Consulting Civil Engineers

Foul and Surface Water Drainage Statement

3 Tangmere Road, Tangmere, West Sussex PO20 2HW

For

Smith Simmons & Partners

Rev - **P**

Reference **C2893**

Date **26th March 2024**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	26/04/2024	Initial Issue	LH	CS

Contents

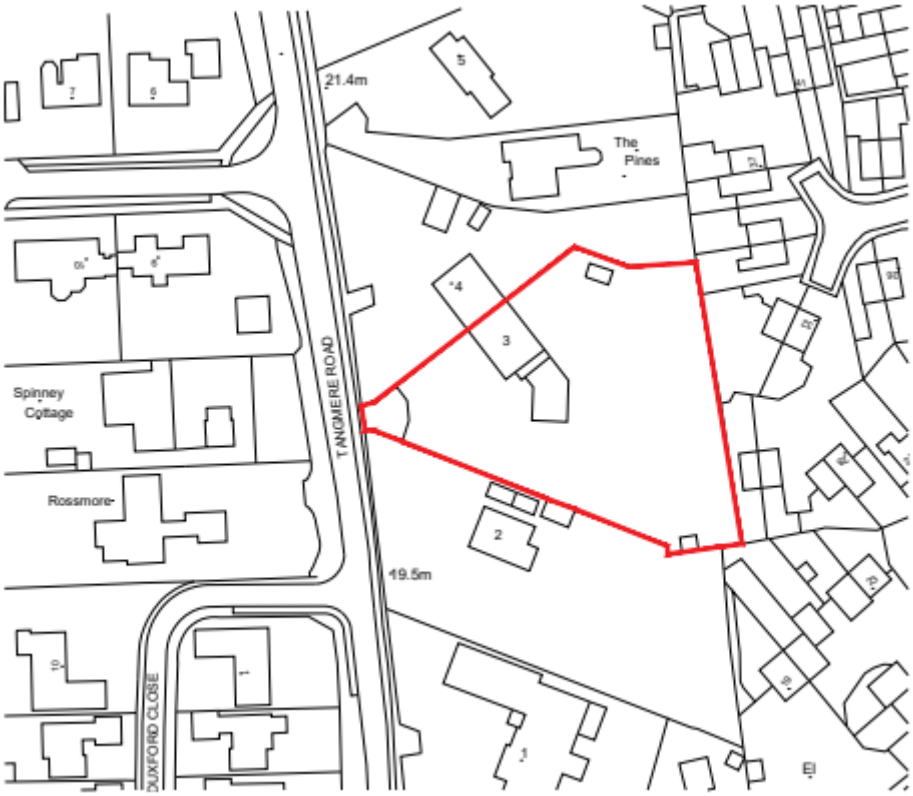
1 Introduction

1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at 3 Tangmere Road, Tangmere in West Sussex.

1.1.2 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere.

1.1.3 The existing site consists of a single dwelling with an attached garage. The proposed development will consist of the demolition of the existing garage and the development of a single 5-bedroom dwelling with an associated garage. The proposed development is located as OS Grid Reference SU 90513 06689 and has the post code PO20 2HW.

Fig 1. Site Location



2 Executive Summary:

2.1.1 An infiltration test to BRE365 was conducted and a groundwater monitoring well was installed on site. The infiltration test yielded a worse case infiltration rate of $1.46x10^{-5}$m/s which is considered a fair rate and suitable for infiltration. The highest groundwater level recorded during the winter period was 1.8mbgl which proves that the use of soakaways is a viable option for the site. It is therefore proposed that all roof and hard paved areas are to be discharged to ground via infiltration, with the roof areas discharging into a geocellular soakaway and the hard paved areas freely draining to ground via a permeable surface.

2.1.2 The foul water will discharge into the existing foul water sewer located within Tangmere Road. This connection can either be made via discharging into the existing foul water network that serves 3 Tangmere Road or via a new connection directly into the sewer. A CCTV drainage survey should be undertaken to confirm whether a connection can be made into the private network and to determine if any remedial works are required.

3 Site Geology

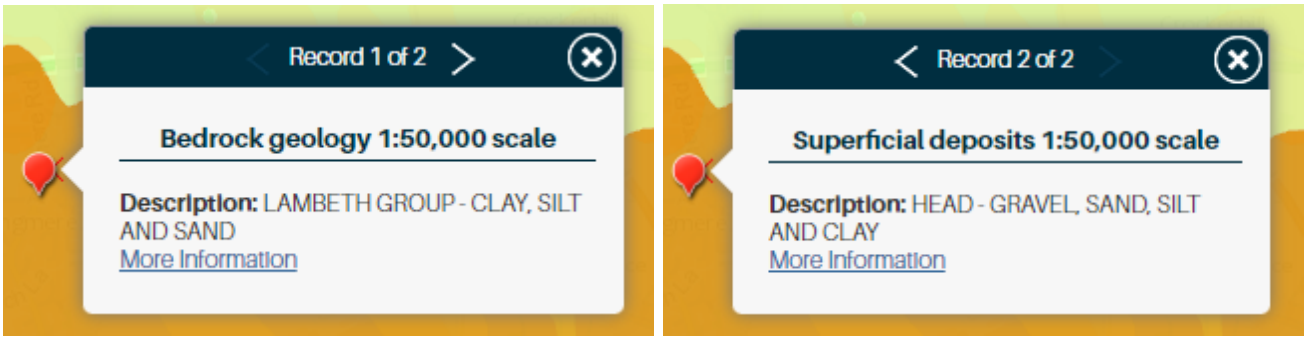
3.1 British Geological Survey information

3.1.1 The British Geological Survey confirms the bedrock geology to be made up Lambeth Group, which is comprised of Clay, Silt and Sand. The BGS website confirms the superficial deposits on site to be made up of Head formation which is comprised of Gravel, Sand, Silt and Clay.

3.1.2 The British Geological survey also holds records of historical boreholes near the site which give some insight into the ground geology.

- Borehole SU90NW172 (Located approx. 270m North East of the site) – Sandy clay.

Fig 2. British Geological Survey



3.2 Geological Assessment

3.2.1 A groundwater monitoring well was installed by E3S Consulting Ltd on 23rd January 2024 which consisted of the advancement of a single groundwater well to a depth of 4.00mbgl. During the installation of the well, groundwater was encountered at a depth of 2.8mbgl. A copy of the summary letter can be found in **Appendix C.**

3.2.2 In addition to the installation of the borehole, a subsequent monitoring visit was conducted on 19th February 2024 which recorded a groundwater level of 1.8mbgl.

Fig 3. Groundwater monitoring well

3.2.3 An infiltration test was also conducted on site on 23rd January 2024. The infiltration test was carried out to BRE365 standards and yielded a worst-case infiltration rate of 1.46×10^{-5}m/s, which is deemed a fair rate and suitable for infiltration.

Fig 4. Infiltration test photographs

4 Existing Drainage

4.1.1 It is not currently known how the existing site discharges all surface water runoff, however, based on the site geology it is presumed that the surface water is discharged to ground via infiltration.

4.1.2 The foul water from the site is believed to discharge into the existing foul water sewer located within Tangmere Road.

5 Proposed Drainage Strategy

5.1 SuDS Hierarchy

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

Table 1. SuDS Hierarchy

Discharge Destination	
Rainwater Harvesting	Yes – Rainwater harvesting is possible and should be considered
Discharge to Ground	An infiltration test to BRE365 was undertaken on site which recorded a worst-case infiltration rate of $1.46x10^{-5}$m/s which is a fair rate and suitable for infiltration. A groundwater monitoring well was installed on site and the highest groundwater that was recorded was at a depth of 1.8mbgl.
Discharge to Watercourse	N/A due to above
Discharge to Surface Water Sewer	N/A due to above
Discharge to Other Sewer	N/A due to above

5.2 Surface Water Drainage

5.2.1 Based upon the results of the infiltration test to BRE365 that was conducted on site which yielded a worse case infiltration rate of $1.46x10^{-5}$m/s; it is proposed that all roof and hard paved areas are to be discharged to ground via infiltration, with the roof areas discharging into a geocellular soakaway and the hard paved areas freely draining to ground via a permeable surface.

5.2.2 The highest groundwater level recorded during the winter period was 1.8mbgl which proves that the use of soakaways is a viable option for the site.

Fig 5. Ciria C753 Pavement System Infiltration Types – Type A Total infiltration

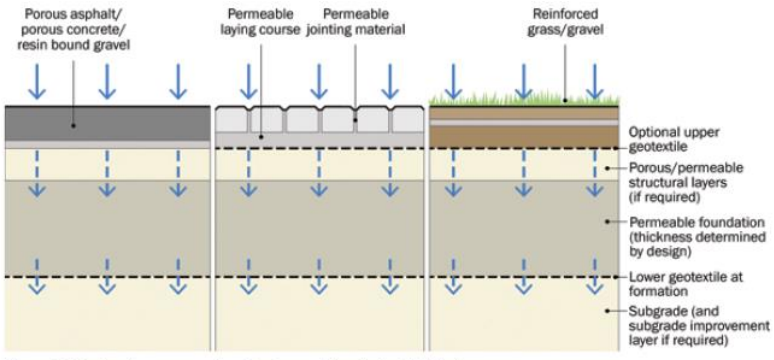


Figure 20.12 Pervious pavement system types: Type A – total infiltration

5.3 Water Quality

5.3.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.

5.3.2 Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals, and various organic and inorganic contaminants) Therefore the first 5-10mm of rainfall should be adequately treated with SuDS.

5.3.3 The new SuDS Manual (Ciria C753, November 2015) introduces slightly different approach compared to the previous version for the water quality management of surface water. The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e., the pollution source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
- The sensitivity of the receiving environment

5.3.4 The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

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

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

5.3.5 As per Table 26.1 Simple Index approach will be used as a design method for this site.

5.3.6 Table 26.2 will provide hazard classification of different land uses. The land uses for the surface water drainage for this site are.

- Residential Roofs
- Individual Property driveways and residential car parks
- Low traffic roads

5.3.7 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index >=pollution hazard index

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

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

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

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

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

Table 3: Pollution Hazard Index and Destination of runoff for the proposed Site					
Land Use	**Destination of Runoff**	**Pollution Hazard Level**	**Total Suspended Solids**	**Metals**	**Hydrocarbons**
Individual driveways, residential car parks and low traffic roads	Ground water	Low	0.5	0.4	0.4

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

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

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

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

Table 4: SuDS mitigation index

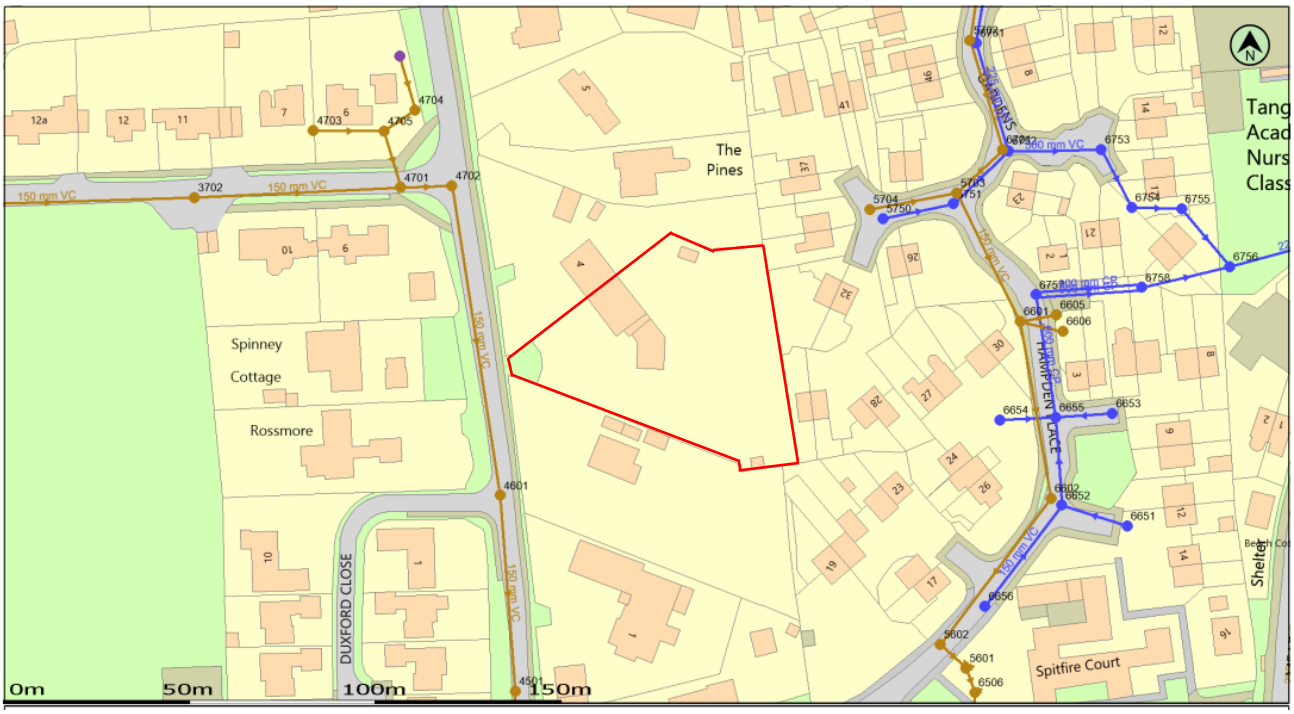
Table 4 Mitigation Indices						
Runoff Source	**Destination of Runoff**	**Mitigation Index Source**	**Type of SuDS Component**	**Total Suspended Solids (TSS)**	**Metals**	**Hydrocarbons**
Individual driveways, residential car parks and low traffic roads	Ground water	Table 26.4 (for ground waters)	Permeable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

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

5.4 Foul water drainage

5.4.1 The foul water will discharge into the local foul water sewer located within Tangmere Road. A CCTV survey should be carried out on site to confirm if there is the opportunity to discharge foul water into the existing foul water network that serves 3 Tangmere Road.

Fig 5. Southern Water Asset plan



6 Summary and Conclusions

6.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the proposed development which will consist of the demolition of the existing garage and the development of a single 5-bedroom dwelling with an associated garage.

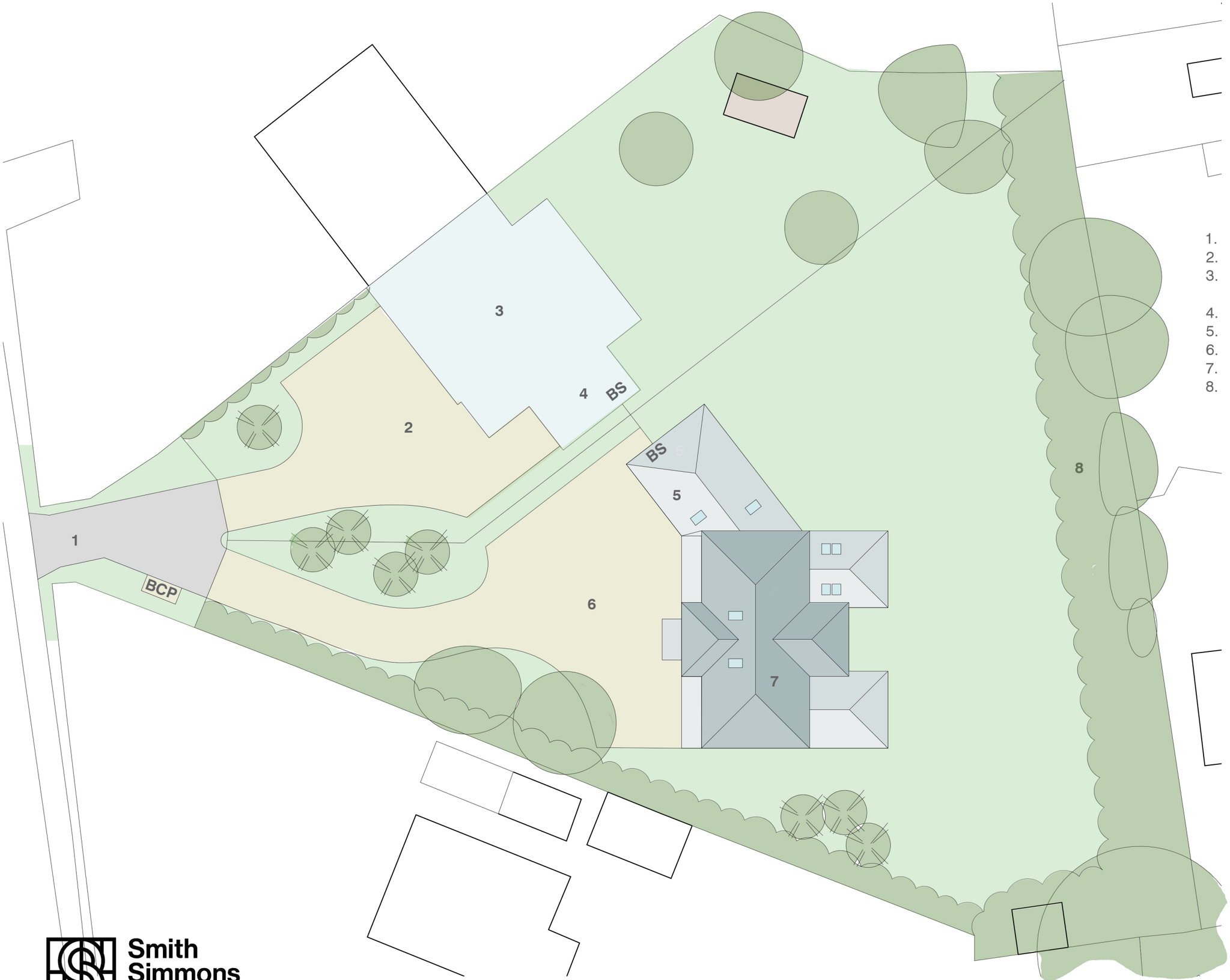
6.1.2 An infiltration test to BRE365 was conducted and a groundwater monitoring well was installed on site. The infiltration test yielded a worse case infiltration rate of 1.46×10^{-5}m/s which is considered a fair rate and suitable for infiltration. The highest groundwater level recorded during the winter period was 1.8mbgl which proves that the use of soakaways is a viable option for the site. It is therefore proposed that all roof and hard paved areas are to be discharged to ground via infiltration, with the roof areas discharging into a geocellular soakaway and the hard paved areas freely draining to ground via a permeable surface.

6.1.3 The foul water will discharge into the existing foul water sewer located within Tangmere Road. This connection can either be made via discharging into the existing foul water network that serves 3 Tangmere Road or via a new connection directly into the sewer. A CCTV drainage survey should be undertaken to confirm whether a connection can be made into the private network and to determine if any remedial works are required.

6.1.4 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water and foul drainage can be achieved for the proposed development.

7 Appendices

7.1 Appendix A – Site Plan



1. existing access widened to 3.6m
2. drive to retained house reconfigured
3. retained house - refer to separate house holder application for proposed works
4. single garage to retained house
5. garage to new house
6. new drive/parking
7. new detached house
8. existing boundary planting reinforced

BCP Bin Collection Point

BS Bin Storage

Cycle storage within integral garages

Proposed Site Plan
Scale 1:250@A3

0m 5m 10m

Smith Simmons & Partners

01243 850411 **office@ss-p.co.uk** www.ss-p.co.uk

3 TANGMERE ROAD, TANGMERE

REV 01

1658/DP205

7.2 Appendix B – Borehole Logs

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Site	Borehole Number
	BH01(s)

Machine:	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			INTERROUTE	19480
Core Dia: mm				
Method :	Location	Dates	Engineer	Sheet
	490602 E 106956 N	13/02/2007		1/1

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.45)	MADE GROUND: Rough grass over soft dark brown slightly sandy clay with a little subangular and subrounded fine to coarse flint gravel, with occasional fine to coarse gravel sized brick and plastic fragments, with frequent rootlets.		
0.50					D1		0.45			
							(0.55)	MADE GROUND: Soft to firm brown slightly sandy clay with a little subangular and subrounded fine to coarse flint gravel, with occasional fine to coarse gravel sized plastic, fabric and brick fragments.		
							1.00 (0.20)			
1.20-2.00					X2		1.20	Firm brown slightly sandy CLAY with some locally much angular to subrounded fine to coarse flint gravel.		
							(1.00)	Stiff light brown mottled grey slightly sandy SILT:CLAY with a little subangular and subrounded fine to coarse flint gravel. With some subangular and subrounded fine to coarse chalk and flint gravel.		
2.00-2.45					U3		2.20			
2.45-2.90					U4			Stiff orange-brown slightly sandy SILT:CLAY with a little to some subangular and subrounded fine to coarse flint gravel, with rare subangular flint cobbles.		
2.90-3.35					U5		(1.15)			
					13/02/2007:DRY		3.35	Chalk in U100 cutting shoe. Complete at 3.35m		
					13/02/2007:					

Remarks	Scale (approx)	Logged By
	1:50	SM
	Figure No.	

Geotechnical Engineering Limited

BOREHOLE LOG

BH01(s)

CLIENT INTERROUTE

SITE A27 TANGMERE — Sheet 1 of 1

Start Date 13 February 2007 — Easting 490602.0 — Scale 1 : 50

End Date 13 February 2007 — Northing 106956.0 — Ground level 22.45* — Depth 3.35 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
13/02/07 1200hrs									MADE GROUND: Rough grass over soft dark brown slightly sandy clay with a little subangular and subrounded fine to coarse flint gravel, with occasional fine to coarse gravel sized brick and plastic fragments, with frequent rootlets.	0.45	-10.10	
	1D	0.50							MADE GROUND: Soft to firm brown slightly sandy clay with a little subangular and subrounded fine to coarse flint gravel, with occasional fine to coarse gravel sized plastic, fabric and brick fragments.	1.00	-22.45	
	2X	1.20	2.00						Firm brown slightly sandy CLAY with some locally much angular to subrounded fine to coarse flint gravel.	1.20	-26.94	
	3U	2.00	2.45	NIL					Stiff light brown mottled grey slightly sandy SILT:CLAY with a little subangular and subrounded fine to coarse flint gravel.	2.20	-49.39	
	4U	2.45	2.90	NIL					1.20 - 1.35m: With some subangular and subrounded fine to coarse chalk gravel.			
13/02/07 1300hrs Dry	5U	2.90	3.35	NIL					1.55 - 1.70m: With some subangular and subrounded fine to coarse chalk and flint gravel.			
									Stiff orange-brown slightly sandy SILT:CLAY with a little to some subangular and subrounded fine to coarse flint gravel, with rare subangular flint cobbles.	3.35	-75.21	
									Chalk in U100 cutting shoe. Borehole completed at 3.35m.	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.00m. Continual U100 sampling 2.00-3.35m.

CASING: Not used.

BACKFILL: On completion borehole backfilled with bentonite pellets and arisings.

* Ground level estimated.

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered.

AGS

CONTRACT 19480

CHECKED

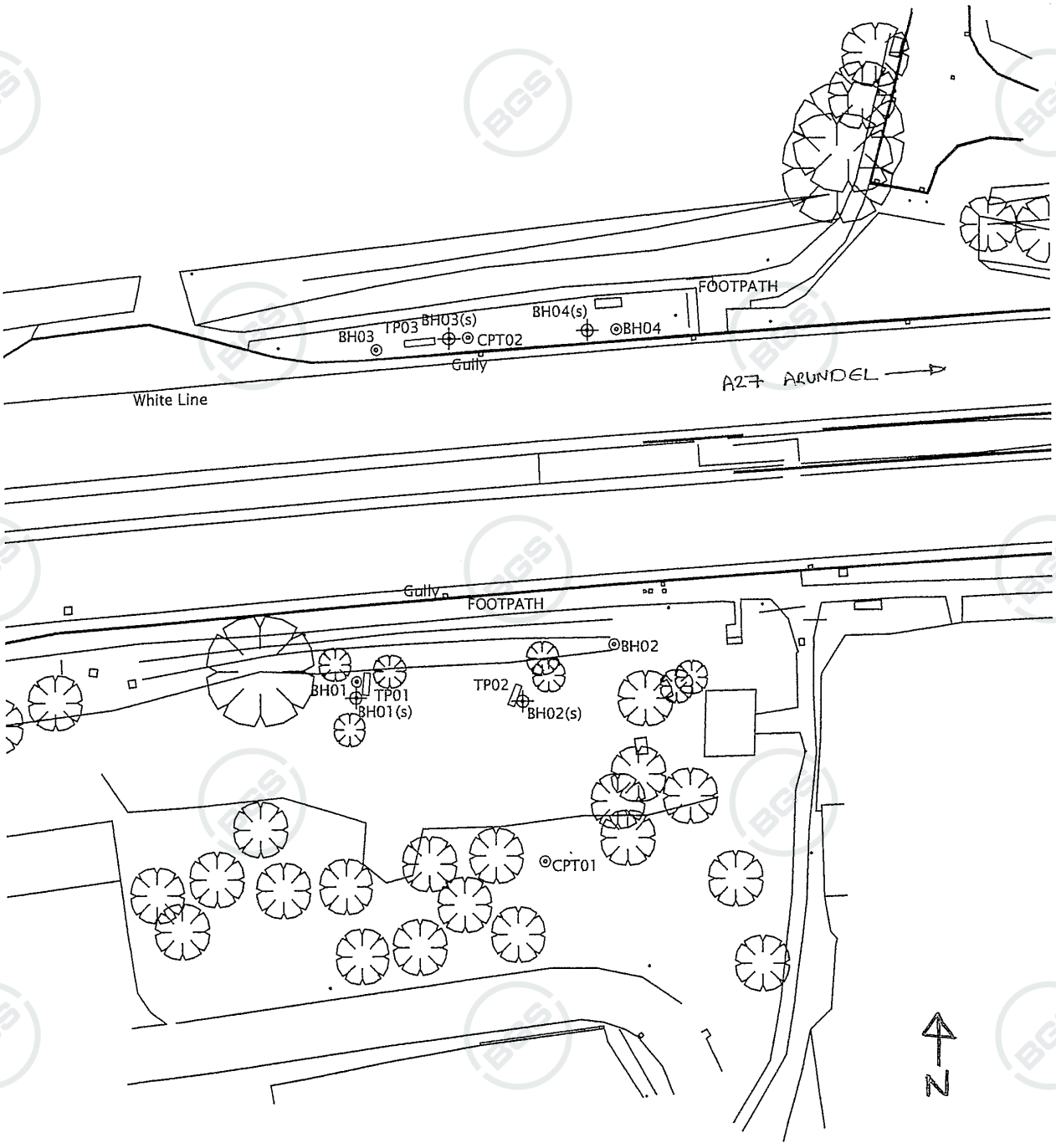
Geotechnical Engineering Ltd, Tel. 01452 527743 19480.GPJ TRIALJH.GPJ GEOENGV62A.GLB 02/05/2007 16:52:12 SM

Geotechnical Engineering Limited

SITE PLAN

CLIENT INTERROUTE

SITE A27 TANGMERE



Denotes supplementary borehole position

Denotes original trial pit position

Denotes original borehole position

Plan supplied by Client
Scale 1:500 approx

CONTRACT	FIGURE
19480	1

7.3 Appendix C – Groundwater monitoring summary letter

The Old Brewhouse
Appuldurcombe House
Wroxall, Ventnor
Isle of Wight, PO38 3EW

e3sconsulting.co.uk

25 January 2024

Our ref: NN1734R01

Chris Slade
chris@cgscivils.co.uk

Attention: Mr Slade

Dear Sir,

GROUND WATER MONITORING INSTALLATION, 3 TANGMERE ROAD, CHICHESTER

This letter presents a summary of the ground water well installation undertaken by E3S Consulting Ltd (E3S) on behalf of CGS Civils Ltd (The Client) in relation to a proposed residential development at the above site.

Fieldwork was undertaken on 23 January 2024. The site works consisted of the advancement of a single groundwater well installation (BH01) advanced to a depth of 4.00m bgl. A borehole location plan is included as **Figure 1** of this report.

The borehole location was set out based on site access and logged by a Geo-Environmental Consultant from E3S. The borehole log is presented as **Appendix A** of this letter. Groundwater was encountered at 2.80mbgl within the borehole at the time of drilling.

We trust that the site works undertaken and summary letter meet your current requirements. Should you have any immediate comments of queries please do not hesitate to contact the undersigned.

Kind Regards,

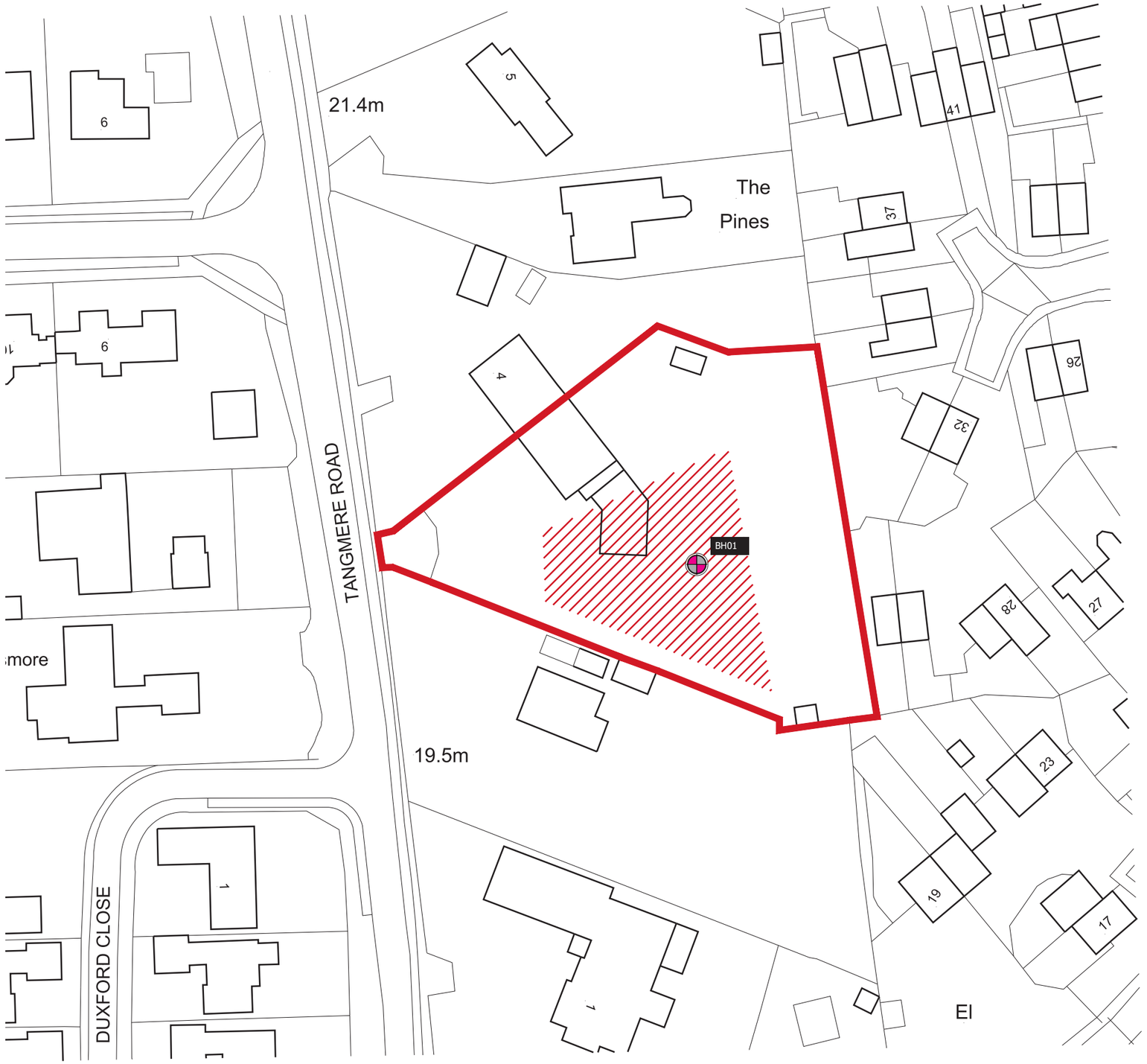
For and on behalf of E3S Consulting Ltd,

Chris Barron BSc (Hons) MIEnvSc CGeol FGS

Attachments;

Figure 1 – *Site & Borehole Location Plan (1 page)*

Appendix A – *Borehole Log (1 Page)*



Site base plan provided by client.

Drawn	CB	e3s Consulting	Client:	CGS CIVILS	
Approved	JO		Project:	GROUNDWATER MONITORING WELL 3 TANGMERE ROAD, CHICHESTER	
Date	25/01/2024		Title:	INVESTIGATION LOCATION PLAN	
Scale	NTS		Project no: NN1734	Figure no: FIGURE 1	Rev: 1
Original	A3				

APPENDIX A

BOREHOLE LOG

BOREHOLE LOG

Project Name: 3 TANGMERE ROAD, CHICESTER	Client: CGS CIVILS LTD	Date: 23/01/2024
Location: TANGMERE ROAD, CHICHESTER	Contractor:	
Project No. : NN1734	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH01	BH			1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.35			Dark brown slightly gravelly clayey TOPSOIL, gravel is fine to medium sub angular to angular.
					1.10			Brown to grey slightly sandy Gravelly CLAY, gravel is fine to coarse angular to sub angular.
					3.20			Orange brown to grey slightly sandy gravelly CLAY to slightly sandy clayey GRAVEL, gravel is fine to coarse sub angular to angular.
					4.00			Yellow brown mottled grey CLAY.
								End of Borehole at 4.000m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

AGS