

Flood Risk Assessment & Drainage Strategy Report

Glebe Road Letchworth

Date: July 2025

Project No.: 204702

Report Reference: 204702-SWH-ZZ-01-DR-RP-9200

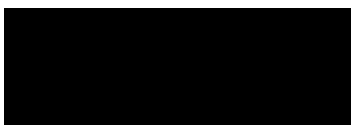
Revision: 01

Prepared by:



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Senior Engineer

Reviewed by:



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Technical Director

	Structural Engineering
	Civil Engineering
	CDM Consultants
	Sustainability and BREEAM
	Traffic and Transport
	Flood Risk Assessments
	Highway Engineering
	Event Engineering

Issue and Amendment Record:

Revision	Comment/Amendment	Prepared	Reviewed	Approved	Date
00	First Issue	MJH	JD	JD	Jan 25
01	Layout Update	MJH	JD	JD	July 25

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1.0 Introduction

- 1.1** Scott White and Hookins have been instructed by Wheatley Group Developments Ltd to undertake a flood risk assessment of a proposed development at Glebe Road, Letchworth. This flood risk assessment has been produced as a supporting document for a planning application and takes the form of a desk study.
- 1.2** The existing site is currently comprises a light industrial building which is divided into separate commercial units. There is a parking area to the rear of the building and a small area of landscaping in front of the building. Access is gained from Glebe Road along the north-west site boundary. The proposed development comprises nine new residential properties with an associated access road and landscaping. The industrial building is proposed to be demolished. A location plan is provided in **Appendix A**. Proposed site plans are given in **Appendix B**.
- 1.3** On the basis of the proposed development the scheme is classed as 'More Vulnerable' under table 2 of the NPPF. On this basis development is considered appropriate for flood zone 1 and 2 only. This site meets the sequential test criteria, and an exception test is not required.

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
FZ1			X		
FZ2		ETR			
FZ3a	ETR		ETR		
FZ3b	ETR				

Green – Development appropriate.

Red- Development not permitted.

ETR – Exception test required to allow development.

- 1.4** This report considers the flood risk to the proposed development and the impact that the development will have in relation to flooding of adjacent areas and watercourses. It also considers any limits relating to flooding that are likely to be imposed to allow the development to be undertaken and recommends Sustainable Urban Drainage systems (SuDS) to control surface water runoff.
- 1.5** This report takes into account the requirements of NPPF and local policies and is based on Environment Agency flood mapping and Anglian Water records.
- 1.6** Local Planning Policy is contained within the North Hertfordshire Local Plan 2011-2031. Relevant planning policies are NE7: Reducing flood risk and NE8 Sustainable drainage systems. See **Appendix L**.
- 1.7** This report is for the private and confidential use of the client and its agents and may not

be copied in whole or in part without the written permission of Scott White and Hookins.

2.0 Existing Site Conditions

- 2.1 The site is located adjacent to Glebe Road, Letchworth Garden City, SG6 1DU, centred on grid reference TL 22299 33373, and is approximately 0.98 ha in size. A location plan is given in **Appendix A**.
- 2.2 The site currently comprises light industrial unit building. The site is surrounded by residential properties to the north and east, a car repair workshop and dealership to the west, and commercial/industrial properties to the south. An aerial view of the site is given in **Appendix A**.
- 2.3 A topographic survey has been undertaken by CSL Surveys dated December 2015. The survey shows the site falls in a south-west direction with levels ranging between 70.40m along the southern boundary and 73.75m AOD in the north-east corner of the site. A copy of the survey is enclosed in **Appendix C**.
- 2.4 A drainage survey was undertaken by Subadra in August 2017, see **Appendix D**. The survey shows the building discharges to two soakaways located in the southern portion of the site. Surface water drainage from the hardstanding areas is collected via a series of gullies which then discharge to two additional soakaways in the south part of the site. Foul drainage from the building discharges to a foul sewer in Glebe Road.
- 2.5 Anglian Water asset plans in **Appendix E** show therefore is a 225mm surface water sewer which runs parallel to the northern boundary. There is a 225mm foul sewer which runs westwards in Glebe Road.
- 2.6 The British Geological Survey records for the site indicate that the site is likely to be underlain by diamicton of the Lowestoft Formation in the north part of the site. The site is unlikely to be underlain by superficial deposits for the remainder of the site. It is likely the site is underlain with chalk of the Holywell Chalk Formation at depth. See **Appendix F**.
- 2.7 The site is underlain by a principal bedrock aquifer and is in Zone 2 of a Source Protection Zone (SPZ). Source Protection Zones (SPZs) identify areas of land through which water infiltrates into a groundwater borehole, well or spring that is used for public drinking water supply. These zones show the risk of contamination from potential pollution. SPZ2 is defined by a 400 day travel time from a point below the water table with a default minimum radius of 250 metres around the source.
- 2.8 An Environmental Investigation Report was undertaken by Subadra in September 2017. Made Ground (MG) was encountered to between 1.1 and 2.6m depth with Chalk below. Low concentrations of PAHs in the Made Ground was identified and therefore localised remediation of MG material is recommended in areas of the site proposed for gardens/landscaping. No groundwater was encountered up to 8m below ground level.
- 2.9 An extensive assessment of the infiltration characteristics of the Holy Chalk Formation

have been undertaken. The results are provided in **Appendix G** but are summarised below.

Trial Pit Number	Depth (m)	Infiltration (Lowest Value) m/s
TP1	2.40	4.8×10^{-5}
TP2	1.95	1.8×10^{-4}

- 2.10** The infiltration rates obtained indicate that infiltration via a soakaway within the chalk layer is feasible. Density testing of the chalk was also undertaken. Test results revealed the chalk has a “high” density, see results in **Appendix G**.

3.0 Potential Flood Risk Affecting the site

3.1 Fluvial Flooding (overtopping of watercourses)

- 3.1.1 Flood plain mapping provided by the Environment Agency (EA) indicates that the site lies in Flood Zones 1 – Low probability of flooding from rivers. See extract of flood maps in **Appendix H**.

3.2 Surface Water Flooding

- 3.2.1 The EA surface water flood map shows the site is at very low and low risk of surface water flooding. The low flood risk areas are confined to the low lying footpath adjacent to the existing building.
- 3.2.2 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure such as culverts which are present in the area. Consequently the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

3.3 Groundwater Flooding

- 3.3.1 The Site Investigation Report undertaken by Subadra encountered no groundwater up to 8m below ground level. The risk of groundwater flooding is low.

3.4 Reservoir Flooding

- 3.4.1 EA flood maps indicate the site is not at risk of flooding in the event of a breach from reservoirs.

3.5 Sewer Flooding

- 3.5.1 Anglian Water has confirmed there have been incidences of records of flooding in the vicinity of the site. Their response is enclosed in **Appendix E**. Provided AW maintain and upgrade the sewers where necessary then the risk of flooding will be minimised.

3.6 Historical Flooding

- 3.6.1 The Level 1 Hertfordshire County Council Strategic Flood Risk Assessment (2022) holds no flood records for the site.

- 3.7 Our assessment of the above flood risks indicates that there is a risk of flooding from groundwater. The risk of flooding from other sources is considered to be low.

4.0 Flood Mitigation and Outline Drainage Proposals

4.1 Flood Mitigation

- 4.1.1 It is recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from buildings in such a scenario.

4.2 Surface Water Drainage

- 4.2.1 Based on the drainage hierarchy stated in paragraph 2.3 of **Appendix L**, the preferred method for disposal of surface water from the new development is infiltration into the ground.
- 4.2.2 Ground Investigation data indicates that the site is underlain by Made Ground comprising underlain by bedrock of the Holywell Nodular Chalk Formation at 1-1.5m bgl. Infiltration testing has confirmed that chalk with suitable infiltration characteristics is present on the site.
- 4.2.3 On the basis of the above the following drainage options are considered to be appropriate for this site:

Device	Description
Rain Gardens	Elements of landscaping designed to accommodate small areas of discharge close to source.
Infiltration devices & Soakaways	Attenuation of flows and allow water to percolate into the ground via natural infiltration. Forms can include chambers, cellular tanks and trenches.
Permeable surfaces	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate into permeable soils or discharge to sewers.
Proprietary Treatment Systems	Petrol interceptors, silt traps and similar devices used as part of an overall SUDS scheme to provide pollution control prior to discharge.

- 4.2.4 A soakaway comprising geocellular crates covering an area of 42m² and 1.2m deep is able to drain the whole development area with no flooding in a 1 in 100 year storm event +40% allowance for climate change, see drainage design calculations are enclosed in **Appendix I**. The total building roof area is 534m² and access road area 592m². An urban creep allowance of 10% was applied to the total roof area in the preliminary design calculations. A conservative infiltration rate of 4.8x10⁻⁵ m/s was also used. Permeable paving is proposed for the access road and parking bays with the subbase graded to fall

towards the location of the soakaway. The soakaway is positioned a minimum 5m away from the proposed dwellings.

4.2.5 A proposed drainage layout is enclosed in **Appendix J**.

4.2.6 Protection of /groundwater from pollution is covered in Chapter 26 of CIRIA SuDS Manual C753. Due to the limited extent of the surface water catchment from the development i.e., rainwater from roofs and non-residential parking areas, we can utilise the "simple qualitative method" described in this chapter (cl. 26.7.1) where we may select **"SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index"**, Table 26.2 & 26.4 (groundwater) CIRIA refers.

Pollution Hazard (Indices method)				
Area	Pollution Hazard	TSS	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Low traffic roads and parking	Low	0.5	0.4	0.4

Note – Please see CIRIA SUDS manual for full descriptions.

Pollution Mitigation (Indices method)			
Area - Whole site			
Component	TSS	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7

Note – Please see CIRIA SUDS manual for full descriptions.

4.2.7 Driveways and low traffic roads have a low risk of pollution. Permeable pavements offer sufficient pollution mitigation and are considered acceptable (Table 26.3 and 26.4 CIRIA).

4.2.8 To ensure drainage elements function correctly, maintenance of drainage should be covered by a suitable management company and subject to a regular maintenance regime. Maintenance of SuDS to be in accordance with CIRIA SuDS manual C753 where specific intervals are advised within the document as per element type. A summary of these are present in **Appendix K**.

5.0 Summary and Recommendations

- 5.1 This Flood Risk Assessment (FRA) has been prepared by Scott White and Hookins to support a planning application for nine residential dwellings at Glebe Road, Letchworth.
- 5.2 This FRA concludes that the site is at low risk from all sources of flooding.
- 5.3 The surface water drainage strategy is infiltration into the ground. Attenuation will be provided through a soakaway and permeable paving in the access road and parking areas.
- 5.4 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

6.0 Appendices

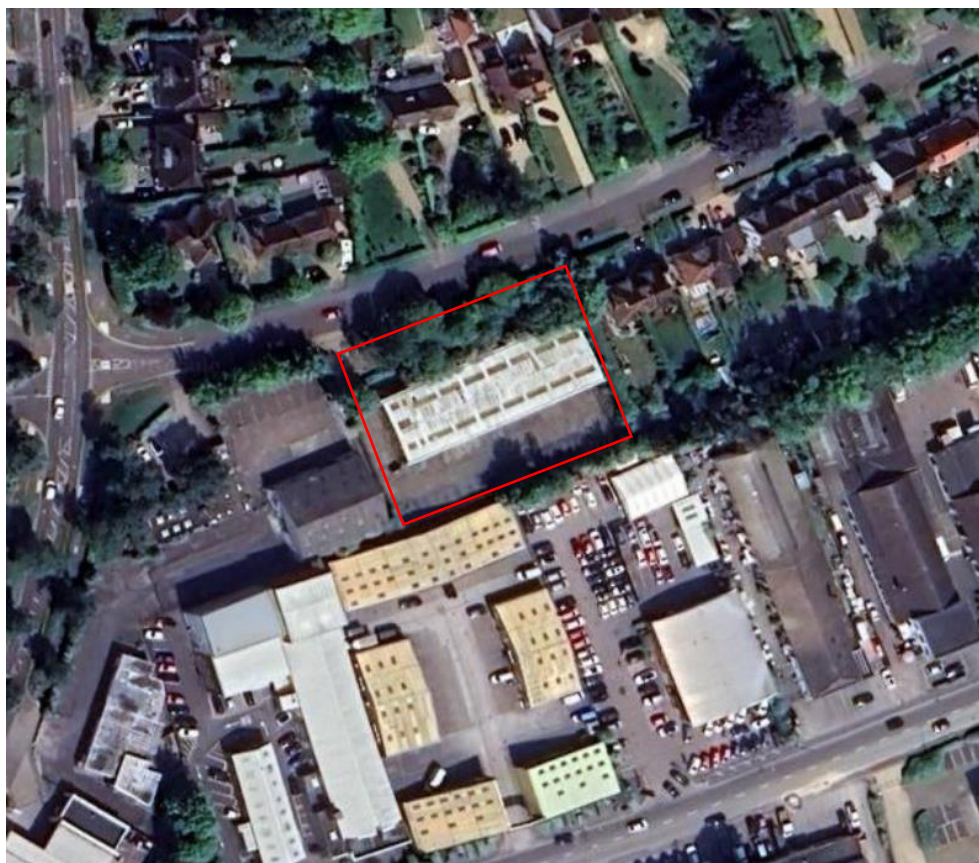
- A. Site Location Plan**
- B. Proposed Site Plan**
- C. Existing Topographic Survey**
- D. Existing Drainage Layout**
- E. Anglian Water Records and Correspondence**
- F. British Geological Survey Records**
- G. Site Investigation Report Extracts**
- H. Flood Map Extracts**
- I. Drainage Design Calculations**
- J. Proposed Drainage Scheme**
- K. SW Drainage Maintenance Schedule**
- L. Local Drainage Planning Policy applicable to the development**

Appendix A

Site Location Plan



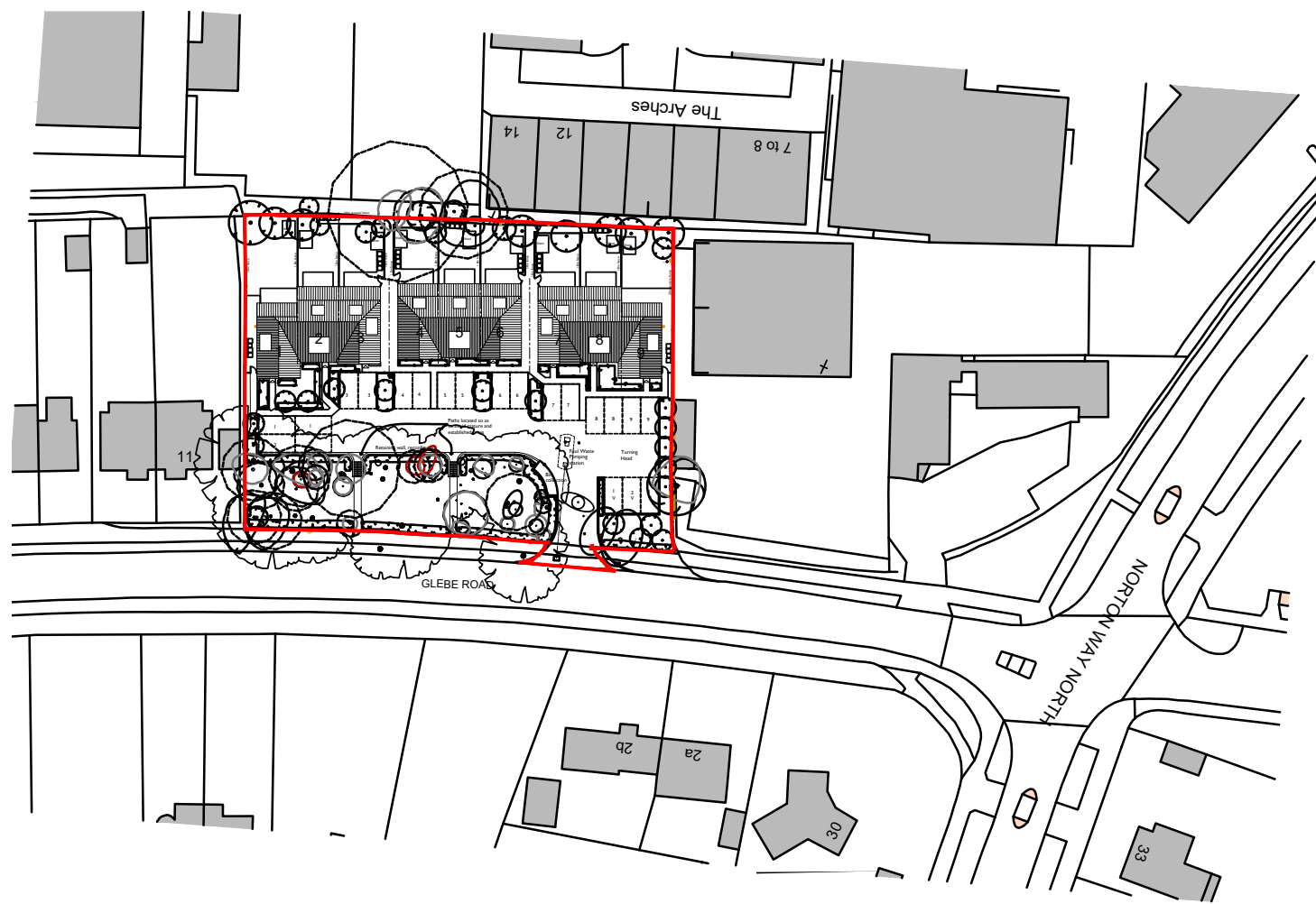
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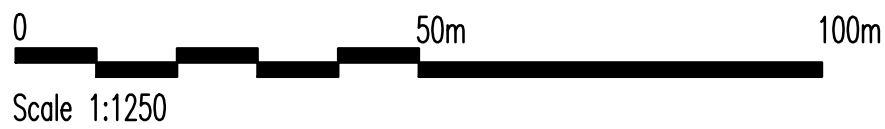
Aerial photograph of existing site

Appendix B

Proposed Site Plan



Proposed Location Plan
1:1250 scale



Materials

Hard landscaping:
Permeable paving, block keyblock pavours to car parking areas, colour to selection.

Saxon textured paving to pedestrian areas and to rear terrace areas.

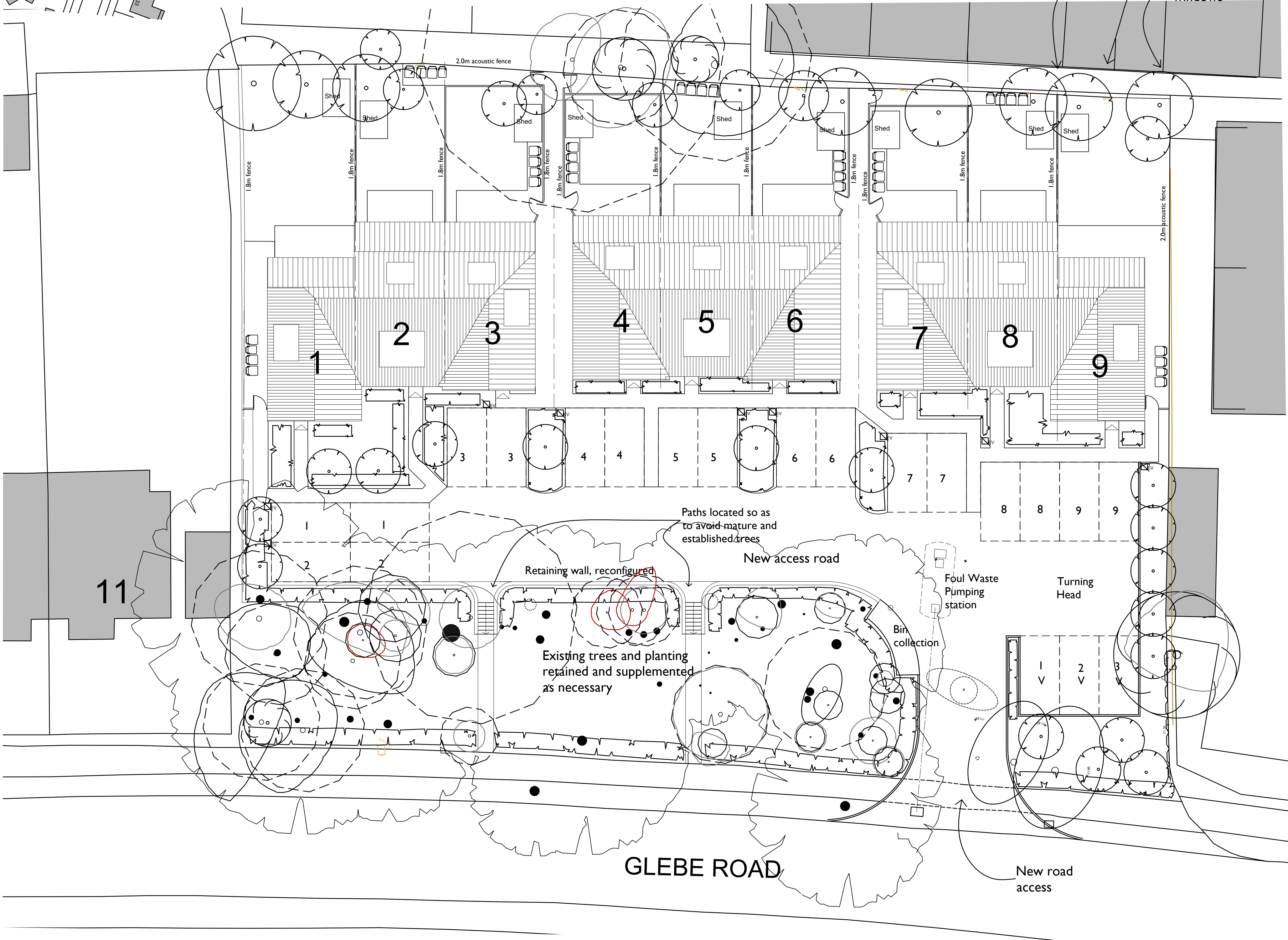
1.8 m close-boarded fenced where noted.

Additional Landscaping Items:
Bird boxes to appropriate facing external walls.

Bat boxes to appropriate facing external walls.

Garden sheds to accommodate secure cycle storage.

 EV charging points



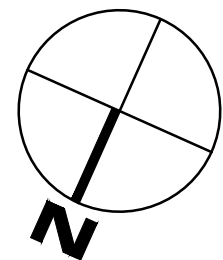
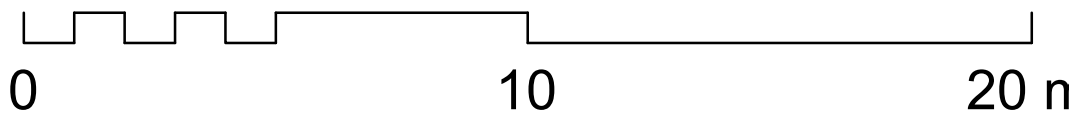
Proposed Site and Roof Plan
1:200 scale

DIMENSIONS TO BE CHECKED ON SITE BEFORE ANY WORKS. ANY QUERIES REGARDING DIMENSIONS TO BE TAKEN UP WITH PENTANGLE DESIGN GROUP.

ALL DIMENSIONS OF EXISTING BUILDINGS TO BE VERIFIED ON SITE.

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NOTES



PLANNING

PENTANGLE

DESIGN GROUP

SUITE 1, 21 BANCROFT HITCHIN HERTS SG5 1JW
TEL:01462 431133 E:PDGPENTANGLEDESIGN.CO.UK

JOB TITLE

Proposed Residential Development
at Glebe Road Industrial Estate,
Letchworth Garden City

DRAWING TITLE

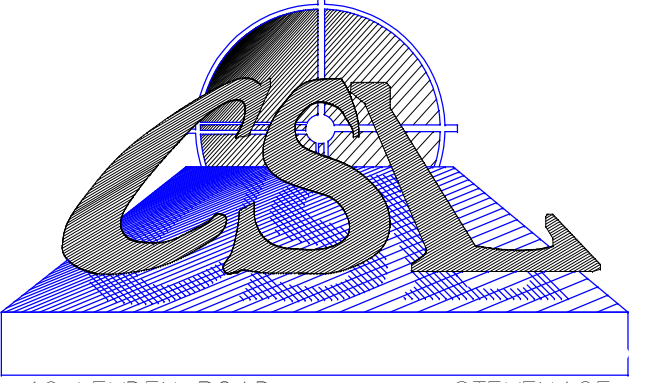
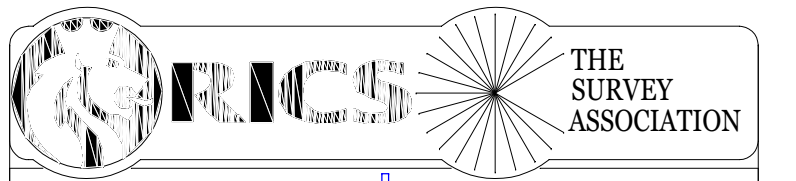
Proposed Site Plan and Location Plan

SCALE	DRAWING NUMBER	REVISION
1:200	60	D
DATE	SHEET	
April '25	A2	
JOB NUMBER		
3879		

ARCHITECTS & INTERIOR DESIGNERS

Appendix C

Existing Topographic Survey



16 LEYDEN ROAD STEVENAGE
HERTFORDSHIRE SG1 2BP
TEL 0143 872 844 FAX 0143 874 2435
email mail@cs1-surveys.co.uk
http://www.cs1-surveys.co.uk

Project
**GLEBE ROAD INDUSTRIAL
ESTATE,
LETCWORTH, SG6 1BT**

Title
TOPOGRAPHICAL SURVEY

Client
DESIGN TEAM CONSULTANTS

Project No 23415TH

Drawing No. 1 of 1 Rev F0

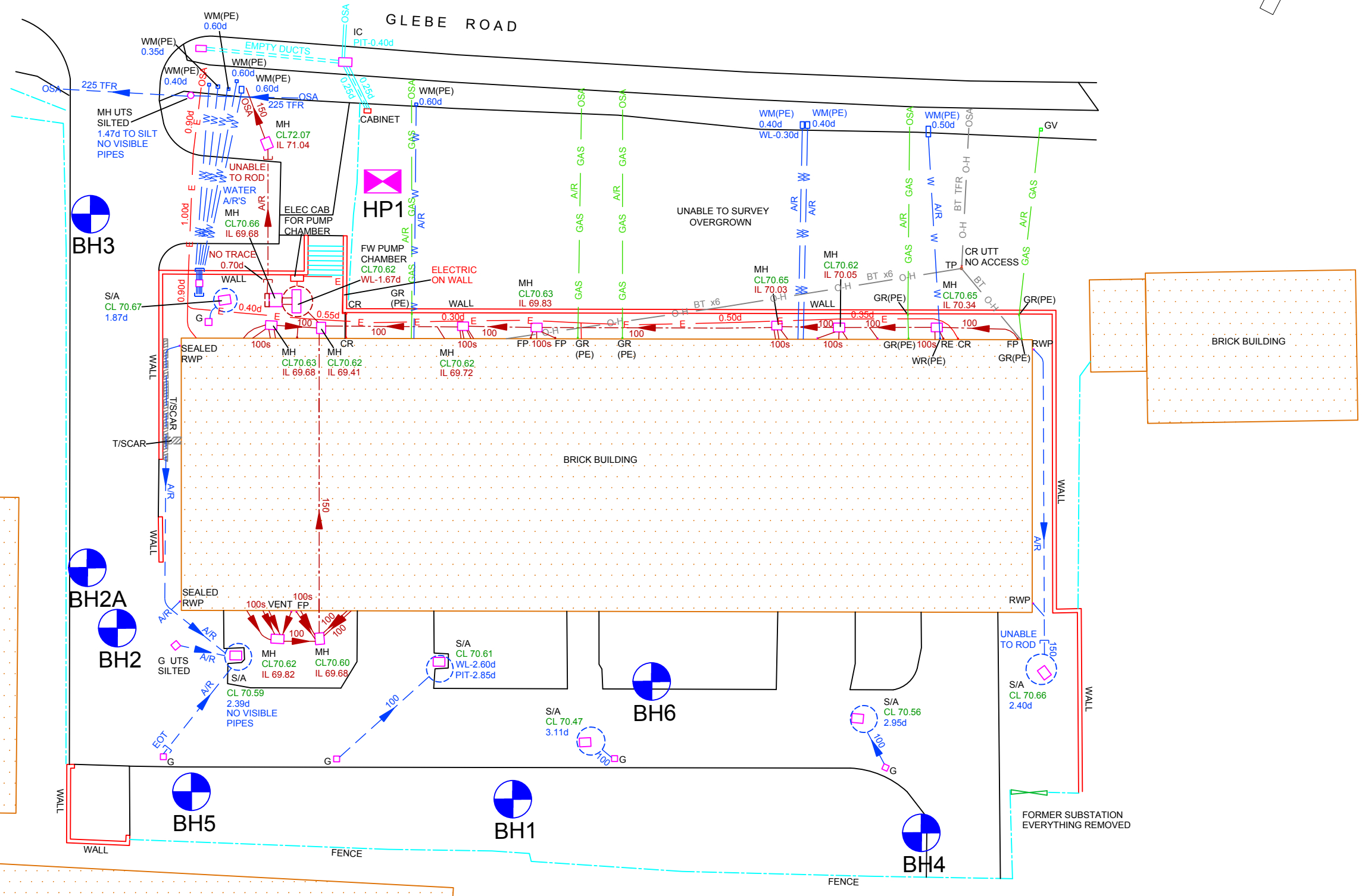
Scale 1:100 @ A0 Date DECEMBER 2015

All levels related to OSGB36 using GPS

Appendix D

Existing Drainage Layout

**Unit 13, Triangle Business Park
Stoke Mandeville, Bucks HP22 5BL
Tel. 01296 739400 Fax. 01296 739401**

[illegible]

A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

[illegible]

REV	DATE	DESCRIPTION

CLIENT	Letchworth Garden City Heritage Foundation
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WYE LOCATION:

Glebe Road Ind.Est.
Glebe Road
Letchworth Garden City

DRAWING TITLE: Borehole location plan

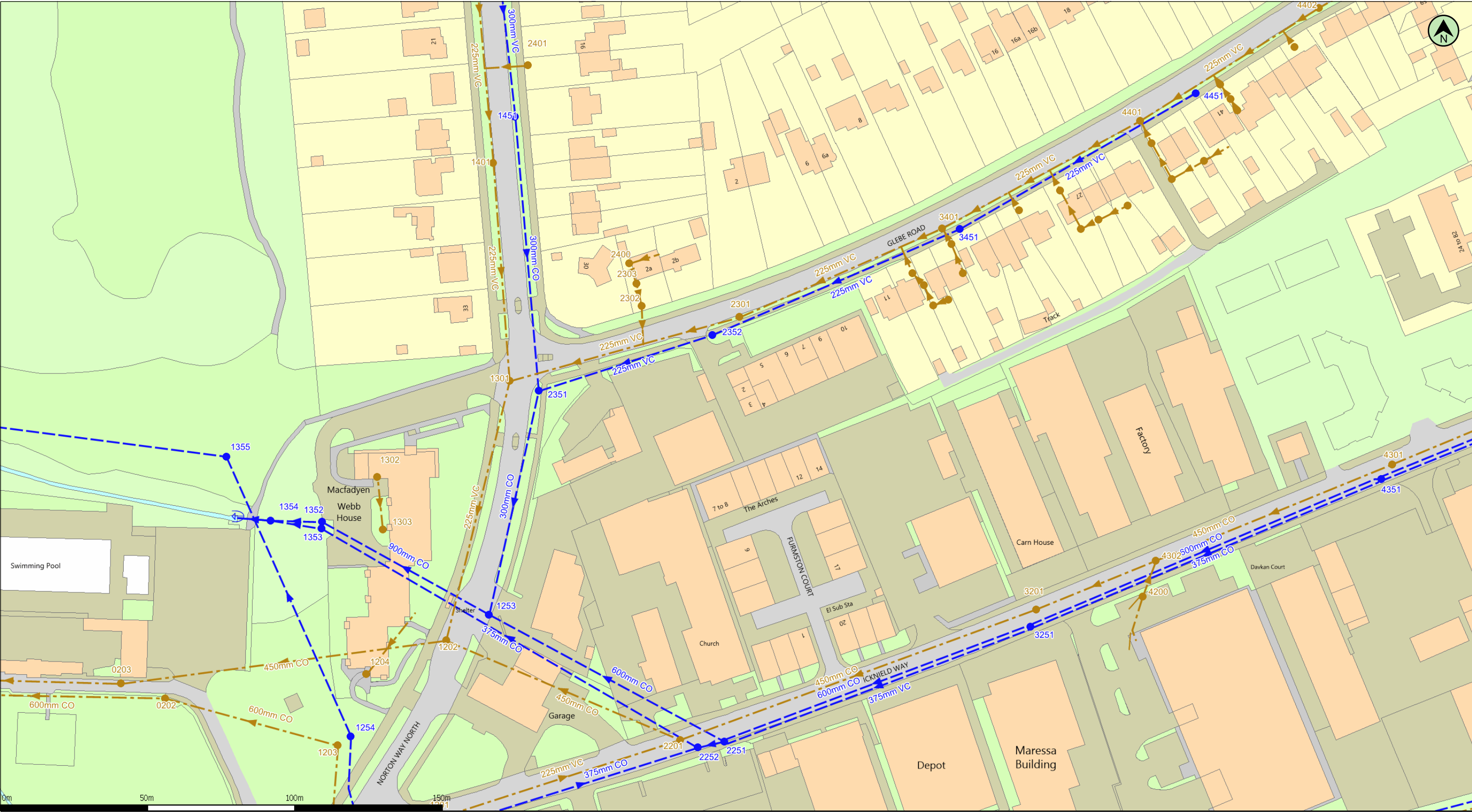
SURVEYED BY: SVS	DRAWN BY: GR	APPROVED BY: JS
DRAWING NO.:	SURVEY DATE:	

IN17568_DR001_Site_Plan	03-08-17
	SHEET NO: 1 OF 1

DISCLAIMER: The location of under ground services shown on this drawing has been determined using electro-magnetic (and/or ground probing radar, where requested) techniques and visual observations. The limitations of this drawing should be realised and no guarantee can be given that all services have been identified. This drawing may not include the location of all public services that may cross the site and therefore the relevant service drawings should be obtained from the appropriate utility company and used in conjunction with this drawing. Additional services, structures or other below ground obstructions not indicated on this drawing may be present on site. Reference should be made to historical plans and as built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document "avoiding dangers from underground services". Location accuracy is determined by referring to manufacturers guidelines for the systems deployed. Reference should be made to the latest version of SYS Ltd site procedures document for utility location surveys.

Appendix E

Anglian Water Records and Correspondence



(c) Crown copyright and database rights 2024 Ordnance Survey AC0000813445 Date: 30/09/24 Scale: 1:1250 Map Centre: 522274,233360 Data updated: 31/08/24 Our Ref: 1582309 - 1 Wastewater Plan A3
Powered by digdat

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2024 Ordnance Survey AC0000813445. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer		Outfall*		Sewage Treatment Works	
Surface Sewer		Inlet*		Public Pumping Station	
Combined Sewer		Manhole*		Decommissioned Pumping Station	
Final Effluent					
Rising Main*					
Private Sewer*					
Decommissioned Sewer*					

*(Colour denotes effluent type)

sjenkins@swh.co.uk	
204702	

Michael Hartley

From: Planning Liaison [REDACTED]
Sent: 08 November 2024 11:43
To: Michael Hartley
Subject: RE: Request for Flood Data: Glebe Road, Letchworth

Follow Up Flag: Follow up
Flag Status: Completed

Good Morning Michael,

Anglian Water are able to confirm that there have been instances of flooding within the vicinity of the proposed development. It is also possible that other flooding may have occurred that we do not have records of, other organisations such as the Local Authority, Internal Drainage Board or the Environment Agency may have records.

We recommend you submit a pre planning application form to enable Anglian Water to advise you of any suitable connection points for the proposed development and identify any mitigation that would be required. Further details including the application form can be found on our website.

Kind regards

Maks Zdunek
Pre Development Engineer
[REDACTED]

Team: 07929 786 955



For further information please email us at planningliaison@anglianwater.co.uk or visit our website at:

<https://www.anglianwater.co.uk/developing/planning--capacity/planning-and-capacity/>

From: Michael Hartley [REDACTED]
Sent: 07 November 2024 10:08
To: Planning Liaison [REDACTED]
Subject: Request for Flood Data: Glebe Road, Letchworth

EXTERNAL MAIL - Please be aware this mail is from an external sender - THINK BEFORE YOU CLICK

Dear Sir/Madam

Scott White and Hookins has been commissioned to undertake a Flood Risk Assessment for a redevelopment at Glebe Road, Letchworth Garden City (National Grid Ref: TL 22300 33377). Nearest Post Code: SG6 1DB. Site Location Plan is attached.

Could you please provide us with any information in your possession regarding any incidences of, or possible problems with, flooding associated with foul, surface water and land drainage in the area of the site?

Kind Regards

Michael Hartley :: Senior Engineer

Est.1963

**Scott White
and Hookins**

London :: Bedford :: Winchester



Fountain House, 26 St John's Street, Bedford, Bedfordshire, MK42 0AQ

T: [+44 \(0\)1234 213111](tel:+441234213111) - E: info@swh.co.uk - W: www.swh.co.uk

Structural Engineering :: Civil Engineering :: CDM Consultants :: Sustainability and BREEAM
Traffic and Transport :: Flood Risk Assessments :: Highway Engineering :: Event Engineering

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The registered office address is Fountain House, 26 St. John's Street, Bedford, Bedfordshire, MK42 0AQ.

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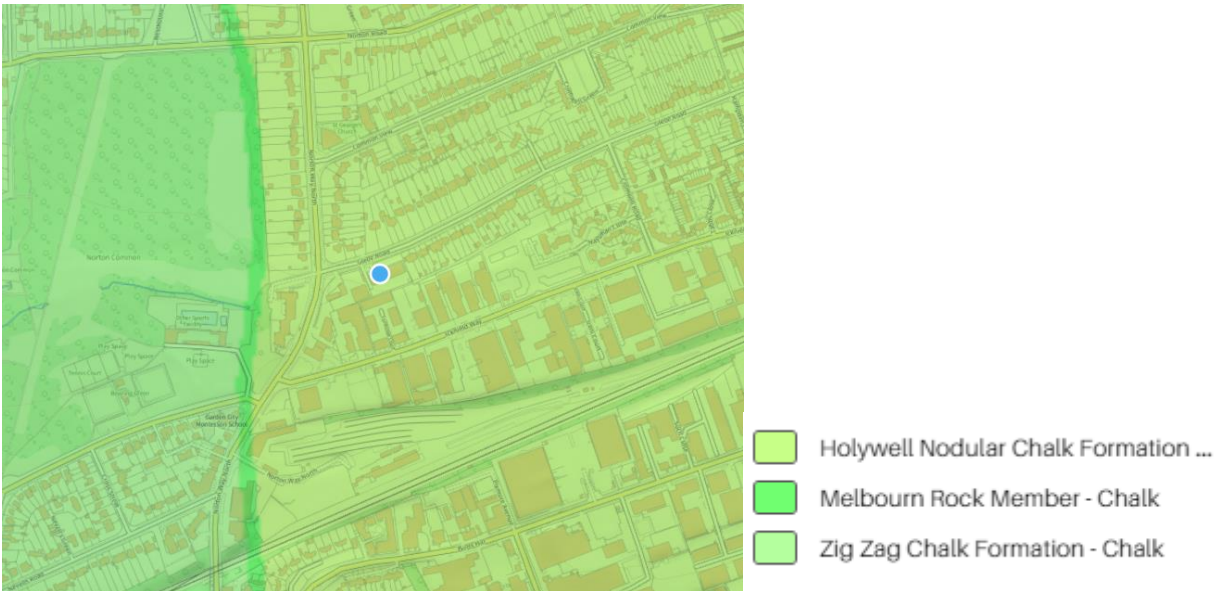
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Appendix F
British Geological Survey Records



Extract of British Geological Survey

Appendix G

Infiltration Testing Report and Results



 LISTERS GEO Geotechnical and Geoenvironmental Consultants		Trial Pit Log				Trial Pit No. TP01		
Project Location: Glebe Road Industrial Estate, Letchworth Garden City, SG8 1BT				Co-ords: 522295E - 233371N Level: Dates: 29/10/2024		Project Number: 24.10.017 Logged By: Kevina Wilds to BS 5930:2015		
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.10	D		0.20		 FILL Orangish brown gravelly SAND. Gravel is fine to coarse sub-angular to sub-rounded of brick tarmac and occasional flint with cobbles of brick.		
	0.50	D		0.90				
	1.25	D		1.55		 MADE GROUND Brown clayey gravelly SAND. Gravel is fine to coarse sub-angular to sub-rounded of flint and brick with occasional brick cobbles.		
	2.00	D		2.40		 HOLYWELL NODULAR CHALK FORMATION Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded medium to coarse GRAVEL. Gravel is weak, low density cream and white chalk. Grade Dc.		
						End of Trial Pit at 2.40m		
Method of excavation: JCB 3CX Dimensions: 0.7m(W) x 1.4m(L) x 2.4m(D)								
Stability: Sides stable								
Groundwater: Not encountered								
Remarks: Co-ords extrapolated from public domain data								
							 ISO 9001 REGISTERED FIRM	
							 Association of Geotechnical & Geoenvironmental Specialists	
Listers Geotechnical Consultants LTD www.listersgeotechnics.co.uk Tel: 01327 860060							Sheet 1 of 1	

				Trial Pit Log				Trial Pit No. TP02	
Project Location: Glebe Road Industrial Estate, Letchworth Garden City, SG6 1BT						Co-ords: 522295E - 233371N Level: Dates: 29/10/2024		Project Number: 24.10.017 Logged By: Kevina Wilds to BS 5930:2015	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth (m)	Type	Result						
	0.08	D		0.15		 FILL Orange brown gravelly SAND. Gravel is fine to coarse sub-angular to sub-rounded of brick tarmac and occasional flint with brick cobbles.			
	0.25	D							
				0.40		 MADE GROUND Firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded flint and sandstone with occasional brick.			
	0.70	D							
				1.00		 LOWESTOFT FORMATION Yellowish white slightly clayey slightly silty gravelly SAND (loose). Gravel is fine to coarse angular to sub-angular of flint and chalk.		1	
	1.50	D							
				1.95		 HOLYWELL NODULAR CHALK FORMATION Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded medium to coarse GRAVEL. Gravel is weak, low density cream and white chalk. Grade Dc.		2	
						End of Trial Pit at 1.95m		3	
								4	
Method of excavation: JCB 3CX Stability: Sides stable Groundwater: Not encountered Remarks: Density in brackets assessed by ease of excavation. Co-ords extrapolated from public domain data						Dimensions: 0.7m(W) x 1.70m(L) x 1.95m(D).  			
Listers Geotechnical Consultants LTD www.listersgeotechnics.co.uk Tel: 01327 860060								Sheet 1 of 1	

Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG6 1BT

Report No: 24.10.017

Date Tested: 29/10/2024

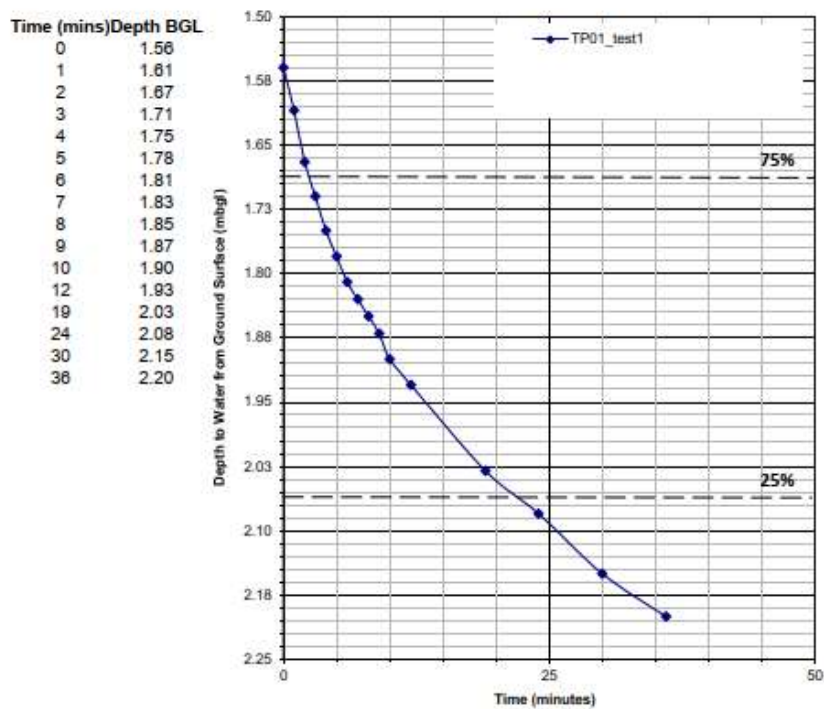
Test Location: TP01_test1

Groundwater: unknown

Dimensions: 0.5mWx1.4mLx2.40mD

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded medium to coarse GRAVEL .
Gravel is weak, low density cream and white chalk. Grade Dc.



Calculated Soil Infiltration Rate, $f = 7.2 \times 10^{-3}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
24.10.017

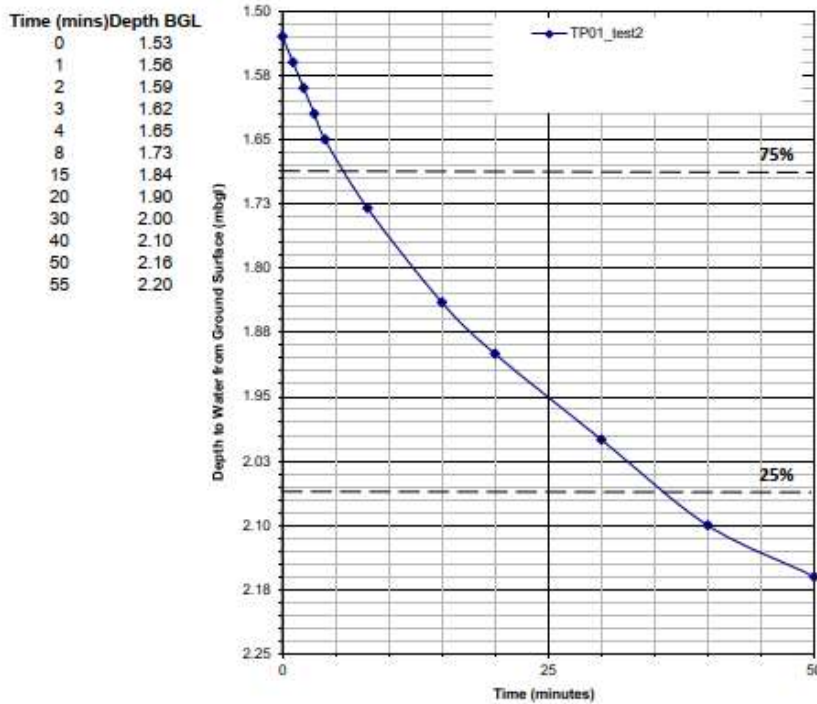
Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG6 1BT

Report No: 24.10.017
Date Tested: 29/10/2024
Test Location: TP01_test2
Dimensions: 0.5mWx1.4mLx2.40mD

Groundwater: unknown

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded medium to coarse GRAVEL .
Gravel is weak, low density cream and white chalk. Grade Dc.



Calculated Soil Infiltration Rate, $f = 4.8 \times 10^{-3}$ m/s

TRIAL PIT INFILTRATION TESTING
to BRE Digest 365

Report:
24.10.017

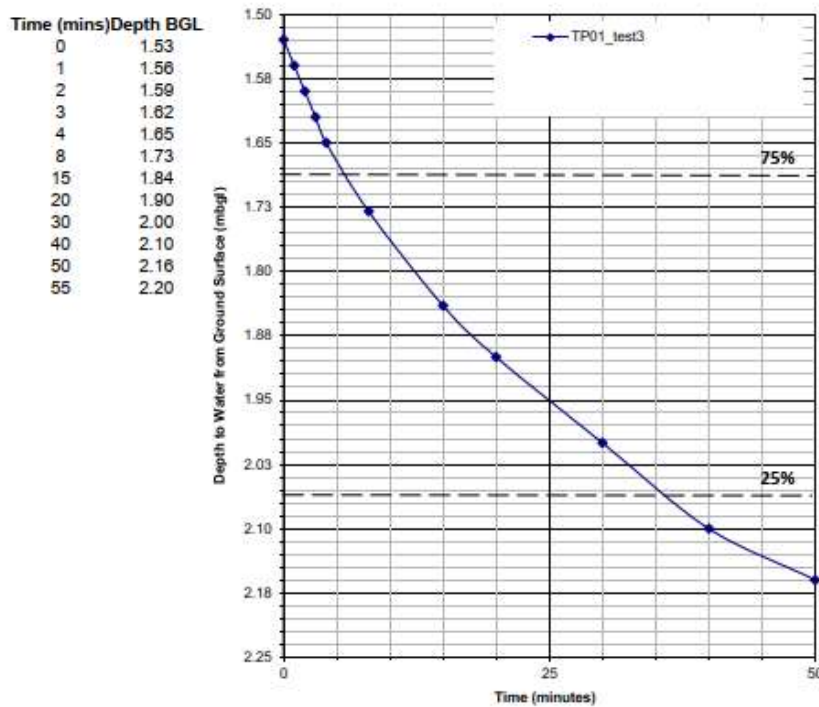
Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG6 1BT

Report No: 24.10.017
Date Tested: 29/10/2024
Test Location: TP01_test3
Dimensions: 0.5mWx1.4mLx2.40mD

Groundwater: unknown

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded medium to coarse GRAVEL .
Gravel is weak, low density cream and white chalk. Grade Dc



Calculated Soil Infiltration Rate, $f = 4.8 \times 10^{-2}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
24.10.017

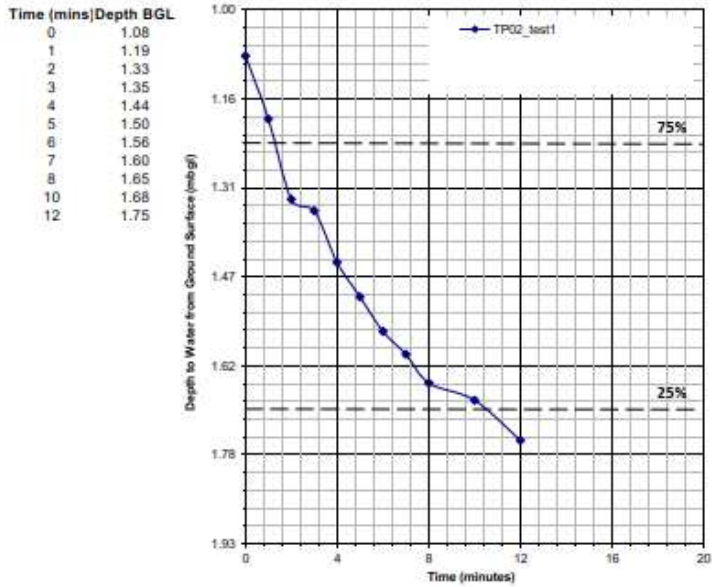
Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG6 1BT

Report No: 24.10.017
Date Tested: 29/10/2024
Test Location: TP02_test1
Dimensions: 0.5mWx1.7mLx1.95mD

Groundwater: unknown

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded mainly medium to coarse GRAVEL. Gravel is weak, low density cream and white chalk. Grade Dc.



Calculated Soil Infiltration Rate. $f = 1.8 \times 10^{-4}$ m/s

TRIAL PIT INFILTRATION TESTING
to BRE Digest 365

Report:
24.10.017

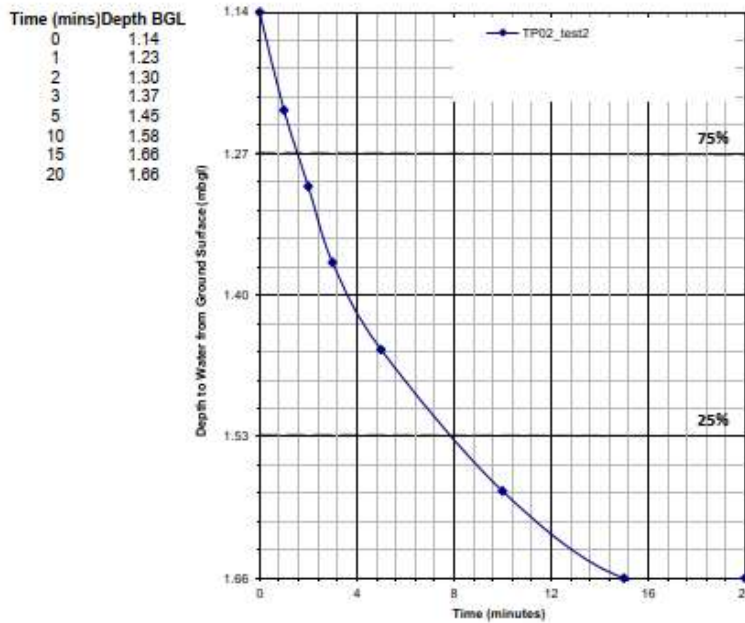
Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG8 1BT

Report No: 24.10.017
Date Tested: 29/10/2024
Test Location: TP02_test2
Dimensions: 0.5mWx1.7mLx1.66mD

Groundwater: unknown

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded mainly medium to coarse GRAVEL. Gravel is weak, low density cream and white chalk. Grade Dc.



Calculated Soil Infiltration Rate, $f = 2.8 \times 10^{-4}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
24.10.017

Site: Glebe Road Industrial Estate, Letchworth
Garden City, SG6 1BT

Report No: 24.10.017

Date Tested: 29/10/2024

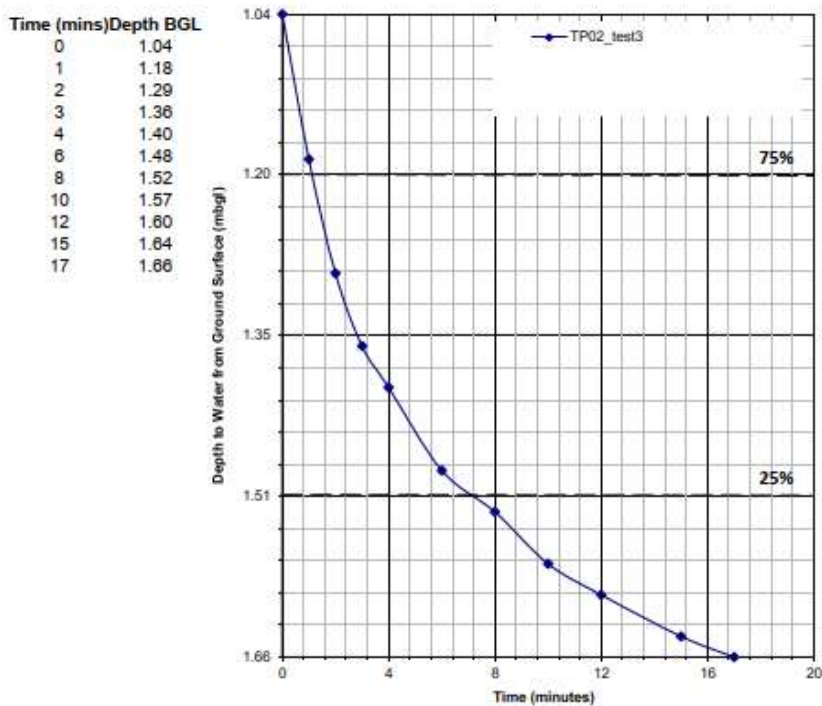
Test Location: TP02_test3

Groundwater: unknown

Dimensions: 0.5mWx1.7mLx1.66mD

Soil Description - test response zone:

Structureless CHALK composed of slightly silty sandy sub-angular to sub-rounded mainly medium to coarse GRAVEL. Gravel is weak, low density cream and white chalk. Grade Dc.



Calculated Soil Infiltration Rate, $f = 3.5 \times 10^{-4}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
24.10.017

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone:- 01327 860947/860060 Email: lab@listersgeotechnics.co.uk

PROJECT INFORMATION		SAMPLE INFORMATION		
Site Location:- Glebe Road Industrial Estate, Letchworth Garden City, SG6 1BT	Client Reference:-	Laboratory Tests Undertaken:-		
		TEST TYPE	TEST METHOD	TESTED
Date Samples Received:- 30 October 2024 Date Testing Completed:- 06 November 2024		Natural Moisture Contents (MC%)	(BS 1377:Part 2:1990 Clause 3.2)	
		Liquid Limits (%)	(BS 1377:Part 2:1990 Clause 4.3)	
		Plastic Limits (%)	(BS 1377:Part 2:1990 Clause 5.3)	
		Plasticity Index (%)	(BS 1377:Part 2:1990 Clause 5.4)	
		Saturated Moisture Content (%)	(BS1377 : Part 2 : 1990, clause 3.3)	✓
		PSD - Wet Sieving	(BS 1377:Part 2:1990 Clause 9.2)	
		Engineering Sample Descriptions	(BS 5930 : Section 6)	
		Passing 425/63 (µm)	-	
		Hydrometer	(BS 1377:Part 2:1990 Clause 9.5)	
		Loss on Ignition (%)	-	
		Soil Suctions (kPa)	BRE Digest IP 4/93, 1993	
		Bulk Density (Mg/m ³)	(BS 1377:Part 2:1990 Clause 7.2)	
		Strength Tests	(BS 1377:Part 7:1990 Clause 8 & 9)	
		Soluble Sulphate Content (SO ₄ g/l)	(BS 1377:Part 3:1990 Clause 5.3)	
pH value	(BS 1377:Part 3:1990 Clause 9.4)			
California Bearing Ratios (CBR)	(BS 1377:Part 4:1990 Clause 7)			
Compaction Tests	(BS 1377:Part 4:1990 Clauses 3.0-3.6)			
The results relate only to the samples tested				
This test-report may not be reproduced, except with full and written approval of GROUNDTECH LABORATORIES		Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001		
Signed on behalf of GroundTech Laboratories:- _____ Technical Signatory				Quality Assured to ISO 9001
GEOTECHNICAL LABORATORY TEST RESULTS				Report No: 24.10.017

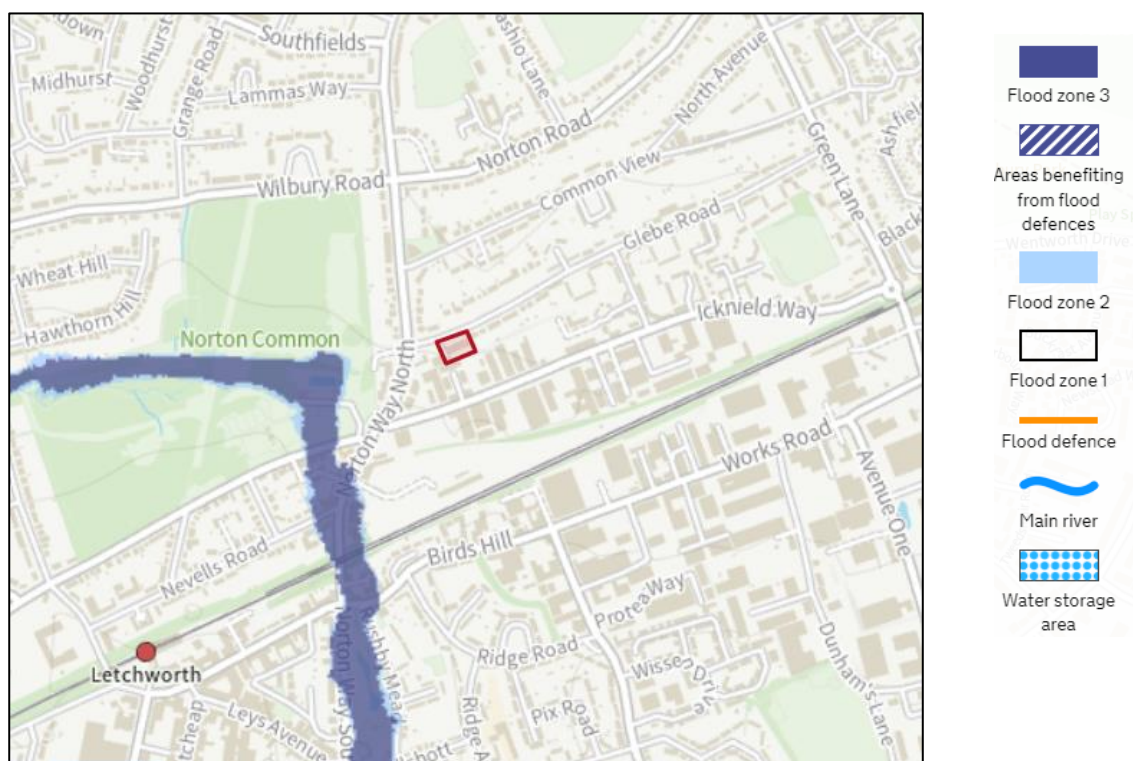
Telephone: 01327 860947/860060 Fax: 01327 860430

Test Location	Sample				Spec Ref.	SWC %	Intact Bulk Density	Intact Dry Density	CIRIA C574 Density Sciae
	Ref	Top	Base	Type			Mg/m³	Mg/m³	
TP 1	1	1.50		D	1	21	2.05	1.72	H
TP 1	2	2.00		D	1	20	2.1	1.76	H
TP 2	3	1.50		D	1	21	2.04	1.72	H
TP 2	4	2.00		D	1	24	1.97	1.63	M
Date 06/11/2024	SATURATION WATER CONTENT						Report No. 24.10.017		L: Low M: Medium H: High VH: Very High
Tested in accordance with BS1377 : Part 2 : 1990, clause 3.3 unless annotated otherwise.									

Appendix H

Flood Map Extracts

River and Sea Flooding



Flood Map For Planning

Flood risk from rivers or the sea

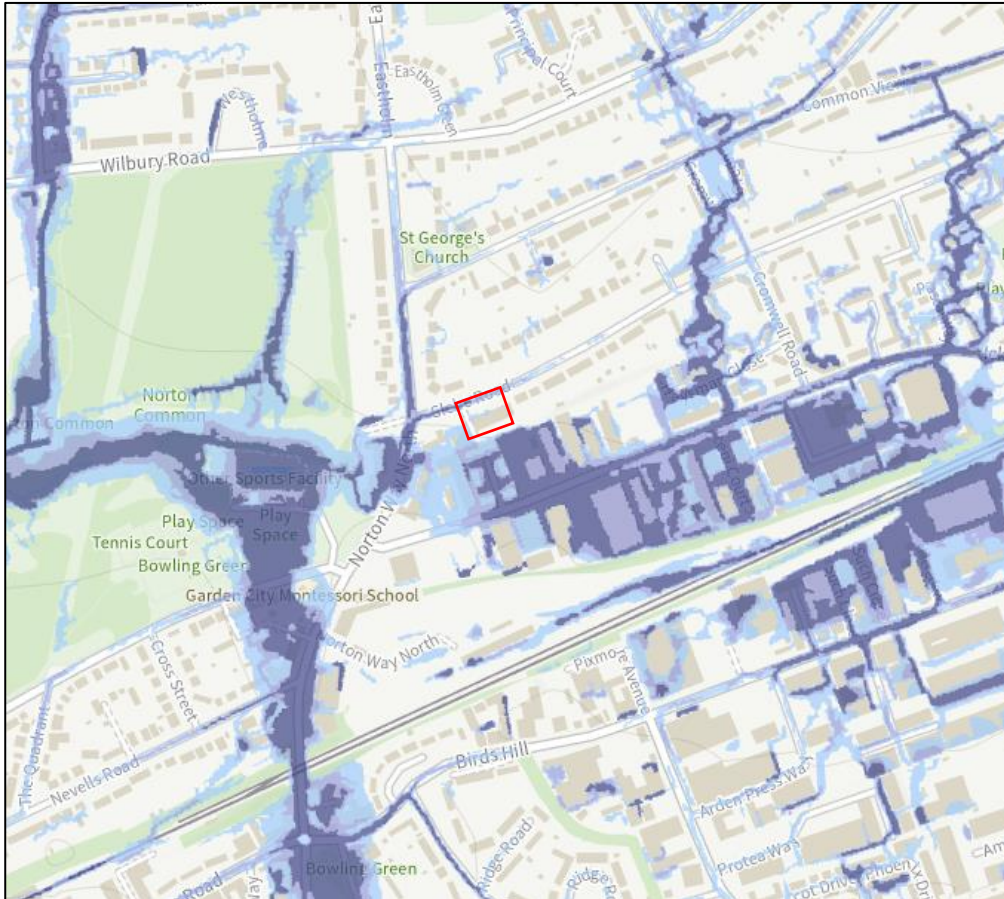
Low Probability (Flood Zone 1) means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium Probability (Flood Zone 2) means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

High Probability (Flood Zone 3) means that each year this area has a chance of flooding of greater than 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or

fail.

Surface Water Flooding



Extent of flooding from surface water

High
 Medium
 Low
 Very low

Flood Map – Surface Water

Flood risk from surface water

Very low risk means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Appendix I

Drainage Design Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Diameter (mm)	Depth (m)
Soakaway	0.118	5.00	70.500	Manhole	600	2.000

Simulation Settings

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

Storm Durations

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

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

Node Soakaway Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.72800	Safety Factor	2.0	Invert Level (m)	68.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	51

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	42.0	42.0	1.200	42.0	42.0	1.201	0.0	42.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC +10% A 15 minute summer	501.547	141.920
100 year +40% CC +10% A 15 minute winter	351.963	141.920
100 year +40% CC +10% A 30 minute summer	322.796	91.340
100 year +40% CC +10% A 30 minute winter	226.523	91.340
100 year +40% CC +10% A 60 minute summer	211.488	55.890
100 year +40% CC +10% A 60 minute winter	140.508	55.890
100 year +40% CC +10% A 120 minute summer	130.691	34.538
100 year +40% CC +10% A 120 minute winter	86.828	34.538
100 year +40% CC +10% A 180 minute summer	99.484	25.601
100 year +40% CC +10% A 180 minute winter	64.667	25.601
100 year +40% CC +10% A 240 minute summer	77.615	20.511

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC +10% A 240 minute winter	51.566	20.511
100 year +40% CC +10% A 360 minute summer	57.488	14.794
100 year +40% CC +10% A 360 minute winter	37.368	14.794
100 year +40% CC +10% A 480 minute summer	44.031	11.636
100 year +40% CC +10% A 480 minute winter	29.253	11.636
100 year +40% CC +10% A 600 minute summer	35.182	9.623
100 year +40% CC +10% A 600 minute winter	24.038	9.623
100 year +40% CC +10% A 720 minute summer	30.680	8.223
100 year +40% CC +10% A 720 minute winter	20.619	8.223
100 year +40% CC +10% A 960 minute summer	24.279	6.393
100 year +40% CC +10% A 960 minute winter	16.083	6.393
100 year +40% CC +10% A 1440 minute summer	16.681	4.471
100 year +40% CC +10% A 1440 minute winter	11.211	4.471
100 year +40% CC +10% A 2160 minute summer	11.337	3.133
100 year +40% CC +10% A 2160 minute winter	7.811	3.133
100 year +40% CC +10% A 2880 minute summer	9.122	2.445
100 year +40% CC +10% A 2880 minute winter	6.131	2.445
100 year +40% CC +10% A 4320 minute summer	6.665	1.743
100 year +40% CC +10% A 4320 minute winter	4.389	1.743
100 year +40% CC +10% A 5760 minute summer	5.406	1.384
100 year +40% CC +10% A 5760 minute winter	3.499	1.384
100 year +40% CC +10% A 8640 minute summer	4.006	1.022
100 year +40% CC +10% A 8640 minute winter	2.585	1.022
100 year +40% CC +10% A 10080 minute summer	3.598	0.918
100 year +40% CC +10% A 10080 minute winter	2.322	0.918

Results for 100 year +40% CC +10% A 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
30 minute winter	Soakaway	31	69.560	1.060	75.8	42.5890	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
30 minute winter		Soakaway	Infiltration	10.1				

Appendix J

Proposed Drainage Scheme

Notes

FLOOD RISK ASSESSMENTS

- This drawing is indicative only and is produced for use in a flood risk assessment.
- This drawing should not be used for design.

Key

○ Proposed SW manhole, Plastic Inspection Chamber (ppic) or Shallow Inspection Chamber (sic).

Proposed SW sewer

RE Rodding eye

df Rainwater diffuser unit

Geocellular Infiltration Soakaway

Permeable Paving

PRELIMINARY - NOT FOR CONSTRUCTION

P02	ARCH GA UPDATED	CW	MH	JD	08.07.25
P01	PRELIMINARY	CW	MH	JD	02.01.25
Rev.	Amendment	Drn.	Chkd.	Appd.	Date

LAND ADJACENT TO GLEBE ROAD,
LETCHWORTH GARDEN CITY

DRAINAGE LAYOUT

Scott White and Hookins
Structural Engineering Civil Engineering Sustainability and BREEAM CDM Consultancy

Scale at A3 1: 250

204702-SWH-ZZ-XX-D-C-0050 P02

Project | Originator | Zone | Level | Type | Role | Number | Rev.

DO NOT SCALE FROM THIS DRAWING

Appendix K

SW Drainage Maintenance Schedule

This schedule sets out the inspection and maintenance requirements for long term management of the development's surface water drainage system. This work is to be undertaken by the Client.

All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The site's infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.

The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on to maintenance operatives through task specific risk assessments.

There are three types of maintenance activities associated with surface water drainage systems.

The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – *'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'*
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'*

SuDS Components Operation and Maintenance Activities

Operation and Maintenance activity	SuDS component (Components shown thus ' Wetland ' are not relevant to the project for which this schedule has been compiled.)												
	Pond	Wetland	Detention basin	Infiltration basin	Sockaway	Infiltration Trench	Filter Drain	Modular Storage	Pervious Pavement	Swale/bioretention/trees	Filter Strip	Green Roofs	Proprietary Treatment Systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

■ Will be required □ May be required

¹ Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Piped Network / Chambers

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Cellular/modular Storage

Cellular Storage Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then annually.
	Remove debris from catchment surface (where may cause risks to performance)	Monthly
	Remove debris from catchment surface (where may cause risks to performance)	Annually or as required
Remedial Maintenance	Repair / rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storm events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of storage units is required.	As required
The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks		

Permeable Pavements

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 year or as required (if infiltration and filtration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and / or weed growth - If required, take remedial action.	Three-monthly, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements		

Appendix L

Local Drainage Planning Policy applicable to the development

National Guidance

- 2.1** The National Planning Policy Framework (NPPF), originally published in 2012 (last updated December 2023) sets out the Government's planning policies for England and how these are expected to be applied by Local Planning Authorities and decision-makers, both in drawing up plans and making decisions about planning applications. Section 14 of the NPPF sets out how the challenges of climate change, flooding and coastal change will be approached through planning and development.
- 2.2** The interpretation of the NPPF is supported by the Planning Practice Guidance (PPG), last updated August 2022. This is a web-based resource which sets out how the government's planning policies are expected to be applied in England. The flood risk and coastal change section of the PPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
- 2.3** Traditionally surface water runoff from developments has been conveyed by pipe systems to the nearest watercourse or sewer. This tends to increase the rate and volume of the run off often leading to flooding downstream of the new development. Latest policy promotes the use of sustainable urban drainage systems (SuDS) whereby the control of run off is to be as close to source as possible. This can be achieved by utilising techniques which mimic the natural drainage processes, the use of direct infiltration for example. The Lead Local Flood Authority will, in general, seek to restrict the allowable discharge from a new development to that previously expected from the undeveloped land.
- 2.4** In terms of what sort of sustainable drainage may be appropriate to consider, the PPG states this will depend on the proposed development and its location, as well as any planning policies and guidance that apply locally. Where possible, preference should be given to multi-functional SuDS, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:
- A soakaway or other infiltration system
 - A watercourse
 - A sewer or drain

The hierarchy is consistent with Building Regulations Part H3.

- 2.5** The Requirements of a Flood Risk Assessment:

- 2.5.1** A Flood Risk Assessment is required in order to ascertain whether a development will exacerbate the risk of flooding elsewhere in the catchment or is at risk of flooding itself.

2.5.2 A site specific FRA is required for developments: -

- in flood zone 2 or 3 including minor development and change of use
- more than 1 hectare (ha) in flood zone 1
- less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
- in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency

Local Policies

2.6 The North Hertfordshire Local Plan 2011-2031 outlines the different requirements of new developments. The requirements of the Local Plan relating to flood risk and drainage states:

2.6.1 Policy NE7: Reducing flood risk

Planning permission for development proposals will be granted provided that (as applicable):

- a) Development is located outside of medium and high-risk flood areas (flood zone 2 and 3) and other areas affected by other sources of flooding where possible;
- b) Where (a) is not possible, application of the sequential and exception tests is demonstrated where development is proposed in areas of flood risk using the Strategic Flood Risk Assessment (SFRA) and Environment Agency flood maps;
- c) A FRA has been prepared in accordance with national guidance that considers the lifetime of the development, climate change impacts and safe access and egress;
- d) It will be located, designed and laid out to ensure the risk of flooding is reduced whilst not increasing flood risk elsewhere;
- e) The impact of any residual flood risk will be minimised through flood resistant, resilient design and construction;
- f) Any flood protection and mitigation measures necessary will not cause harm to nature conservation, heritage assets, and/ or landscape and recreation and, where possible, will have a positive impact in these respects; and
- g) Overland flow routes and functional floodplain areas are protected from all development other than that which is "water compatible" and this must be designed and constructed to remain operational and safe for users during flood events, resulting in no net loss of flood plain storage and not impeding water flows or increasing flood risk elsewhere.

2.6.2 Policy NE8: Sustainable drainage systems

Planning permission for development will be granted provided that:

- a) The most appropriate sustainable drainage solution is used taking into account technical, viability and design issues to reduce the risk of surface water flooding, enhance biodiversity, water quality and provide amenity benefits;
- b) It aims to mimic the natural drainage patterns and processes as far as possible; and
- c) Drainage solutions follow the SuDS hierarchy.