH22 CSV file
	25168 FEH_Point_Rainfall_FEH22_AM_424755_132506 (1).csv
Return period (years)	100
Climate change allowance factor	145%

Results

Soakaway minimum height (m)	0.8	m
Time for half-emptying (hours)	4.2	hours
Critical duration (hours)	2.0	hours

Please note storage volume estimation are subject to uncertainty. Infiltration system height and base area are reported to the nearest 1m or 1m² value when the height or base area are greater than 10m or 10m²; and reported to the nearest to 0.1m or 0.1m² value when the height or base area are less than 10m or 10m².

Disclaimer

This report was produced using the infiltration volume design tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate infiltration volumes and drain-down times. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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Infiltration volume design tool

www.uksuds.com | Infiltration volume design tool (https://www.uksuds.com/)

This is an estimation of the infiltration volumes and drain-down time to half empty the infiltration system in line with the on CIRIA infiltration drainage R156 guidance (1996) and CIRIA SuDS manual (C753, 2015). This information may be used as the basis for designing an infiltration system for the drainage of surface water runoff from sites.

Project details

Date	15/09/2026
Calculated by	A Traves
Reference	25168 pavement
Model version	2.2.3

Site details

Site name	opposite Jubilee Cottage
Site location	West Winterslow

Infiltration system

Infiltration system	Planar infiltration
Type	Infiltration from base only

Geometry, porosity and infiltration

Infiltration coefficient (m/s)	0.00004	m/s
Porosity of fill material	30% - e.g. High-porosity sand/gravel	
Soakaway height (m)	0.15	m

Area to be drained

Total area (m²)	835	m^2
Factor of safety	3	

Rainfall

Rainfall input type	FEH22 CSV file
	25168 FEH_Point_Rainfall_FEH22_AM_424755_132506 (1).csv
Return period (years)	100
Climate change allowance factor	145%

Results

Minimum base area (m²)	555	m^2
Time for half-emptying (hours)	0.5	hours
Critical duration (hours)	0.5	hours

Please note storage volume estimation are subject to uncertainty. Infiltration system height and base area are reported to the nearest 1m or 1m² value when the height or base area are greater than 10m or 10m²; and reported to the nearest to 0.1m or 0.1m² value when the height or base area are less than 10m or 10m².

Disclaimer

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Aqua Callidus Consulting Ltd
52 common Lane
Titchfield
Hants, PO14 4BU

t: 07717 759149
www.aquacallidus.co.uk

Date: 08/04/2026

Project No 25168
Project Oppoosite Jubilee Cottage
Channel ref new ditch

Trapezoidal channel

Channel depth (m)	0.40
Bed width (m)	0.50
Bank to bank width (m)	2.10
Gradient (S_0)	0.0197
Channel nature	Floodplain short grass pasture
Manning N value	min = 0.025 Norm = 0.030 max = 0.035

				n min			n norm			n max		
Depth (m)	Area (m^2)	contact perimeter (m)	S_o	Manning n	Flow capacity (m^3/sec)	Flow velocity (m/sec)	Manning n	Flow capacity (m^3/sec)	Flow velocity (m/sec)	Manning n	Flow capacity (m^3/sec)	Flow velocity (m/sec)
0.10	0.07	0.95	0.020	0.025	0.07	0.98	0.030	0.06	0.82	0.035	0.05	0.70
0.20	0.18	1.39	0.020	0.025	0.26	1.42	0.030	0.21	1.19	0.035	0.18	1.02
0.30	0.33	1.84	0.020	0.025	0.59	1.77	0.030	0.49	1.48	0.035	0.42	1.27
0.40	0.52	2.29	0.020	0.025	1.08	2.08	0.030	0.90	1.73	0.035	0.77	1.49
0.50	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
0.60	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
0.70	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
0.80	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
0.90	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.00	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.10	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.20	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.30	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.40	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.50	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.60	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.70	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.80	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
1.90	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.00	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.10	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.20	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.30	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.40	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.50	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.60	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.70	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.80	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
2.90	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
3.00	N/A	N/A	0.020	0.025	N/A	N/A	0.030	N/A	N/A	0.035	N/A	N/A
					Q_{max}			Q_{max}			Q_{max}	
					1.08			**0.90**			**0.77**	

Aqua Callidus Consulting Ltd
52 Common Lane, Titchfield,
Hants, PO14 4BU

t: 07717 759149
www.aquacallidus.co.uk

Date: 13/05/2026

Site Ref Opposite Jubilee Cottage

SuDS Water Quality Management CIRIA C753 Ch26 **Simple Index Approach**

Catchment driveway

Is discharge to: SPZ1? N Drinking Water Protection Area ? N

Is site in close proximity to an area with sensitive environmental designation? N

if so how close? m

Is an additional treatment component required due to sensistivity? Y

Land Use	Hazard	TSS index	Metals index	HydroCar index
driveways (individual)	low	0.5	0.4	0.4

Treatments

To surface water discharge N

	Component	TSS MIndex	Metals MIndex	HydroCa MIndex	factor
1	N/A	0	0	0	1.00
2	N/A	0	0	0	0.50
3	N/A	0	0	0	0.50
	mitigation index	**0**	**0**	**0**	
X1	N/A	0	0	0	1.00
	Enhanced mitigation index	**0**	**0**	**0**	
	Residual pollution index	**0.5**	**0.4**	**0.4**	

Land Use	Hazard	TSS index	Metals index	HydroCar index	*residual*
driveways (individual)	low	**0.5**	**0.4**	**0.4**	

Treatments

To groundwater discharge Y

	Infiltration surface	TSS MIndex	Metals MIndex	HydroCa MIndex	factor
1	Permeable pavement	0.7	0.6	0.7	1.00
2	N/A	0	0	0	0.50
	Final residual pollution index	**0**	**0**	**0**	

Is a groundwater risk screening required? N

Notes:

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Date: 13/05/2026

Site Ref Opposite Jubilee Cottage

SuDS Water Quality Management CIRIA C753 Ch26 **Simple Index Approach**

Catchment roofs

Is discharge to: SPZ1? N Drinking Water Protection Area ? N

Is site in close proximity to an area with sensitive environmental designation? N

if so how close? m

Is an additional treatment component required due to sensistivity? Y

Land Use	Hazard	TSS index	Metals index	HydroCar index
roofs-residential	very low	0.2	0.2	0.05

**2 residential roofs remove gross solids and sediments*

Treatments

To surface water discharge N

	Component	TSS MIndex	Metals MIndex	HydroCa MIndex	factor
1	N/A	0	0	0	1.00
2	N/A	0	0	0	0.50
3	N/A	0	0	0	0.50
	mitigation index	**0**	**0**	**0**	
X1	N/A	0	0	0	1.00
	Enhanced mitigation index	**0**	**0**	**0**	
	Residual pollution index	**0.2**	**0.2**	**0.05**	

Land Use	Hazard	TSS index	Metals index	HydroCar index	*residual*
roofs-residential	very low	**0.2**	**0.2**	**0.05**	

**2 residential roofs remove gross solids and sediments*

Treatments

To groundwater discharge Y

	Infiltration surface	TSS MIndex	Metals MIndex	HydroCa MIndex	factor
1	catch pit & leaf guard	0.2	0.2	0.05	1.00
2	Soil only	0.4	0.3	0.3	0.50
	Final residual pollution index	**0**	**0**	**0**	

Is a groundwater risk screening required? N

Notes:

SUDS operation and maintenance - general

There are three categories on maintenance activities:

Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example). The table below summarises the likely maintenance activities required for each SUDS component and specific maintenance activities is given in the following sections.

Remedial maintenance comprises intermittent tasks that may be required to rectify faults associated with the system. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict. Remedial maintenance items can comprise items such as:

- inlet/outlet repairs
- erosion repairs
- reinstatement or realignment of edgings, barriers, rip-rap or other erosion control
- infiltration surface rehabilitation
- replacement of blocked filter fabrics
- construction stage sediment removal (although this activity should have been undertaken before the maintenance contract)
- system rehabilitation immediately following a pollution event.

	SUDS component												
O&M activity	Pond	Wetland	Detention basin	Infiltration basin	Soakawayu	Infiltration trench	Filter trench	Modular storage	Pervios pavements	Swale/bioretention/greenroofs	Filter strip	Sand filter	Pre-treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter/debris removal	■	■	■	■	□	■	■	□	■	■	■	■	■
Grass cutting	■	■	■	■	□	■	■	□	□	■	■	□	□
Wee/invasive plant control	□	□	□	□		□	□		□	□	□	□	□
Shrub management	□	□	□	□					□	□	□		□
Shoreline vegetation management	■	■	□										□
Aquatic vegetation management	■	■	□										□
Occasional maintenance													
Sediment management *	■	■	■	■	■	■	■	■	■	■	■	■	■
Vegetation/plant replacement	□	□	□	□						□	□		□
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation/repair	□	□	□	□	□	□	□	□	□	□	□	□	□
Infiltration surface reconditioning				□	□	□	□		□	□	□	□	

■ will be required □ may be required * sediment to be collected upstream of the main device

GENERAL MAINTENANCE

Litter/debris removal

This is an integral part of SUDS maintenance and reduces the risks of inlet and outlet blockages, retains amenity value and minimises pollution risks. High litter removal frequencies may be required at high profile commercial/retail parks where aesthetics are a major driver.

Grass cutting

It is recommended that grass cutting be minimised around SUDS facilities, apart from swales and filter strips and structural embankments where a height of 100–150 mm is recommended to prevent the plants falling over, or "lodging", when water flows across the surface. In general, allowing grass to grow tends to enhance water quality performance. Short grass around a wet system such as pond or wetland provides an ideal habitat for nuisance species such as geese; allowing the grass to grow is an effective means of discouraging them. Grass around wet pond or wetland systems should not be cut to the edge of the permanent water. Grass cutting is an activity undertaken primarily to enhance the perceived aesthetics of the facility. The frequency of cutting will tend to depend on surrounding land uses, and public requirements. Therefore, grass cutting should be done as infrequently as possible, recognising the aesthetic concerns of local residents. However, grass around inlet and outlet infrastructure should be strimmed closely to reduce risks to system performance. If a manicured, parkland effect is required, then cutting will need to be undertaken more regularly than for meadow type grass areas, which aim to maximise habitat and biodiversity potential.

Weed/invasive plant control

Weeds are generally defined as vegetation types that are unwanted in a particular area. For SUDS, weeds are often alien or invasive species, which do not enhance the technical performance or aesthetic value of the system, or non-native species and the spread of which is undesirable. In some places, weeding has to be done by hand to prevent the destruction of surrounding vegetation (hand weeding should generally be required only during the first year, ie during plant establishment). However, over grassed surfaces, mowing can be an effective management measure. The use of herbicides and pesticides should be prohibited since they cause water quality deterioration. The use of fertilisers should also be limited or prohibited to minimise nutrient loadings which are damaging to water bodies.

Shrub management

Shrubs tend to be densely planted and are likely to require weeding at the base, especially during the first year to ensure that they get enough water. Shrubs should be selected so they can grow to their maximum natural height without pruning.

Aquatic/shoreline vegetation management

Aquatic plant aftercare in the first 1–3 years may be required to ensure establishment of planted vegetation and control nuisance weeds/invasive plants. Once established, the build-up of dead vegetation from previous seasons should be removed at convenient intervals to reduce organic silt accumulation (eg every three years and at the end of landscape contract periods).

Emergent vegetation may need to be harvested every 5–10 years to maintain flood attenuation volumes, optimise water quality treatment potential and ensure fresh growth, although this is often not required. Care should be taken to avoid nesting birds during the breeding season and to avoid great crested newt and water vole habitats. The typical window for this activity is towards the end of the growing season (September and October). As vegetation matures, plant height may also become a safety issue in residential areas.

Where emergent vegetation is managed, up to 25 per cent can be removed by cutting at 100 mm above soil level using shearing action machinery. Up to 25 per cent of submerged vegetation can be cut and raked out at any one time, using approved rakes, grabs or other techniques, depending on whether clay or waterproof membranes are present. Aquatic vegetation arisings should be stacked close to the water's edge for 48 hours to de-water and allow wildlife to return to the SUDS feature. They should then be removed to wildlife piles, compost heaps or off site before decomposition, rotting or damage to existing vegetation can occur.

Algae removal may be undertaken for aesthetic purposes during the first 3–5 years of a pond/wetland's life. The growth of algae, which is considered by some to be visually intrusive, is encouraged by nutrients introduced into the water body. This situation should settle down once upstream construction activities are complete.

Management of green waste
Appropriate methods should be implemented to dispose of green waste, including

- The development of wildlife piles
- On- or off-site composting
- Disposal to landfill

REMEDIAL MAINTENANCE

Structure rehabilitation/repair
There will come a time with most SUDS techniques when a major overhaul of the system is required to remove clogged filters, geotextiles, gravel etc. This will typically be between 10 and 25 years, depending on the technique and factors such as the type of catchment and sediment load. For example the use of geotextiles close to the surface in pervious surfaces traps the majority of sediment in a relatively easily accessible location. Reconstruction of the surface layer and bedding layer is all that is required, rather than reconstruction of the whole pavement depth.

Major overhaul is most likely to be required on techniques that rely on filtration through soils or aggregates, such as sand filters and infiltration devices. Other SUDS techniques are unlikely to need major overhaul if routine maintenance is undertaken as required (for example ponds and wetlands).

Rehabilitation activities for each SUDS component are described on the following tables.

Infiltration surface rehabilitation
In the event that grassed surface permeability has reduced, there are a number of landscape techniques that can be used to open the surface to encourage infiltration. Such activities are not commonplace and are likely to be required only in circumstances where silt has not been effectively managed upstream.

1. Scarifying to remove "thatch". Thatch is a tightly intermingled organic layer of dead and living shoots, stems and roots, developing between the zone of green vegetation and the soil surface. Scarifying with tractor-drawn or self-propelled equipment to a depth of at least 50 mm breaks up silt deposits, removes dead grass and other organic matter and relieves compaction of the soil surface.
2. Spiking or tining the soil, using aerating equipment to encourage water percolation. This is particularly effective if followed by top dressing with a medium to fine sand, and is best undertaken when the soil is moist. Spiking or tining with tractor drawn or self-propelled equipment penetrates and perforates soil layers to a depth of at least 100 mm (at 100 mm centres) and allows the entry of air, water, nutrients and top dressing materials.
3. As a last resort, it may be necessary to remove and replace the grass and topsoil by:
    - removing accumulated silt and (subject to a toxicity test) applying to land or dispose of to landfill
    - removing damaged turf which should be composted
    - cultivating remaining topsoil to required levels
    - re turfing (using turf of a quality and appearance to match existing) or reseeding (to BS 7370: Part 3, Clause 12.6 (BSI, 1991) using seed to match existing turf) area to required levels. It may be necessary to supply and fix fully biodegradable coir blanket to protect seeded soil. Turf and seeded areas should be top dressed with fine sieved topsoil to BS 3882 (BSI, 1994) to achieve final design levels. Watering will be required to promote successful germination and/or establishment.

Water butts operation and maintenance

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris..	Annually (or following poor performance).
Occasional maintenance	Replacement of any filters.	As required
Remedial actions	Repair of erosion damage, or damage to tank.	As required
Monitoring	Inspection of the tank for debris and sediment build up.	Annually (or following poor performance).
	Inspection of inlets, outlets and withdrawal devices.	Annually (or following poor performance).
	Inspection of areas receiving overflow, for evidence of erosion.	After extreme storms.
	Inspection of roof drain filters	Annually (or following poor performance).

Soakaway operation and maintenance

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove sediment and debris from pre-treatment devices and floor of inspection tube or chamber.	Annually
	Cleaning of gutters and any filters on downpipes.	Annually
	Trimming any roots that may be causing blockages	Annually (or as required
Occasional maintenance	-	-
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs.	As required
	Replacement of clogged geotextile	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually.
	Check soakaway to ensure emptying is occurring.	Annually

Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/debris removal for large systems or in public environments.

Pervious pavement operation and maintenance

Maintenance schedule	Required action	Frequency
Regular maintenance	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weed.	As required
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	Initial inspection.	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48 h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers.	Annually

Modular systems operation and maintenance

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre-treatment structures	Annually, or as required
Occasional maintenance	-	-
Remedial actions	Repair/rehabilitation of 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 and after large storms

Appendix D

CONDITIONS AND LIMITATIONS OF FLOOD RISK ASSESSMENT & DRAINAGE STRATEGIES October 2020

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