



Flood Risk Assessment

Land off Cunnery Close, Barlestone, Leicestershire

Client

Gladman Developments Ltd

Ref: 14023

Date: February 2026

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Issue	Issue date	Compiled	Checked
First Issue	19/02/2026	FVV	MR
Second Issue – to client's comments	23/02/2026	FVV	MR

Executive Summary

- GTA Civils & Transport have been instructed by Gladman Developments Ltd to undertake a Flood Risk Assessment (FRA) in support of an outline planning application for a proposed residential development at Land off Cunnery Close, Barlestone. The Application Proposal is described in Section 1.
- This FRA aims to address the requirements of relevant Local Plan Policies and demonstrate compliance with the National Planning Policy Framework ("NPPF") and relevant planning practice guidance, in particular "Flood risk and coastal change" (PPG).
- The Site lies entirely within Flood Zone 1 and is therefore at low risk of fluvial flooding. Environment Agency surface water mapping identifies localised overland flow routes associated with the boundary ditch, a depression along the eastern boundary, and a low point at the existing access. These features have been fully considered within the development proposals and will be appropriately managed through design and finished floor level setting.
- Infiltration testing confirms that widespread use of traditional soakaways is not viable due to limited soil permeability; however, permeable surfacing and shallow infiltration techniques can potentially be incorporated within development parcels. A new discharge to the existing ditch will be required.
- A comprehensive Sustainable Drainage Systems (SuDS) strategy is proposed, combining on-plot source control measures with strategic conveyance swales and attenuation basins. Surface water discharge will be restricted to the 1 in 2-year greenfield runoff rate (4.5 l/s/ha), with sufficient attenuation provided to manage the 1 in 100 year plus 40% climate change event.
- The proposed strategy provides betterment over the existing greenfield condition by controlling runoff rates and volumes, improving water quality through a defined treatment train, and integrating drainage features within the landscape to deliver amenity and biodiversity benefits. Foul flows will discharge to the existing sewer network, with diversion works undertaken where required.
- The development is therefore appropriate in flood risk terms and accords with national and local planning policy.

1 Introduction

- 1.1 GTA Civils & Transport have been instructed by Gladman Developments Ltd to undertake a Flood Risk Assessment (FRA) in support of an outline planning application for a proposed residential development at Land off Cunnery Close, Barlestone.
- 1.2 The proposed development comprises a new residential scheme on a greenfield site off Cunnery Close. The development includes associated access, landscaping, amenity space, and supporting infrastructure. The total site area is approximately 6.53 hectares (ha).
- 1.3 No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.4 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF) (2024) and relevant planning practice guidance, in particular "Flood risk and coastal change" (PPG ID7, updated September 2025).

2 Policy Context

Local Plan

- 2.1 The Hinckley and Bosworth Core Strategy 2006-2026 was adopted in 2009. The Council are currently preparing a new Local Plan to 2045, which is anticipated to be consulted upon in summer 2026 (Regulation 19) before being submitted for Examination in late 2026. There is no policy directly relevant to flood risks or drainage within the current Local Plan.
- 2.2 Notwithstanding the above, HBBC published their Strategic Flood Risk Assessment (SFRA) in 2025 to support the emerging Local Plan. This sets out an overview of the flood risk from various sources within the borough to inform land use planning. The findings of the SFRA in relation to the Site are discussed in Section 3.

Local Flood Risk Management Strategy (LFRMS)

- 2.3 Leicestershire County Council published their LFRMS in February 2024. This focuses on the management of local flood risk sources within the county. In particular, it outlines how new development should apply the principles of sustainable drainage (SuDS). SuDS should be designed to prevent increases in the amount and rate at which surface water leaves sites.

Legislative Context

- 2.4 The Flood and Water Management Act 2010 (FWMA) updated legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought. The FWMA helps reduce flood risk by:
- clarifying who is responsible for managing all sources of flood risk;
 - encouraging more sustainable forms of drainage in new developments; and
 - making it easier to resolve misconnections to sewers.
- 2.5 The FWMA established the creation of the Lead Local Flood Authority (LLFA) at county or unitary level to manage local flood risk. Each LLFA is required to prepare a Local Flood Risk Management Strategy which considers all sources of flood risk and identifies objectives to manage local flood risk to local communities.
- 2.6 The LLFA relevant to the Development is Leicestershire County Council.
- 2.7 The FWMA also laid the groundwork for national Sustainable Drainage Systems (SuDS)

standards to be created. Defra published the "National standards for sustainable drainage systems (SuDS)" on 19 June 2025 which provide the technical guidance that developers are expected to follow and which LLFAs will use to assess submissions.

3 Existing Site & Current Flood Risk

Site Location

- 3.1 The Site comprises approximately 6.53 ha of agricultural land on the south-western edge of Barlestone. The site is broadly rectangular, with a strip of land extending to the east towards Bosworth Road. It is bounded to the south and west by further agricultural land, and by residential properties to the north. It is accessed via Cunnery Close to the north.
- 3.2 A Study Area Plan is in Appendix A.

Topography

- 3.3 The site falls steadily from north to south, with levels ranging from between approximately 125.7m Above Ordnance Datum at Cunnery Close, to 118m AOD in the southeast corner. The levels then continue falling to the east, with a low point of 116.6m AOD adjacent to Bosworth Road.
- 3.4 Survey data is in Appendix B.

Hydrology

- 3.5 The nearest EA Main River to the Site is the River Sense approximately 4.5km to the west of the Site, and the River Tweed approximately 6km to the south.
- 3.6 There is a ditch (Ordinary Watercourse) along the western and southern boundary of the site. This flows in a west to east direction, crossing beneath Bosworth Road before continuing south towards the Ashby-de-la-Zouch Canal.
- 3.7 This ditch is culverted beneath a farm access, via a 450mm diameter culvert, and borders the site.

Geology

- 3.8 The published bedrock geology for the site comprises the Gunthorpe Member (Mudstone). Superficial deposits of Oadby Till Member (Diamicton) are shown across the majority of the site. There is a small pocket of Glaciofluvial deposits in the north-west corner of the site, and areas of Alluvium directly adjacent to the existing ditch on the southern border.
- 3.9 The Soilscape classification for the upper soils is "slowly permeable seasonally wet [...] loamy and clayey soils" with impeded drainage. It is expected to drain to the "local

stream network”.

- 3.10 The Site is located in an area of high groundwater vulnerability. It is not located within a Source Protection Zone (SPZ).
- 3.11 Initial soakage testing was conducted in 2019 by RSK to support a previous development proposal at the site. This confirmed the presence of Glaciofluvial deposits and the Oadby member overlying the Gunthorpe Member at the site. Soakage testing conducted at the site indicated some soakage potential in the Glaciofluvial deposits, but very impeded soakage into the Oadby member.
- 3.12 The Factual Soakaway Test Report is included in Appendix C.

Flood Zone

- 3.13 The EA's Flood Map for Planning shows the Site lies within Zone 1 – Low Probability, having less than a 1 in 1,000 (0.1%) annual exceedance probability (AEP) of river flooding.
- 3.14 The EA's "Flood Map for Planning" is in Appendix D.

Surface Water Flood Risk

- 3.15 The EA's surface water flood risk mapping is reproduced in Appendix D for the Site. The mapping shows three notable surface water flood risk areas:
- There is a flood risk corridor associated with the Ordinary Watercourse (ditch) on the western and southern boundary of the site. This links to a wider overland flow route coming from the north through the existing residential area. The flood maps in Appendix D indicates that the maximum flood depths in this area are less than 0.6m.
 - A secondary flow path occurs in the 0.1% AEP (low risk) scenario along the eastern boundary of the Site, before crossing over to join the wider flow route on the southern boundary. This flow path originates from exceedance flow within Manor Road, The Glebe and Cunnery Close. A localised depression is visible on site along the site boundary, corresponding to this flow route. The flood maps in Appendix D indicates that the maximum flood depths along this flow path are less than 0.2m.
 - There is an isolated area of surface water flood risk at the access to the site from Cunnery Close. This is associated with a depression formed by an artificially raised bund located within the site at the access. The flood maps in Appendix D indicates

that the maximum flood depths in this area are less than 0.6m.

- 3.16 It should be noted that the EA surface water mapping was last updated in September 2025 and therefore supersedes the mapping that is presented in HBBC's SFRA.

Reservoir Flood Risk

- 3.17 There are no impounded water features in the vicinity and the Site is not close to any reservoir flood risk area shown on the EA's mapping.
- 3.18 The EA's "Flood Risk Map from Reservoirs" is in Appendix D.

Groundwater Flood Risk

- 3.19 The EA groundwater susceptibility mapping indicates that there is a greater than 75% probability of groundwater flooding at the site. This is a coarse scale national model and might not be reflective of localised variations in geology.
- 3.20 HBBC's SFRA includes mapping indicative the risk of groundwater emergence within the borough. This map was generated using more detailed geological information through the borough. This indicates that there is no risk of groundwater emergence for the majority of the site, with the exception of the small, localised area of Glaciofluvial deposits in the northwest corner of the Site.

Climate Change

- 3.21 A Climate Change (2070 to 2125) layer was added to the Flood Map for Planning by the EA on 27 August 2025. This dataset is intended to show how the combined extent of Flood Zones 2 and 3 could increase with climate change over the next century, ignoring the benefits of any existing flood defences and assuming no changes to flood defences or land-use during that time. There are no impacts shown at or close to the site.
- 3.22 The site lies within the Tame Anker and Mease Management Catchment. The applicable peak rainfall allowances are 35% for the 1 in 30 AEP events, and 40% for the 1 in 100 AEP events. The allowances are the same for both the 2050s and 2070s epochs.
- 3.23 The EA mapping for the "Yearly change of flooding between 2040 and 2060" shows slightly larger surface water flood risk extents in each affected area. None of the Medium-risk outlines are as extensive as the Low-risk outlines in the present-day

mapping.

Historical Flooding

- 3.24 A review of the available data and documents has not identified any records of flooding incidents at or close to the site.

Existing Sewers

- 3.25 Severn Trent sewer records (included in Appendix E) indicate the presence of a combined gravity sewer crossing the Site from the northwest corner to the east. The records do not provide size or level information.
- 3.26 There is also a separate surface water network within the residential street to the north, which outfalls to the ditch on the southern boundary of the Site, just upstream of Bosworth Road.
- 3.27 A CCTV survey was carried out on site to confirm the route and levels of the existing sewers and confirm the condition of the exiting culverts. The findings of the report are included in Appendix E. This confirms the site of the foul sewer (225mm diameter, increasing to 300mm diameter within the site), and surface water sewer (300mm diameter).

Existing Drainage Characteristics

- 3.28 The existing site is essentially 100% greenfield. Although there is some permeability in the northwest corner of the site, infiltration is mostly impeded. Hence the typical existing drainage patterns at the site consists of limited infiltration into the shallow ground, with excess runoff to the boundary ditch.
- 3.29 Greenfield runoff rates per hectare have been calculated using the FEH statistical method. The results are shown below, and calculations included in Appendix G.

1 in 1 AEP	4.2 l/s/ha
1 in 2 AEP	4.5 l/s/ha
Qbar	5.0 l/s/ha
1 in 30 AEP	10.0 l/s/ha
1 in 100 AEP	12.9 l/s/ha

4 Proposed Flood Risk Mitigation

- 4.1 The Drainage Strategy plan is included in Appendix F. The Strategy plan includes the flood extents to allow comparison with the proposed development layout.
- 4.2 The Site lies entirely within Flood Zone 1. All types of development are appropriate within this Zone in terms of flood risk according to the NPPF and planning practice guidance.
- 4.3 The major overland flow path associated with the existing ditch will be kept free of development (including SuDS features).
- 4.4 The existing depression along the eastern boundary of the site will be formalised as part of the proposed drainage strategy. This will help channel the minor overland flow route which exists in that location in line with the existing pattern and protect the adjacent residential parcels.
- 4.5 Building floor levels in the vicinity will be set sufficiently above the predicted flood level. This will need to be addressed at detailed stage once the architectural layout plans are available.
- 4.6 The levels across the proposed emergency access from Bosworth Road will be maintained so that it does not impede the overland flow crossing towards the existing ditch. The maximum flow depths, as outlined in Section 3, are under 200mm in all modelled scenarios and would therefore not impede emergency vehicles access into the site.
- 4.7 The primary site access will be free from flood risks once the existing artificially raised bund is removed, alongside adequate drainage being provided as part of the proposed site.
- 4.8 The proposed development follows the sequential approach outlined in the NPPF by locating the more vulnerable uses on land with least flood risk. No further specific flood risk mitigation measures are required beyond the management of development runoff. This is discussed in the next section.

5 Proposed Surface Water Strategy

- 5.1 Defra published the National Standards for SuDS ("NSS") on 19 June 2025. The key principles underpinning the NSS include a natural approach to managing water and an early and integrated design. The proposed SuDS strategy is illustrated in Appendix F and has been prepared in accordance with these key principles. There are 7 core standards set out in the NSS and these are discussed in turn as follows:

Standard 1: runoff destinations.

- 5.2 The NSS hierarchy sets the priority as collecting runoff for non-potable use. Rainwater harvesting (RwH) solutions need to be considered with the architectural and building services design and hence will be considered at detailed stage. Water butts will be included as a minimum. Unless supersized storage tanks are provided in excess of the demand sizing, it must be assumed that any RwH systems are full and quickly overflowing at the time of an extreme storm event. Onward discharge must therefore be considered.
- 5.3 The 2nd priority is to infiltrate runoff to ground. In-situ soakaway testing has confirmed that point-load soakaways will not be viable for a vast majority of the site. The area of Glaciofluvial is extremely localised and at the site high point, which makes it impractical to use as part of the drainage strategy. It may still be possible to include some permeable surfacing with shallow infiltration within the residential parcels. However, it is evident that infiltration SuDS will not provide a complete surface water management solution and an off-site discharge will be needed.
- 5.4 The 3rd priority is to discharge runoff to an above ground surface water body. The strategy for the development is therefore to discharge runoff to the existing ditch watercourses at the site. The outfall location is illustrated on the Strategy Plan in Appendix F.

Standard 2: management of everyday rainfall (interception)

- 5.5 An integrated SuDS approach will be taken within the built development parcels. The on-plot and source control SuDS measures will be defined at the detailed design stage. As these are the measures that principally address the management of everyday rainfall, it is appropriate to consider the interception and area volume calculations required by Standard 2 at detailed stage. The available SuDS techniques include those listed below:

- Green roofs.
- RWH systems.
- Domestic, roadside and local bioretention areas include tree pit drainage and rain gardens.
- Permeable driveways and surfaces (where the additional impermeable area drained is no greater than the permeable area).
- On-plot conveyance swales.

Standard 3: management of extreme rainfall and flooding

- 5.6 The NSS guidance sets out that the peak allowable discharge rate from the development to the watercourses should be limited to the 1 in 2 (50%) AEP greenfield runoff rate, or 3 l/s/ha, whichever is the greater. As shown in Section 3 above, the 1 in 2 AEP greenfield runoff rate for the site is 4.5 l/s/ha (see Appendix G). The peak allowable discharge rate for the development is therefore **4.5 l/s/ha**.
- 5.7 A typical calculation is included in Appendix G which demonstrates that a storage volume of **867m³ per hectare** will be required to cater for the 1 in 100 AEP +40% storm events.
- 5.8 A summary calculation is also included in Appendix G which shows the estimated impermeable areas and volume requirements for the Site. The impermeable area estimates are based on the proposed development parcels and are considered sufficient to account for urban creep. It is assumed that 30% of the required volume will be provided within the development parcels as part of the on-plot source control techniques listed under Standard 2 above. The residual 70% will be located within the strategic SuDS basin located in the lower part of the site.
- 5.9 Flow will be directed to the basins by means of strategic conveyance swales located within the green infrastructure corridors and spaces between the development parcels. Vortex-type flow control will be installed on the basin outfall to manage the off-site discharge rates.
- 5.10 The strategic SuDS features and volumes are illustrated on the Strategy Plan in Appendix F. The plan demonstrates that sufficient land has been made available within the outline masterplan for the management of surface water in line with the NSS. The strategy will be progressed with full supporting calculations at detailed stage.
- 5.11 Exceedance: Overland flow routes in the event of exceedance routes are indicated on the Strategy Plan in Appendix F. Routes will be assessed at detailed stage to ensure

buildings are protected.

Standard 4: water quality

5.12 The proposed SuDS strategy includes a multi-stage treatment train to protect water quality in the receiving water environment. At outline stage, the treatment train can be simplified as follows: 1) on-plot source control measures including permeable surfacing and bioretention areas; 2) conveyance swales; 3) attenuation ponds.

5.13 Based on the Simple Index Approach described in CIRIA C753 (The SuDS Manual) the development's pollution hazard indices are outlined in Table 5-1 below along with the relevant SuDS mitigation indices for the proposed SuDS components.

Pollutant type	TSS	Metals	Hydrocarbons
Pollution hazard indices			
Residential roofs – Very low	0.2	0.2	0.05
Vehicular areas – Low	0.5	0.4	0.4
Spine roads – Medium	0.7	0.6	0.7
SuDS mitigation indices			
Permeable pavement	0.7	0.6	0.7
Bioretention system	0.8	0.8	0.8
Swale	0.5	0.6	0.6
Paving → Swale	0.9	0.9	1.0
Bioretention → Swale	1.0	1.1	1.1
Basin	0.5	0.5	0.6
Swale → Basin	0.75	0.85	0.9
Paving → Swale → Basin	1.15	1.15	1.3
Bioretention → Swale → Basin	1.25	1.35	1.4

Table 5-1: Runoff Treatment - Simple Index Approach

5.14 Table 5-1 demonstrates that the proposed SuDS treatment train will sufficiently protect the water environment.

Standard 5: amenity

5.15 The strategic SuDS features have been integrated into the landscape proposals to ensure their amenity potential is realised. For more information, refer to the landscape architect's documents. Further details will be provided at the next stage.

Standard 6: biodiversity

5.16 The proposed SuDS strategy offers some potential for biodiversity gains due to the array

of habitat creation. For more information, refer to the ecology consultant's documents.

Standard 7: design of drainage for construction, operation, maintenance, decommissioning and structural integrity

5.17 Construction and Phasing: Limited information is available at this stage regarding the proposed phasing of the development. These topics are typically addressed by condition with Phasing Plans and Construction Environmental Management Plans (CEMP). Construction of the surface water drainage scheme will be carried out in line with best practice methods and controls.

5.18 Ownership and maintenance: A draft Drainage Maintenance Plan (DMP) outlining ownership and maintenance responsibilities is included in Appendix H. This is a draft version based on the information currently available at this stage; the DMP will be updated as the design of each phase is developed and will remain a live document over the duration of the project. A summary of the various ownership responsibilities is as follows:

- Individual property drainage will be cared for by the property owner.
- Highway drainage and SuDS will be the responsibility of Leicestershire County Council as the Highway Authority. The final extent of adopted roads will be confirmed at the detailed design stage.
- Adopted sewers and qualifying SuDS components will be the responsibility of Severn Trent, or will be vested in a sewerage company under a NAV agreement. The final arrangements will be confirmed at the detailed design stage.
- The remaining drainage features along with the site-wide infrastructure will be cared for the Estate Management Company set up by the developer.
- The developer will be responsible for maintaining completed SuDS components in advance of transfer to / adoption by the relevant party.

6 Foul Drainage Strategy

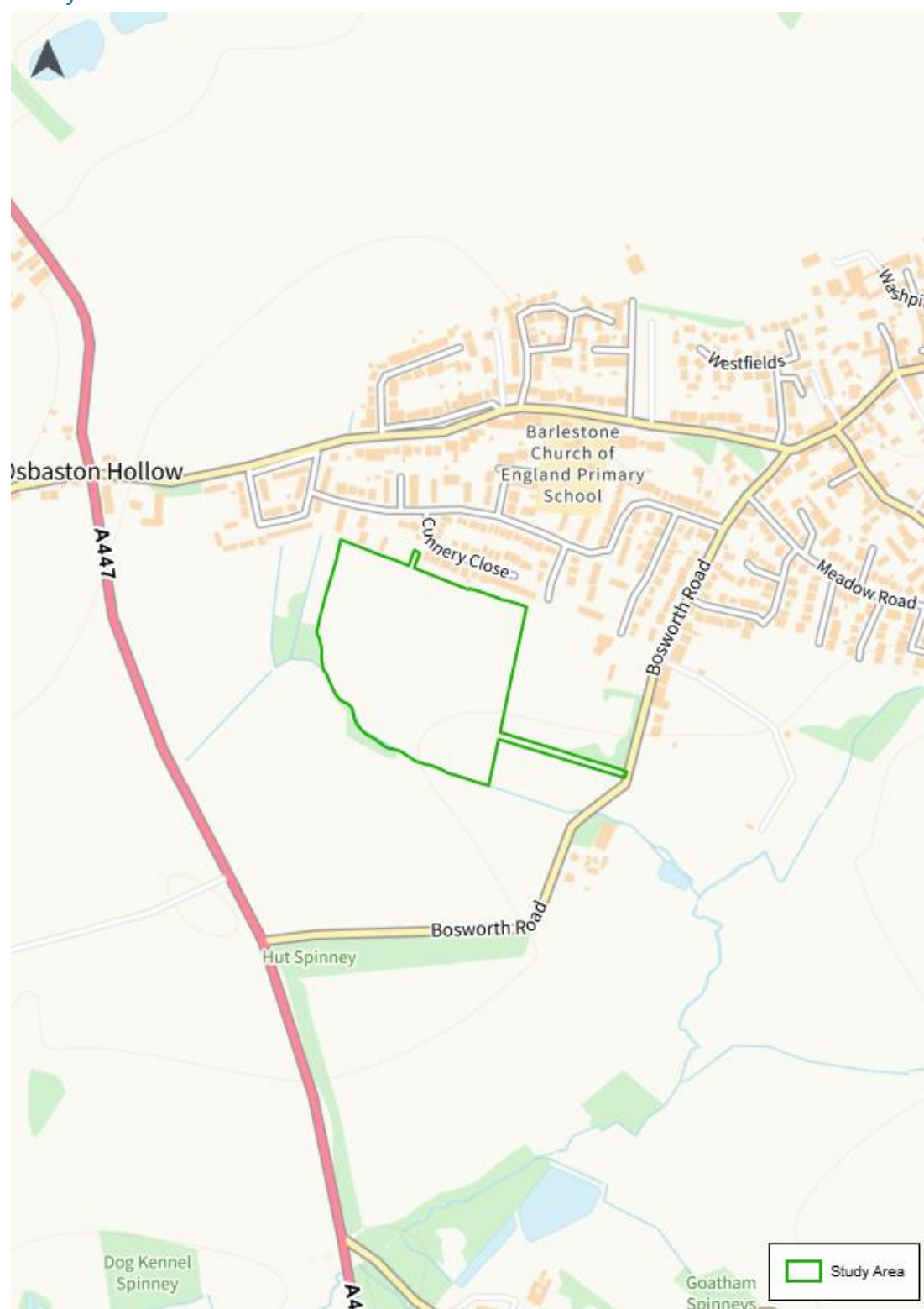
- 6.1 The proposed foul drainage strategy is included in Appendix F. The existing foul sewer crossing the site will be diverted within the proposed site road network, to be confirmed at the detailed design stage. This will be subject to a Section 185 application with Severn Trent.
- 6.2 The proposed residential parcels will then be able to connect into the diverted foul sewer. Some land raising of the southernmost parcels will be required in order to achieve a gravity connection back into the existing sewer, as shown on the strategy plan. This will be detailed at the next stage of the design, once an architectural layout is available.
- 6.3 Severn Trent does not offer advice on pre-application enquiries. Any upgrades required in the downstream network to accommodate the proposals will be carried out by Severn Trent in line with their statutory obligations under Section 94 of the Water Industry Act 1991.
- 6.4 All new connections to the sewer network will be subject to S106 agreements with Severn Trent in due course.

7 Conclusions

- 7.1 The proposed development site lies wholly within Flood Zone 1 and is not at risk of fluvial or reservoir flooding. Localised surface water flow routes and depressions have been identified and have been incorporated into the design through landscape integration, level management and strategic planning of built development parcels.
- 7.2 The surface water drainage strategy has been developed in accordance with the National standards for SuDS and limits discharge to greenfield runoff rates, with attenuation provided for the 1 in 100 AEP event including a 40% allowance for climate change. The strategy adopts a multi-stage treatment train comprising source control measures, conveyance features and attenuation basins, ensuring protection of the receiving water environment while also delivering amenity and biodiversity enhancements.
- 7.3 The proposals will not increase flood risk on site or elsewhere and will provide an overall betterment compared to the existing situation through the controlled management of runoff. Foul drainage can be accommodated within the existing sewer network, subject to the necessary statutory approvals.
- 7.4 It is therefore concluded that the development complies with the NPPF and associated planning practice guidance in respect of flood risk and drainage, and that the site is suitable for the proposed residential use from a flood risk perspective.

Appendix A

Study Area Plan

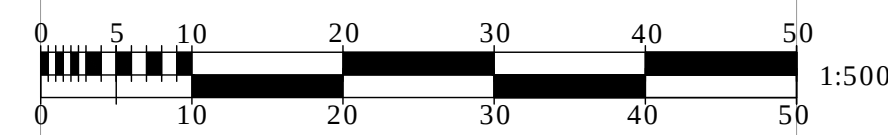
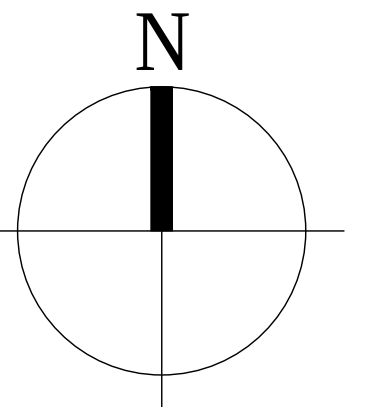


Aerial Photo



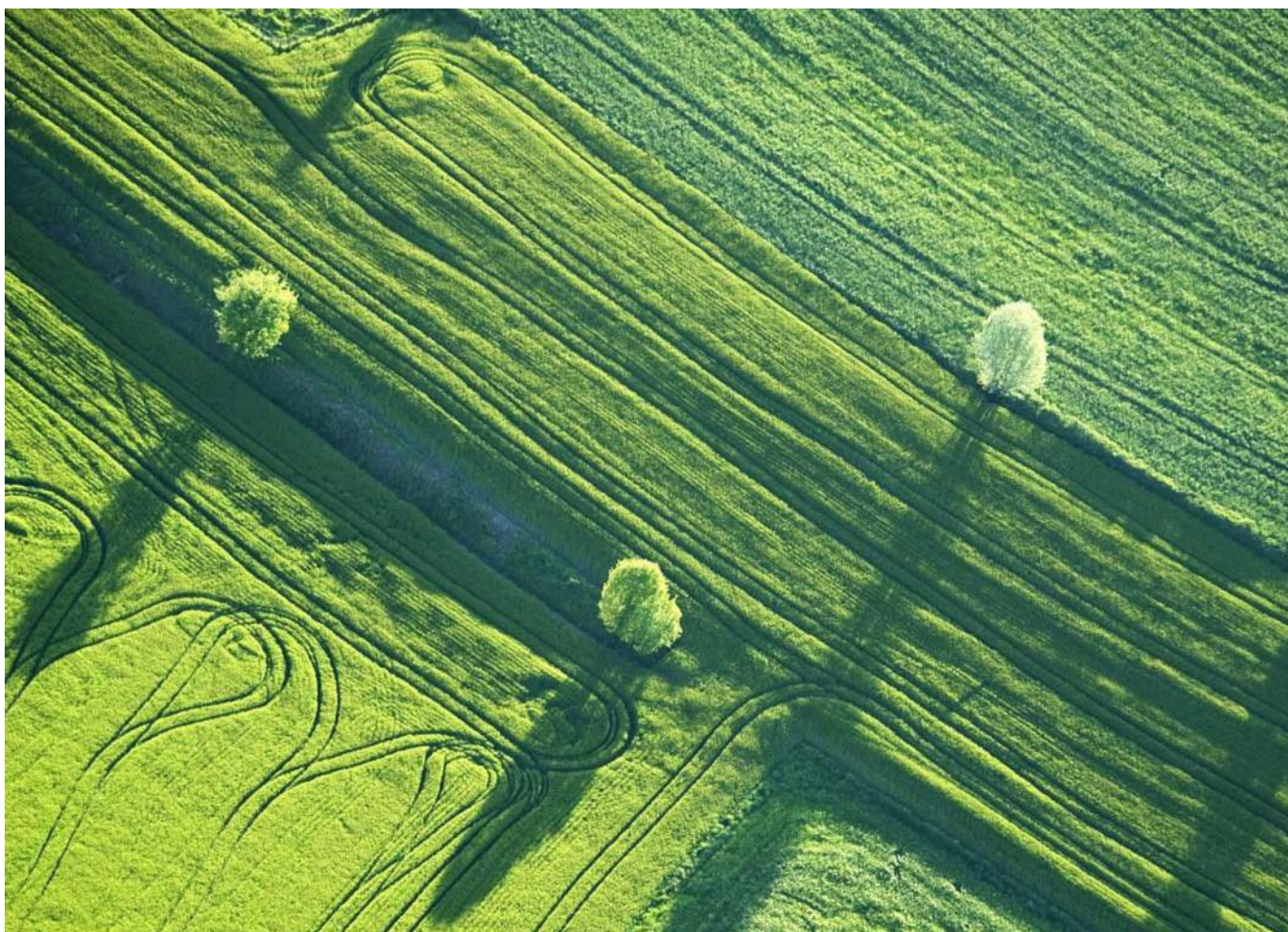
Appendix B

Site Survey



Appendix C

Factual Soakaway Test Report



Gladman Developments Ltd

Cunnery Close, Barlestone

Factual Soakaway Test Report

252169 R01 (00)

JUNE 2019





RSK GENERAL NOTES

Project No.: 252169-R01 (00)

Title: Factual Soakaway Test Report: Cunnery Close, Barlestone

Client: Gladman Developments Ltd, Congleton Business Park, Alexandria Way,
Congleton, CW12 1LB

Date: 12th June 2019

Office: Abbey Park, Humber Road, Coventry, CV3 4AQ.

Status: Final

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Date:	<u>11th June 2019</u>	Date:	<u>12th June 2019</u>

Project manager	<u>Michael Lawson</u>
	
Signature	
Date:	<u>11th June 2019</u>

RSK Environment Limited (RSK) has prepared this report for the sole use of the Client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the Client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the Client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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APPENDICES

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1 INTRODUCTION

RSK Environment Limited (RSK) has been commissioned by Gladman Developments Ltd (the 'Client') to carry out a series of shallow infiltration tests at land off Cunnery Close, Barlestone hereafter referred to as the 'site'.

This report is subject to the RSK service constraints given in Appendix A. This report is also intended to act as the health and safety file for the works undertaken.

1.1 Objective and scope of investigation

The objective of the investigation was to provide information regarding the infiltration characteristics of the shallow soils, in order to inform the design of the proposed residential development.

The project was carried out to an agreed brief as set out in RSK's proposal (252169-T01 (00), dated 10th May 2019). The scope of testing was as follows:

- GPR and CAT scanning for service clearance;
- Excavation of 5No. trial pits, using an operated JCB excavator to a provisional depth of 2.50 metres below ground level (m bgl);
- Infill each trial pit with stone to maintain stability (in accordance with BRE Digest DG365, 2016);
- Undertake up to three soakage tests (depending on the amount of infiltration occurring) within each trial pit where possible to full BRE specification to assess infiltration characteristics;
- Excavate gravel on the completion of tests and stockpile in one location and backfill holes with arisings

A description of the procedures followed during the testing is presented within Section 3. The trial pit records are presented in Appendix C, while factual data obtained during the soakaway tests is presented within Appendix D.

1.2 Limitations

The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation. In addition, groundwater levels and flows may vary from those reported due to seasonal, or other, effects. It should be noted that when RSK arrived at the site

there was an established wheat crop present in the fields. As such exploratory positions were relocated close to existing vehicle routes over the site in order to limit damage to the crop.

2 SITE DETAILS

2.1 Site location and description

The site is located to the south of the village of Barlestone at National Grid reference SK 42213 05361, as shown on Figure 1. The site currently consists of agricultural fields.

To the north of the site lies residential properties associated with the village of Barlestone. To the east lies a sports and recreational ground and to south and west lies agricultural fields.

2.2 Proposed development

The site in question is being considered for development for residential use. The planned layout of the site has not been provided to RSK.

2.3 Geology

Published records (British Geological Survey (BGS), for the area and historical borehole logs indicate the geology of the site to be characterised by the succession recorded in Table 1. There are three publicly available BGS historical boreholes located on or within 500 m of the site.

Table 1: Geology at the site

Geological unit	Description	Estimated thickness (m)
Glaciofluvial Deposits	Sands and Gravels	3m
Oadby Member	Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments.	3m
Gunthorpe Member	Mudstone, red-brown, with subordinate dolomitic siltstone and fine-grained sandstone, greenish grey, common gypsum veins and nodules.	Unknown
Relevant information sources: BGS Geoindex ☒ BGS borehole logs ☒		

2.4 Previous reports

Existing reports for the site include:

- RSK Phase 1 Desk Study: Cunnery Close, Barlestone (ref: 314466-R01 (00), dated April 2019).

3 TEST PROCEDURE AND RESULTS

3.1 Site investigation methodology

Soakaway testing was undertaken between 4th and 6th June 2019. The test locations were initially scanned using a Cable Avoidance Tool (CAT) and Ground Penetrating Radar (GPR) survey prior to excavation. A total of 5No. trial pits, designated TP01 to TP05, were mechanically excavated to depths of between 2.50-2.90m bgl to provide coverage of the site using a JCB3CX wheeled excavator. The trial pits were infilled with clean 20mm gravel and water level measurements were taken from a slotted pipe installed to its base.

3No. soakaway tests were carried out in trial pit TP01 with two running over a period of 6 hours and the final test running overnight to the final day. Only one test was carried out in trial pits TP02-TP05 due to the low infiltration rates associated with the clay present at these locations. These tests were run for the duration of the fieldworks, i.e. over 2.5 days.

The locations of the trial pits are presented on Figure 2.

A photographic log of the works undertaken is presented within Appendix B.

3.2 Health and Safety

Prior to site work commencing a full set of service plans were obtained. These indicated that 2no. sewers and 1no. water main run across the site. These are mapped on Figure 2 in relation to the exploratory hole positions. The service plans are provided in Appendix E.

3.3 Ground Conditions

The investigation and the soil descriptions were carried out in accordance with 'BS 5930:2015. Code of Practice for Site Investigations' (BSI, 2015); and the testing was undertaken in general accordance with Building Research Establishment (BRE) DG365.

Each soakaway trial pit was excavated and logged by a suitably qualified engineer, with full logs for each location presented within Appendix C.

The ground investigation encountered shallow agricultural topsoil overlying superficial deposits comprising of Glaciofluvial Deposits in the north-west of the site, which is likely underlain by the Oadby Member. The Oadby Member is present at surface across the rest of the site. The weathered Gunthorpe Member was identified at a single location,

trial pit TP02 at a depth of 2.5m bgl, in the south-west of the site. For the purpose of discussion, the ground conditions are summarised in Table 2 and the strata discussed in subsequent subsections.

Table 2: General succession of strata encountered

Strata	Exploratory holes encountered	Depth to top of stratum (m bgl)	Proven thickness (m)
Agricultural Topsoil	TP01 - TP05	Ground level	0.30-0.40
Glaciofluvial Deposits	TP01	Ground level	2.50
Oadby Member	TP02 – TP05	0.30-0.40	2.50-2.90
Weathered Gunthorpe Member	TP02	2.50	Base not proven

3.3.1 Topsoil

An agricultural topsoil was encountered within TP01-TP05 from ground level to a depth of between 0.30 – 0.40m bgl. This stratum comprised a brown, slightly gravelly, slightly silty sand in TP02 and TP03 with gravel comprising of subangular to subrounded quartzite and flint. In TP04 and TP05 the topsoil comprised a firm to stiff brown slightly gravelly sandy clay with gravel comprising of subangular to subrounded quartzite.

3.3.2 Glaciofluvial Deposits

Glaciofluvial Deposits were encountered in TP01 beneath the agricultural topsoil in the north-west of the site only. This corresponded with the mapped location noted on BGS geological mapping for the site. The stratum comprised slightly gravelly, fine to coarse sand, with a gravel content of sub-angular to sub-rounded fine to coarse quartzite and was present to the base of the trial pit at a depth of 2.50m bgl.

3.3.3 Oadby Member

The Oadby Member was encountered in TP02-TP05 beneath the agricultural topsoil and initially comprised stiff, yellowish brown, slightly gravelly, slightly sandy clay. The gravel comprised sub-angular to sub-rounded quartzite and flint with occasional cobbles of flint. The clay appeared initially desiccated to depths of approximately 1.0m bgl. Below this the stratum continued as stiff to very stiff, mottled grey and red brown, slightly gravelly, slightly sandy to sandy clay. The gravel fraction comprised sub-angular to sub-rounded quartzite, flint and chalk with occasional cobbles of flint and chalk. This stratum was proven to a maximum depth of 2.90m bgl.

3.3.4 Weathered Gunthorpe Member

A stratum identified as the weathered Gunthorpe Member was encountered in TP02 in the south-west of the site beneath the Oadby Member at a depth of 2.50m. This strata consisted of soft red brown sandy clay. The stratum was present to the base of the trial pit at a depth of 2.90m bgl and its base was not proven.

3.3.5 Groundwater

No groundwater was encountered during the site investigation works.

3.4 Soakaway Test Results

As outlined in BRE DG365, the soil infiltration rate of the soils can be calculated from the time taken for the water level to fall from 75% to 25% effective storage depth in the soakage trial pit, using the following calculation:

$$f = \frac{V_{p75-25}}{a_{s50} \times t_{p75-25}}$$

where:

f = soil infiltration rate

V_{p75-25} = the effective storage volume of water in the soakage trial pit between 75% and 25% effective storage depth

a_{s50} = the internal surface area of the soakage trial pit up to 50% effective storage depth and including the base area

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

Table 3, summarises the programme of testing undertaken and the infiltration rates recorded for each individual test. The results of the tests are presented in full within Appendix C.

Table 3: Summary of infiltration testing programme

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
TP01	0.40 to 2.00 m bgl	Glaciofluvial Deposits	1	8.95×10^{-6}
			2	8.71×10^{-6}
			3	3.33×10^{-6}
TP02		Oadby Member	1	8.00×10^{-7}
TP03			1	N/R
TP04			1	5.23×10^{-7}
TP05			1	N/R

Table 3 indicates that infiltration rates in the Oadby Member were poor. TP03 and TP05 did not achieve a 25% drop in the water level and as such no practical infiltration value can be calculated and so has been described as a non-result. TP02 and TP04 did reach

the 25% mark but did not reach the 75% by the time the test was terminated. As such the tp75-tp25 value had to be extrapolated to get the infiltration value. Based on this, soakaways would not be appropriate for the sections of the site covered in the Oadby Member.

The infiltration rate in the Glaciofluvial Deposits (TP01) is higher than the Oadby Member with tests running for approximately 6 hours to achieve the 75% mark. While it would in theory be possible to build soakaways in this section of the site it should be noted that the Glaciofluvial Deposits cover only the north-western section of the site, which is topographical the highest point of the site, with TP01 being located some 8.0m higher than the lowest trial pit on site (TP05). As such the soakaway would drain directly on to the Oadby Member with water potentially reemerging at surface where the Oadby is present at surface. As such it is unlikely that this would be practical for the suitable construction of soakaways within this area of the site.

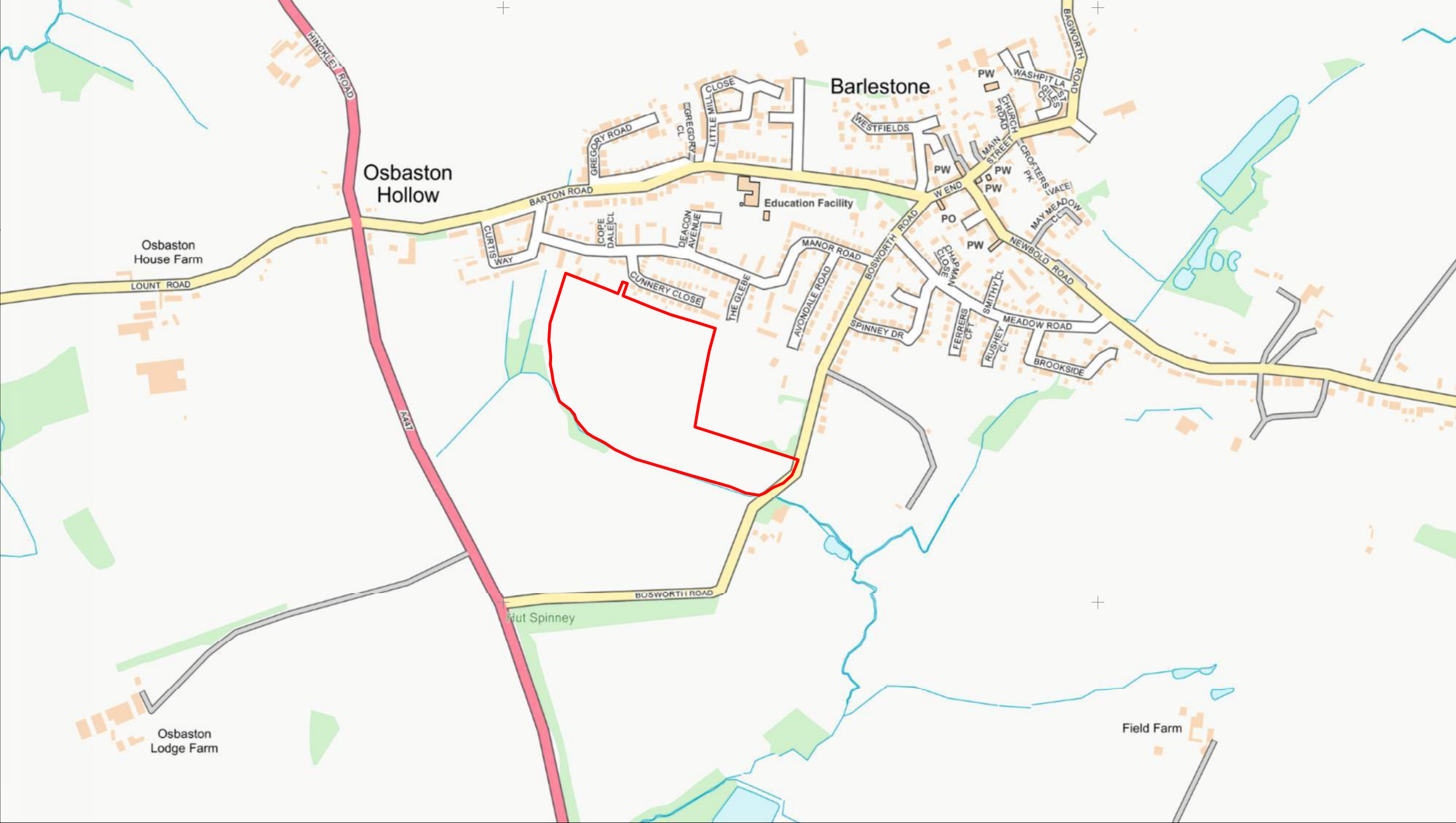
FIGURES

442000

443000

306000

305000



Legend:
[Red Outline] Site Boundary

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drm	Chk	App
00	21/03/2019	First Draft	DR	SA	SA

Barlestone



TITLE: Figure 1:
Site Location Plan

050100

Metres

SCALE: 1:7,250 @ A3

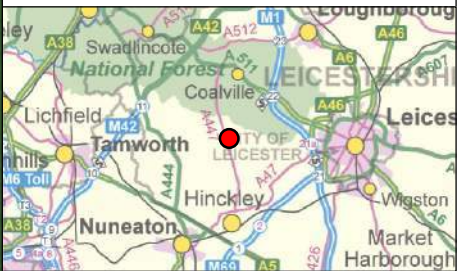
N
W
E
S

REV 00



- Legend:
- Site Boundary
 - Exploratory Hole Locations with Soakaways at each end
 - Indicative Sewer Record
 - Indicative Water Record

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

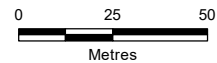


00	13/06/2019	First Draft	DR	SA	SA
Rev	Date	Description	Drm	Chk	App

Barlestone



TITLE: Figure 2:
Exploratory Hole Location Plan



SCALE: 1:2,000 @ A3



REV 00

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Gladman Developments Ltd (the "Client") in accordance with the terms of a contract between RSK and the "Client", dated May 2019. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the Client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the Client without RSK's review and advice shall be at the Client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the Client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the Client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the Client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.
8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the Client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

PHOTOGRAPHIC RECORD

Photo No.	Date:	
1	04/06/2019	
Description: Geology of trial pit TP01		

Photo No.	Date:	
2	07/05/2019	
Description: Soil arisings from trial pit TP01		

Photo No.	Date:	
3	04/06/2019	
Description: Geology of trial pit TP02		

Photo No.	Date:	
4	08/06/2019	
Description: Soil arisings from TP02		

Photo No.	Date:	
5	04/06/2019	
Description: Geology of TP03		

Photo No.	Date:	
6	04/06/2019	
Description: Soil arisings from TP03		

Photo No.	Date:	
7	04/06/2019	
Description: Geology of TP04		

Photo No.	Date:	
8	04/06/2019	
Description: Length view of TP04		

Photo No.	Date:	
9	04/06/2019	
Description: Geology of TP05		

Photo No.	Date:	
10	08/05/2019	
Description: Soil arisings from TP05		



APPENDIX C

EXPLORATORY HOLE RECORDS

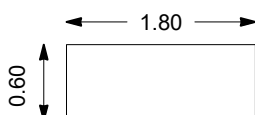


TRIAL PIT LOG

Contract: Land off Cunnery Close, Barlestone		Client: Gladman Developments Ltd		Trial Pit: TP01
Contract Ref: 252169	Start: 04.06.19 End: 04.06.19	Ground Level: 124.90	National Grid Co-ordinate: E:442140.7 N:305521.6	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
1.00	1	B				Grass over slightly gravelly fine to corarse SAND. Gravel is subangular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	(0.30) 0.30	
						Brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse quartzite with occasional cobbles of quartzite. (GLACIOFLUVIAL DEPOSITS)	(1.40) 1.70	
2.00	2	B				Red brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse quartzite. (GLACIOFLUVIAL DEPOSITS)	(0.80) 2.50	
						... Feeling damp at 2.50m bgl. Trial pit terminated at 2.50m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scanned with GPR prior to breaking ground. No services encountered.
2. Trial pit advanced to 2.50m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method
Used:

Machine dug

Plant
Used:

JCB-3CX

Logged
By:

PSearing

Checked
By:

MCD



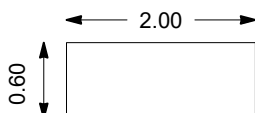


TRIAL PIT LOG

Contract: Land off Cunnery Close, Barlestone		Client: Gladman Developments Ltd		Trial Pit: TP02
Contract Ref: 252169	Start: 04.06.19 End: 04.06.19	Ground Level: 121.81	National Grid Co-ordinate: E:442167.5 N:305357.2	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
1.00	1	D				Grass over brown slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded quartzite and flint. (AGRICULTURAL TOPSOIL)	(0.30)	
						Stiff to very stiff desicated buff brown mottled grey slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite. (OADBY MEMBER)	0.30	
						. . . Clay no longer desicated from 1.00m bgl.	(1.70)	
						. . . Pocket of sand between 1.00m - 1.30m bgl.	2.00	
2.60	3	D				Stiff to very stiff dark grey mottled red brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse quartzite. (OADBY MEMBER)	(0.50)	
						Soft red brown sandy CLAY. Sand is fine to coarse. (GUNTORPE MEMBER)	2.50	
3.00	2	D				Trial pit terminated at 2.90m bgl.	(0.40) 2.90	

Plan (Not to Scale)



General Remarks

1. Location scanned with GPR prior to breaking ground. No services encountered.
2. Trial pit advanced to 2.90m bgl.
3. Groundwater not encountered.
4. Hard digging from 0.80m bgl.
5. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method
Used:

Machine dug

Plant
Used:

JCB-3CX

Logged
By:

PSeering

Checked
By:

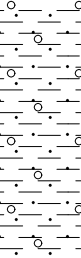
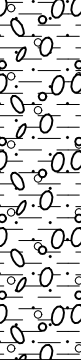
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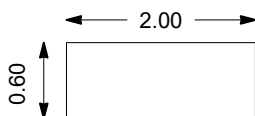


TRIAL PIT LOG

Contract: Land off Cunnery Close, Barlestone		Client: Gladman Developments Ltd		Trial Pit: TP03
Contract Ref: 252169	Start: 04.06.19 End: 04.06.19	Ground Level: 122.37	National Grid Co-ordinate: E:442287.9 N:305392.4	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
2.00	1	D				Yellowish brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
						Stiff to very stiff desicated buff brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER) ... Clay no longer desicated from 1.00m bgl.	(0.90) 1.30	
						Stiff dark grey mottled red brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and quartzite with rare cobbles of flint. (OADBY MEMBER) ... Pockets of fine to coarse sand between 1.50m to 1.70m bgl.	(1.20) 2.50	
						Trial pit terminated at 2.50m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scanned with GPR prior to breaking ground. No services encountered.
2. Trial pit advanced to 2.50m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method
Used:

Machine dug

Plant
Used:

JCB-3CX

Logged
By:

PSearing

Checked
By:

MCD



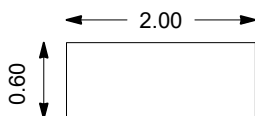


TRIAL PIT LOG

Contract: Land off Cunnery Close, Barlestone		Client: Gladman Developments Ltd		Trial Pit: TP04
Contract Ref: 252169	Start: 04.06.19 End: 04.06.19	Ground Level: 118.67	National Grid Co-ordinate: E:442333.8 N:305268.1	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
1.60	1	D				Grass over firm dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	(0.30)	
						Stiff to very stiff desicated light brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)	0.30	
						. . . Clay no longer desicated below 1.00m bgl.	(1.10)	
						Firm grey slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite. (OADBY MEMBER)	1.40	
							(1.50)	
							2.90	
Trial pit terminated at 2.90m bgl.								

Plan (Not to Scale)



General Remarks

1. Location scanned with GPR prior to breaking ground. No services encountered.
2. Trial pit advanced to 2.90m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon arisings.

All dimensions in metres

Scale: **1:25**

Method
Used:

Machine dug

Plant
Used:

JCB-3CX

Logged
By:

PSearing

Checked
By:

MCD



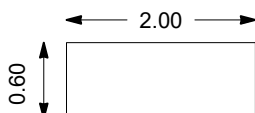


TRIAL PIT LOG

Contract: Land off Cunnery Close, Barlestone		Client: Gladman Developments Ltd		Trial Pit: TP05
Contract Ref: 252169	Start: 04.06.19 End: 04.06.19	Ground Level: 117.39	National Grid Co-ordinate: E:442380.8 N:305218.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
2.00	1	B				Grass over stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	(0.30)	
						Stiff desicated yellowish brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite and flint with occasional cobbles of flint. (OADBY MEMBER)	0.30	
						. . . Clay no longer discated below 1.00m	(0.90)	
						Stiff blue grey mottled red brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite, flint and chalk with cobbles of flint and chalk. (OADBY MEMBER)	1.20	
							(1.60)	
							2.80	
Trial pit terminated at 2.80m bgl.								

Plan (Not to Scale)



General Remarks

1. Location scanned with GPR prior to breaking ground. No services encountered.
2. Trial pit advanced to 2.80m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method
Used:

Machine dug

Plant
Used:

JCB-3CX

Logged
By:

PSearing

Checked
By:

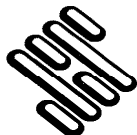
MCD





APPENDIX D

IN-SITU SOAKAWAY TESTING REPORT



STRUCTURAL SOILS LTD

INSITU TESTING REPORT



1774

Report No. 748928R.01(01)

Date 11-June-2019 Contract Barlestone, Warwickshire

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire
WA6 0AR

For the Attention of Jessica Fretwell

Order received 29-May-2019
Testing Started 04-June-2019
Testing Completed 06-June-2019

Client Reference None
Client Order No. P0293655
Instruction Type Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

Not UKAS Accredited Tests

5no. Soakaway tests carried out at locations specified by client.

The results represent the ground conditions at the specified locations and depths at the time of testing.

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

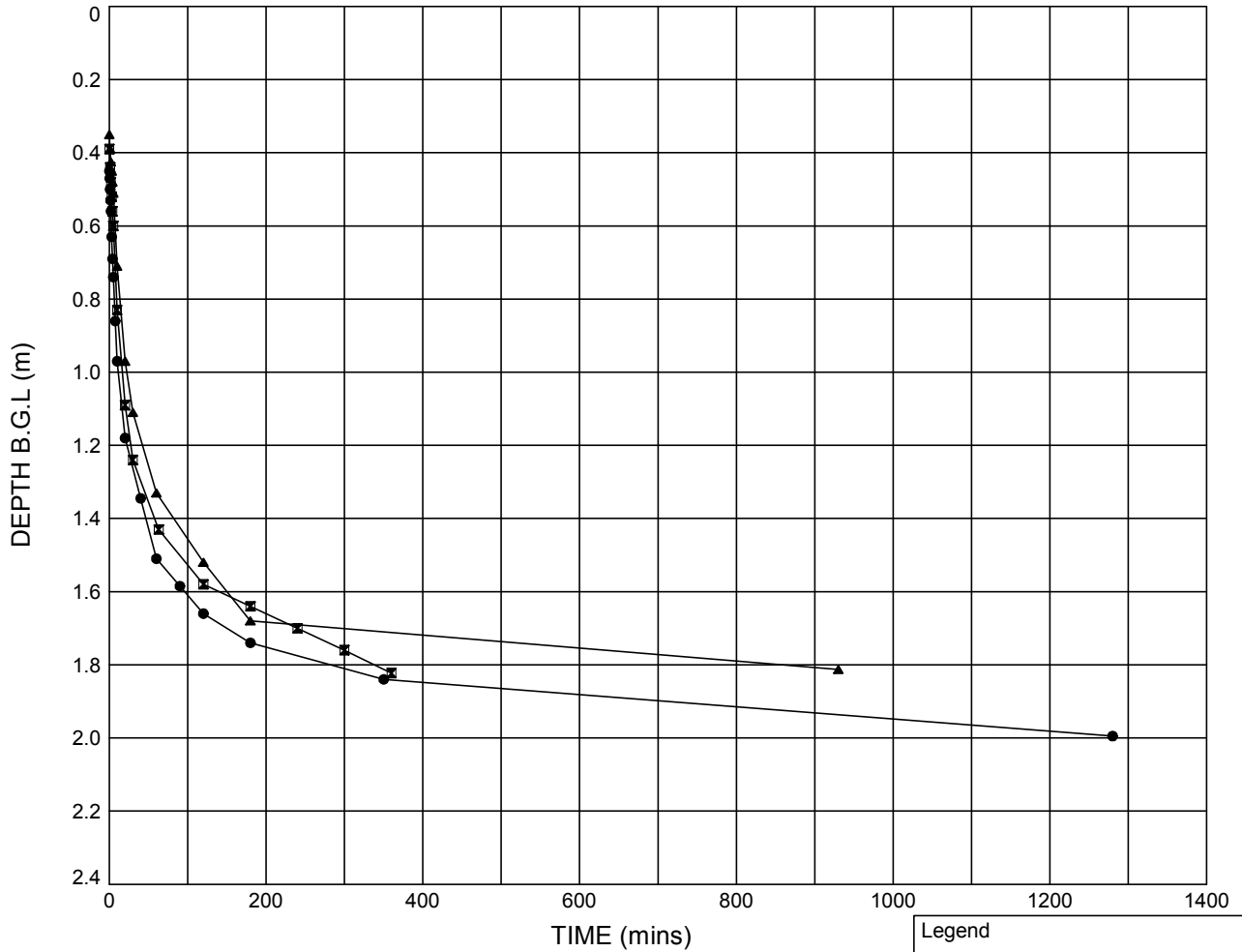
Structural Soils Ltd 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000. e-mail dimitris.xirouchakis@soils.co.uk

FULL SCALE SOAKAWAY TEST

In accordance with BRE Digest 365

Soakaway Test - Position ID : TP01

Plot of Depth of Water Below Ground Level Against Time

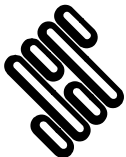
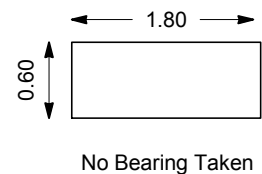


	Test 1	Test 2	Test 3	
Pit start depth:	= 2.30	2.30	2.30	m
Pit final depth:	= 2.30	2.30	2.30	m
Effective depth, D_e	= 1.85	1.91	1.95	m
Effective storage volume, V_{p75-25}	= 0.9990	1.0314	1.0530	m ³
Surface area, a_{p50}	= 5.5200	5.6640	5.7600	m ²
Time, t_{p75-25}	= 20223	20907	54872	secs
Infiltration rate, f	= 8.95×10^{-6}	8.71×10^{-6}	3.33×10^{-6}	m/s

Legend

- Test 1 (04.06.19)
- ✕ Test 2 (05.06.19)
- ▲ Test 3 (05.06.19)

Plan (Not to scale)



STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By

Date

Checked By

Date

Sharon

11/06/19

S. Philp

11/06/19

Contract

Barlestone, Warwickshire

Contract Ref:

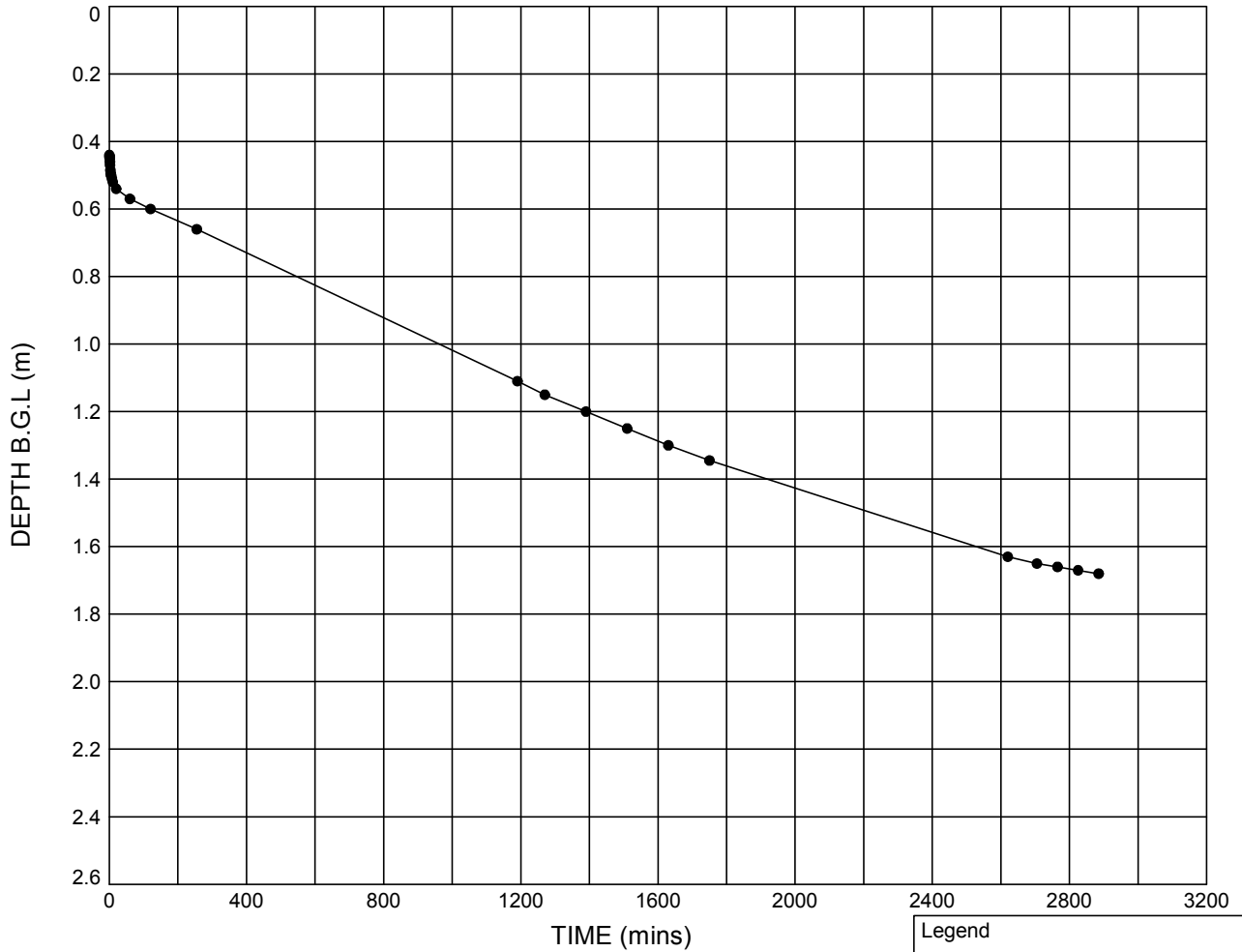
748928

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP02**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

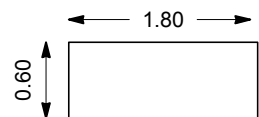
Pit start depth: = **2.50** m
 Pit final depth: = **2.50** m
 Effective depth, D_e = **2.06** m
 Effective storage volume, V_{p75-25} = **1.1124** m³
 Surface area, a_{p50} = **6.0240** m²
 Time, t_{p75-25} = **230823** secs
 Infiltration rate, f = **8.00×10^{-7}** m/s

Please note test data was extrapolated to obtain tp75-tp25.

Legend

● Test 1 (04.06.19)

Plan (Not to scale)



No Bearing Taken



STRUCTURAL SOILS
 1a Princess Street
 Bedminster
 Bristol
 BS3 4AG

Compiled By

Sharon

Date

11/06/19

Checked By

S. Philp

Date

11/06/19

Contract

Barlestone, Warwickshire

Contract Ref:

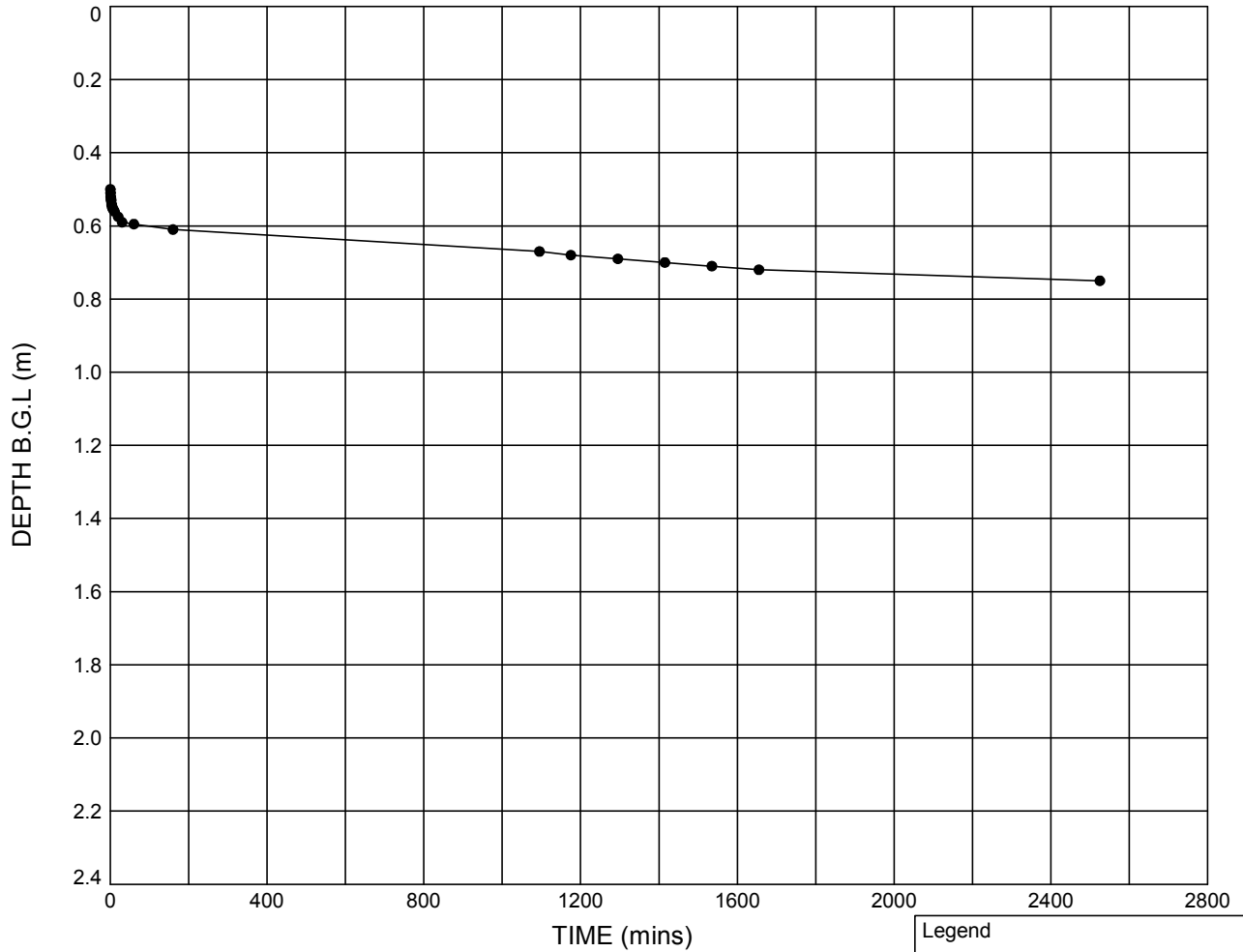
748928

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP03**

Plot of Depth of Water Below Ground Level Against Time



Test 1

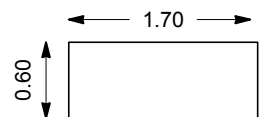
Pit start depth: = **2.35** m
 Pit final depth: = **2.35** m
 Effective depth, D_e = **1.85** m
 Effective storage volume, V_{p75-25} = **0.9435** m³
 Surface area, a_{p50} = **5.2750** m²
 Time, t_{p75-25} = **NA** secs
 Infiltration rate, f = **NA** m/s

Notes: Test 1 - Insufficient drop in water level to calculate infiltration rate.

Legend

● Test 1 (04.06.19)

Plan (Not to scale)



No Bearing Taken



STRUCTURAL SOILS
 1a Princess Street
 Bedminster
 Bristol
 BS3 4AG

Compiled By

Sharon

Date

11/06/19

Checked By

S. Philp

Date

11/06/19

Contract

Barlestone, Warwickshire

Contract Ref:

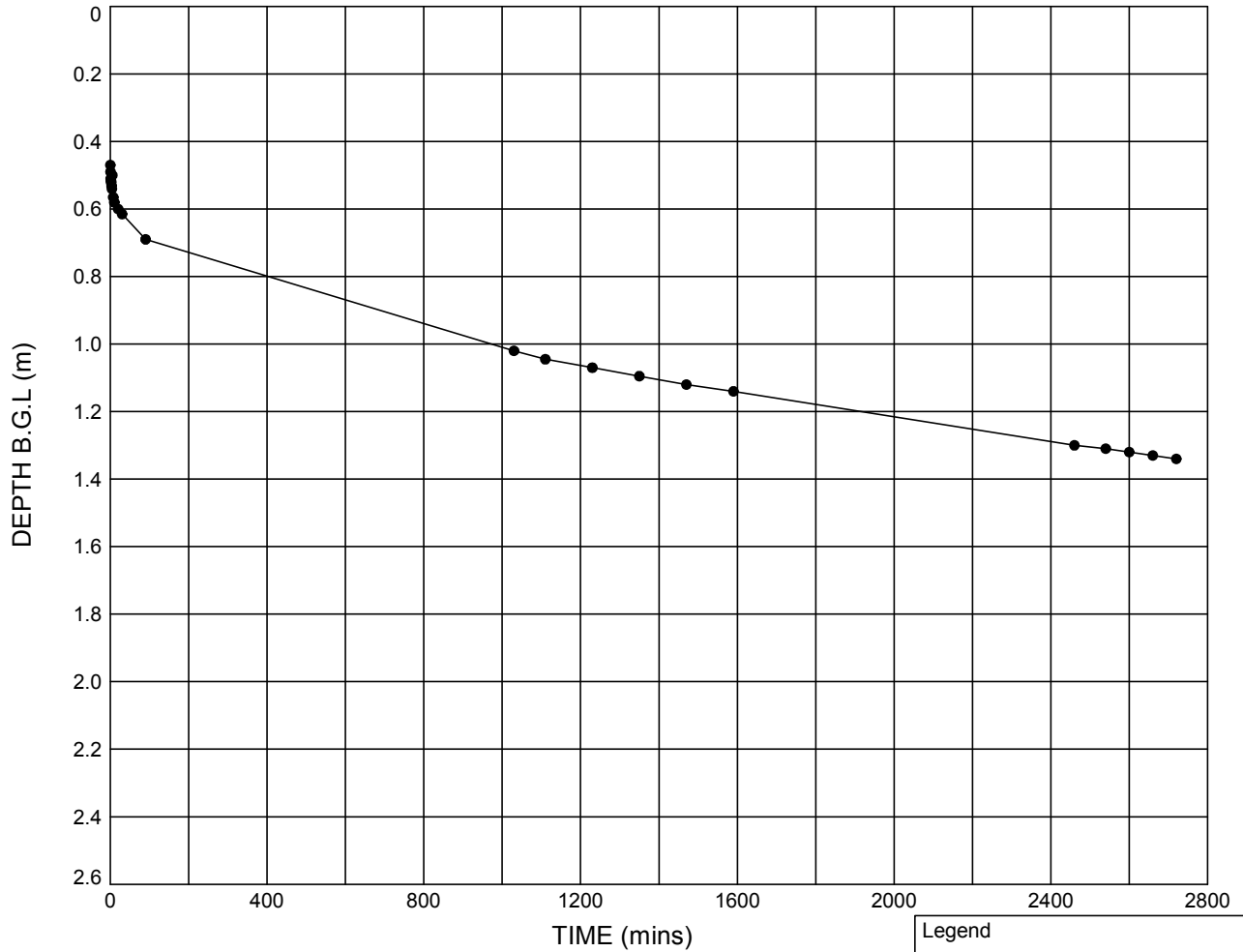
748928

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP04**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

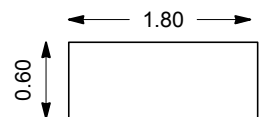
Pit start depth: = **2.45** m
 Pit final depth: = **2.45** m
 Effective depth, D_e = **1.98** m
 Effective storage volume, V_{p75-25} = **1.0692** m³
 Surface area, a_{p50} = **5.8320** m²
 Time, t_{p75-25} = **350650** secs
 Infiltration rate, f = **5.23×10^{-7}** m/s

Please note test data was extrapolated to obtain tp75-tp25.

Legend

● Test 1 (04.06.19)

Plan (Not to scale)



No Bearing Taken



STRUCTURAL SOILS
 1a Princess Street
 Bedminster
 Bristol
 BS3 4AG

Compiled By

Sharon

Date

11/06/19

Checked By

S. Philp

Date

11/06/19

Contract

Barlestone, Warwickshire

Contract Ref:

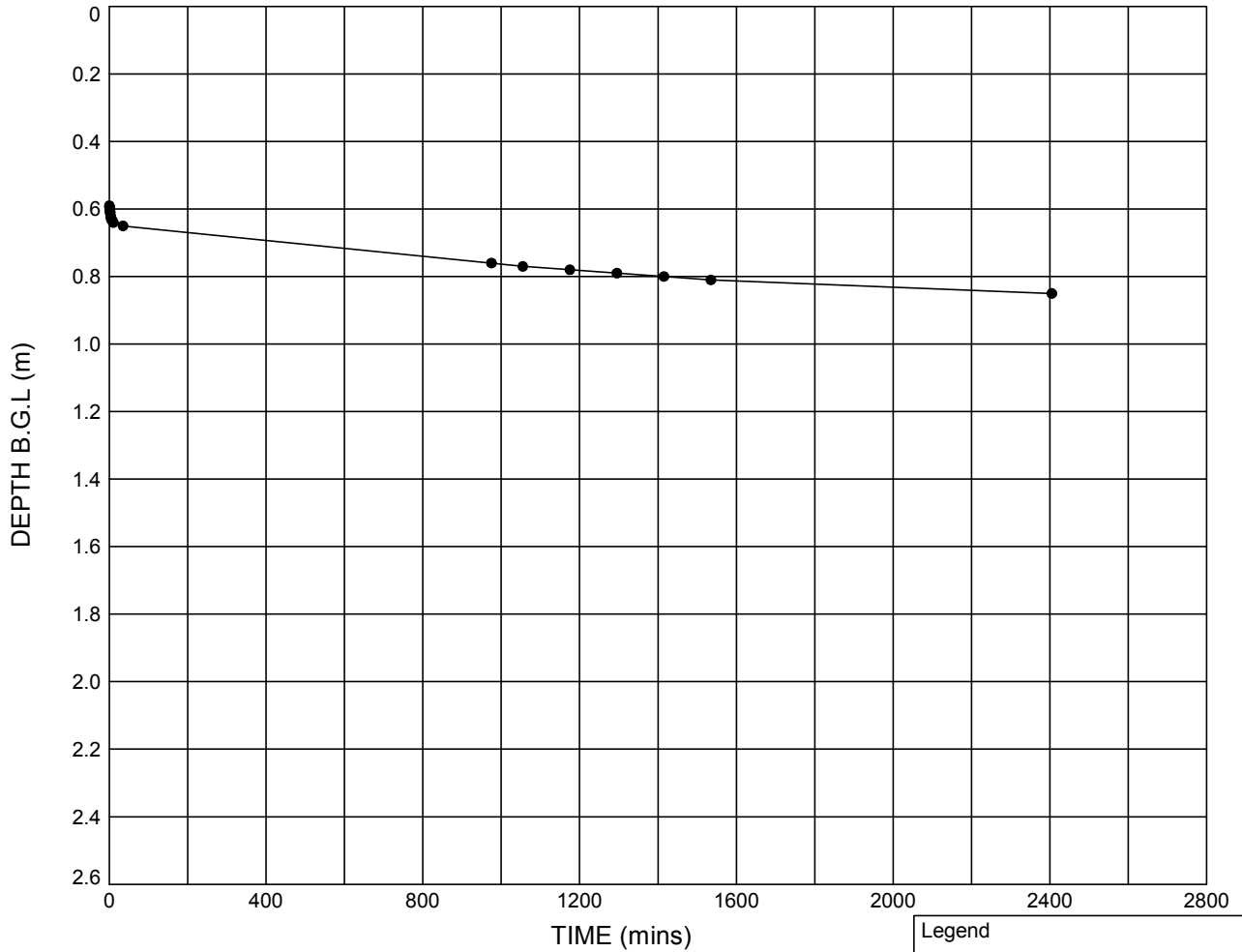
748928

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP05**

Plot of Depth of Water Below Ground Level Against Time



Test 1

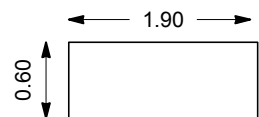
Pit start depth: = **2.50** m
 Pit final depth: = **2.50** m
 Effective depth, D_e = **1.91** m
 Effective storage volume, V_{p75-25} = **1.0887** m³
 Surface area, a_{p50} = **5.9150** m²
 Time, t_{p75-25} = **NA** secs
 Infiltration rate, f = **NA** m/s

Notes: Test 1 - Insufficient drop in water level to calculate infiltration rate.

Legend

● Test 1 (04.06.19)

Plan (Not to scale)



No Bearing Taken



STRUCTURAL SOILS
 1a Princess Street
 Bedminster
 Bristol
 BS3 4AG

Compiled By

Date

Checked By

Date

S. P. P. P.

11/06/19

S. P. P. P.

11/06/19

Contract

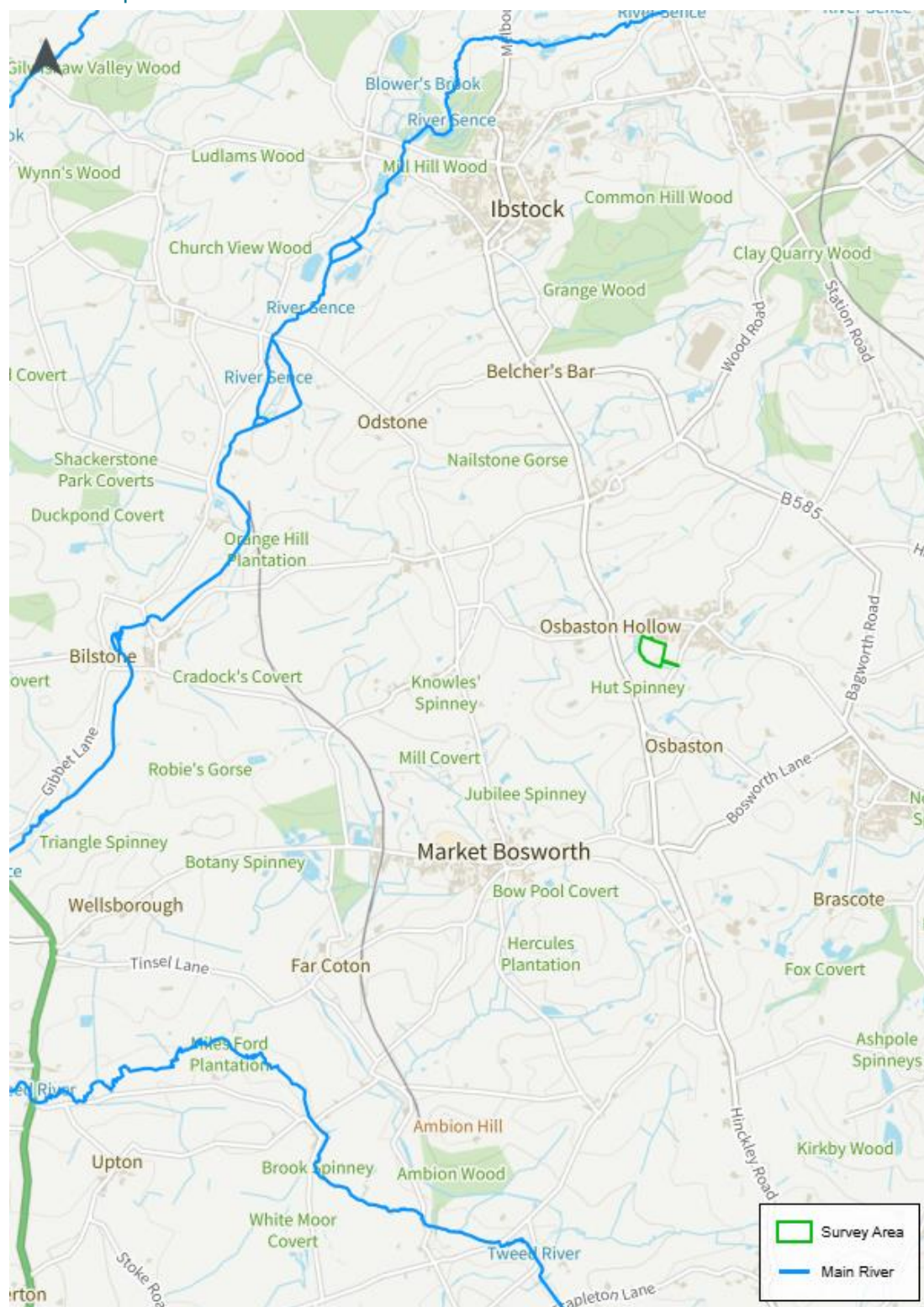
Barlestone, Warwickshire

Contract Ref:

748928

Appendix D

Flood Maps

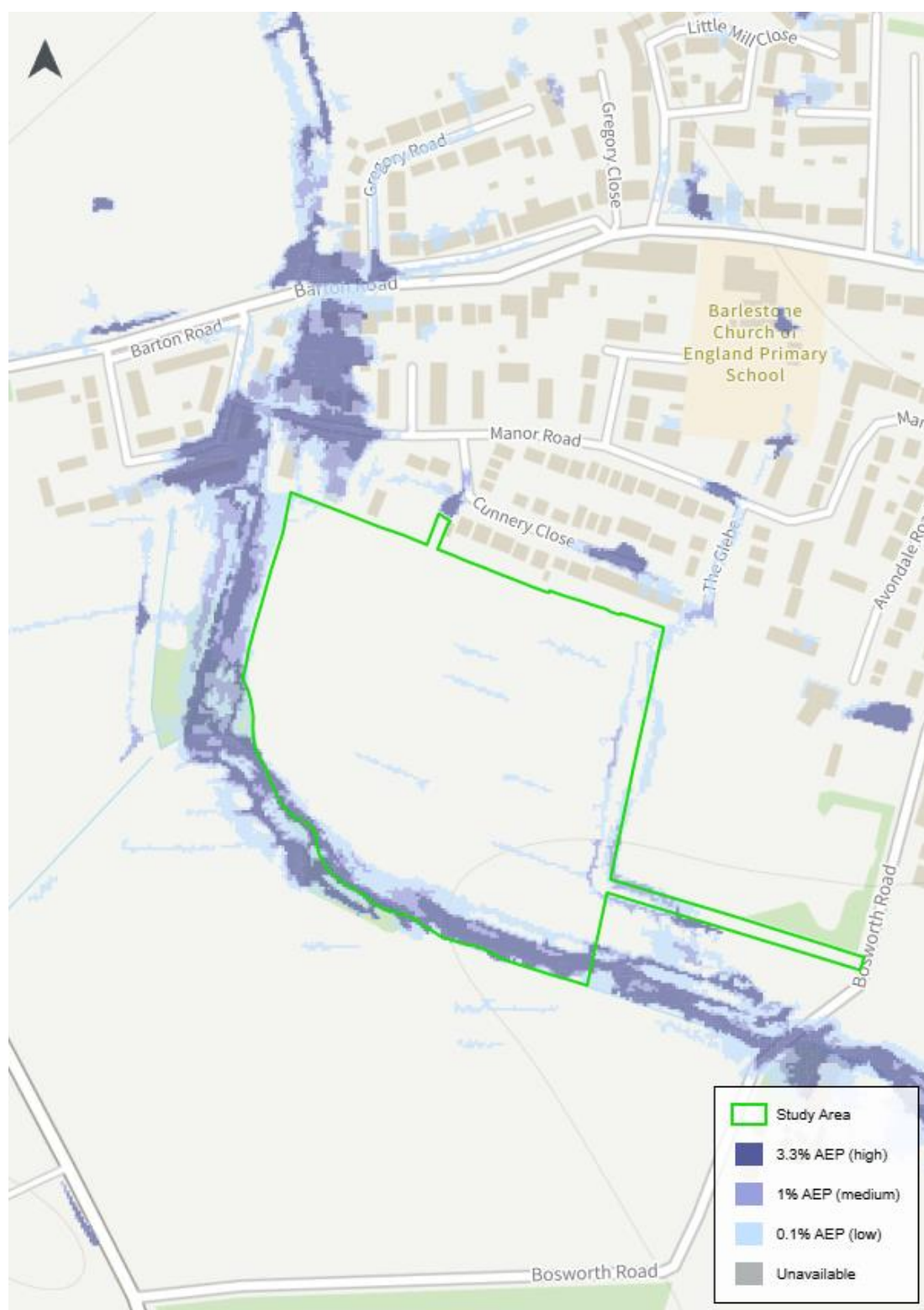


Environment Agency Main Rivers Map

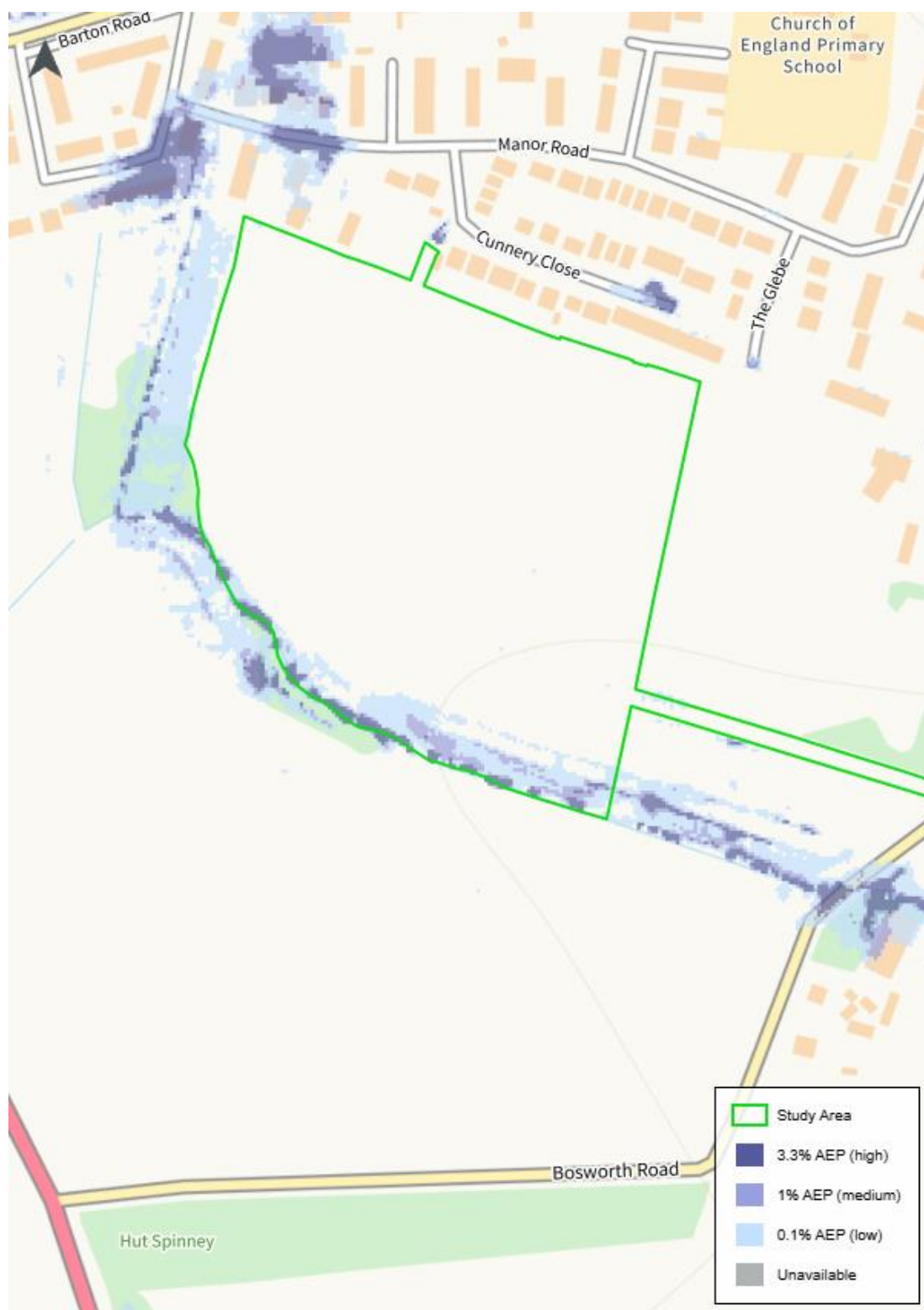


Environment Agency Flood Map for Planning

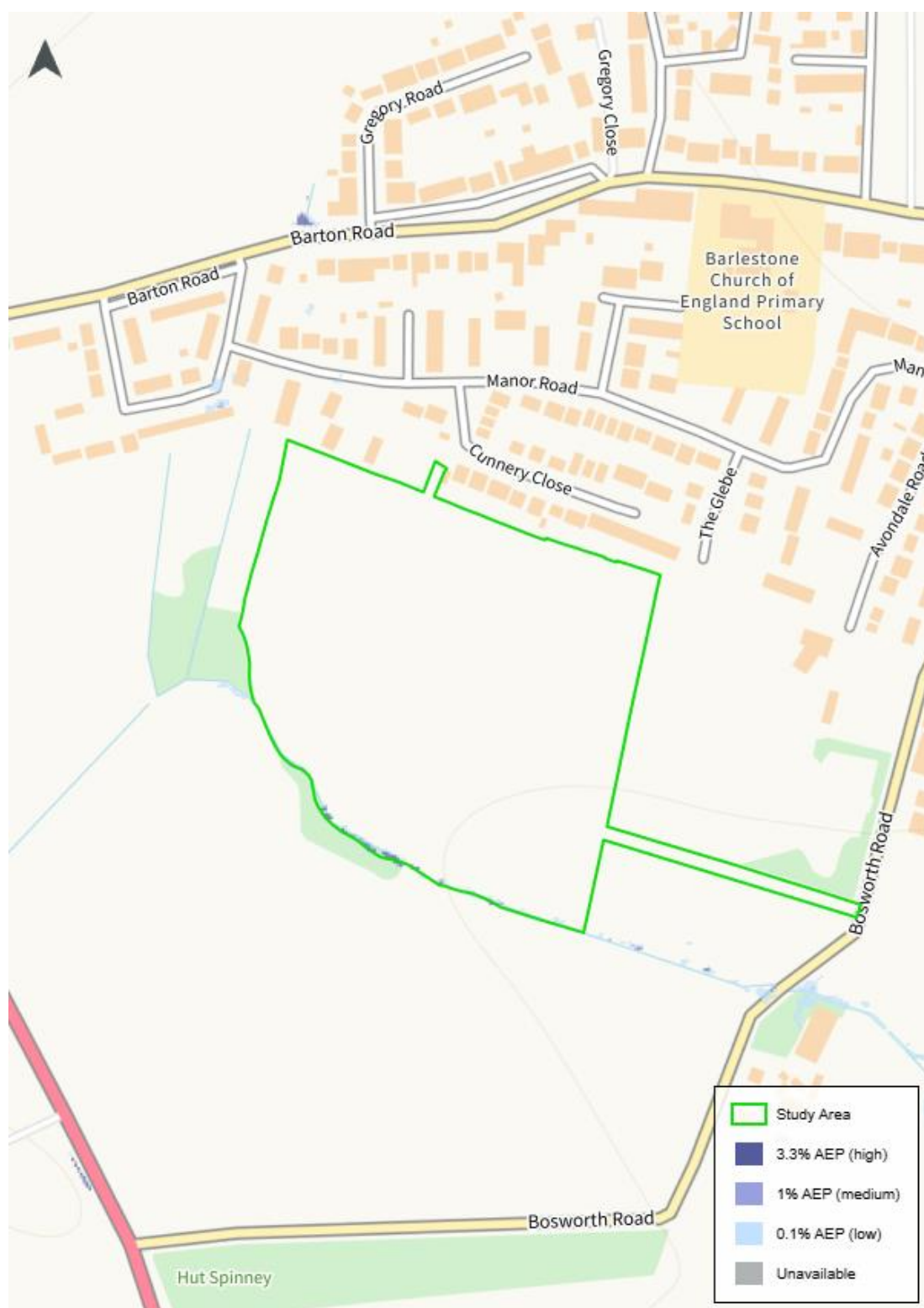
The site is located in Flood Zone 1.



Environment Agency Surface Water Flood Extents Map



Environment Agency Risk of Surface Water Flooding (0.2m) Map

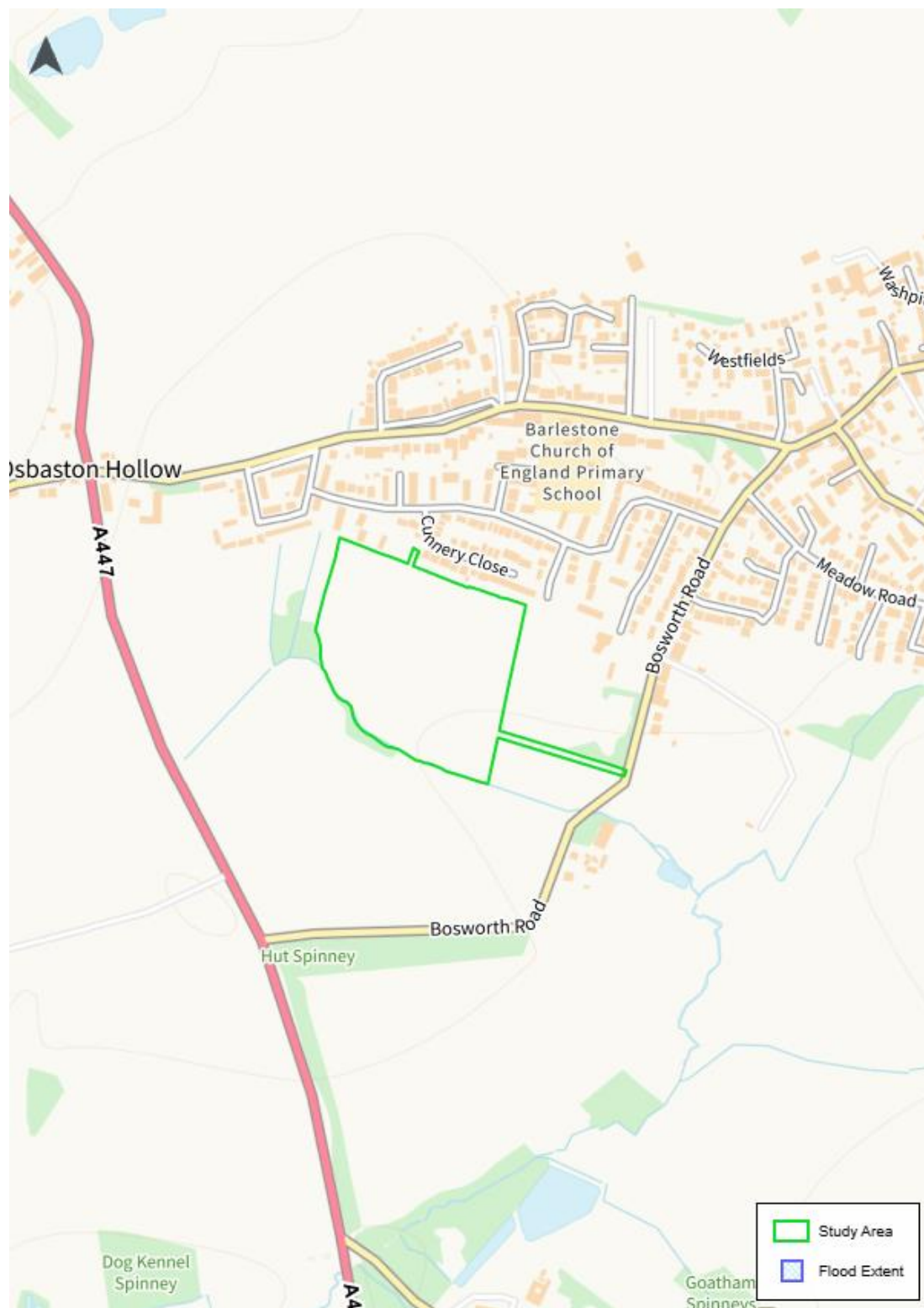


Environment Agency Risk of Surface Water Flooding (0.6m) Map



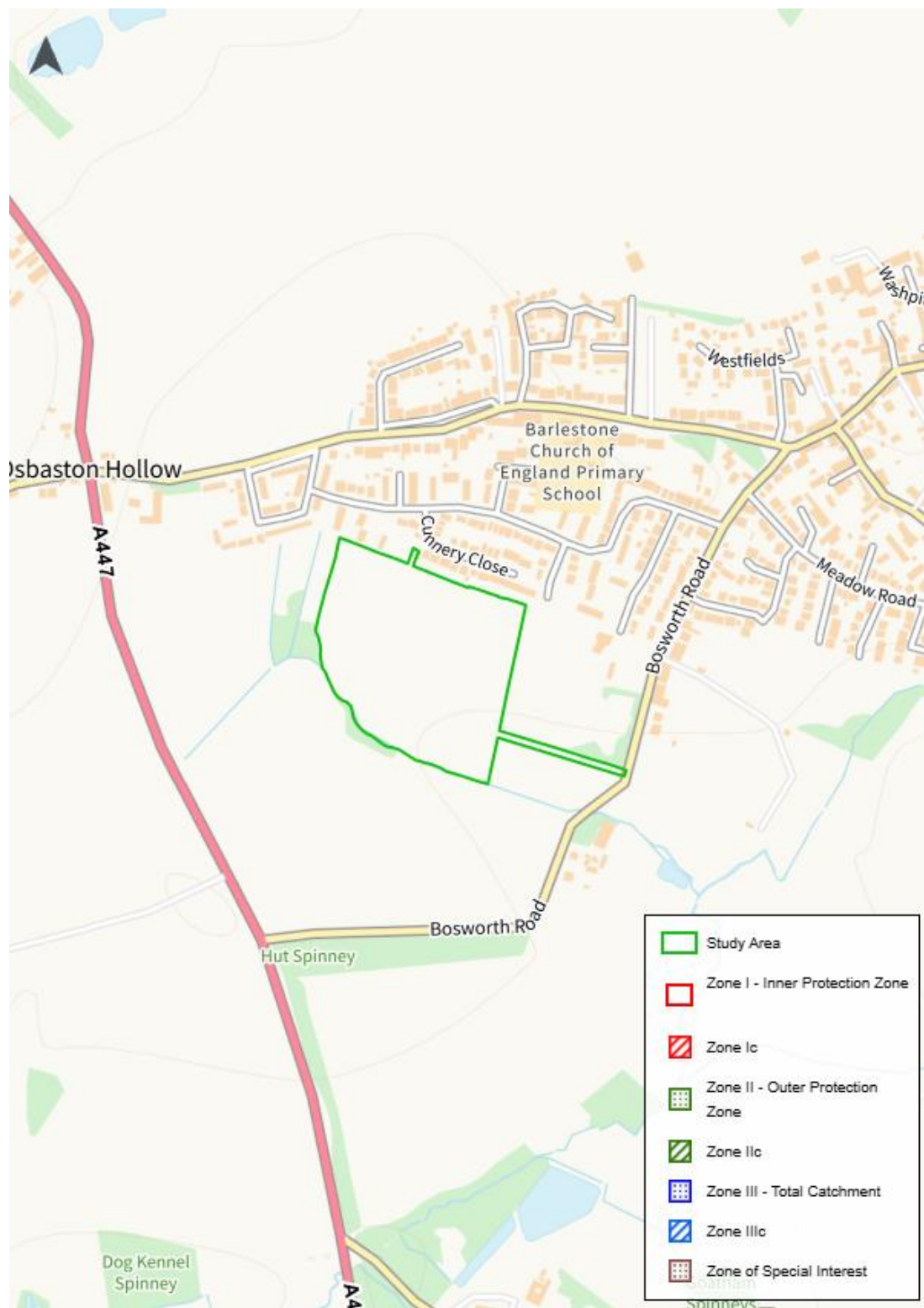
Environment Agency Flood Risk from Reservoirs

The site is clear from the risk of flooding from this source



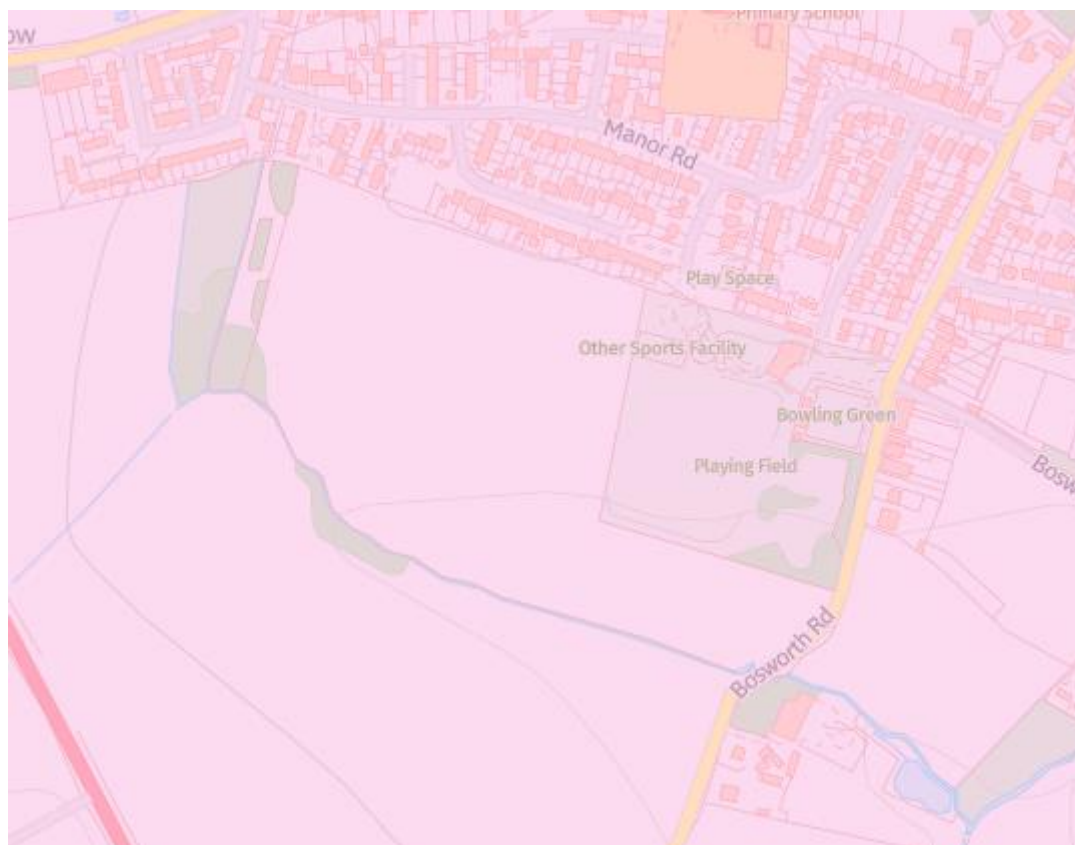
DEFRA Historical Flooding Map

Neither this site nor anywhere in the vicinity has been affected by flooding in the past



Environment Agency Groundwater Source Protection Zones Map

The site is not situated within a SPZ.



Environment Agency Online Groundwater Vulnerability Zones Map

The site overlies a Medium Groundwater Vulnerability Zone without soluble rock risk.

Groundwater Vulnerability Map (England)

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

Appendix E

Sewer Records

SEWER RECORD land off,

Land at: 442281, 305364 Cunnery Close, Barlestone, CV13 0HH



1. Do not scale off this Map. This Map is furnished as a general guide and no warranty as to its correctness is given or implied. This Map must not be relied upon in the event of any development or works in the vicinity of Severn Trent Water's assets. 2. On 1 October 2011 most private sewers and private lateral drains transferred to the ownership of Water Companies. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on this map. 3. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2018. All rights reserved. Ordnance Survey licence number 0100031673. Document users other than Severn Trent Water business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

WATER RECORD land off,

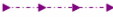
Land at: 442281, 305364 Cunnery Close, Barlestone, CV13 0HH



1. Do not scale off this Map. This Map is furnished as a general guide and no warranty as to its correctness is given or implied. This Map must not be relied upon in the event of any development or works in the vicinity of Severn Trent Water's assets. 2. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2018. All rights reserved. Ordnance Survey licence number 0100031673. Document users other than Severn Trent Water business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

MAP KEYS

Sewer Record

	Public Combined Gravity Sewer		Hydrobrake		Sewerage Air Valve
	Public Foul Gravity Sewer		Lamphole		Sewerage Hatch Box Point
	Public Surface Water Gravity Sewer		Outfall		Sewerage Isolation Valve
	Combined Use Pressurised Sewer		Overflow		Soakaway
	Foul Use Pressurised Sewer		Penstock		Surface Water Manhole
	Surface Water Pressurised Sewer		Petrol Interceptor		Blind Shaft
	Abandoned Gravity Sewer		Sewage Treatment Works		Combined Use Manhole
	Private Gravity Sewer		Sewer Blockage		Disposal Site
	Section 104 Gravity Sewer		Sewer Collapse		Flushing Chamber
	Transferred Gravity Sewer		Sewer Chemical Injection Point		Foul Use Manhole
	Highway Drain (Not STW)		Sewer Junction		Grease Trap
	Vent Column				Head Node
	Waste Water Storage				
	Culverted Watercourse (Not STW)				
	Protective Strip				
	Sewage Pumping Facility				
	Sewage Facility Connection Inlet / Outlet				

Notes

The majority of private gravity sewers and lateral drains shown in magenta transferred into public ownership in October 2011, providing they met the relevant criteria. Please note that private pressurised sewers and drains within the boundary of the property they serve remain private. Sewers shown in green which remain the subject of an adoption agreement under Section 102 or 104 of the Water Industry Act (1991) are not the responsibility of the Sewerage Undertaker. Please refer to response to Question 2.6 in search report to check current status of the sewers. All Sewers that have been transferred to the Sewerage Undertaker after 1st October 2011, which they have a record of but have not surveyed and confirmed, are shown in orange.

Please note, the full extent and route of these sewers may not be plotted on the sewer map. By October 1st 2016 any private pumping station and associated apparatus serving a lateral drain or sewer which was operational before July 1st 2011 will have transferred over to the Sewerage Undertaker's responsibility and become a public asset (subject to any appeals).

Water Record

	Distribution Main		Pumping Facility		Water Isolation Valve (Closed)		Change in Characteristic
	Trunk Main (local/primary)		Booster Facility		Water Isolation Valve (Open)		Marker Post
	Strategic Main		Potable Water Storage		Water Isolation Valve (Partially Open)		Cable Junction
	Fire Supply Main		Water Tower		Water Air Valve		Anode
	Fire Main		Well / Borehole		Pressure Reducing Valve		Boundary Box
	Non-Domestic Customer Service Pipe		Intake		Pressure Sustaining Valve		Stop Tap
	Domestic Customer Service Pipe		Water Treatment Works / Chamber		Non-Return Valve		Cross Piece
	Abandoned Main		Draw-off Tower		Float Valve		Strainer
	Elevated Main		Bowser Point		Hydrant (Single/Double)		Listening Post
	Aqueduct		Water Facility Connection		Washout (Single/Double)		Revenue Meter
	Duct		Pipe Support Structure		Bulk Meter		Housing, Building
	Pre-1937 Properties		Open Pipe		Water Hatch Box		Housing, Kiosk
	SSSI Area		Discharge		Pressure Tapping		Housing, Other
	Protective Strip		End Cap		Insertion Flow Meter Point		Quality Sample Point

For a detailed glossary of the above terminology please visit:

www.severntrentsearches.com/glossary

Project**Project Name:** Land Off Cunnery Close**Project Description:** CCTV Survey, Trace & Plot**Project Status:** Complete**Project Date:** 22/10/2025**Inspection Standard:** MSCC5 Sewers & Drainage GB (SRM5 Scoring)

EYES ON DRAINAGE

CCTV-Trace-Plot-Map-Repair

Table of Contents

Project Name	Project Number	Project Date
Land Off Cunnery Close		22/10/2025

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Section Profile	P-6
Section Summary	P-7
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Section Item 2: FW2 > FW3 (FW2X)	3
Section Item 3: FW3 > FW4 (FW3X)	8
Section Item 4: FW4 > FW5 (FW4X)	16
Section Item 5: FW5 > FW6 (FW5X)	26
Section Item 6: SW1 > Outfall (SW1X)	28
Section Item 7: HW1 > HW2 (HW1X)	33
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Disclaimer	37

Project Information**Project Name**
Land Off Cunnery Close**Project Number****Project Date**
22/10/2025**Client**

Company: gta Civils & Transport
Department: Maple House
Street: 192-198 London Road
Town or City: Burgess Hill
County: West Sussex
Post Code: RH15 9RD
Phone: 01444 871444

**Site**

Street: Land off Cunnery Close
Town or City: Barlestone
County: Leicestershire
Post Code: CV13 0HH

Contractor

Company: Eyes On Drainage Services Ltd
Contact: Jay Young
Department: Merrion House
Street: Bines Green
Town or City: Horsham
County: West Sussex
Post Code: RH13 8EH
Phone: 01403 710971
Mobile: 077111 84951
Email: info@eyesondrainage.co.uk



Scoring Summary

Project Name
Land Off Cunmery Close

Project Number

Project Date
22/10/2025

Structural Defects

Grade 3: Best practice suggests consideration should be given to repairs in the medium term.

Grade 4: Best practice suggests consideration should be given to repairs to avoid a potential collapse.

Grade 5: Best practice suggests that this pipe is at risk of collapse at any time. Urgent consideration should be given to repairs to avoid total failure.

Section	PLR	Grade	Description
2	FW2X	4	Broken pipe at joint from 10 o'clock to 2 o'clock
3	FW3X	3	Multiple defects
4	FW4X	4	Fractures, multiple at joint from 9 o'clock to 2 o'clock

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
2	FW2X	5	Other obstacles at joint from 4 o'clock to 7 o'clock, 20% cross-sectional area loss
3	FW3X	2	Multiple defects
4	FW4X	4	Settled deposits, coarse, 5% cross-sectional area loss, finish
6	SW1X	5	Multiple defects

Abandoned Surveys

Section	PLR	Description
1	FW1X	Survey abandoned
5	FW5X	Survey abandoned

Information

These scoring summaries are based on the SRM grading from the WRc.

Project Pictures

Project Name
Land Off Cunnery Close

Project Number

Project Date
22/10/2025



FW2



FW3



FW4



FW5



FW2 Location



FW3

Project Pictures

Project Name
Land Off Cunnery Close

Project Number

Project Date
22/10/2025



FW3



FW4



FW5



SW1



Outfall from SW1



Outfall from SW1

Project Pictures

Project Name
Land Off Cunnery Close

Project Number

Project Date
22/10/2025



Headwall 1



Headwall 1 (with dye)



Headwall 2



Headwall 2



Headwall 3



Headwall 3



THIS SURVEY IS ORIENTATED TO ORDNANCE SURVEY GRID NORTH. THE SURVEY IS
TO A PLANE GRID. HORIZONTAL MEASUREMENTS TAKEN FROM THIS SURVEY WILL
BE GROUND DISTANCES.

SITE CENTRE: E 442258 302, N 305238 596

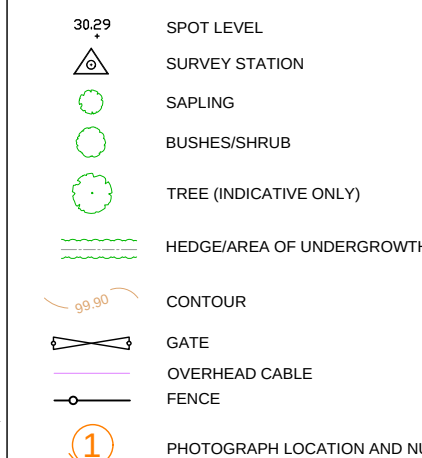
LOCAL SCALE FACTOR: 0.9996292

ALL LEVELS RELATE TO ORDINANCE SURVEY DATUM GENERATED BY ACTIVE GP NETWORK.

NO ALLOWANCE HAS BEEN MADE FOR SUB SURFACE ACCESS TO MANHOLES OR CHAMBERS. ANY PIPE SIZES, DEPTHS OR BELOW GROUND DIMENSIONS ARE TAKEN FROM THE SURFACE AND THUS WILL ONLY BE APPROXIMATE. ANY FLOW TYPE (FOUL WATER, SURFACE WATER OR COMBINED) ARE ASSUMED AND THEREFORE REQUIRE VERIFICATION.

ROAD MARKINGS DISPLAYED ARE SYMBOLIC. LENGTH, SPACING AND THICKNESS ETC. ARE INDICATIVE ONLY.

LEGEND



ABBREVIATIONS

[illegible]

STATION CO-ORDINATES

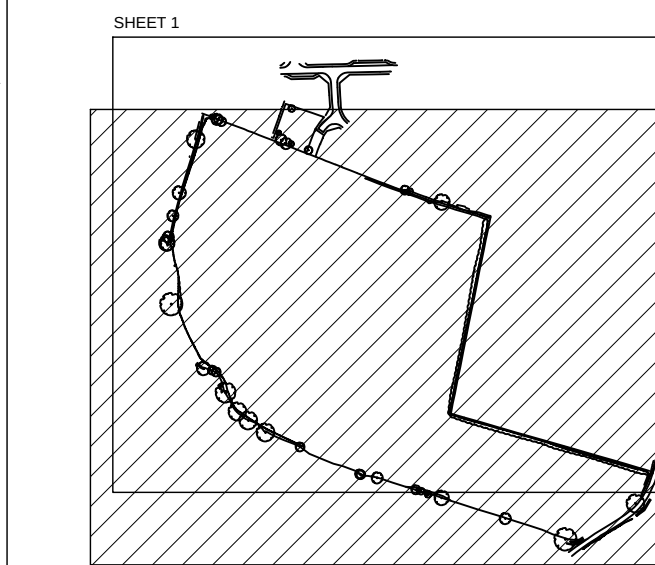
STATION	EASTING	NORTHING	LEVEL	DESCRIPTION
STN1	442208.52	305587.47	128.29	Survey Nail
STN2	442205.35	305536.34	125.69	Survey Nail
GTN6	442210.75	305540.34	126.70	Survey Nail

TREE SCHEDULE

№1	QAM	SPREAD	MSK
TE1	0.36	7	7
TE2	0.26	4	4
TE3	0.30	10	10
TE4	0.45	10	8
TE5	0.45	10	8
TE6	0.50	8	8
TE7	1.00	14	14
TE8	1.00	8	8
TE9	0.50	8	8
TE10	0.30	8	8
TE11	0.30	8	20
TE12	0.40	10	20
TE13	0.15	4	6
TE14	0.00	12	16
TE15	0.70	12	16
TE16	0.80	10	14
TE17	0.60	10	14
TE18	0.50	12	16
TE19	0.40	14	18
TE20	1.00	20	18
TE21	0.40	8	18
TE22	1.10	18	20
TE23	1.30	12	12
TE24	0.70	18	20
TE25	0.80	16	18
TE26	0.80	16	18
TE27	0.80	16	18
TE28	0.40	8	8
TE29	0.80	16	18
TE30	0.80	16	18
TE31	0.80	16	18
TE32	1.00	20	16
TE33	0.80	20	16
TE34	1.00	20	16
TE35	0.80	20	16
TE36	0.60	6	6
TE37	0.20	4	4
TE38	0.30	6	6
TE39	0.20	4	4
TE40	0.40	6	6

TREE DIAMETER MEASURED APPROXIMATELY 1.5M ABOVE GROUND LEVEL. TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE GENERALISED CANOPY SIZE. TREE BOLE MAY NOT SIT CENTRALLY TO THE CANOPY. TREE HEIGHT

PLOT LOCATIONS



*	*	*	
A	06.06.19	Additional road surveyed.	J
Rev	Date	Revision notes	B
DO NOT SCALE			

State

INFORMATION

Project	Cunnery Close, Barlestone.
---------	----------------------------

Title	TOPOGRAPHICAL SURVEY AS OF 25.04.19 SHEET 2 OF 2
-------	--



Drawn By	Publish Date	Scale(s)	Sheet Size
JW/JH	26.04.19	1:500	A0
Project no. 2018-071	Drawing no. Topo_02_2D	Revision A	

Section Profile

Project Name
Land Off Cunnery Close

Project Number

Project Date
22/10/2025

Circular, 0 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
7	HW1	HW2	22/10/2025	Cunnery Close		6.00 m	6.00 m

Total: 1 Inspection x Circular 0 mm, 0 mm = 6.00 m Total Length and 6.00 m Inspected Length

Circular, 225 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
2	FW2	FW3	21/10/2025	Cunnery Close	Vitrified clay	80.50 m	80.50 m

Total: 1 Inspection x Circular 225 mm, 0 mm = 80.50 m Total Length and 80.50 m Inspected Length

Circular, 300 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
3	FW3	FW4	21/10/2025	Cunnery Close	Vitrified clay	97.20 m	97.20 m
4	FW4	FW5	21/10/2025	Cunnery Close	Vitrified clay	98.60 m	98.60 m
6	SW1	Outfall	21/10/2025	Cunnery Close	Concrete	79.40 m	79.40 m

Total: 3 Inspections x Circular 300 mm, 0 mm = 275.20 m Total Length and 275.20 m Inspected Length

Circular, 400 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
8	HW4	HW3	22/10/2025	Cunnery Close	Vitrified clay	4.00 m	4.00 m

Total: 1 Inspection x Circular 400 mm, 0 mm = 4.00 m Total Length and 4.00 m Inspected Length

Total: 6 Inspections = 365.70 m Total Length and 365.70 m Inspected Length

Section Summary

Project Name Land Off Cunnergy Close	Project Number	Project Date 22/10/2025
--	-----------------------	-----------------------------------

Number of sections	8
Total length of sections	365.70 m
Total length of inspected sections	365.70 m
Total length of not inspected sections	0.00 m
Number of abandoned inspections	2
Number of section inspection photos	113
Number of section inspection videos	5
Number of section inspection scans	0
Number of section inclination measurements	0

PLR: FW1X	Upstream Node: FW1
Inspection Direction: Upstream	Downstream Node: FW2
Inspected Length: 0.00 m	Dia/Height: 225 mm
Total Length:	Material: Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW2
2	0.00	WL	Water level, 30% of the vertical dimension, Live
3	0.00	SA	Survey abandoned, Unable to survey due to flow rate. Unable to locate next upstream chamber to stem flow.

PLR: FW2X	Upstream Node: FW2
Inspection Direction: Downstream	Downstream Node: FW3
Inspected Length: 80.50 m	Dia/Height: 225 mm
Total Length: 80.50 m	Material: Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW2, Surveyed after stopping flow
2	0.00	WL	Water level, 5% of the vertical dimension, Continuous
3	0.50	BJ	Broken pipe at joint from 10 o'clock to 2 o'clock
4	8.40	FCJ	Fracture, circumferential at joint from 2 o'clock to 10 o'clock
5	16.70	WL	Water level, 10% of the vertical dimension, Continuous
6	22.60	OBZJ	Other obstacles at joint from 4 o'clock to 7 o'clock, 20% cross-sectional area loss
7	22.80	WL	Water level, 5% of the vertical dimension, Continuous
8	29.60	FLJ	Fracture, longitudinal at joint at 11 o'clock
9	36.90	FCJ	Fracture, circumferential at joint from 10 o'clock to 3 o'clock
10	37.60	FLJ	Fracture, longitudinal at joint at 10 o'clock
11	50.10	FCJ	Fracture, circumferential at joint from 12 o'clock to 12 o'clock
12	70.50	FCJ	Fracture, circumferential at joint from 9 o'clock to 10 o'clock
13	73.20	FLJ	Fracture, longitudinal at joint at 3 o'clock

Section Summary

Project Name Land Off Cunnergy Close	Project Number	Project Date 22/10/2025
--	-----------------------	-----------------------------------

No.	m+	Code	Observation
14	73.20	FLJ	Fracture, longitudinal at joint at 9 o'clock
15	73.20	FL	Fracture, longitudinal at 12 o'clock, start
16	76.50	FLJ	Fracture, longitudinal at joint at 2 o'clock
17	76.50	FLJ	Fracture, longitudinal at joint at 9 o'clock
18	77.50	FL	Fracture, longitudinal at 12 o'clock, finish
19	77.50	FCJ	Fracture, circumferential at joint from 12 o'clock to 4 o'clock
20	79.80	FC	Fracture, circumferential from 12 o'clock to 12 o'clock
21	80.50	MHF	Finish node, manhole, reference: FW3

PLR:	FW3X	Upstream Node:	FW3
Inspection Direction:	Downstream	Downstream Node:	FW4
Inspected Length:	97.20 m	Dia/Height:	300 mm
Total Length:	97.20 m	Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW3
2	0.00	WL	Water level, 5% of the vertical dimension, Live
3	0.30	FLJ	Fracture, longitudinal at joint at 2 o'clock
4	1.50	FL	Fracture, longitudinal at 12 o'clock, start
5	2.00	FL	Fracture, longitudinal at 3 o'clock, start
6	2.00	FL	Fracture, longitudinal at 9 o'clock, start
7	6.50	FL	Fracture, longitudinal at 6 o'clock, start
8	8.40	FCJ	Fracture, circumferential at joint from 6 o'clock to 9 o'clock
9	14.50	FCJ	Fracture, circumferential at joint from 11 o'clock to 3 o'clock
10	28.10	FCJ	Fracture, circumferential at joint from 9 o'clock to 12 o'clock
11	31.90	FCJ	Fracture, circumferential at joint from 12 o'clock to 4 o'clock
12	33.00	WL	Water level, 10% of the vertical dimension, Continuous
13	35.00	WL	Water level, 5% of the vertical dimension, Live
14	36.20	FCJ	Fracture, circumferential at joint from 7 o'clock to 11 o'clock
15	36.40	FL	Fracture, longitudinal at 6 o'clock, finish
16	36.40	FL	Fracture, longitudinal at 9 o'clock, finish
17	36.40	FL	Fracture, longitudinal at 3 o'clock, finish
18	36.40	FL	Fracture, longitudinal at 12 o'clock, finish
19	42.00	FL	Fracture, longitudinal at 12 o'clock, start
20	42.00	FL	Fracture, longitudinal at 3 o'clock, start
21	42.00	FL	Fracture, longitudinal at 9 o'clock, start
22	45.00	FC	Fracture, circumferential from 12 o'clock to 12 o'clock
23	52.50	FL	Fracture, longitudinal at 3 o'clock, finish
24	52.50	FL	Fracture, longitudinal at 9 o'clock, finish
25	52.50	FL	Fracture, longitudinal at 12 o'clock, finish
26	52.80	FC	Fracture, circumferential from 12 o'clock to 12 o'clock
27	54.80	FLJ	Fracture, longitudinal at joint at 4 o'clock
28	68.30	FL	Fracture, longitudinal at 12 o'clock, start
29	68.60	FL	Fracture, longitudinal at 3 o'clock, start
30	69.00	FL	Fracture, longitudinal at 9 o'clock, start

Section Summary

Project Name Land Off Cunneery Close	Project Number	Project Date 22/10/2025
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No.	m+	Code	Observation
31	84.50	FL	Fracture, longitudinal at 9 o'clock, finish
32	84.50	FL	Fracture, longitudinal at 3 o'clock, finish
33	85.30	FL	Fracture, longitudinal at 12 o'clock, finish
34	93.70	WL	Water level, 10% of the vertical dimension
35	97.20	MHF	Finish node, manhole, reference: FW4

PLR:	FW4X	Upstream Node:	FW4
Inspection Direction:	Downstream	Downstream Node:	FW5
Inspected Length:	98.60 m	Dia/Height:	300 mm
Total Length:	98.60 m	Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW4
2	0.00	WL	Water level, 5% of the vertical dimension, Live
3	0.00	DER	Settled deposits, coarse, 20% cross-sectional area loss, start
4	4.00	DER	Settled deposits, coarse, 25% cross-sectional area loss, change
5	10.00	DER	Settled deposits, coarse, 15% cross-sectional area loss, change
6	14.00	DER	Settled deposits, coarse, 20% cross-sectional area loss, change
7	15.90	DER	Settled deposits, coarse, 25% cross-sectional area loss, change
8	16.50	DER	Settled deposits, coarse, 20% cross-sectional area loss, change
9	17.70	DER	Settled deposits, coarse, 10% cross-sectional area loss, change
10	22.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, change
11	23.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
12	32.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, start
13	36.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
14	38.50	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
15	39.60	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
16	40.60	FL	Fracture, longitudinal at 12 o'clock, start
17	41.70	FL	Fracture, longitudinal at 9 o'clock, start
18	41.70	FL	Fracture, longitudinal at 3 o'clock, start
19	41.70	FLJ	Fracture, longitudinal at joint at 8 o'clock
20	42.40	FCJ	Fracture, circumferential at joint from 12 o'clock to 1 o'clock
21	44.50	FMJ	Fractures, multiple at joint from 9 o'clock to 2 o'clock
22	47.40	FCJ	Fracture, circumferential at joint from 9 o'clock to 3 o'clock
23	49.80	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
24	55.50	DER	Settled deposits, coarse, 5% cross-sectional area loss, change
25	56.40	FCJ	Fracture, circumferential at joint from 10 o'clock to 4 o'clock
26	56.60	RF	Roots, fine
27	56.80	DER	Settled deposits, coarse, 10% cross-sectional area loss, change
28	58.50	DER	Settled deposits, coarse, 15% cross-sectional area loss, change
29	59.50	FL	Fracture, longitudinal at 12 o'clock, finish
30	59.50	FL	Fracture, longitudinal at 9 o'clock, finish
31	59.50	FL	Fracture, longitudinal at 3 o'clock, finish
32	59.60	DER	Settled deposits, coarse, 10% cross-sectional area loss, change
33	63.00	DER	Settled deposits, coarse, 15% cross-sectional area loss, change

Section Summary

Project Name Land Off Cunneery Close	Project Number	Project Date 22/10/2025
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No.	m+	Code	Observation
34	68.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, change
35	70.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
36	71.30	FLJ	Fracture, longitudinal at joint at 9 o'clock
37	72.10	FL	Fracture, longitudinal at 2 o'clock
38	72.10	FLJ	Fracture, longitudinal at joint at 9 o'clock
39	76.00	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
40	80.50	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
41	84.20	DER	Settled deposits, coarse, 15% cross-sectional area loss, start
42	85.80	DER	Settled deposits, coarse, 5% cross-sectional area loss, change
43	86.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
44	90.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, start
45	91.50	DER	Settled deposits, coarse, 10% cross-sectional area loss, change
46	92.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, change
47	94.40	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
48	98.60	MHF	Finish node, manhole, reference: FW5

PLR:	FW5X	Upstream Node:	FW5
Inspection Direction:	Downstream	Downstream Node:	FW6
Inspected Length:	0.00 m	Dia/Height:	300 mm
Total Length:		Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW5, Unable to separate cover from frame, Assembly lifted to gather info.
2	0.00	SA	Survey abandoned, Unable to insert camera

PLR:	SW1X	Upstream Node:	SW1
Inspection Direction:	Downstream	Downstream Node:	Outfall
Inspected Length:	79.40 m	Dia/Height:	300 mm
Total Length:	79.40 m	Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: SW1
2	0.00	WL	Water level, 5% of the vertical dimension, Live
3	0.00	WL	Water level, 5% of the vertical dimension, Live
4	5.70	WL	Water level, 10% of the vertical dimension
5	7.40	OBB	Other obstacles, brick or masonry in invert from 2 o'clock to 10 o'clock, 65% cross-sectional area loss
6	10.70	DER	Settled deposits, coarse, 15% cross-sectional area loss
7	12.70	OBZ	Other obstacles from 4 o'clock to 8 o'clock, 50% cross-sectional area loss
8	14.00	OBZ	Other obstacles from 3 o'clock to 9 o'clock, 60% cross-sectional area loss
9	15.60	CUW	Loss of vision, camera under water, start
10	28.00	CUW	Loss of vision, camera under water, finish
11	28.00	DER	Settled deposits, coarse, 40% cross-sectional area loss, start
12	29.00	DER	Settled deposits, coarse, 40% cross-sectional area loss, finish
13	38.60	DER	Settled deposits, coarse, 20% cross-sectional area loss
14	46.70	WL	Water level, 10% of the vertical dimension
15	48.80	CUW	Loss of vision, camera under water, start
16	52.50	CUW	Loss of vision, camera under water, finish

Section Summary

Project Name Land Off Cunnergy Close	Project Number	Project Date 22/10/2025
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No.	m+	Code	Observation
17	53.10	WL	Water level, 5% of the vertical dimension, Live
18	54.30	WL	Water level, 10% of the vertical dimension
19	55.00	CUW	Loss of vision, camera under water, start
20	79.40	CUW	Loss of vision, camera under water, finish
21	79.40	OFF	Finish node, outfall, reference: Outfall

PLR:	HW1X	Upstream Node:	HW1
Inspection Direction:	Downstream	Downstream Node:	HW2
Inspected Length:	6.00 m	Dia/Height:	
Total Length:	6.00 m	Material:	

No.	m+	Code	Observation
1	0.00	OF	Start node, outfall, reference: HW1, Culvert submerged, unable to ascertain diameter or material
2	0.00	REM	General remark, Dye tested to prove connectivity
3	6.00	OFF	Finish node, outfall, reference: HW2

PLR:	HW4	Upstream Node:	HW4
Inspection Direction:	Upstream	Downstream Node:	HW3
Inspected Length:	4.00 m	Dia/Height:	400 mm
Total Length:	4.00 m	Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	OF	Start node, outfall, reference: HW3
2	0.20	JN	Junction at 9 o'clock, 400mm dia, Capped
3	4.00	OFF	Finish node, outfall, reference: HW4, Blocked

Appendix F

Drawings

DESIGN NOTES

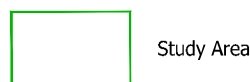
1. THE PUBLISHED BEDROCK IS MUDSTONE WITH SUPERFICIAL DEPOSITS OF SAND AND GRAVEL, AND PREVIOUS INFILTRATION TESTING CARRIED OUT IN JUNE 2019 INDICATES THAT INFILTRATION-BASED DISCHARGE STRATEGY IS NOT SUITABLE. DRAINAGE STRATEGY RELIES ON OFF-SITE DISCHARGE TO WATERCOURSE, SHALLOW INFILTRATION WITHIN THE PARCELS TO BE CONFIRMED SUBJECT TO FURTHER INVESTIGATIONS.
2. OFF-SITE DISCHARGES TO BE LIMITED TO EXISTING GREENFIELD 50% AEP RATE OF 4.5 l/s/ha, IN ACCORDANCE WITH THE NATIONAL STANDARDS FOR SUDS. THE PRELIMINARY STORAGE ESTIMATE CALCULATION FOR 1 IN 100 AEP +40% STORM EVENTS IS 847 m³/ha. PROPOSED IMPERMEABLE AREA ARE ESTIMATED AS 3.1ha, THE TOTAL REQUIRED STORAGE IS THEREFORE 2607m³. IT IS ASSUMED THAT 30% OF THIS STORAGE WILL BE PROVIDED ON PLOT AND 70% BY THE ATTENUATION BASIN.
3. A SUITABLE SUDS TREATMENT TRAIN IS NEEDED AND WOULD COMPRISE: 1) PERMEABLE PAVING OR RAIN GARDENS/BIORETENTION CELLS/TREE PITS; 2) CONVEYANCE SWALES; 3) ATTENUATION BASIN. LINING REQUIREMENTS TO BE CONFIRMED AT DETAILED STAGE.
4. UNDERLAY PLAN: 2020-007-102, DATED JANUARY 2026.
5. EXISTING DRAINS SHOWN ARE BASED ON CCTV SURVEY UNDERTAKEN 22/10/25

GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.
2. Tender or billing drawings shall not be used for construction or the ordering of materials.
3. Do not scale. All dimensions and levels to be site confirmed.
4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
5. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.
7. If viewing this drawing as an Autocad file (.dwg) in digital format then it is done so with this Disclaimer due to the fact that it can be altered and manipulated following its issue by GTA Civils & Transport and therefore, any alteration or modification of DWG data files provided by GTA Civils & Transport, by you or a third party, without GTA Civils and Transport's express written approval, is done so entirely at your own risk. Modification includes (but is not limited to) turning layers on and off, unfreezing layers and reloading, turning on and off print functions and unloading x-refs.
8. Your attention is also drawn to the fact that the information contained within this file may be subject to alteration at any time, pending technical approval from an approving authority or at the client's instruction. It is therefore strongly recommended that multiple and regular cross checks are made against the current contract drawings.
9. It is your responsibility to ensure that the correct issue or revision of the DWG data file is being used and requests for updated information made accordingly.
9. Should any apparent discrepancies between the data contained within the DWG file and the current contract drawings become evident, it must be reported back to GTA Civils & Transport as soon as reasonably practicable. Precedence should be given to the current contract drawings (PDF) unless advised otherwise.

LEGEND

SITE



SURFACE WATER FLOOD RISK

- Surface Water Flood Risk - 1 in 30yr
- Surface Water Flood Risk - 1 in 100yr
- Surface Water Flood Risk - 1 in 1000yr
- Existing ditch

EXISTING DRAINAGE (FROM SEVERN TRENT RECORDS)

- Surface Water Sewer
- Foul Water Sewer
- Clean Water Supply

PROPOSED DESIGN

- Shallow depression for overland flow
- Proposed Attenuation Basin
- Indicative conveyance swale route
- Surface Water Piped route
- Foul Water Sewer
- Area of localised land raising
- Foul Water Sewer to be diverted
- Subject to S185 application



P5	FOR SUBMISSION	19/02/26	AW	FVW
P4	UPDATED TO SHOW NEW ARCHITECT LAYOUT WITH NEW POND	19/12/25	AW	FVW
P3	UPDATED TO SHOW NEW POND LAYOUT	10/11/25	AW	FVW
P2	UPDATED TO SHOW FOUL DIVERSION OPTIONS	29/10/25	AW	FVW
P1	INITIAL ISSUE	22/10/25	AW	FVW
Rev	Amendments	Date	Dis	Chk

Status PLANNING

Client GLADMAN

Architect

Project CUNNERY CLOSE, BARLESTONE LEICESTERSHIRE

Title DRAINAGE STRATEGY

Date OCTOBER 2025 Scale @ A1 1:1000

Clients Ref. Project Ref. 14023

gta Civils & Transport

Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD Tel: 01444 871444 Web: www.gtacivils.co.uk

Drawing Number 14023-1100 Rev. P5

Appendix G

Calculations

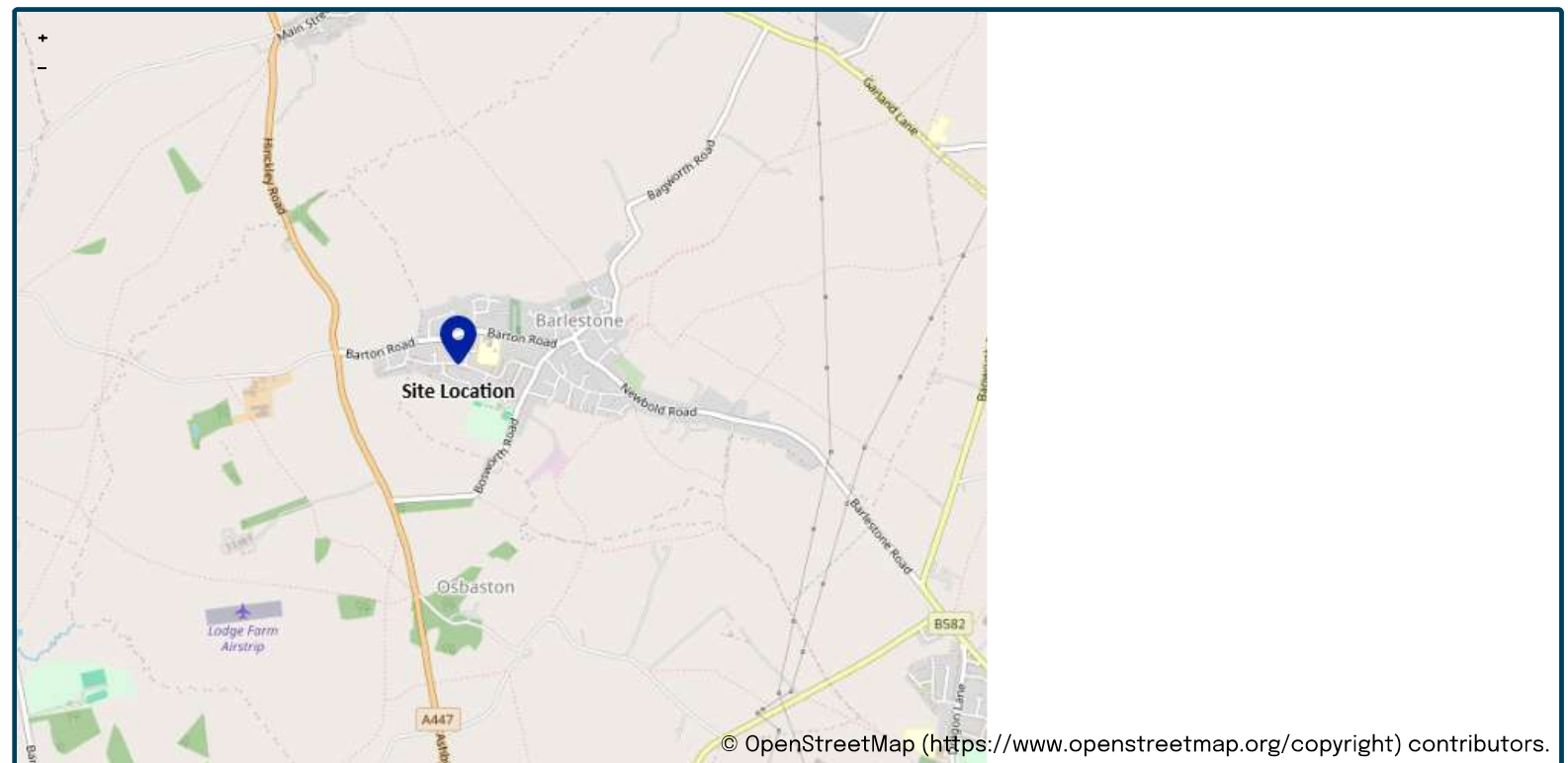
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	22/10/2025
Calculated by	Abbie Webb
Reference	14023
Model version	2.2.1

Location

Site name	Barlestone
Site location	Leicestershire



Site easting (British National Grid)	442285
Site northing (British National Grid)	305501

Site details

Total site area (ha)	1	ha
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Greenfield runoff

Method

Method	FEH statistical (2025)
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FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	709	mm
BFIHOST19scaled	0.341	
QMed-QBar conversion	1.124	☒ 1.124
QMed (l/s)	4.5	l/s
QBar (FEH statistical 2025) (l/s)	5	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	☒ 4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	4.2	l/s
Flow rate 2 year (l/s)	4.5	l/s
Flow rate 10 years (l/s)	7.5	l/s
Flow rate 30 years (l/s)	10.0	l/s
Flow rate 100 years (l/s)	12.9	l/s
Flow rate 200 years (l/s)	15.2	l/s

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

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.1) developed by HR Wallingford and available at [uksuds.com](https://www.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) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. 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.

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Depth (m)	Invert Level (m)
Depth/Area 1	1.000	5.00	12.000	1.650	10.350
1			12.000	1.714	10.286
2			12.000	1.938	10.062

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)
1.000	Depth/Area 1	1	9.664	0.600	10.350	10.286	0.064	150.0	450	Circular	5.10
1.001	1	2	11.741	0.600	10.286	10.062	0.224	52.4	450	Circular	5.17

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.657	263.6	253.0	1.200	1.264	1.000	356	1.874
1.001	2.813	447.3	253.0	1.264	1.488	1.000	242	2.893

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	1440	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

30	60	120	180	240	360	480	600	720	960	1440	2160	2880
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Node 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	10.286	Product Number	CTL-SHE-0092-4500-1600-4500
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.5	Min Node Diameter (mm)	1200

Node Depth/Area 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	11.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1000.0	0.0	1.000	1000.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 94.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Depth/Area 1	705	11.912	1.562	60.4	867.1732	0.0000	FLOOD RISK
720 minute winter	1	705	11.912	1.626	5.5	4.1389	0.0000	FLOOD RISK
30 minute summer	2	1	10.062	0.000	4.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	Depth/Area 1	1.000	1	5.5	0.091	0.021	1.5312	
720 minute winter	1	Hydro-Brake®	2	4.5				535.8

14023 Cunnery Close, Barlestone
Preliminary Attenuation Storage Calculations

V1 - 18.02.26

Discharge rate	4.5	l/s/ha	Q2 flow rate
Preliminary storage volume required	867	m ³ /ha	Calculated in Causeway Flow

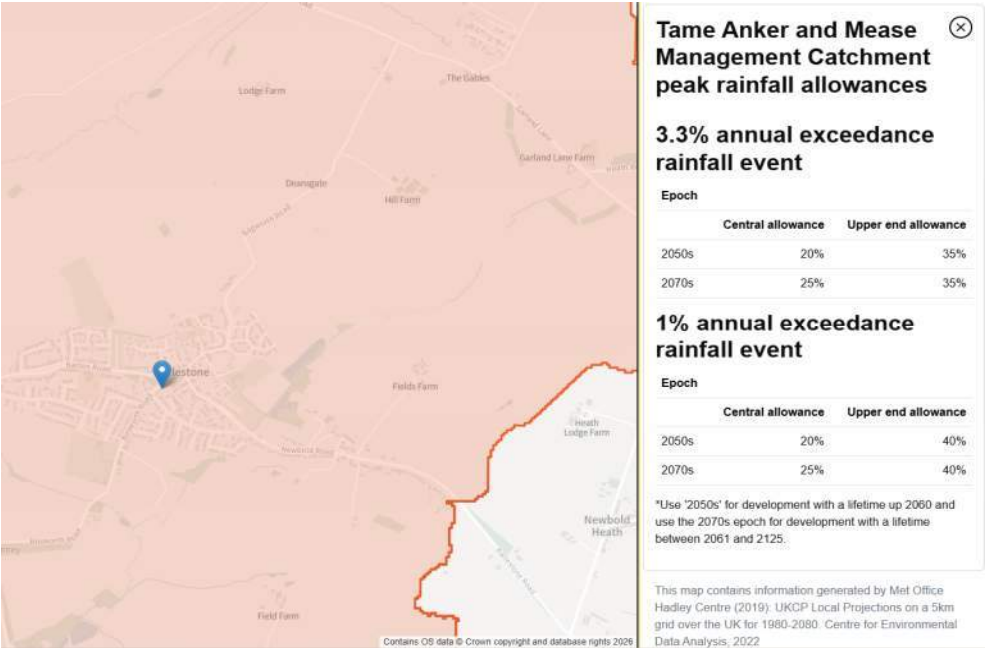
Site area	6.53	ha	Parcel areas + spine road
Parcel area	3.68	ha	
% Impermeable	65%		
Spine road area	0.68	ha	
% Impermeable	100%		
Total impermeable area	3.1	ha	
Required storage	2,668	m ³	

30% on plot storage	800	m ³
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Storage required in basin	1,868	m ³
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Pond capacity	1,930	m ³	Including 0.3m freeboard
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Shortfall	- 62	m ³
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Appendix H

Draft Drainage Maintenance Plan