



Flood Risk & Drainage Impact Assessment

Longacres, Eastergate Lane, Walberton, Arundel, BN18 0BA

Client

Tim & Sarah Pearce

Ref: 13467

Date: February 2024

Consulting Engineers

GTA Civils & Transport Ltd

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Issue	Issue date	Compiled	Checked
Preliminary Issue	27 February 2025	JP	FV / MR
First Issue			

1 Introduction

- 1.1 GTA Civils Ltd. was appointed by Tim & Sarah Pearce to prepare a Flood Risk & Drainage Impact Assessment (FRDIA) report in relation to the proposed development at Longacres, Eastergate Lane, Walberton, Arundel, BN18 0BA. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.2 GTA Civils & Transport Limited was appointed by the client to provide a Flood Risk & Drainage Impact Assessment (FRDIA) as required by the Environment Agency and Arun District Council in order to achieve Planning Approval at said property.
- 1.3 This report will take the form of a formal Flood Risk Assessment in accordance with the 2024 National Planning Policy Framework (NPPF) and the current Planning Practice Guidance (PPG).

2 Existing Site and Current Flood Conditions

- 2.1 The application site lies to the west of Walberton village centre, in the area administered by Arun District Council (ADC). It comprises part of a former nursery, accessed from Eastergate Lane. Its area is approximately 0.36ha. Site location maps and an aerial view are shown in Appendix A.
- 2.2 Hydrology: the site lies approximately 6.7km north of the English Channel. The site falls within the Lidsey Rife's catchment. An unnamed watercourse runs westwards along the south of Eastergate Lane, some distance to the west of the site's entrance. A ditch watercourse runs southwards along the east boundary.
- 2.3 Topography: a topographic survey was commissioned – refer to Appendix C. The direction of fall is broadly north-south, with levels ranging between 16.7m AOD and 14.42m AOD.
- 2.4 Geology: The BGS's online geology map shows the soil type is London Clay Formation (clay, silt and sand). Drift deposits of Head (sand, silt and clay) overlie the bedrock.
- 2.5 Winter soil soakage testing was carried out on site in accordance with BRE Digest 365 on 06/12/24. The water level fell by only 4% during the test – and this was deemed 'a fail' (nil result). The test report, including photographs of the pit and site conditions, is shown in Appendix D.
- 2.6 A winter groundwater monitoring programme was undertaken, starting on 06/12/24. The interim graph in Appendix D shows that the water table rose during January 2025 to **0.3m below ground level**. This confirms that soakage is unfeasible in this vicinity.
- 2.7 The greenfield runoff rates for 1ha was calculated using the HR Wallingford online application. The rates for the 4 main storm return periods have been tabulated as follows:

Event	Catchment Area: 1ha (l/s)
QBAR	0.19
1 in 1 yr	0.16
1 in 30 yrs	0.44
1 in 100 yrs	0.61

- 2.8 Public sewers: Southern Water's sewer records are shown in Appendix C. A 175mmØ foul sewer flows east-west under Eastergate Lane. The site's Eastergate Lane access lies between manhole references 7102 and 8101. There are no surface water sewers in this area.
- 2.9 Fluvial flooding: the Environment Agency's (EA) Rivers and Seas flood map in Appendix B shows the

site lying in Flood Zone 1 (FZ1 – Low Risk). Inland sites located in FZ1 have an Annual Exceedance Probability (AEP) of less than 1 in 1000 years (<0.1%) of flooding from rivers or watercourses.

- 2.10 Surface water flooding: this can occur when excess rainwater does not infiltrate into the ground, or is not intercepted by urban drainage systems, and instead flows across the surface. The EA's online Surface Water Depth Flood Map for the 2040-2060 epoch, in Appendix B, shows the site is not liable to flood from this source.
- 2.11 Climate Change: the EA provides guidance on the level of climate change to apply for developments. This is on a catchment basis, with this site falling in the Arun and Western Streams Management Catchment. The matrix provided is relevant only for sites in FZ2 and FZ3, strictly speaking.
- 2.12 Artificial sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix B shows the site is not liable to flood from a nearby reservoir failing. There are no docks or canals nearby.
- 2.13 Groundwater Flooding: Groundwater flooding can occur when groundwater rises up from the underlying aquifer to flood subsurface infrastructure or to emerge at the ground surface.
- 2.14 The EA's Groundwater Vulnerability Zone (GWVZ) and Groundwater Protection Zones (GWPZ) mapping shows the site to be overlying a 'Low' GWVZ with soluble rock risk. The north (majority) of the site overlies a Zone II Sub-Surface Activity zone (see Appendix B).
- 2.15 Historical Flooding: the EA's historical flood maps in Appendix B shows the site has not been affected by flooding in the past.
- 2.16 The Lidsey Surface Water Management Plan (SWMP) published by West Sussex County Council (WSCC) in 2014 identifies Local Flood Risk Zones (LFRZ) for further analysis. The site lies in LFRZ_026 (Eastergate Lane, Eastergate). The flood map for the LFRZ is in Appendix B and identifies historical flooding from surface water. None of the flooding extends to this site and so can be put to one side.
- 2.17 In conclusion, the flood risk profile of this site is **Low**.

3 Proposed Development & The Sequential Test

- 3.1 The proposed scheme is to build one new detached dwelling plus amenity landscaping. Refer to the proposed site layout drawing in Appendix E.
- 3.2 As concluded in section 2.13 above, the site's flood risk profile is Low. No mitigation is needed or proposed.
- 3.3 Vulnerability and the Sequential Test: the Sequential and Exception Tests are policy mechanisms created to discourage 'vulnerable use' developments in FZ2 and FZ3. This process 'steers' higher vulnerability uses to sites in lower flood-risk zones (eg FZ1.) The vulnerability classification of any new development should be considered. All vulnerabilities are 'appropriate development' in FZ1 – **Low Risk**.

4 Proposed SuDS and Foul Drainage Strategy

- 4.1 As set out in Sections 2.5 - 2.6 above, the combination of a nil soakage rate and shallow water table level means that infiltration features are unfeasible.
- 4.2 The only impermeable surface is the new unit's roof.
- 4.3 Various sustainable drainage systems were considered to store the excess storm water and mitigate runoff pollution:
- Porous Pavings: porous pavings were deemed to be of limited benefit due to low soil soakage rate and the need for anti-buoyancy measures, if lined.
 - Green roofs: not practical for this development due to the proposed steep pitches of the roofs.
 - Ponds/swales/filter strip: because of the high water table level the use of such features to hold volume is impractical. The introduction of a shallow swale and filter strip shall be considered at detailed design stage.
 - Rainwater harvesting: at least one water butt shall be installed on a rainwater downpipe to reduce the volumes of runoff discharged off the site.
- 4.4 A drainage strategy layout is shown in Appendix E. The network will be routed to the ditch on the east boundary, via a cellular attenuation tank.
- 4.5 The offsite flow rate will be restricted to a total of 1.0l/s, this being the practical minimum limit of screened vortex/orifice devices.
- 4.6 The tank has been sized to hold the volume in the critical '100 years plus 45% CC' storm event. The drainage calculation sheets in Appendix F show that the storage volume needed is 10.4m³. Causeway Flow has been used (in simulation mode) as this uses FEH22 hydrological data. The tank's capacity is 10.26m³: the additional 0.14m³ needed is provided in the manholes and pipes.
- 4.7 Flotation risk: The tank will be lined to prevent groundwater ingress. Anti-flotation calculations shall be included at detailed design stage (in tandem with the filter strip and swale design).
- 4.8 Treatment: no treatment is needed as the only impermeable surface is the new unit's roof. The drive will be of permeable surfacing, eg gravel – with no positive drainage.
- 4.9 Exceedance flows: exceedance flows in the event of the control manhole overtopping, will be south and southeast into the watercourse away from buildings. Overland flow arrows are shown on the drainage strategy layout – from all parts of the network, these reflecting flows in an extreme storm.

- 4.10 Ordinary Watercourse Consent will be applied for from the Lead Local Flood Authority in due course – this being needed for the new outfall headwall.
- 4.11 Maintenance of the SuDS system will remain with the Applicant.
- 4.12 Foul drainage: it is proposed to discharge the development's foul water under gravity into the existing 175mm dia sewer under Eastergate Lane – refer to the Drainage Strategy Layout in Appendix D.
- 4.13 Permission to discharge into the sewer – by means of a Section 106 application – will be required from Southern Water as the owner of the public sewerage network.

5 Drainage Impact Assessment

- 5.1 Arun Local Plan Policy W DM1 requires a Drainage Impact Assessment (DIA) for major developments within the Lidsey Wastewater Treatment Works (WTW) catchment area. The proposed development will connect to Southern Water's foul network to the south of the site. Lidsey WTW is almost due south of this area – and at a lower elevation. The LLFA engineer has insisted that a DIA is needed here, even though this is not a Major Development.
- 5.2 Communities within the Lidsey WTW catchment area have experienced foul water flooding which has led to the pollution of watercourses. This is assumed to be caused by the sewerage system being overloaded due to groundwater infiltration and surface water inundation. The Local Plan document explains that development within the Lidsey WTW catchment area is required to take account and contribute to the improvement of the existing sewage and drainage network.
- 5.3 As discussed in the previous section of this FRA, the proposed development will discharge surface water runoff to the local ditch network at 1l/s. This strategy will ensure no adverse impact on surface water flood risk downstream of the site.
- 5.4 In addition, the on-site foul sewers will be constructed in accordance with current best practice to prevent groundwater infiltration and surface water ingress and ensure no adverse impact on sewer flood risk downstream of the site. This will include measures as follows:
- No surface water connections permitted to the wastewater system.
 - Use of joint sealant or mass concrete chamber surrounds to prevent infiltration.
- 5.5 Capacity improvements within Southern Water's sewerage network (including at Lidsey WTW) are managed and funded by Southern Water using its Infrastructure Charges Scheme under Section 143 of the Water Industry Act 1991. All developers pay these Charges upon new connections. Investment needs are identified by Southern Water within its Drainage and Wastewater Management Plan (DWMP) for the Arun and Western Streams River Basin Catchment. These needs are reviewed with OFWAT for each business plan period.

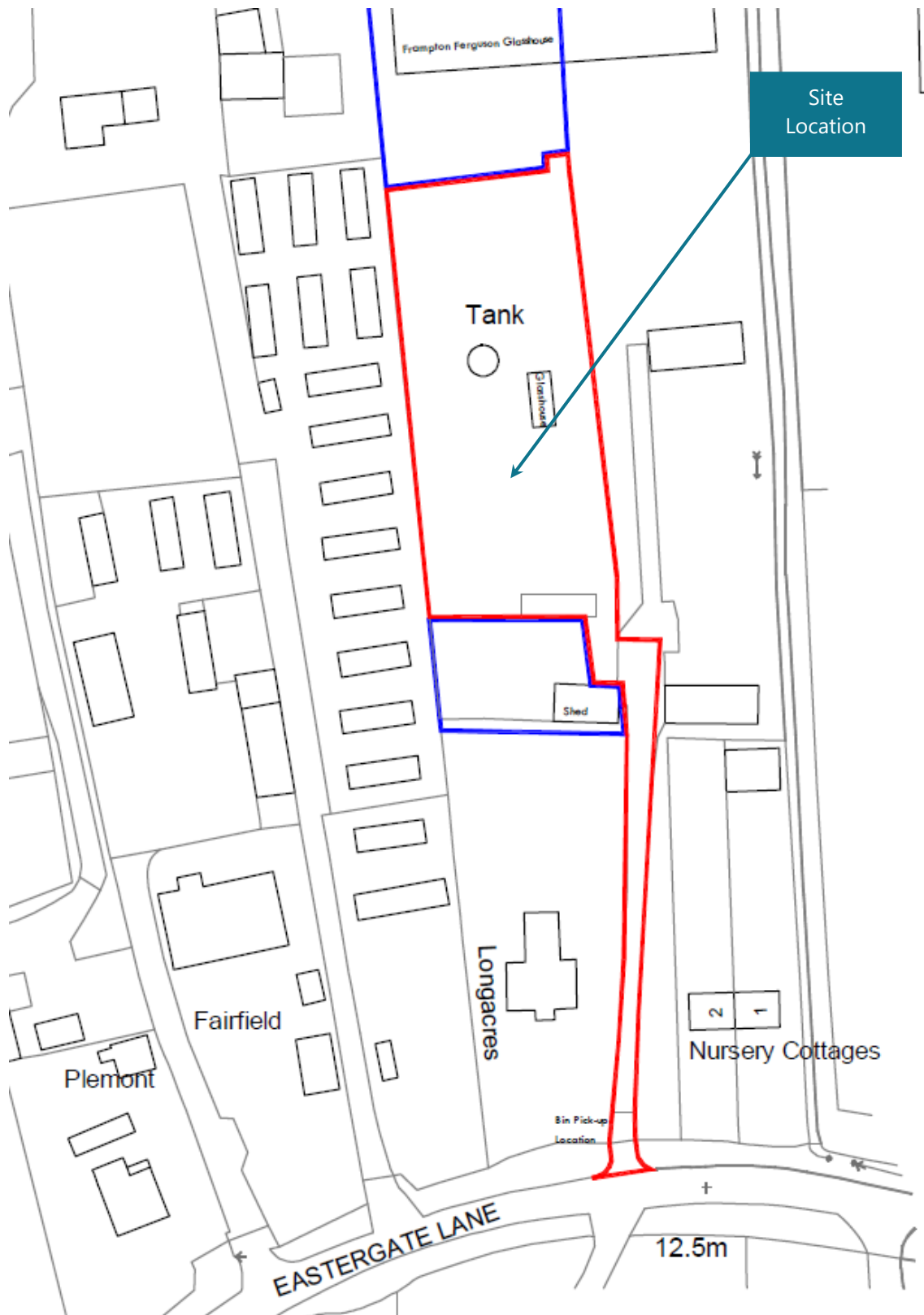
6 Summary & Conclusion

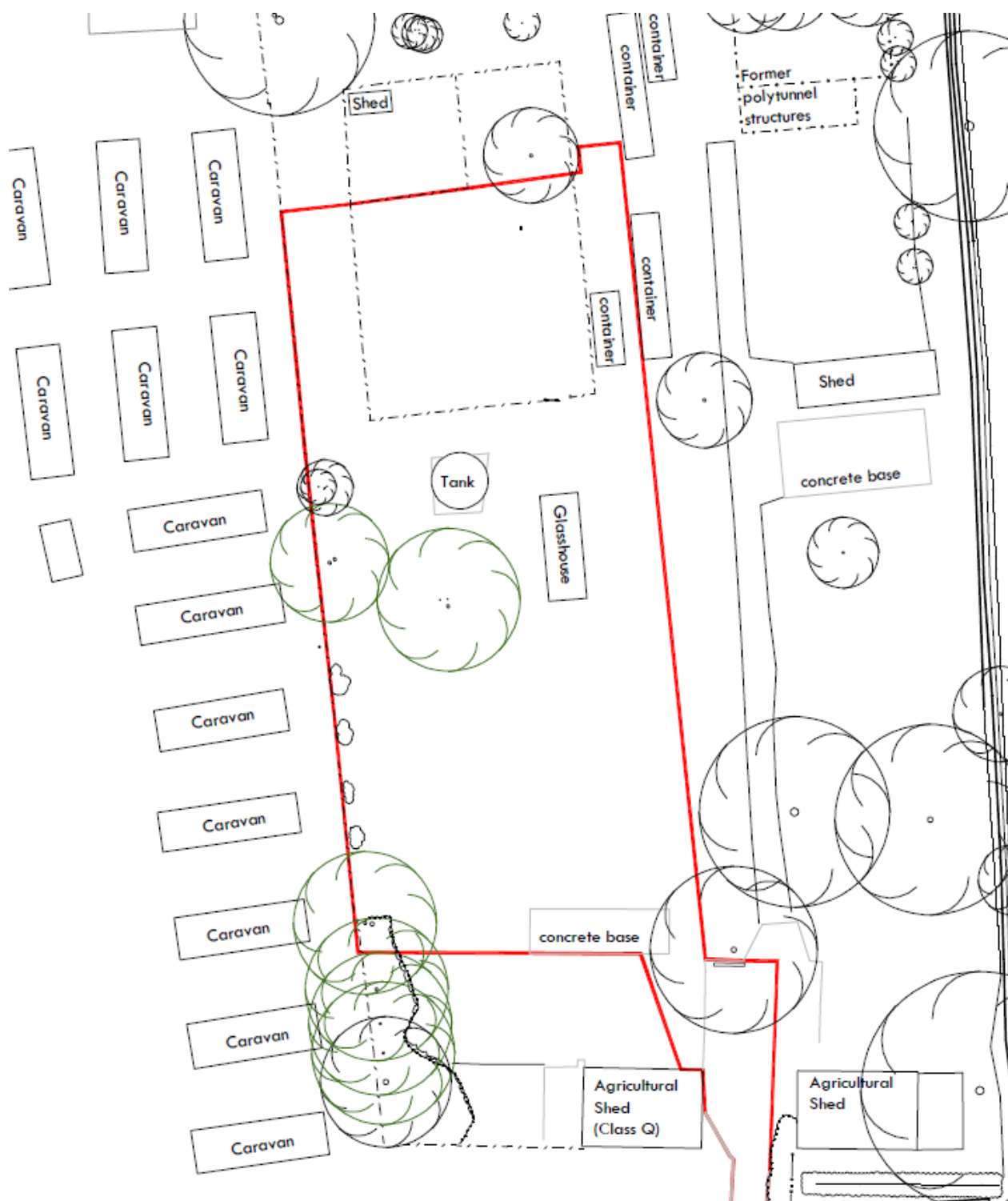
- 6.1 The application site has a 'Low' Risk flood risk profile.
- 6.2 On-site BRE 365 soil soakage testing confirms that there is no soakage potential.
- 6.3 The development's surface water will be routed to the watercourse on the east boundary.
- 6.4 The offsite runoff rate will be restricted to 1.0l/s, the practical minimum limit of screened flow restrictors.
- 6.5 A cellular tank has been sized to hold the volume of roof runoff - in the critical '100 years plus 45% CC' storm event. The total storage volume provided on the scheme is 10.4m³.
- 6.6 This development will not increase the flood risk, either on this site or to neighbouring properties, and so complies fully with the 2024 NPPF and current PPG.

- End of Report -

Appendix A

Site Location Maps & Aerial Photo



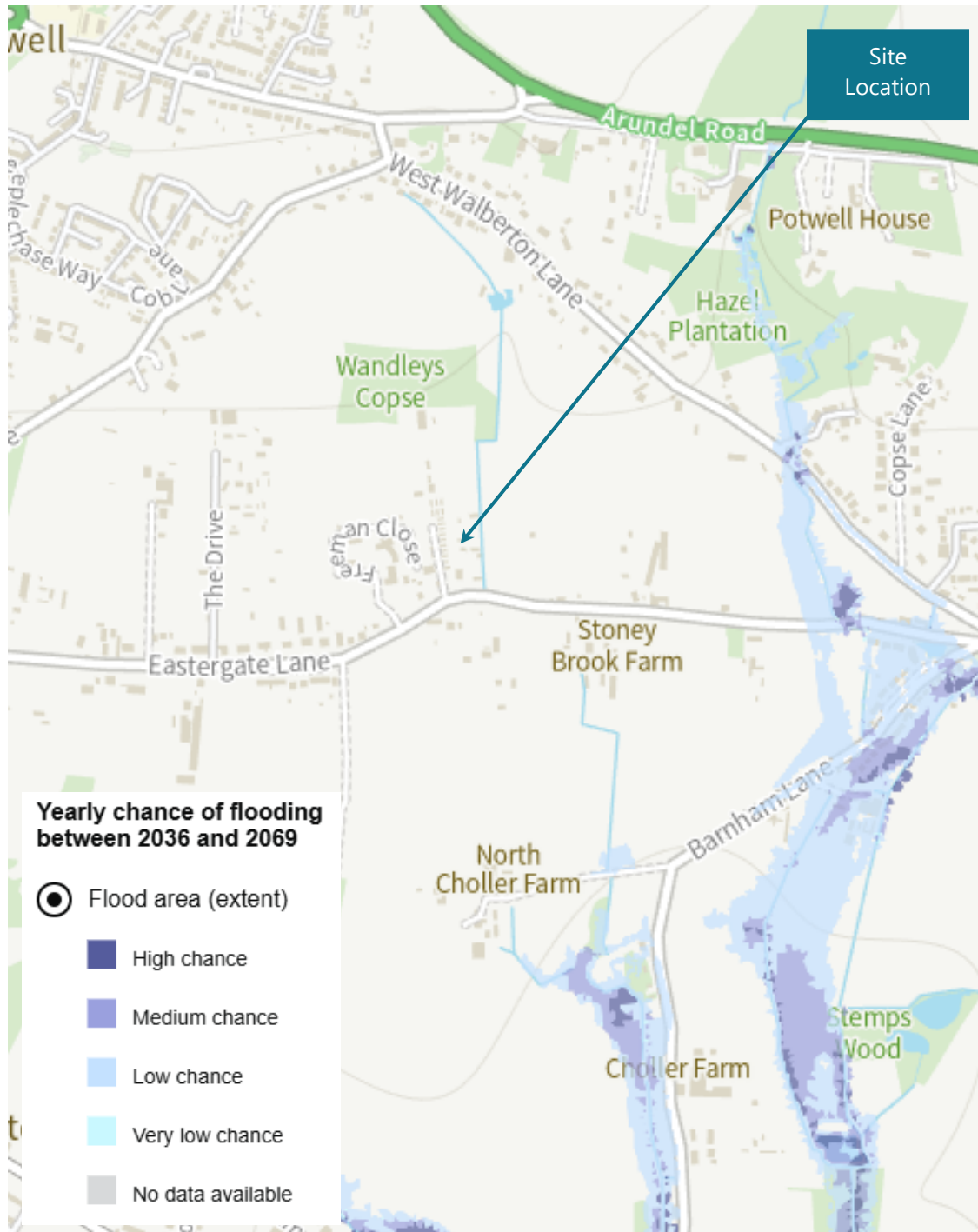


Site
Location



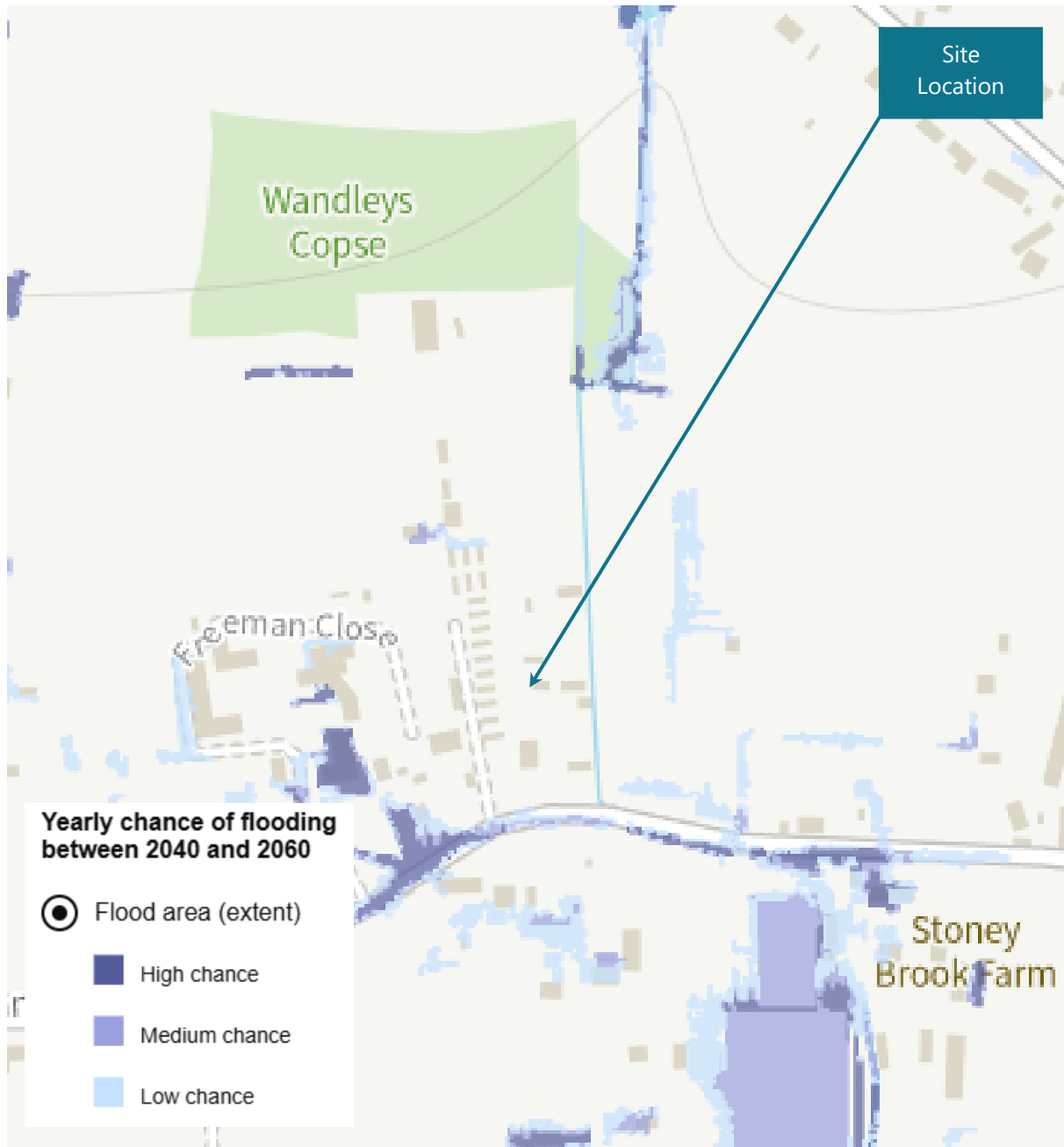
Appendix B

Flood Maps – Environment Agency and WSCC



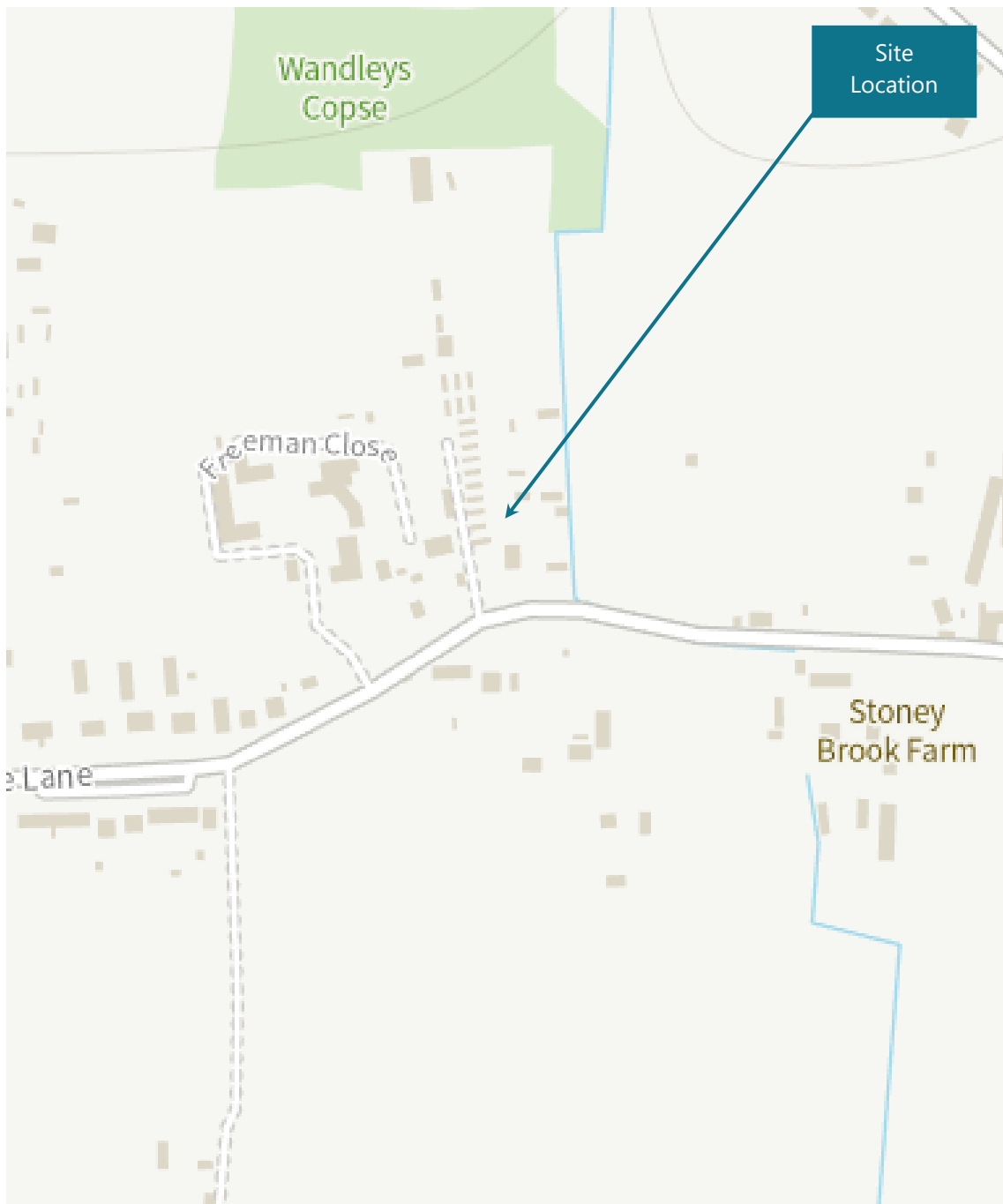
EA's Online Rivers and Seas Flood Map (2036 – 2069 Epoch)

The site is located in Flood Zone 1 (FZ1)



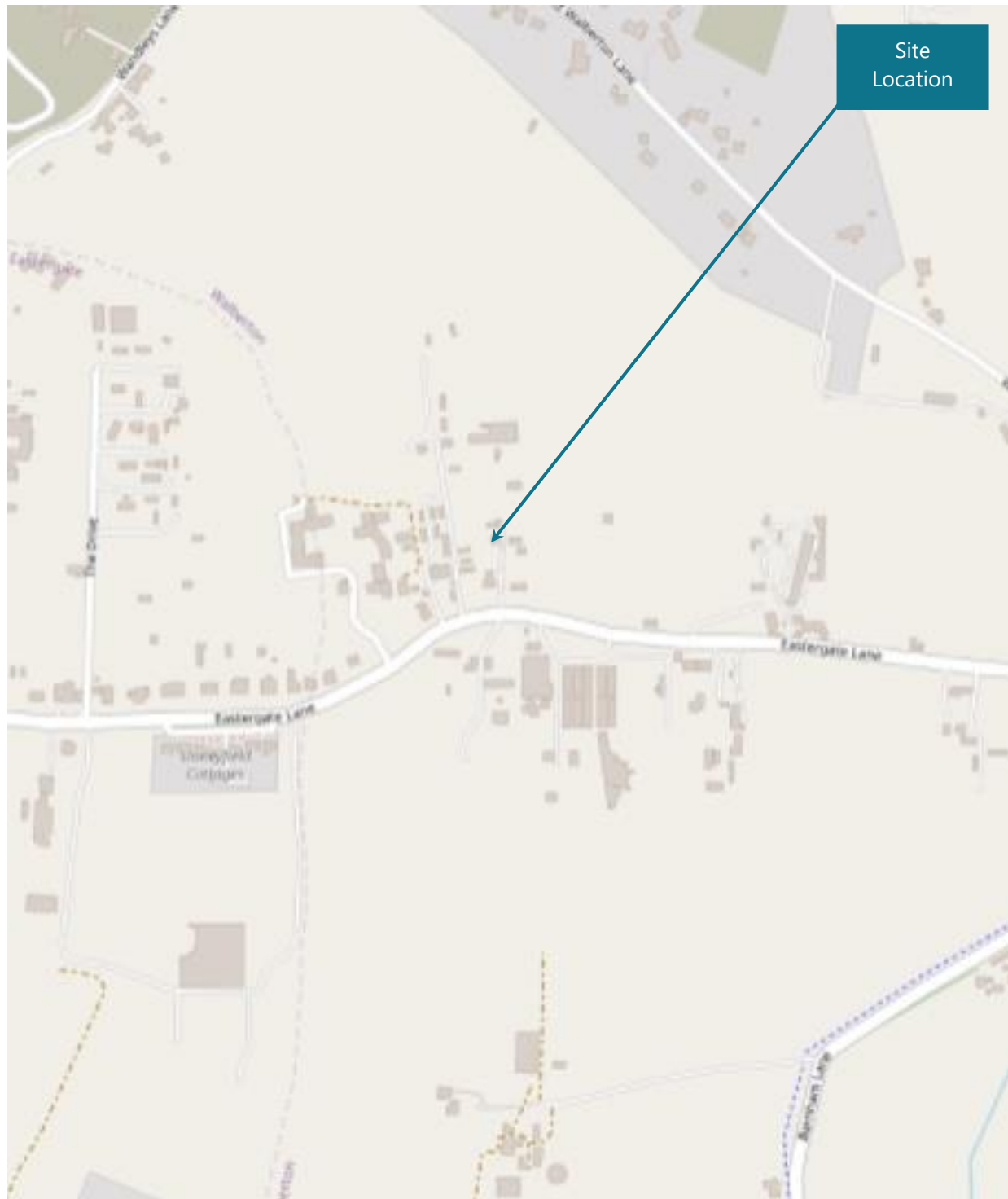
EA's Online Surface Water Flood Map
(Yearly chance of flooding between 2040 and 2060)

The site is not liable to flood from this source



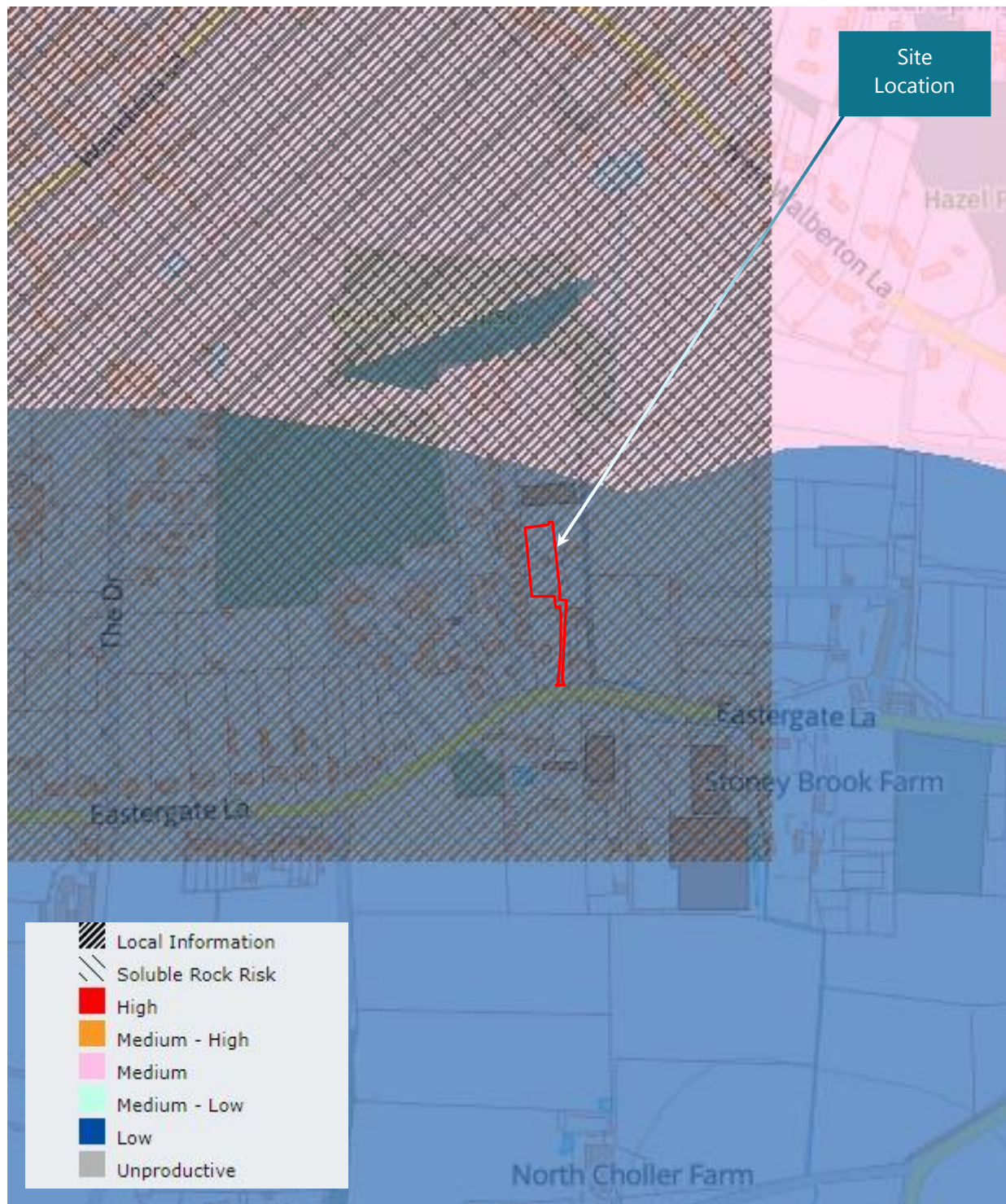
EA's Online Risk of Flooding from Reservoirs' Map

The site is not liable to flood from this source



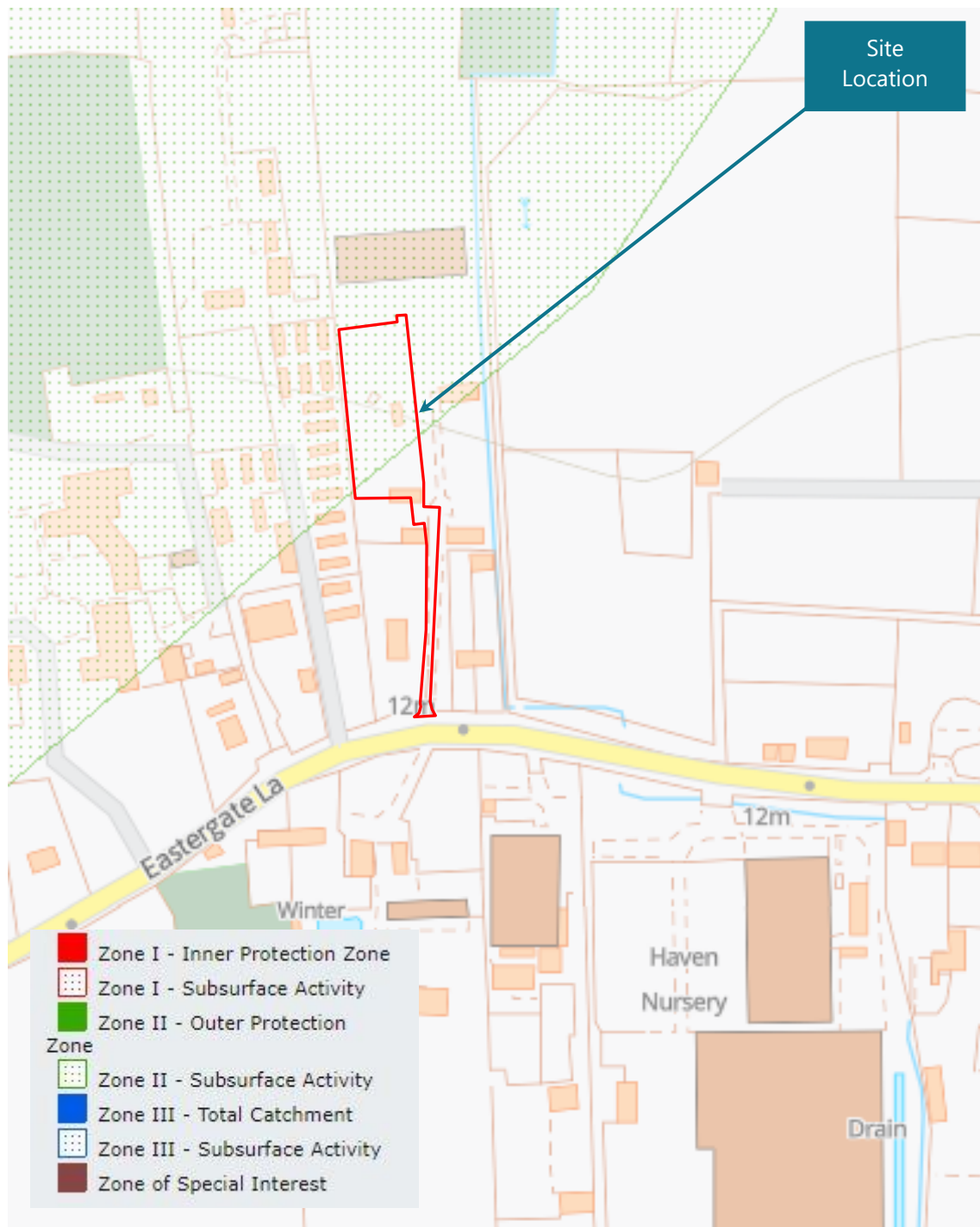
Environment Agency's Online Historicallood Map

The site has not been affected by flooding in the past



Environment Agency's Groundwater Vulnerability Zone Map

The site overlies a 'Low' Groundwater Vulnerability Zone, with soluble rock risk



Environment Agency's Online Groundwater Source Protection Zones Map

The northern, larger part of this site overlies a 'Zone II – Subsurface Activity' Groundwater Protection Zone



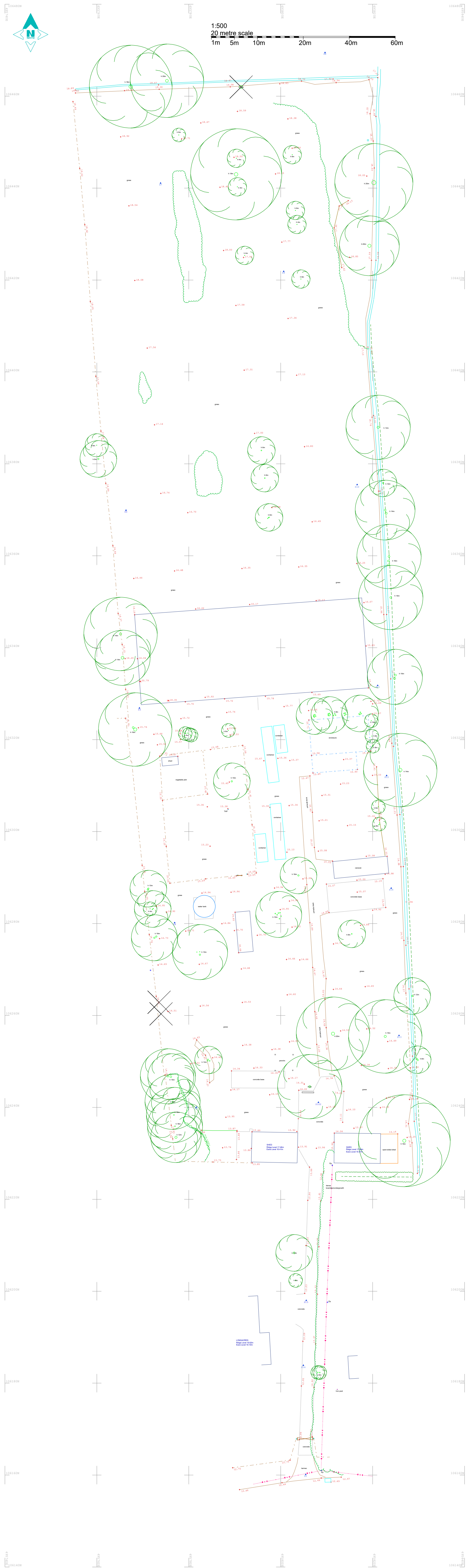
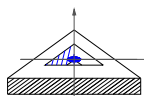
Lidsey SWMP Figure 7.53 - Flood Risk LFRZ 026 (1 in 100 year storm event)



Lidsey SWMP Figure 7.53 - Flood Risk LFRZ 026 (1 in 100 year storm event)

Appendix C

Topographic Survey & Sewer Records



Legend		
	Buildings	
	Glass Roof (Greenhouse)	Heights and spread indicative only (Species Subject to Confirmation)
	Tree	Leaning Tree
	Down pipes	
	Survey Station	Hedges
	Top	Canopy Line
	Bottom	Walls (Width Drawn To Scale)
	Spot Levels (Metres)	Fences
	Steps	CLF = Chain Link Fence
	Gate	P&R = Post & Rail
	Sapling	P&W = Post & Rail
		PAL = Palisade

Abbreviations (where applicable)		
BT = Telecom cover	CBF = Closed board fence	CLF = Chain Link Fence
G = Gully	IC = Inspection cover	DB = Door Base Ht
JB = Junction box	LP = Lamp post	CS = Ceiling Skelting
P&W = Post and wire fence	P&R = Post and rail fence	BR = Beam height
Re = Recess	RS = Road sign	Co = Column
St = Water stop tap	Sw = Storm water drainage run	EXF = Extractor Fan
Tip = Telegraph pole	UTL = Unable to lift (inspection cover)	Sdp = Soli down pipe
Wm = Water meter		F-S = Spring height
FENCES		
BARBED WIRE	BWF	Windows/Doors:
CLOSED BOARD	CBF	F-C Floor to Oil height
CHAIN LINK	CLF	C-H Oil to Head
CHESTNUT PALING	CPF	
CHICKEN WIRE	CWF	
IRON RAIL	IRF	
INTERWOVEN	IWF	
LARCH LAP	LLF	
POST & CHAIN	PCF	
POST & RAIL	PRF	
POST & WIRE	PWF	
WIRE MESH	WMF	

Copyright in this drawing remains with ADA Solutions Ltd.

This survey has been carried out at an accuracy commensurate with the scale shown on the title block of the drawing. Enlarging the drawing by digital means will not increase the accuracy of the survey.

Taking dimensions from the drawing is not recommended and measurements for design/construction should be taken from the digital version only although a scale rule can be used for basic layout and check measurements.

Any discrepancies found must be reported to ADA Solutions Ltd immediately.

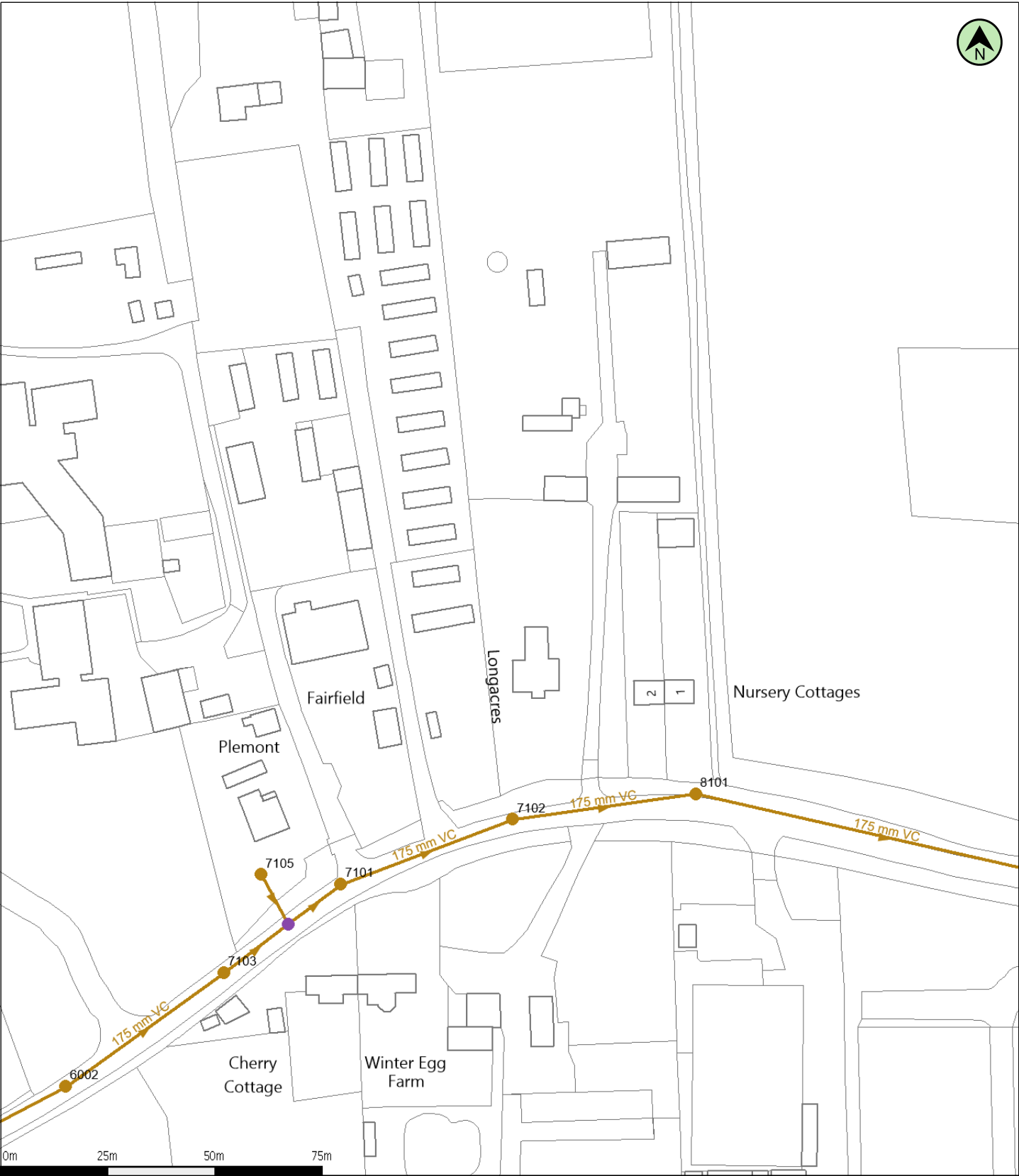
Survey control information

Levels/horizontal site detail based on Ordnance Survey National Grid coordinates, referenced to survey control station (S1) via the use of Leica GS07 GPS equipment

Site Address :

LONGACRES
EASTERGATE LANE
WALBERTON
WEST SUSSEX
BN18 OBA

Client : Mr and Mrs Pearce		
Date	Aug 2024	Project: Topographic Survey
Drawing Number : 0824-DB6-T500-A1		
Drawn by : SA	Checked: SA	Scale At A1 1:500



(c) Crown copyright and database rights 2024 Ordnance Survey AC0000808122 Scale: 1:1250 Date: 28/11/24 Wastewater Plan A4
Data updated: 27/11/24 Map Centre: 495786,106208 Our Ref: 1630341 - 1 Powered by digdat

cfagan@gtacivils.co.uk
13467 Long Acres



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey AC0000808122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

[illegible]

Appendix D

BRE Digest 365 Soil Soakage Test Report & Winter Groundwater Monitoring Result



IN SITU INFILTRATION TEST REPORT

**LONGACRES
EASTERGATE LANE
WALBERTON
WEST SUSSEX**

PROJECT REFERENCE: P16951

REPORT REFERENCE: R16518

Report Beneficiary: Tim & Sarah Pearce

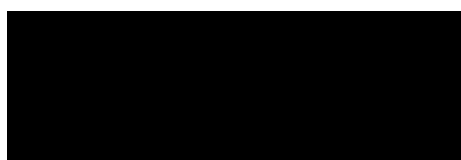
Document Control			
Issue No.	Status	Issue Date	Notes
1	Final	19 th December 2024	
Report Section		Prepared By	Approved By
In Situ Infiltration Report		Adam Cormack HNC FGS	Rebecca Webb BSc FGS

Limitations

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FIGURES AND APPENDICES

Figure 1 Site Location Plan
Figure 2 Site Plan
Explanatory Notes
Exploratory Hole Records
Trial Pit In Situ Infiltration Test Results

1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ infiltration testing and groundwater monitoring at Longacres, Eastergate Lane, Walberton to assist others with the design of a sustainable drainage system.

The specific objectives of the works were to:

- a) Investigate the shallow ground and groundwater conditions at the exploratory hole locations;
- b) Undertake in situ infiltration testing and provide calculated infiltration rates to assist others with the drainage design; and
- c) Install a standpipe at the site and carry out a programme of groundwater monitoring.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q14779, dated 28th November 2024. The instruction to proceed was received on behalf of the client, Tim & Sarah Pearce.

2. SITE CONTEXT

2.1 Site Location

The site is located at Eastergate Lane, Walberton, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 495790, 106300. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological Setting

2.2.1 *Expected Geology and Aquifer Designation*

The stratigraphic succession that may be expected to underlie the site has been established by reference to British Geological Survey (BGS) mapping and the BGS Lexicon of Named Rock Units. The expected stratigraphy is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Superficial	River Terrace Deposits	Secondary A Aquifer
	Head Deposits	Secondary A Aquifer
Bedrock	London Clay Formation	Unproductive Stratum

The site lies close to the boundary of both the River Terrace Deposits and Head Deposits strata.

The River Terrace Deposits generally comprise well graded sandy fine to coarse gravel. Locally sand or gravel strata may predominate. Lenses of clay, silt and localised peat may be present. Gravels normally include a high proportion of subangular flint.

The superficial Head is a polymict deposit generally comprising clay and sandy clay with variable amounts of gravel. The lithology of the Head reflects the nature of the parent solid strata. The material is likely to have been disturbed by intense frost action in a periglacial environment. It is usually poorly sorted but may be stratified where it has been subject to solifluction and/or hillwash and soil creep.

The London Clay Formation forms part of the Thames Group. The formation is of Ypresian age (47.8 to 56 million years old; Early Eocene). The London Clay Formation mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occur in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels. The formation is recorded by the BGS to range in thickness up to 150m.

2.2.2 Groundwater Source Protection Zones (SPZ)

The Environment Agency defines SPZs as those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption.

The site lies within an Outer zone – SPZ2c. The 'c' suffixed to the designation indicates the aquifer is confined by overlying low permeability strata.

3. SITE WORKS

The intrusive site works comprised a single dynamic sampler borehole, designated WS01 drilled to a depth of 5.00m below ground level, as well as a machine excavated trial pit, denoted TP01. The pit was dug to an average depth of 1.25m below ground level to enable in situ infiltration testing to be undertaken. The intrusive work was carried out on 6th December 2024. The exploratory hole locations are shown on Figure 2.

A groundwater data logger, programmed to collect readings at 15-minute intervals, was installed within the standpipe constructed within the borehole. A description of the standpipe installation is shown on the exploratory hole record. The results of the groundwater monitoring will be issued separately on completion of the monitoring period in early May 2025.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records which are appended to this report, together with explanatory notes to assist in their interpretation. The results of the in situ infiltration testing are also appended.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 *Surface Covering*

Both exploratory holes were excavated through a surface cover of topsoil.

4.1.2 *Made Ground*

Made ground, generally comprising of a slightly gravelly clay, was recorded to a depth of 0.40m and 0.45m below ground level in WS01 and TP01, respectively. The gravel content comprised variable quantities of flint, brick, flint and ash-like material, locally with organic material.

4.1.3 *River Terrace Deposits*

Underlying the made ground, the investigation progressed into undisturbed slightly sandy silty clay soils, which became gravelly with depth. No gravel content was present below a depth of 3.40m below ground level within the borehole.

These deposits, considered to represent the River Terrace Deposits indicated to underlie the site on BGS geological maps, continued to the full extent of the investigation.

4.2 Stability

The borehole sides were noted to be squeezing in below a depth of 4.00m below ground level. The trial pit was noted to be stable during excavation.

4.3 Groundwater Conditions

Groundwater was noted at the base of the trial pit during its excavation; the pit was not progressed beyond the depth of the observed groundwater seepage. The water was recorded to rise to a depth of 1.18m over a 25minute observation period, prior to undertaking the in situ infiltration testing.

Groundwater was also recorded within boreholes WS01 standing at a depth of 1.20m below ground level on completion of drilling.

It should be noted that water levels within the exploratory holes may not have equilibrated with the groundwater table at the time the readings were recorded and that groundwater levels should be expected to fluctuate seasonally. Groundwater monitoring is currently ongoing and the results will be issued under separate cover on completion of the monitoring period.

5. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing¹ was carried out in trial pit TP01.

During the test performed, the water level within the test pit only reached 96% of the initial test depth and because the water level did not fall below 75% to 25% of the initial test depth, calculation of the soil infiltration rate in accordance with the BRE digest was not possible. The soil infiltration rate has therefore been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period, and the test duration in seconds.

The infiltration rate derived from the testing is summarised in the following table.

Table 2. Calculated Infiltration Rates

Exploratory Hole	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Stratum	Infiltration Rate (f) (m/sec)
TP01 Test 1	0.83	1.25	River Terrace Deposits	4.08×10^{-7}

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system.

If infiltrations systems are being considered, to comply with building regulations², point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings.

¹ Conducted in general accordance with the requirements of BRE 365, Soakaway Design.

² The Building Regulations 2010; Part H; Drainage and Waste Disposal

FIGURES & APPENDICES

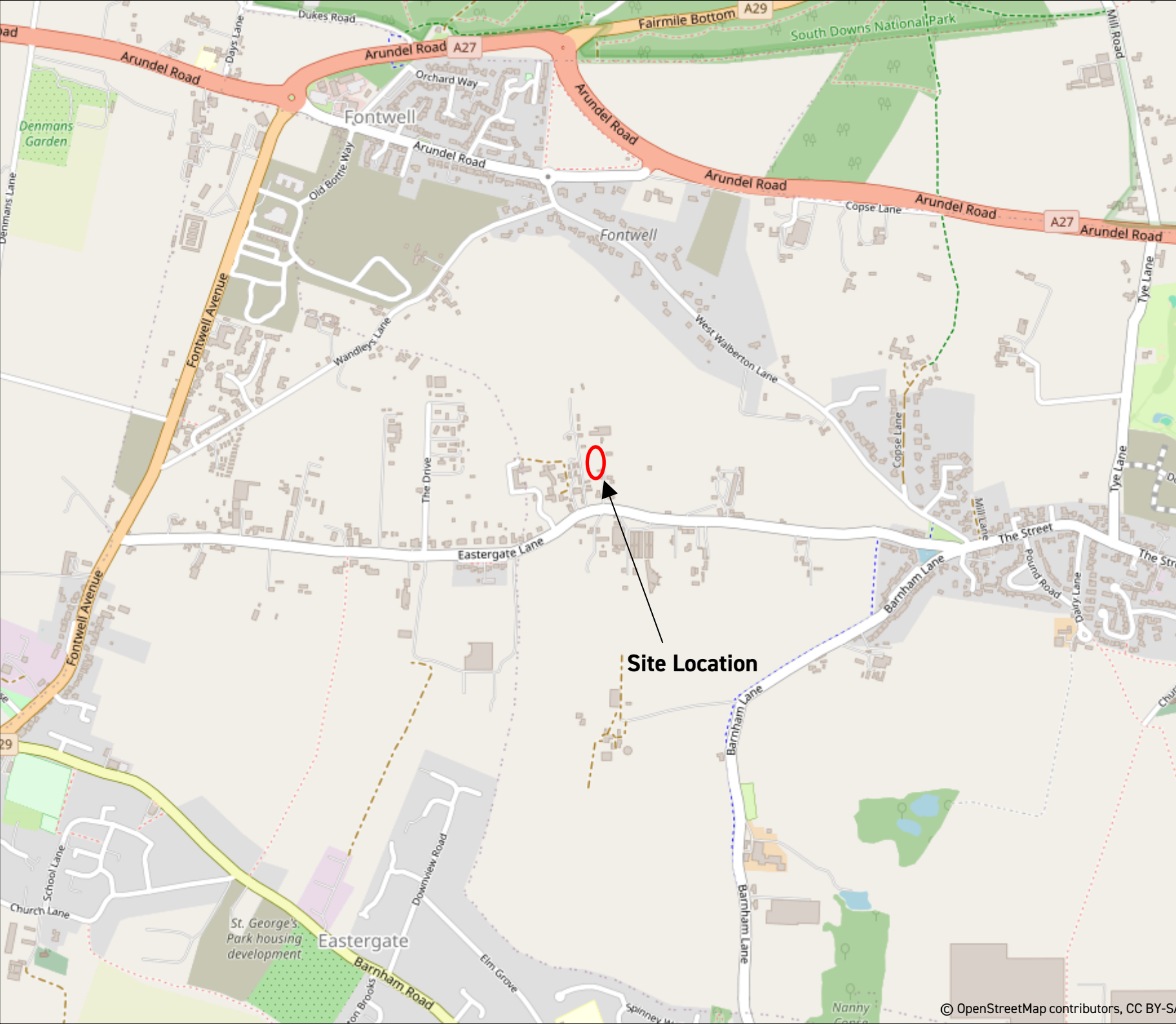
Figure 1 Site Location Plan

Figure 2 Site Plan

Explanatory Notes

Exploratory Hole Records

Trial Pit In Situ Infiltration Test Results



Head Office

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
contact@ashdownsi.co.uk

Site

Longacres
Eastergate Lane
Walberton
West Sussex

Project Ref

P16951

Figure No

1

Drawing Title

Site Location Plan

Scale

Not To Scale



Head Office
Unit 3 The Old Grain Store Ditchling Common Business Park Ditchling East Sussex BN6 8SG contact@ashdownsi.co.uk
Site
Longacres Eastergate Lane Walberton Arundel West Sussex
Project Ref.
P16951
Figure No.
2
Drawing Title
Site Plan
Scale
NTS



EXPLANATORY NOTES

Symbols and abbreviations on Exploratory Hole Records

Samples

U	'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample
R	Root Sample
B	Bulk Disturbed Sample
W	Water Sample
ES	Environmental Suite (on older records may be referenced J T)

In Situ Testing

S	Standard penetration test (SPT): Using the split spoon sampler.
C	Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

CP	Cable Percussion Borehole
RC	Rotary Cored Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HDP	Trial Pit excavated using hand tools

Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

In Situ Strength Testing

Standard penetration testing (SPT) carried out in accordance with BS EN ISO 22476-3:2005.

Continuous dynamic probe testing conducted using a super heavy DPSH-B (As defined by BS EN ISO 22476-2:2005) probing geometry. The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

Perth penetrometer tests carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained shear strength determinations made in-situ using a Geonor hand shear vane or a hand penetrometer.

Testing to determine the in-situ California Bearing Ratio (CBR) of soils conducted at shallow depths using a hand-held Transport Research Laboratory (TRL) cone penetrometer.



Site Name: Longacres, Eastergate Lane, Walberton, West Sussex

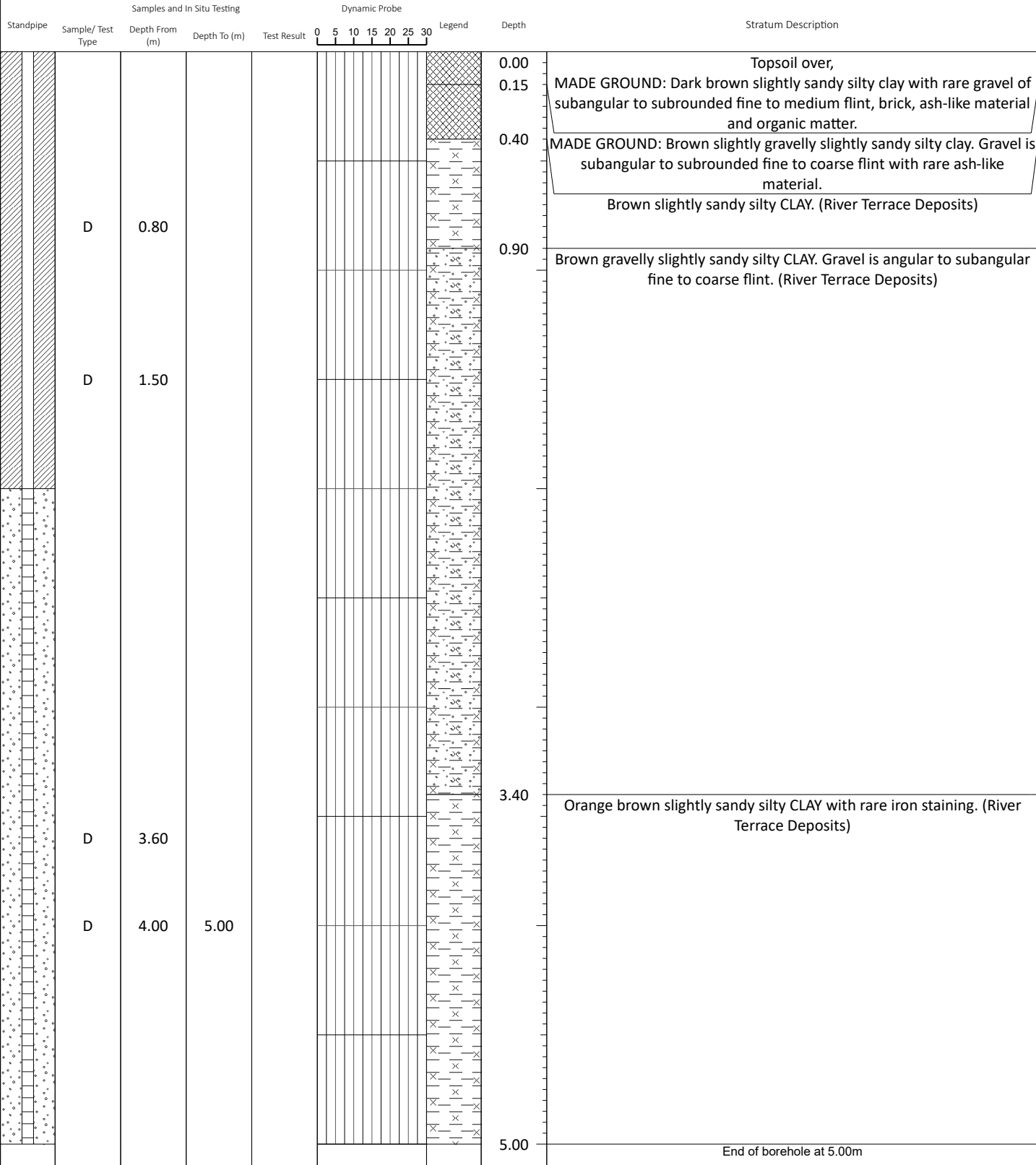
Job Number: P16951

Start Date: 06/12/2024

End Date: 06/12/2024

Borehole Number: WS01

Sheet 1 of 1



Remarks

Groundwater: Groundwater recorded at 1.20m depth on completion of borehole.

Stability: Borehole sides squeezing in below 4.00m depth.

Notes: Standpipe installed to 5.00m depth; 5.00m to 2.00m slotted pipe with gravel surround; 2.00m to ground level plain pipe with bentonite seal; completed with end cap and security cover concreted flush with ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: TM



Site Name: Longacres, Eastergate Lane, Walberton, West Sussex

Job Number: P16951

Start Date: 06/12/2024

End Date: 06/12/2024

Trial Pit Number: TP01

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
D	0.50				0.00	Topsoil over,
					0.15	MADE GROUND: Dark brown slightly sandy silty clay with rare gravel of subangular to subrounded fine to medium flint, brick, ash-like material and organic matter.
D	0.90				0.45	MADE GROUND: Brown slightly gravelly slightly sandy silty clay. Gravel is subangular to subrounded fine to coarse flint with rare ash-like material.
					0.80	Brown slightly sandy silty CLAY. (River Terrace Deposits)
					1.25	Brown gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse flint. (River Terrace Deposits)
						End of trial pit at 1.25m

Remarks

Groundwater: Groundwater ponding at base of trial pit on completion, rising to 1.18m in 25 minutes, prior to infiltration testing.

Stability: Trial pit stable on completion.

Notes: Trial pit depth terminated due to presence of groundwater.

Excavation Method: TP

Pit Length: 1.50m

Pit Width: 0.45m

Made By: TM

Site: Longacres, Eastergate Lane, Walberton, West Sussex

Project Ref: P16951

Test Location Reference	TP01
Test Number	1

Width of Pit	0.45 m	W
Length of Pit	1.50 m	L
Depth of Pit	1.25 m	D
Pit type	Open	

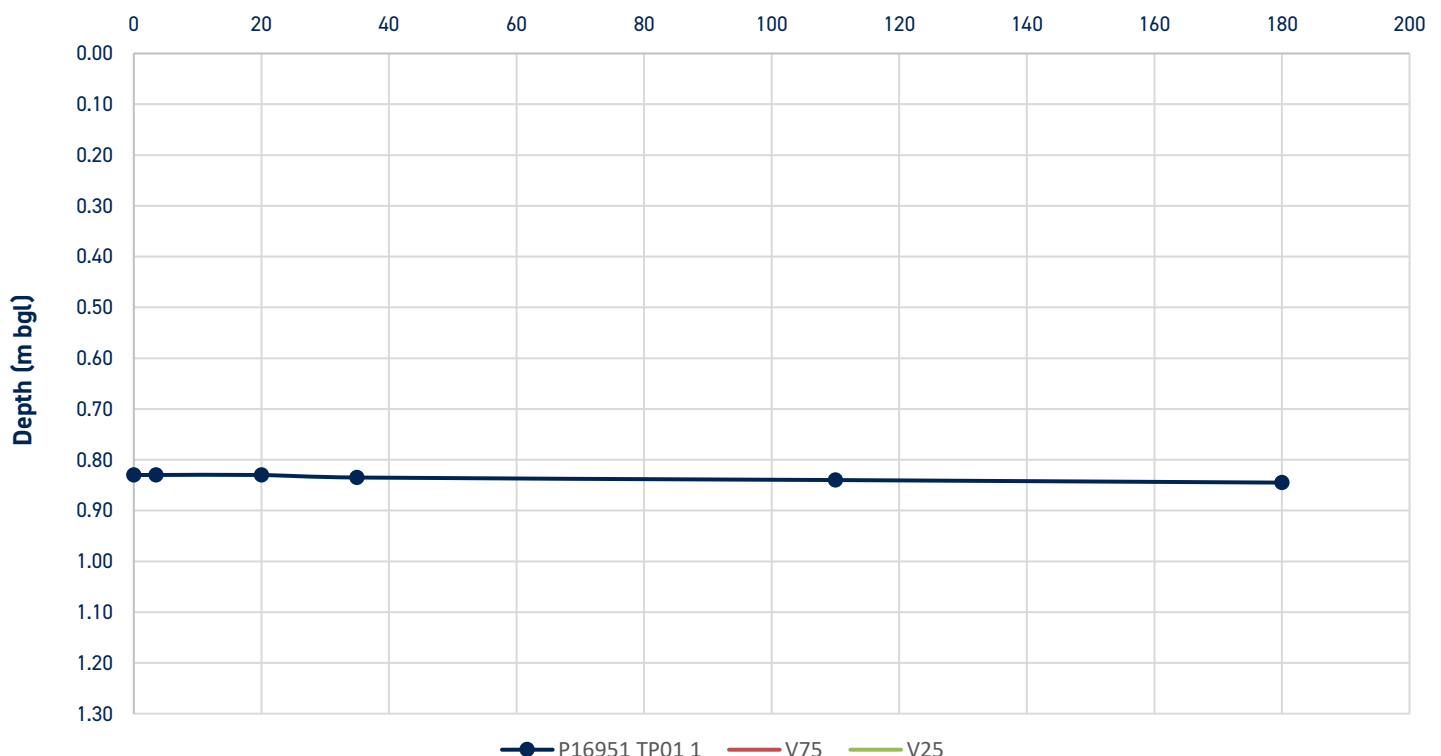
Volume of water introduced into pit	0.285 m ³	
Initial head of water	0.42 m	h_o
Water level at start of test	0.83 m	
Water level at end of test	0.85 m	
Volume of water discharged from pit	0.010 m ³	
Duration of test	180 min	
Average soaked surface area	2.29 m ²	
Time for water level to fall to 75% of initial head	Not reached min	t_{p75}
Time for water level to fall to 25% of initial head	Not reached min	t_{p25}
Depth to water at 75% of initial head	Not reached m	d_{75}
Depth to water at 25% of initial head	Not reached m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	1.50 m ²	a_{s50}

Infiltration rate

4.08E-07 m/sec f

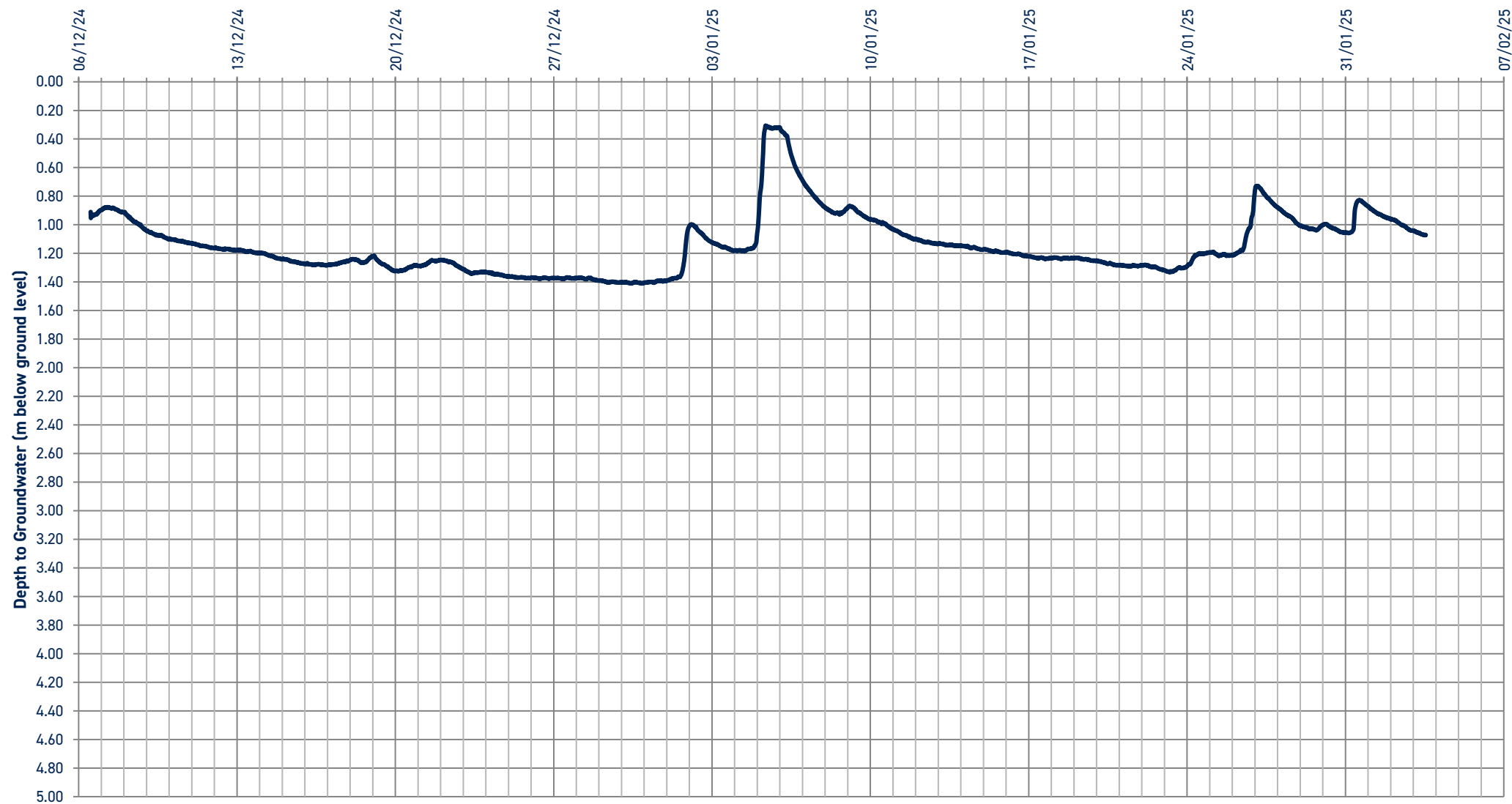
Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.

Elapsed Time (min)



Site: Longacres, Eastergate Lane, Walberton, West Sussex

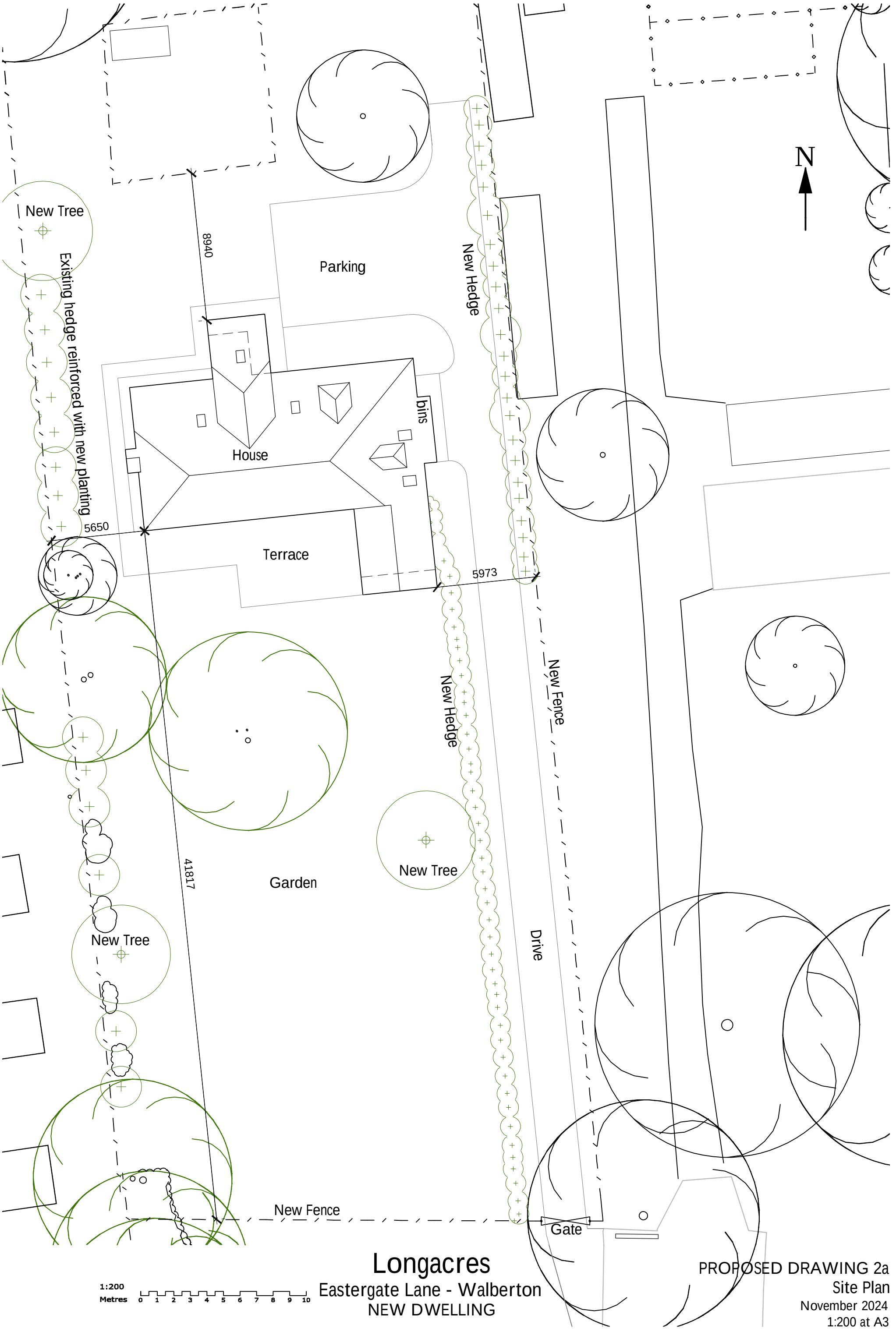
Project Ref: P16951



WS01

Appendix E

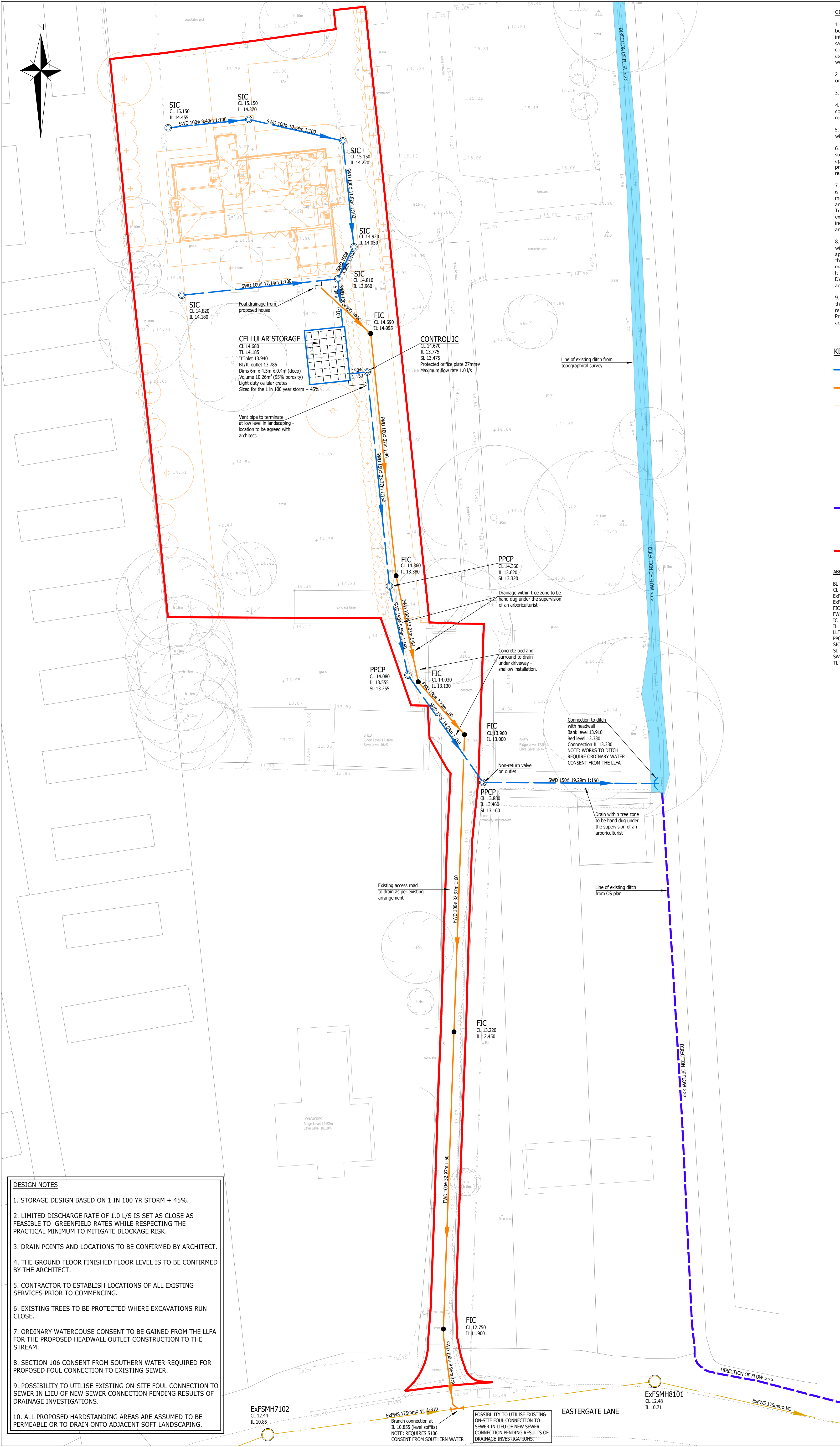
Proposed Scheme Drawings including Drainage Strategy Layout



1:200
Metres
0 1 2 3 4 5 6 7 8 9 10

Longacres
Eastergate Lane - Walberton
NEW DWELLING

PROPOSED DRAWING 2a
Site Plan
November 2024
1:200 at A3



- DESIGN NOTES**
1. STORAGE DESIGN BASED ON 1 IN 100 YR STORM + 45%.
 2. LIMITED DISCHARGE RATE OF 1.0 L/S IS SET AS CLOSE AS FEASIBLE TO GREENFIELD RATES WHILE RESPECTING THE PRACTICAL MINIMUM TO MITIGATE BLOCKAGE RISK.
 3. DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT.
 4. THE GROUND FLOOR FINISHED FLOOR LEVEL IS TO BE CONFIRMED BY THE ARCHITECT.
 5. CONTRACTOR TO ESTABLISH LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCING.
 6. EXISTING TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.
 7. ORDINARY WATERCOUSE CONSENT TO BE GAINED FROM THE LLFA FOR THE PROPOSED HEADWALL OUTLET CONSTRUCTION TO THE STREAM.
 8. SECTION 106 CONSENT FROM SOUTHERN WATER REQUIRED FOR PROPOSED FOUL CONNECTION TO EXISTING SEWER.
 9. POSSIBILITY TO UTILISE EXISTING ON-SITE FOUL CONNECTION TO SEWER IN LIEU OF NEW SEWER CONNECTION PENDING RESULTS OF DRAINAGE INVESTIGATIONS.
 10. ALL PROPOSED HARDSTANDING AREAS ARE ASSUMED TO BE PERMEABLE OR TO DRAIN ONTO ADJACENT SOFT LANDSCAPING.

- 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 & 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. 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.

- KEY**
- Surface water drain
 - Foul drain
 - Existing foul sewer (from records)
 - SIC
 - PPCP
 - FIC
 - Existing watercourse (from topo)
 - Existing watercourse (from OS plan)
 - ExFSMH
 - Existing foul sewer manhole (from records)
 - Site boundary

- ABBREVIATIONS**
- | | |
|--------|----------------------------------|
| BL | BASE LEVEL |
| CL | COVER LEVEL |
| ExFSMH | EXISTING FOUL SEWER MANHOLE |
| ExFWS | EXISTING FOUL SEWER |
| FIC | FOUL INSPECTION CHAMBER |
| FWD | FOUL DRAIN |
| IC | INSPECTION CHAMBER |
| IL | INVERT LEVEL |
| LLFA | LEAD LOCAL FLOOD AUTHORITY |
| PPCP | POLYPROPYLENE CATCHPIT |
| SIC | SURFACE WATER INSPECTION CHAMBER |
| SL | SUMP LEVEL |
| SWD | SURFACE WATER DRAIN |
| TL | TOP LEVEL |

P1	INITIAL ISSUE	25/02/25	JR	PW
Rev	Amendments	Date	Dsn	Chk
Status				
PRELIMINARY				
Client				
MR AND MRS PEARCE				
Architect				
DOUGLAS BRIGGS PARTNERSHIP				
Project				
LONGACRES EASTERGATE LANE				
Title				
SITE DRAINAGE STRATEGY				
Date		Scale @ A1	1:200	
FEBRUARY 2025				
Clients Ref.		Project Ref.	13467	
 Civils & Transport Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD Tel:01444 871444 Web: www.gtacivils.co.uk				
Drawing Number			13467/1101	Rev.
				P1

Appendix F

Drainage Calculation Sheets

Calculated by:

Florence Van Vaerenbergh

Site name:

Longacres

Site location:

Eastergate Lane

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.

Site Details

Latitude:

50.84779° N

Longitude:

0.64071° W

Reference:

1842943779

Date:

Feb 27 2025 10:02

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

1

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	779	779
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.19	0.19
1 in 1 year (l/s):	0.16	0.16
1 in 30 years (l/s):	0.44	0.44
1 in 100 year (l/s):	0.61	0.61
1 in 200 years (l/s):	0.71	0.71

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at 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 www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of 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, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Depth (m)
CONTROL M/HOLE	0.019	5.00	0.0	14.160	Manhole	0.565

Simulation Settings

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

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	0	0
30	40	0	0				

Node CONTROL M/HOLE Online Orifice Control

Flap Valve	x	Invert Level (m)	13.595	Design Flow (l/s)	1.0	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Depth (m)	0.750	Diameter (m)	0.027		

Node CONTROL M/HOLE Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	13.595
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	184

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	27.0	0.0	0.400	27.0	0.0	0.401	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	CONTROL M/HOLE	120	13.683	0.088	1.4	2.2785	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute summer	CONTROL M/HOLE	Orifice	0.4

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	CONTROL M/HOLE	94	13.896	0.301	5.6	7.8048	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
120 minute summer	CONTROL M/HOLE	Orifice	0.8

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	CONTROL M/HOLE	98	14.053	0.458	5.0	10.4024	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
120 minute winter	CONTROL M/HOLE	Orifice	1.0



Civil Engineering - Transport Planning - Flood Risk

GTA Civils & Transport, Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD

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