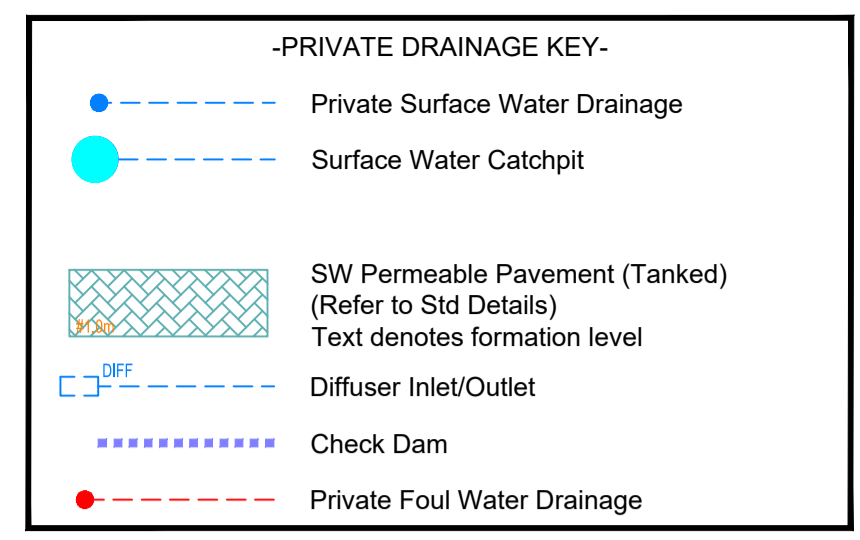
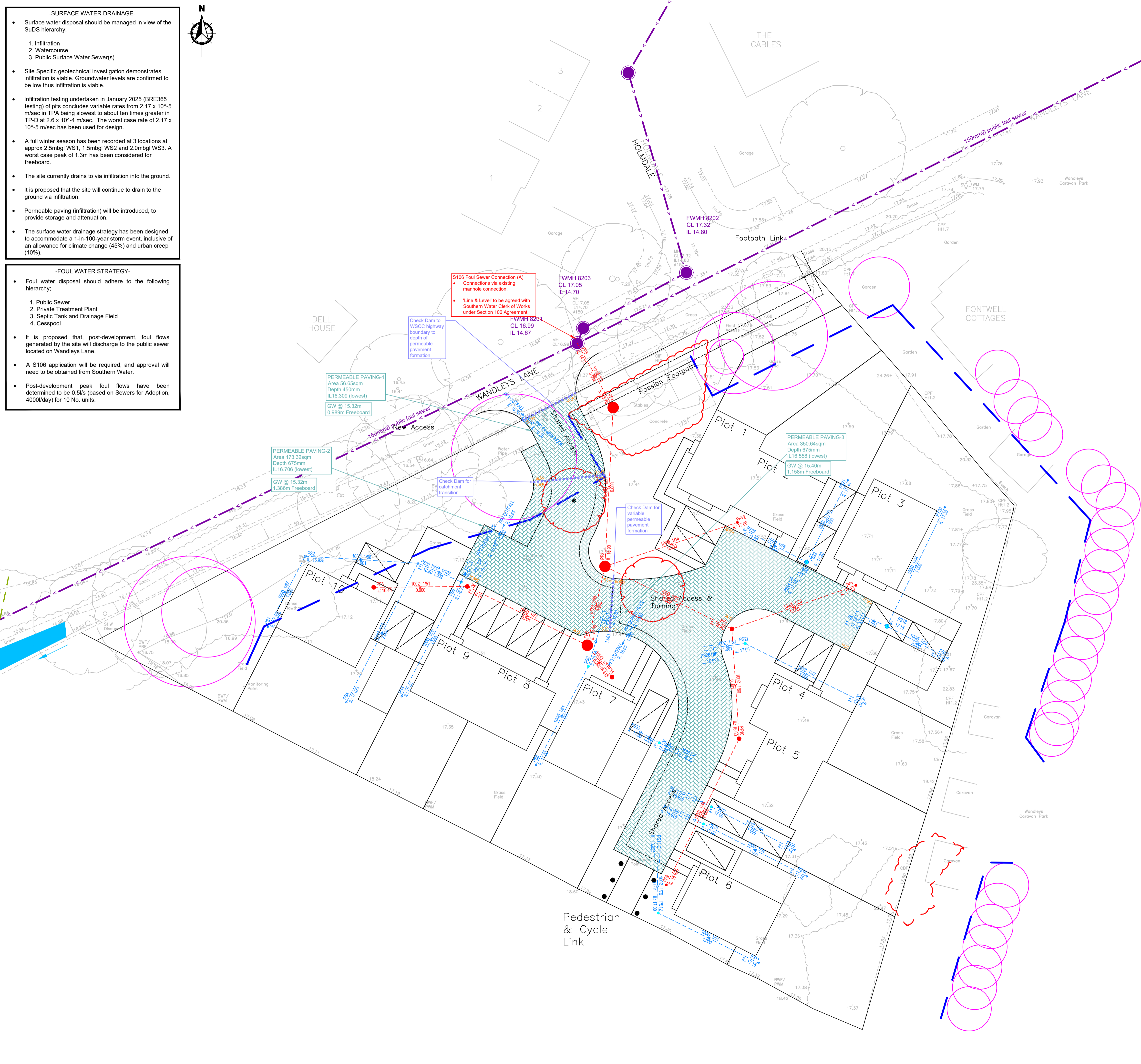


-SURFACE WATER DRAINAGE-

- Surface water disposal should be managed in view of the SuDS hierarchy;
 - Infiltration
 - Watercourse
 - Public Surface Water Sewer(s)
- Site Specific geotechnical investigation demonstrates infiltration is viable. Groundwater levels are confirmed to be low thus infiltration is viable.
- Infiltration testing undertaken in January 2025 (BRE365 testing) of pits concludes variable rates from 2.17 x 10⁻⁵ m/sec in TPA being slowest to about ten times greater in TP-D at 2.6 x 10⁻⁴ m/sec. The worst case rate of 2.17 x 10⁻⁵ m/sec has been used for design.
- A full winter season has been recorded at 3 locations at approx 2.5mbgl WS1, 1.5mbgl WS2 and 2.0mbgl WS3. A worst case peak of 1.3m has been considered for freeboard.
- The site currently drains to via infiltration into the ground.
- It is proposed that the site will continue to drain to the ground via infiltration.
- Permeable paving (infiltration) will be introduced, to provide storage and attenuation.
- The surface water drainage strategy has been designed to accommodate a 1-in-100-year storm event, inclusive of an allowance for climate change (45%) and urban creep (10%).

-FOUL WATER STRATEGY-

- Foul water disposal should adhere to the following hierarchy;
 - Public Sewer
 - Private Treatment Plant
 - Septic Tank and Drainage Field
 - Cesspool
- It is proposed that, post-development, foul flows generated by the site will discharge to the public sewer located on Wandley Lane.
- A S106 application will be required, and approval will need to be obtained from Southern Water.
- Post-development peak foul flows have been determined to be 0.5l/s (based on Sewers for Adoption, 4000l/day) for 10 No. units.



NOTES

- This drawing is to be read in conjunction with all other BP Civils drawings, and with all relevant Architects and Engineer's drawings and specification. Any discrepancies found are to be reported immediately to the Engineer.
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RESIDUAL HAZARDS

In addition to the hazards/risks normally associated with the type of work detailed on this drawing, note the following:

- Buried services. Contractor to refer to record drawings and use CAT to locate existing services and undertake necessary precautions and investigation prior to excavating.
- Working in live traffic. Contractor to ensure traffic management is designed, erected and maintained to protect the work area and the public. Contractor to undertake necessary precautions and ensure suitable traffic management is in place prior to commencement.
- Working in live sewers. Contractor to ensure operatives are familiar and competent with the dangers of working in live sewers.

Appropriate risk assessments and method statements should be prepared to manage these risks as required.

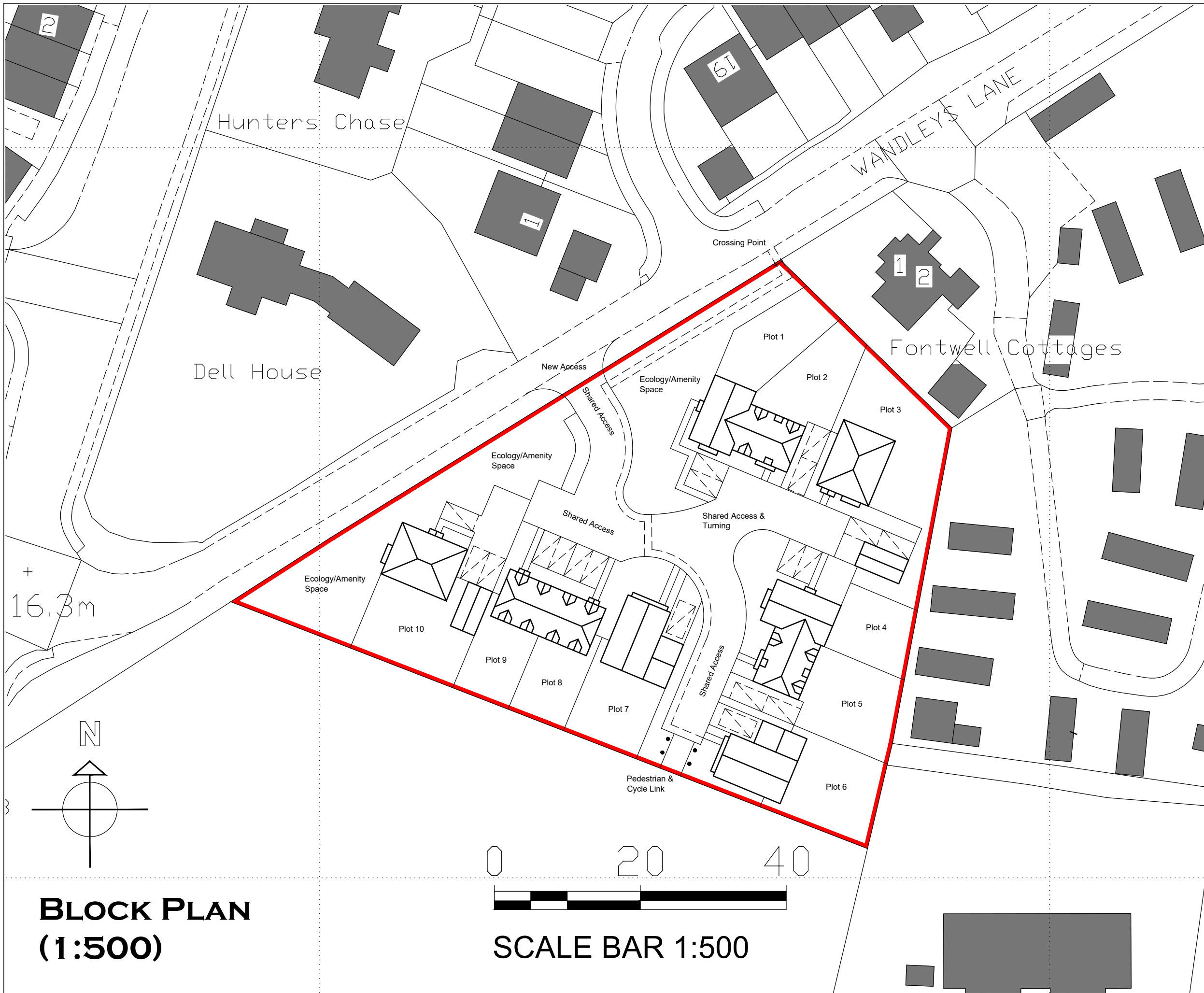
PIPE (PRIVATE)	MANHOLE	MANHOLE	COVER	COVER	INVERT	DEPTH TO	EASTING	NORTHING
No.	NO.	TYPE	TYPE	LEVEL (M)	LEVEL (M)	SOFFIT (M)		
PPI DUMBY NODE	2000	250 Inlet	D40	16.889	16.300	0.489	48482.789	10020.710
PPI OUTFALL	2000	250 Inlet	D40	16.803	16.250	0.453	48481.692	10020.669
PPI DUMBY NODE	1800	Type E	D40	17.511	16.700	0.711	48482.734	10024.871
PPI OUTFALL	1800	Type E	D40	17.483	16.650	0.733	48482.739	10026.679
PPI DUMBY NODE	1800	Type E	D40	17.363	16.900	0.363	48484.557	10026.558
PPI OUTFALL	1800	Type E	D40	17.432	16.850	0.432	48482.698	10024.868
PS1	1800	Type E	B125	17.093	17.025	-0.032	48480.146	10026.617
PS2	2000	250 Inlet	B125	17.235	16.925	0.210	48480.175	10023.285
PS4	1800	Type E	B125	17.175	17.025	0.050	48482.628	10027.457
PS5	1800	Type E	B125	17.247	17.000	0.147	48481.619	10028.102
PS6	2000	CATCHPIT	B125	17.411	16.750	0.567	48485.078	10020.488
PS8	1800	Type E	B125	17.400	17.000	0.300	48483.191	10020.679
PS9	2000	CATCHPIT	B125	17.533	16.850	0.583	48482.687	10024.343
PS11	1800	Type E	B125	17.327	17.150	0.077	48487.364	10029.183
PS12	2000	CATCHPIT	B125	17.500	17.000	0.400	48486.428	10024.627
PS14	1800	Type E	B125	17.337	17.150	0.087	48482.525	10028.592
PS15	2000	CATCHPIT	B125	17.524	17.000	0.424	48481.325	10024.284
PS17	1800	Type E	B125	17.695	17.300	0.295	48487.881	10042.210
PS18	4000	CATCHPIT	B125	17.887	17.150	0.617	48481.228	10046.686
PS20	1800	Type E	B125	17.778	17.300	0.378	48487.479	10028.385
PS21	1800	Type E	B125	17.624	17.300	0.224	48480.211	10026.549
PS22	2000	CATCHPIT	B125	17.771	17.200	0.471	48482.588	10022.842
PS23	1800	Type E	B125	17.783	17.300	0.383	48485.737	10026.102
PS25	2000	CATCHPIT	B125	17.506	17.000	0.406	48482.177	10028.132
PS27	2000	CATCHPIT	B125	17.577	17.000	0.477	48485.682	10024.825
PS29	1800	Type E	B125	17.535	17.150	0.285	48480.880	10027.316
PS30	1800	Type E	B125	17.412	17.150	0.162	48481.280	10022.424
PS32	2000	CATCHPIT	D40	17.428	16.800	0.528	48483.363	10022.524
PS33	2000	250 Inlet	B125	17.465	17.000	0.365	48484.484	10024.227
PS34	2000	CATCHPIT	B125	17.428	16.950	0.378	48486.535	10023.585
PS10 DF	1000x400	Type E	D40	17.372	16.800	0.472	48480.495	10026.826
PS13 DF	1000x400	Type E	D40	17.540	16.925	0.515	48486.304	10023.540
PS16 DF	1000x400	Type E	D40	17.538	16.925	0.513	48480.280	10025.185
PS19 DF	1000x400	Type E	D40	17.817	17.100	0.617	48480.302	10046.833
PS24 DF	1000x400	Type E	D40	17.717	17.150	0.467	48481.675	10021.624
PS28 DF	1000x400	Type E	D40	17.484	16.925	0.459	48481.688	10024.326
PS31 DF	1000x400	Type E	D40	17.527	16.925	0.502	48480.091	10027.156
PS38 DF	1000x400	Type E	D40	17.418	16.900	0.416	48486.140	10022.200
PS7 DF	1000x400	Type E	D40	17.428	16.725	0.601	48482.668	10022.200
PF1	2000	450 Inlet	D40	17.845	17.100	0.645	48487.658	10020.132
PF2	4000	450 Inlet	D40	17.554	16.400	1.054	48484.416	10046.402
PF3	12000	Type E	D40	17.514	15.900	1.514	48480.651	10022.182
PF4	12000	Type B	D40	17.434	15.700	1.634	48484.545	10029.388
PF5	12000	Type B	D40	16.994	14.700	2.194	48487.662	10026.338
PF6	4000	450 Inlet	D40	17.401	16.400	0.901	48481.583	10049.913
PF7	4000	450 Inlet	D40	17.422	16.200	1.122	48482.737	10020.008
PF8	12000	Type E	D40	17.417	16.000	1.317	48482.739	10043.635
PF9	2500	250 Inlet	D40	17.593	16.925	0.568	48487.353	10027.670
PF10	4000	450 Inlet	D40	17.544	16.600	0.844	48485.253	10023.513
PF11	4000	450 Inlet	D40	17.588	16.415	1.065	48484.433	10040.189
PF12	2500	250 Inlet	D40	17.771	17.000	0.671	48485.016	10026.844

Rev.	Date	Amendments
-	28/03/25	Original Issue



Drawing Status	PLANNING NOT FOR CONSTRUCTION
Client	Landquest UK (Southern)
Project	Wandley Lane, Eastergate,
Drawing Title	Proposed Drainage
Scale at A1	1:200
Date	Mar. '25
Drawn By	JHL
Checked By	MJA
Project No.	D2345
Drawing Code	000-BPC-WD-ZZ-D-C
Drawing No.	PL007
Rev.	-

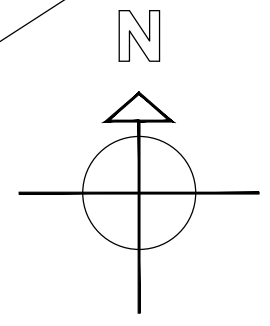
Appendix A



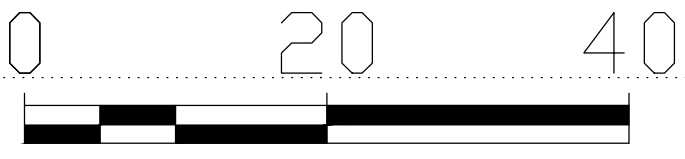
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Rev:-	Description:-	Date:-	Chkd by:-

+ 16.3m



**BLOCK PLAN
(1:500)**



SCALE BAR 1:500



The Barn, Calcot Mount Business Park, Calcot Lane,
 Curdridge, Southampton, Hampshire, SO32 2BN
 Tel: 01489 786670
 Email: info@vividdesignstudio.co.uk
 Website: www.vividdesignstudio.co.uk

Project:-
**Proposed Residential Development
 Land to the South of
 Wandleys Lane
 Eastergate
 Chichester**

Title:-
Block Plan

Client:-
LandQuest UK (Southern) Ltd

Scale:-
1:500 (@A3)

Drawn By:- **PJD** Checked By:-

Date:- **03/03/25** Date:-

Job.No:- **230010** Drg.No:- **04** Rev:-

Appendix B

Appendix C



Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (<https://www.uksuds.com/>)

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

Project details

Date	<input type="text" value="01/04/2025"/>
Calculated by	<input type="text"/>
Reference	<input type="text"/>
Model version	<input type="text" value="0.6.5"/>

We use cookies on this site to enhance your user experience

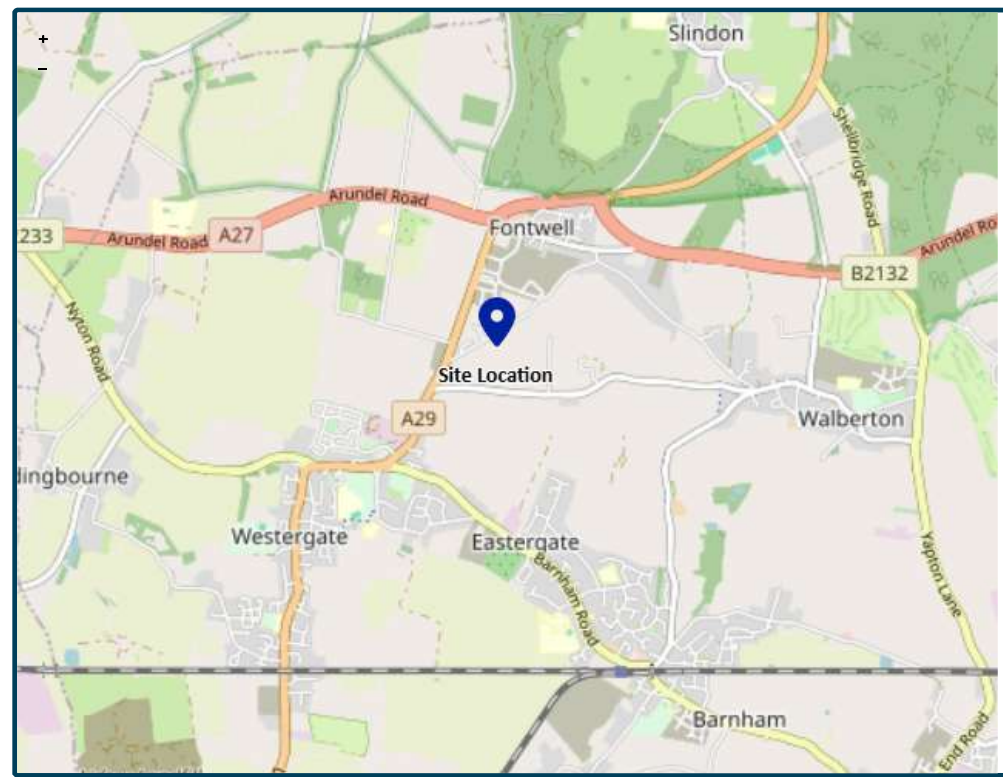
By clicking the Accept button, you agree to us doing so.

OK, I AGREE

MORE INFO

Location

Site name	<input type="text" value="Wandleys Lane"/>
Site location	<input type="text" value="Eastergate"/>



© OpenStreetMap (<https://www.openstreetmap.org/copyright>) contributors.

Site easting	<input type="text" value="495067"/>
Site northing	<input type="text" value="106193"/>

Site details

Total site area (ha)	<input type="text" value=".42"/>	ha
----------------------	----------------------------------	----

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Greenfield runoff

Method

Method

IH124

IH124

SAAR (mm)

My value

779

mm

Map value

779

How should SPR be derived?

WRAP soil type

WRAP soil type

1

1

SPR

0.1

0.1

QBar (IH124) (l/s)

0.08

l/s

Growth curve factors

Hydrological region

My value

7

Map value

7

1 year growth factor

0.85

2 year growth factor

0.88

10 year growth factor

1.62

30 year growth factor

2.3

100 year growth factor

3.19

200 year growth factor

3.74

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Appendix D

Phase II Site Investigation Report

Land South of Wandleys Lane, Fontwell, Eastergate, West Sussex PO20 3SE

On behalf of LandQuest UK (Southern) Limited

Report Reference: GWPR5571/GIR/February 2025			Status: Final
Issue	Prepared By	Checked By	Verified By
v.2.01	[REDACTED]		
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Site Investigations | Environmental Consultants | Geotechnical Engineers

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EXECUTIVE SUMMARY	
PROPOSED DEVELOPMENT	At the time of reporting, February 2025, the proposed development was understood to comprise the construction of 9No residential properties with associated private gardens and/or soft landscaped areas, along with access roads and areas of car parking.
GEOLOGY AND HYDROGEOLOGY	<p>The site was underlain by the Head Deposits (Secondary A Aquifer) overlying bedrock deposits of the Lambeth Group (Secondary a Aquifer). London Clay Formation (Unproductive Strata) may be encountered in the extreme south-east corner. An area of Worked Ground was noted ~222m to the south-east.</p> <p>Examination of the Environment Agency records showed that the site was located within an Inner Zone – subsurface activity only (Zone Ic) Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. Inner Zone – subsurface activity only (Zone Ic) Groundwater Source Protection Zone (SPZ) extends the Zone I where the aquifer is confined and maybe impacted by deep drilling activities. .</p> <p>From analysis of hydrogeological and topographical maps the actual groundwater table was anticipated to be encountered at shallow to moderate depth perched within the Head Deposits (Vally Gravel) above the London Clay Formation. Some amounts of groundwater however may be present at shallower depths within Made ground or silty/sandy pockets of the London Clay Formation. It was considered that groundwater was flowing in a southerly direction in line with local topography.</p>
VOLUME CHANGE POTENTIAL	The granular soils of the Head Deposits were shown to have a volume change potential in accordance with BRE240 and no volume change potential in accordance with NHBC Standards Chapter 4.2.
FOUNDATION DESIGN	Foundations should be taken through the Topsoil and into the underlying Head Deposits. Details are presented in section 6.2.
SUB-SURFACE CONCRETE	According to BRE Special Digest 1, 2005, ‘Concrete in Aggressive Ground’ a Sulphate Design Class of DS-1 could be used for sub-surface concrete in contact with the soils beneath the site. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-1.
CONTAMINATION AND REMEDIATION	Based on the results of the intrusive works, chemical analyses and risk assessments undertaken, no significantly elevated levels of determinants which pose an unacceptable risk to end-users for a ‘Residential with homegrown produce’ land-use scenario and no remedial measures are required
GROUND GAS	In accordance with CIRIA C665, it is anticipated that a minimum of six spot monitoring visits will be required to complete the ground gas risk assessment from off-site sources.

1. INTRODUCTION

1.1. General

Ground and Water Limited were instructed by LandQuest UK (Southern) Limited on the 1st September 2023 to conduct a Phase II Ground Investigation on the site at Land South of Wandleys Lane, Fontwell, Eastergate, West Sussex PO20 3SE. The scope of the investigation was detailed within the fee proposal GW2282Rev2, dated 1st September 2023.

1.2. Aims of the Investigation

The aim of this report was to supply the client and their designers with information regarding the ground conditions underlying the site to assist them in preparing an appropriate scheme for development.

The investigation was to be undertaken to provide parameters for the design of foundations by means of in-situ and laboratory geotechnical testing undertaken on soil samples recovered from trial holes.

A contamination assessment was to be undertaken following chemical laboratory testing on soil samples recovered from the site to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any potential contamination identified. The assessment comprises a Tier 2 Generic Quantitative Risk Assessment, under Land Contamination Risk Management (LCRM), with the intention of discharging any relevant planning conditions.

This Site Investigation Report must be read in conjunction with the Desk Study Report referenced GWPR5771/DS/October 2023.

The techniques adopted for the investigation were chosen considering the requirements of the client, anticipated ground conditions, and bearing in mind the nature of the site, limitations to site access and other logistical limitations.

1.3. Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

This report includes the results of the winter groundwater monitoring undertaken between October 2023 and March 2024 and the infiltration testing undertaken in January 2025 and supersedes the Phase II Ground Investigation Report produced by Ground and Water Limited reference GWPR5571/GIR/October 2023 v1.01.

1.4. Technical Glossary

Generic technical terms and their description can be viewed within the glossary provided within Appendix B.

2. SITE SETTING

2.1. Site Location

The site comprised a ~4,100m² irregular-shaped plot of land located on the southern side of Wandleys Lane. The site was located between the villages of Fontwell and Eastergate in West Sussex.

The national grid reference/Easting Northing for the centre of the site was approximately SU 94851 06243. A site location plan is given within Figure 1.

2.2. Site Description

A Site Walkover was undertaken on the 6th September 2023. A description of the site, as noted during the Site Walkover, is tabulated below.

Site Description Sheet	
Use of site	At the time of the Site Walkover, 6 th September 2023 the site comprised an area of undeveloped fields with stables/sheds located in the north-west corner close to the site entrance.
Site topography	The site was flat.
Area topography	The area in which the site was located was flat.
Structures on-site	Wooden stables/sheds were located in the north-west corner close to the site entrance.
Structures off-site and the use of surrounding ground	A caravan park was located to the north-east/east of the site and two storey residential properties were located to the west. Open undeveloped fields were located to the east and south.
Boundary features	Northern Boundary: ~1.20 – 1.50m high wooden fence and hedgerow/trees. Eastern Boundary: ~1.20 – 1.50m high wooden fence and hedgerow/trees. Southern Boundary: ~1.20m high fence Western Boundary ~1.20 – 1.50m high wooden fence and hedgerow/trees.
Site covering	The site was grass covered with trees and bushes around the northern, eastern and western boundaries.
Contamination sources onsite	None noted.
Contamination sources off-site	None noted
Vegetation on-site	3 – 7m mature to semi- trees and bushes around the northern, eastern and western boundaries.
Vegetation off-site	Scattered vegetation was noted.
Services	None noted.

2.3. Proposed Development

At the time of reporting, February 2025, the proposed development was understood to comprise the construction of 9No residential properties with associated private gardens and/or soft landscaped areas, along with access roads and areas of car parking.

The proposed development plan can be seen within Figure 2.

2.4. Geology

The British Geological Survey Solid and Drift Geology Map for the Fontwell area (Chichester Sheet No. 317) revealed that the site was underlain by superficial Head Deposits (Valley Gravel) and bedrock deposits of the Lambeth Group. London Clay Formation may be encountered in the extreme south-east corner. An area of Worked Ground was noted ~222m to the south-east.

Superficial deposits (Drift) are the youngest geological deposits formed during the most recent period of geological time. They rest on older deposits or rocks referred to as bedrock (Solid), which are the main mass forming the Earth. Bedrock is present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Head Deposits (Valley Gravel)

The Head Deposits (Valley Gravel) consists of local tracts of gravel at low level in the bottom of valleys, usually along the line of a former or existing water course. The soils generally comprise poorly sorted sand and gravel.

London Clay Formation

The London Clay Formation comprises stiff grey fissured clay, weathering to brown near surface. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of Gypsum (Selenite) are often found within the weathered part of the London Clay Formation, and precautions against sulphate attack to concrete are sometimes required. The lowest part of the formation is a sandy bed with black rounded gravel and occasional layers of sandstone and is known as the Basement Bed.

Lambeth Group

The Lambeth Group (formerly known as the Woolwich and Reading Beds) is a sedimentary complex comprising a basal bed (the Upnor Formation also known as the Bottom Bed) composed of glauconitic sand, sandy clay and gravel (well-rounded flint pebbles), with laterally variable sand and clay above. In the eastern part of the area the basal bed is mostly overlain by a shelly grey sandy clay or silty sand and laminated beds (Woolwich Formation). At the top of the sedimentary complex is the Reading Formation, which is made up of multi-coloured mottled clays and silty clays.

Lignite, or brown coal, a carbonaceous rock composed of plant remains which has not been subject to the same intensity of heat and pressure as has ordinary coal, is occasionally found within the Lambeth Group, as are individual logs and groups of logs indicating the position of a former log jam, which was covered by sand and clay at the time of deposition.

2.5. Hydrogeology and Hydrology

A study of the aquifer maps on the DEFRA website revealed the site was underlain by a **Secondary A Aquifer** comprising the superficial Head Deposits (Valley Gravel) underlain by the Lambeth Group also classified as a Secondary A Aquifer. **Unproductive Strata** comprising bedrock deposits of the London Clay Formation may be encountered in the extreme south-east corner.

Examination of the Environment Agency records showed that the site was located within an Inner Zone – subsurface activity only (Zone 1c) Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. Inner Zone – subsurface activity only (Zone 1c) Groundwater Source Protection Zone (SPZ) extends the Zone 1 where the aquifer is confined and may be impacted by deep drilling activities.

No surface water features were present within a 250m radius of the site.

From analysis of hydrogeological and topographical maps the actual groundwater table was anticipated to be encountered at shallow to moderate depth perched within the Head Deposits (Valley Gravel) above the London Clay Formation. Some amounts of groundwater however may be present at shallower depths within Made ground. It was considered that groundwater was flowing in a southerly direction in line with local topography.

Examination of the Environment Agency records showed that the site was located within a Flood Zone 1, i.e. an area with a low probability of fluvial/coastal flooding.

The Groundsure Datasheets revealed the site was not at risk of flooding from rivers and the sea. The datasheets also revealed the site was at a moderate to high risk of groundwater flooding. The extreme western corner of the site had a 1 in 30 year return period risk of surface water flooding at a depth of between 0.10 – 0.30m.

2.6. Radon

A review of the freely available Public Health England radon database, UK Radon, indicated that the site was located within a 1km grid square, where the maximum radon potential of 3 – 5% was recorded. Basic radon protection measures are required in areas where more than 3% of houses are at or above the Action Level.

A BGS Radon Risk Assessment was commissioned for the site which indicated that **no radon protection measures are required to be installed in new buildings**. The risk assessment can be seen in Appendix C.

2.7. Internet Search (Site Setting)

2.7.1. Available Unexploded Ordnance (UXO) Map Review

A review of the data available on www.zeticauxo.com/ revealed the site was located within a low-risk area associated with unexploded ordnance (UXO), as indicated by having <15 bombs dropped per 1000 acres. A known Luftwaffe Bombing Target site was located ~500m west of the site.

2.7.2. Historical Landfill Tool Review

A review of the data available on www.groundsure.io/ revealed 2No. areas of Historical Landfilling within 250m of the site. One was located on the northern side of Wandleys Lane ~9m north of the site. The site was active between 14/03/1979 – 13/03/1981 and was infilled with inert waste. The second was located off Eastergate Lane ~214m south-east of the site and was active between 31/12/1949 – 1/12/1963 and was infilled with household waste.

2.8. Preliminary Risk Assessment

The tabulated Conceptual Site Model developed as part of the Ground and Water Ltd Desk Study (GWPR5771/DS/October 2023) is outlined overleaf. For ease of reference and understanding, the risks have been classified within this risk assessment against four possible levels / categories, summarised in the table below. Any risk deemed to be negligible within the Preliminary Risk Assessment have been excluded from this report.

Risk Categories used in the Tabulated CSM	
Low Risk	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is not considered to be an unacceptable risk to receptors. However, it is considered that further investigation to confirm this is recommended.
Moderate Risk	Regarding this potential SPR linkage, the site may not be suitable for the proposed end-use in its current condition and there may be an unacceptable risk to receptors. Further investigation is required to confirm this.
High Risk	Regarding this potential SPR linkage, the site is probably or certainly not suitable for proposed end-use and there is likely to be an unacceptable risk to receptors. Contaminants probably or certainly present and urgent action required in the short term.

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(On-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
<ul style="list-style-type: none"> No potential sources for contamination identified. 	<ul style="list-style-type: none"> Direct ingestion of soil and soil derived dust Dermal contact of soil and soil derived dust Inhalation of dust (indoors and outdoors) with elevated concentration of determinands Ingestion of home-grown produce, and soils attached Direct ingestion of groundwater Inhalation of volatile vapour (indoors and outdoors) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development Site operatives during maintenance works Neighbours and public 	Low
	<ul style="list-style-type: none"> Direct uptake of groundwater Direct uptake of determinands in the soil 	<p>Flora and Fauna</p> <ul style="list-style-type: none"> Vegetation within soft landscaped areas Ecological Receptor (Clapham Common) 	Low
	<ul style="list-style-type: none"> Anthropogenic (man-made) pathways Vertical and lateral migration in permeable strata Surface water runoff 	<p>Controlled Waters</p> <ul style="list-style-type: none"> Secondary A Aquifer (Head Deposits and Lambeth Group) 	Low
Aggressive ground conditions with Made Ground and natural ground, including groundwater: <ul style="list-style-type: none"> Sulphates, PAH/TPH. 	<ul style="list-style-type: none"> Direct contact with aggressive ground conditions 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buried Concrete Underground services (water pipes) 	Low
Ground gases generated by Made Ground: <ul style="list-style-type: none"> Methane, Carbon Dioxide, Hydrogen Sulphide, and Carbon Monoxide. 	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Inhalation of Asphyxiating gases Explosion (methane only) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development (especially in confined spaces) Site operatives during maintenance works in confined spaces Neighbours and public 	Low
	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Explosion (methane only) 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buildings Confined spaces Underground services 	Low

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from nearby works: <ul style="list-style-type: none"> Asbestos, PAHs, TPHs, VOCs, Sulphates, and Metals. 	<ul style="list-style-type: none"> Direct ingestion of soil and soil derived dust Dermal contact of soil and soil derived dust Inhalation of dust (indoors and outdoors) with elevated concentration of determinands Direct ingestion of groundwater Inhalation of volatile vapour (indoors and outdoors) 	Human Health <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development Site operatives during maintenance works Neighbours and public 	Low
	<ul style="list-style-type: none"> Direct uptake of groundwater 	Flora and Fauna <ul style="list-style-type: none"> Vegetation within soft landscaped areas 	Low
		Controlled Waters <ul style="list-style-type: none"> Secondary A Aquifer (Head Deposits and Lambeth Group) 	Low
Aggressive ground conditions associated with impacted groundwater; <ul style="list-style-type: none"> Sulphates, PAH/TPH. 	<ul style="list-style-type: none"> Direct contact with aggressive ground conditions 	Building Materials and Services <ul style="list-style-type: none"> Buried Concrete Underground services (water pipes) 	Low
Ground gases generated by infilled ground excavations and Historical Landfill Sites 9m north and 214m south-east: <ul style="list-style-type: none"> Methane, Carbon Dioxide, Hydrogen Sulphide, and Carbon Monoxide. 	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Inhalation of Asphyxiating gases Explosion (methane only) 	Human Health <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development (especially in confined spaces) Site operatives during maintenance works in confined spaces Neighbours and public 	Moderate
	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Explosion (methane only) 	Building Materials and Services <ul style="list-style-type: none"> Buildings Confined spaces Underground services 	Low

3. SITE WORKS

3.1. Scope of Works

Site works were undertaken in two phases.

Phase I was undertaken on 26th September 2023 and comprised the drilling of 5No. Windowless Sampler Borehole (WS1 – WS5) to a depth of between 1.00 – 3.00m bgl where the density of the soils prevented further progress of each of the boreholes. Standard Penetration Tests were carried out at 1.00m intervals within the boreholes. A “Super Heavy” Dynamic Probe (DP1 – DP5) was undertaken adjacent to each of the boreholes to a depth of between 1.00 – 5.00m bgl where the density of the soils again prevented further penetration.

A combined ground-gas/groundwater monitoring standpipe, with an internal diameter of 50mm, was installed in WS1, WS3 and WS5. The installation details can be viewed within the table below.

Combined Ground-gas and Groundwater Monitoring Well Construction					
Trial Hole	Depth of Installation (m bgl)	Thickness of slotted piping with gravel filter pack (m)	Depth of plain piping with bentonite seal (m bgl)	Response Zone (m bgl)	Piping internal diameter (mm)
WS1	3.00	2.00	1.00	1.00 – 3.00	50
WS3	2.50	1.50	1.00	1.00 – 2.50	50
WS5	2.00	1.00	1.00	1.00 – 2.00	50

Phase II was undertaken on 22nd January 2025 and comprised the machine excavation of 4No. trial pits (TPA – TPD) to a depth of between 0.80m – 1.50m bgl to enable the undertaking of infiltration tests in accordance with BRE365. The trial hole locations can be seen within Figure 3.

Prior to commencing the ground investigation, a walkover survey was carried out to identify the presence of underground services and drainage. Where underground services/drainage were suspected and/or positively identified, the exploratory position was relocated away from these areas.

As a further precautionary measure, the borehole was hand excavated to 1.20m below the local ground level (bgl) and scanned with a Cable Avoidance Tool (CAT scanner) to minimise the risk to services.

Upon completion of the drilling works, the trial holes were backfilled and made good, in relation to the surrounding area.

3.2. Sampling Procedures

Small disturbed samples and environmental samples were recovered from the trial holes at the depths shown on the trial hole records. Soil samples were generally retrieved from each change of strata and/or at specific areas of concern. Samples were also taken at approximately 0.5m intervals during broad homogenous soil horizons. A selection of samples were despatched to a laboratory for both geotechnical and chemical testing purposes.

4. ENCOUNTERED GROUND CONDITIONS

4.1. Soil Conditions

The trial holes were logged by a Ground and Water Limited representative, generally in accordance with BS EN 14688 'Geotechnical Investigation and Testing – Identification and Classification of Soil'.

The ground conditions encountered within the trial holes constructed on the site did generally conform to that anticipated from examination of the geology map. A capping of Topsoil was noted to overlie the superficial Head Deposits. The bedrock deposits of the Lambeth Group and the London Clay Formation were not encountered in the trial holes.

The succession of conditions and description of soils encountered in the trial holes in descending order is tabulated below.

Summary of Strata Encountered			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
TOPSOIL: Dark brown slightly gravelly SAND. The sand was fine and the gravel was fine, sub-angular flint	GL	0.25 – 0.60	0.25 – 0.60
HEAD DEPOSITS: Dark brown to pale brown slightly clayey sandy GRAVEL. The sand was fine to medium and the gravel was fine to medium sub-angular to sub-rounded flint..	0.25 – 0.60	>0.80 – >3.00	>0.75 – >2.40

For details of the composition of the soils encountered at particular points, reference must be made to the individual trial hole logs within Appendix D of this report. A trial hole location plan can also be viewed within Figure 3.

4.2. Roots Encountered

Roots were noted to a proved depth of between 0.20 – 0.50m bgl within the boreholes. A summary of the depth of root penetration can be viewed below.

Root Depth	
Trial Hole	Fresh Root Penetration (m bgl)
WS1	0.50
WS2	0.30
WS3	0.25
WS4	0.20
WS5	0.50
TPA	0.40
TPB	0.40
TPC	0.40
TPD	0.40

It must be noted that the chance of determining actual depth of root penetration through a narrow diameter borehole is low. Roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

4.3. Groundwater Conditions

Groundwater was not encountered during either phase of the ground investigation. It should be noted that groundwater strikes may be obscured by the drilling/excavation process.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was undertaken in September 2023 when groundwater levels are likely to be rising from their annual minimum (lowest elevation) and in January 2025 when groundwater levels are likely to be close to their annual maximum (highest elevation). Exact groundwater levels may only be determined through long term measurements from monitoring wells installed on-site.

Groundwater monitoring was undertaken on twelve occasions between October 2023 and March 2024. The results can be seen tabulated below.

Depth of Standing Groundwater Within The Standpipes			
Trial Hole	Date	Depth of Groundwater (m bgl)	Depth of Standpipe (m bgl)
WS1	16/10/2023	Dry	2.60m
	10/11/2023	Dry	1.90m
	22/11/2023	Dry	2.50m
	08/12/2023	Dry	2.70m
	21/12/2023	Dry	2.80m
	05/01/2024	Dry	2.60m
	22/01/2024	Dry	2.60m
	05/02/2024	Dry	2.70m
	19/02/2024	Dry	2.70m
	07/03/2023	Dry	2.70m
	21/03/2024	Dry	2.70m
	28/03/2024	Dry	2.70m
WS3	16/10/2023	Dry	1.50m
	10/11/2023	Dry	1.50m
	22/11/2023	Dry	1.30m
	08/12/2023	Dry	1.90m
	21/12/2023	Dry	1.80m
	05/01/2024	Dry	1.50m
	22/01/2024	Dry	1.50m
	05/02/2024	Dry	1.60m
	19/02/2024	Dry	1.60m
	07/03/2023	Dry	1.55m
	21/03/2024	Dry	1.55m
	28/03/2024	Dry	1.60m
WS5	16/10/2023	Dry	2.00m
	10/11/2023	Dry	2.00m
	22/11/2023	Dry	2.00m
	08/12/2023	Dry	2.00m
	21/12/2023	Dry	2.00m
	05/01/2024	Dry	1.90m
	22/01/2024	Dry	1.90m
	05/02/2024	Dry	2.00m
	19/02/2024	Dry	2.00m

	07/03/2023	Dry	1.90m
	21/03/2024	Dry	1.90m
	28/03/2024	Dry	2.00m

4.4. Obstructions

The density of the soils prevented further progress of the boreholes (WS1 – WS5) below a depth of between 1.00 – 3.00m bgl and the dynamic probes below a depth of between 1.00 – 5.00m bgl.

No other artificial or natural sub-surface obstructions were noted during construction of the trial holes.

5. IN-SITU AND LABORATORY TESTING

5.1. In-situ Strength Testing

Standard Penetration Tests (SPTs) and Super Heavy Dynamic Probes (SHDPs) were undertaken as part of the site investigation. The results of the SPT's have not been amended to consider hammer efficiency, rod lengths and overburden pressure in accordance with Eurocode 7. The test results are presented on the borehole logs within Appendix D. An interpretation of the in-situ geotechnical testing results is given in the table below.

Interpretation of In-situ Geotechnical Testing Results					
Strata	SPT "N" Blow Counts and Equivalent SPT "N" Value from DP	Equivalent Undrained Shear Strength (Cu) (kPa) (Stroud (1974))	Soil Type		Trial Hole/s
			Granular (Density)	Cohesive (Cu)	
Head Deposits	16 - >106	-	Med Dense – Ext Dense	-	WS1/0.60 – 3.00
	12 - >65		Med Dense – Ext Dense		WS2/0.25 – 2.00
	8 - >56		Med Dense – Ext Dense		WS3/0.30 – 2.50
	13 – 56		Med Dense – V Dense		WS5/0.55 – 2.00
Assumed Head Deposits	10 – 55	-	Med Dense – Dense	-	DP1/0.60 – 5.00
	18 – 110		Med Dense – Ext Dense		DP2/0.25 – 2.40
	10 – 83		Med Dense – Ext Dense		DP3/0.30 – 3.30
	16 – 108		Med Dense – Ext Dense		DP4/0.20 – 1.00
	12 – 114		Med Dense – Ext Dense		DP5/0.55 – 2.40

5.2. Geotechnical Laboratory Testing

A programme of geotechnical laboratory testing, scheduled by Ground and Water Limited and carried out by an accredited geotechnical testing laboratory was undertaken on samples recovered. Details of the specific tests used in each case are given below.

Standard Methodology for Laboratory Geotechnical Testing		
Test	Standard	Number of Tests
Particle Size Distribution Tests	BS1377:2016:Part 2:Clause 9	5
Water Soluble Sulphate and pH Test	BS1377:2018:Part 3:Clause 5	1
BRE Special Digest 1 Tests	BRE Special Digest 1 "Concrete in Aggressive Ground (BRE, 2005).	2

5.2.1. Particle Size Distribution Testing

The results of particle size distribution (PSD) testing undertaken show that the Head Deposits have a volume change potential in accordance with BRE240 and no volume change potential in accordance with NHBC Standards Chapter 4.2. The results of the PSD testing can be viewed within Appendix E and summarised overpage.

Particle Size Distribution Results Summary			
Stratum	Range Passing 63µm Sieve (%)	Volume Change Potential	
		BRE	NHBC
Head Deposits	19 – 27	Yes	No
<ul style="list-style-type: none"> • Volume Change Potential refers to BRE Digest 240 (based on Grading test results). • Shrinkability refers to NHBC Standards Chapter 4.2 (based on Grading test results). • BRE 240 states that a soil has a volume change potential when the clay fraction exceeds 15%. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63µm sieve. • NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63µm sieve is greater than 35% and the Plasticity Index is greater than 10%. 			

6. ENGINEERING CONSIDERATIONS

6.1.1. Chalk Dissolution Risk Assessment

Chalk will be encountered at depth underlying the soils of the Lambeth Group and this combination of soils can result in the creation of chalk dissolution features.

The presence of dissolution features on-site can prove problematic, as they often provide inconsistency within the underlying geology. Often formed during glacial and periglacial conditions, the depth and width of these features can vary substantially, often providing inconsistency in geological strength data.

If a dissolution feature is suspected, a geotechnical engineer and structural engineer should be contacted for suitable engineering designs, based on further works identifying and classifying the area the feature occupies.

The Groundsure Geosight datasheets, presented Appendix E of this report, revealed the following information which may be pertinent to this risk assessment.

- Ground Dissolution of Soluble Rocks – The site was classified as having a negligible risk of ground dissolution of soluble rocks.
- An on-site Class A Historical Mining area was identified on-site. A Class A area was described as *“Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult ground conditions are unlikely and are at a level, where they need not be considered”*. However, this is generally a precautionary statement attributed to all areas associated with chalk within the ground profile. Therefore, this does not identify any underground chalk features at the site location.
- 10No. off-site records of surface ground workings were noted corresponding to: unspecified pit/gravel pit 11 – 18m north and 22 – 25m north-west; gravel pits 130m north; and unspecified pits/disused pits/sand pit/gravel pits 217 – 242m south-east.
- No underground workings, natural cavities or Britpits were noted within 250m radius of the site.
- The Edmonds Procedure (Edmonds, C.N., 2001. Predicting natural cavities in chalk. Geological Society, London, Engineering Geology Special Publications, 18(1), pp.29-38.); highlighted a low subsidence hazard classification.

The historical mapping review undertaken in section 3.1 of this report confirmed the findings of the groundsure datasheets discussed above.

This risk assessment indicates that in principle there is a negligible risk from the dissolution of soluble rocks at the site.

The risk from dissolution should be closely monitored, along with the geological sequence of soils below the site.

6.2. Soil Characteristics and Foundation Considerations

A summary of the soil characteristics following the intrusive site investigation and laboratory testing and the relevant foundation considerations has been provided below. The following information from the ground investigation was considered pertinent to the design of foundations.

- Foundations should be taken through any Topsoil and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.
- Foundations should be designed in accordance with soils of low volume change potential, based on PSD results showing some VCP being present.
- Given the presence of soils exhibiting some volume change potential at shallow depth, special foundation precautions may be required to prevent possible future shrinkage/swelling of the soils affecting the integrity of the faces of foundations (underfloor void diameter/compressible material/void formers etc.).
- The loads of proposed foundations should not exceed the allowable bearing capacity of the soils they are founding upon.
- Foundations must not be placed within fresh root penetrated and/or desiccated soils with volume change potential. It is recommended that foundations are taken at least 300mm into non-fresh root penetrated strata if the soils have volume change potential, or into soils of no volume change potential.
- The influence of trees on or surrounding the site will need to be taken into account in final design (NHBC Standards Chapter 4. 2) (tree rings).
- Any water ingress must be prevented from entering foundation trenches and excavations must be kept dry and either concreted or blinded as soon after excavation as possible. If water were allowed to accumulate within the excavation for even a short period of time, an increase in heave occur. The shear strength will also be reduced, resulting in lower bearing capacities, resulting in increased settlements. Instability issues may arise within the foundation trenches, in case of perched water being present.

6.3. Shallow Foundations

Based on the previous section, foundations should bypass any Topsoil before extending 300mm below the proved depth of root penetration. Foundations would therefore be constructed on competent, moisture stable soils of the Head Deposits.

Foundations must not be placed within cohesive root penetrated and/or desiccated soils and the influence of the trees surrounding the site must be taken into account, in case of soils with volume change potential. The base of foundation excavations must extend at least 300mm into non-root penetrated soils.

Foundations should be taken through any Topsoil/Made Ground, extend 300mm below the proven depth of root penetration and found on moisture stable, competent granular soils of the Head Deposits; minimum foundation depths are likely to vary between 0.75 – 0.90m bgl, with locally deepened foundations in the vicinity of WS3 to ~1.50m bgl in order to by pass the softer/loose zones encountered at that location.

Foundations based on the above recommendations can be designed based on an allowable bearing capacity of 150kN/m².

This is based on trial hole records, the results of in-situ testing, inspection of samples recovered, and based on a 5m long by 1m wide foundation and a maximum settlement of 25mm. Settlements on loading are likely to be moderate.

Water seepages may be encountered within foundation excavations, and this should be taken into account in the final design. Some instabilities may be recorded, especially within sandy layers.

Additional Comments

A number of comments and recommendations has been provided below.

- It is prudent to avoid having a foundation spanning across materials of different consistency, like clay and gravel, in order to avoid potential differential settlements. If unavoidable, foundations must be reinforced to allow for such potential differential movement. It should be noted that differential settlement may also occur between strip and isolated pad foundations.
- Foundation excavations must be carefully bottomed out and any loose soil or soft spots removed prior to the foundation concrete or blinding being placed. Failure to ensure that foundation excavations are suitably bottomed out could result in additional settlements.
- Inspection of foundation excavations, prior to concreting, must be made by a competent and suitably qualified person to check for soft spots and to check for the presence of roots.
- Foundations must not be cast over foundations of former structures and/or other hard spots.
- Given soils of volume change potential were encountered, a suspended slab is recommended.
- Isolated Pad Foundations must be at least 1.5 times the width of the widest pad apart to keep to the anticipated settlements.
- Final designs for the foundations should be carried out by a suitably qualified Engineer based on the findings of this investigation and with reference to the anticipated loadings, serviceability requirements for the structure and the developments proximity to former, present, and proposed trees. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

6.4. Piled Foundation

Based on the results of the intrusive investigation, a piled foundation scheme was unlikely to be required.

6.5. Excavations and Stability

Shallow excavations in the Topsoil and Head Deposits are likely to be marginally stable at best. Long, deep excavations, through these strata are likely to become unstable.

Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported before excavations are entered by personnel.

6.6. Sub-Surface Concrete Design

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground' considering the pH of the soils. For the classification given below, the "mobile" and "natural" case was adopted given the geology encountered and the use of the site.

Topsoil

The water-soluble sulphates in the Topsoil were noted to be <4 – 10.9mg/l, with a pH of 5.65 – 6.41, from chemical and geotechnical laboratory testing.

Head Deposits

The water-soluble sulphates in the Head Deposits were noted to be <4mg/l, with a pH of 8.25 – 9.06, from chemical and geotechnical laboratory testing.

According to BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' a Sulphate Design Class of DS-1 could be used for sub-surface concrete in contact with the Head Deposits. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-1.

6.7. Roads and Hardstanding Design

This section provides information relating to the construction of roads and hardstanding, for each strata encountered.

6.7.1. Anticipated CBR Values and Frost Susceptibility

Topsoil

Roads and hardstanding should bypass Topsoil given the likely low strength, high compressibility and general variability.

Head Deposits

Roads and hardstanding constructed on the granular Head Deposits should be designed based on a CBR value of 40%. This is based on reference to Table C1 of TRL1132 and average construction conditions. Based on wet conditions a CBR of 20% should be adopted, with dry conditions a CBR of 60% being applicable. Given that the soils encountered beneath the site had a clay content of 19 - 27% **these deposits are likely to be frost susceptible.**

All formation levels for roads and hardstanding should be proof rolled to highlight any soft areas which should then be dug out and replaced with selected granular material compacted in thin layers to a suitable specification.

6.8. Surface Water Disposal

Soakaway testing in accordance with BRE365 was undertaken within TPA - TPD with the results tabulated below.

Soakage Testing Results						
Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
TPA	1	1.25	0.53	1.25	70	2.69 x 10 ⁻⁵
	2	1.10*	0.68	1.10 Dry	100	2.35 x 10 ⁻⁵
	3	1.10*	0.69	1.10 Dry	110	2.17 x 10 ⁻⁵
TPB	1	1.16**	0.77	1.16 Dry	10	2.57 x 10 ⁻⁴
	2	1.16**	0.77	1.10	6	5.84 x 10 ⁻⁴
	3	1.16**	0.74	1.10	10	2.94 x 10 ⁻⁴
TPC	1	1.25***	0.75	1.25 Dry	70	3.61 x 10 ⁻⁵
	2	1.25***	0.80	1.14	30	1.04 x 10 ⁻⁴
	3	1.25***	0.77	1.14	40	6.66 x 10 ⁻⁵
TPD	1	0.80	0.55	0.80 Dry	4	5.41 x 10 ⁻⁴
	2	0.80	0.57	0.80 Dry	6	3.79 x 10 ⁻⁴
	3	0.80	0.59	0.80 Dry	7	2.65 x 10 ⁻⁴

*hole had collapsed to 1.10m bgl.

**hole had collapsed to 1.16m bgl.

***hole had collapsed to 1.25m bgl.

Falling head testing was undertaken within WS1 and WS2 to give preliminary infiltration rates with the results tabulated below.

Soakage Testing Results						
Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
WS1	1	3.00	1.10	3.00	2	6.67 x 10 ⁻⁴
WS2	1	2.00	1.15	2.00	28	5.34 x 10 ⁻⁵

Based upon the results of the infiltration tests, it was considered that the soils of the Head Deposits encountered would provide a suitable medium for soakaway installation provided that adequate storage was included in the design.

Any soakaways should be located sufficiently away from buildings and infrastructure, in order to prevent undermining of foundations.

The submission of a Sustainable Urban Drainage Scheme (SUDS) is likely to be required for this site due to the proposed development increasing the amounts of hardstanding.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources, abstractions and surface water features/watercourses.

It should be noted that water discharge into the chalk may worsen / create dissolution features. Therefore, soakaways should be remote from structures and undertaken in accordance with available guidance.

A number of published information sources make reference to an appropriate distance at which a soakaway should be sited in relation to any building foundations in the vicinity:

- The British Standard BS8301 :1985 “Code of practice for building drainage” (1985), suggests that: “A soakaway is not desirable nearer to a building than about 5 metres nor in such a position that the ground below foundations is likely to be adversely affected.”
- The Building Research Establishment Digest 365 “Soakaway design” (1991), suggests that “Soakaways should not normally be constructed closer than 5m to building foundations. In chalk or other soil and fill material subject to modification or instability, the advice of a specialist geotechnologist should be sought as to the advisability and siting of a soakaway”.

In addition, the distance a soakaway is located from any foundations can be informed by both the soakaway type and chalk density present at the site.

- The Kent County Council Soakaway Design Guide (July 2000) states that “Highway soakaways shall be situated the following minimum distances from dwellings (measured from the outside edge of the soakaway): (1) 5 metres for conventional perforated soakaway; (2) 10 metres for deep bored soakaway. In addition, adjacent soakaways of a similar type shall also be spaced a minimum of 10 metres apart.
 - CIRIA 574 states that soakaways should be sited at least 5-10m away from any structure, depending on the chalk density. Where the chalk present is of low or unknown density, soakaways should be sited at least 10m from any foundations, and where the chalk is of medium density or higher, any foundations should be sited at least 5m from any foundations.
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7. CONTAMINATION RISK ASSESSMENT

7.1. Results of the Preliminary Risk Assessment

The tabulated Conceptual Site Model (CSM) developed by the Ground and Water Desk Study (ref. GWPR5771/DS/October 2023) is reproduced in section 2.8. For the complete information please see the Desk Study report.

No additional source of contamination, pathway or receptor was identified between the desk study and the ground investigation and as such, it was not necessary to modify the CSM.

In the UK, the assessment of risk from contamination follows the source-pathway-receptor (SPR) approach. For a risk to be present there must be a source of contamination, a receptor or receptors, and a pathway for contaminants to migrate or be absorbed. If there is a linkage between any given source and receptor, then a quantitative risk assessment is used to assess the significance or impact of the pollutant linkage.

7.2. Sampling Locations

The synopsis for the trial hole locations and their final depth can be seen tabulated below. A trial hole location plan is provided within Figure 3. The table also indicates whether any locations targeted a source of contamination as well as the proposed end-use. The proposed development can be seen in Figure 2.

Trial Hole Location Synopsis		
Trial Hole/Final Depth	Sampling Strategy	Proposed End-Use
WS1/3.00m	Random	Access Road
WS2/2.00m	Random	Access Road
WS3/2.50m	Random	Soft Landscaping
WS4/1.00m	Random	Soft Landscaping
WS5/2.00m	Random	Soft Landscaping

The investigation area totals approximately 4,100m² and with five sampling locations, given an unknown hotspot shape, the sampling density means that a hotspot with an area of approximately 1,023m² and a radius of approximately 19.8m would be encountered (CLR 4).

7.3. Soil Risk Assessment

Sampling depths were chosen to reflect the receptor of concern (e.g. human health, controlled waters and vegetation). The samples were scheduled under a random strategy. The receptors relevant to the sampling depths are tabulated below.

Summary of Receptors per Sample Depth	
Depth	Receptors
Shallow Samples (< 0.75m bgl)	<ul style="list-style-type: none"> • End Users (Residents/Future site visitors) • Construction workers during development • Site operatives during maintenance works • Neighbours and public • Vegetation within soft landscaped areas (shallow rooted) • Secondary A Aquifer (Head Deposits and Lambeth Group) • Buried Concrete • Receiving landfill

Chemical laboratory testing, scheduled by Ground and Water Limited, and carried out by ALS Laboratories UK Limited, was undertaken on three samples of Topsoil. The samples were subjected to a combination of analysis that comprised:

- Asbestos screen;
- Semi-metals and heavy metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc;
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene;
- Speciated TPH including full aliphatic/aromatic split; and
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs).

A breakdown of the number of tests undertaken for each determinand is discussed in further sections. The chemical laboratory results are presented in Appendix F.

7.3.1. Soil Assessment Criteria and Results

At the time of reporting, February 2025, the proposed development was understood to comprise the construction of 9 No residential properties with associated private gardens and/or soft landscaped areas, along with access roads and areas of car parking. The proposed development plan can be seen within Figure 2.

Based on the proposed development, the results of the chemical laboratory testing were compared to the Generic Assessment Criteria (GAC) for a ***'Residential with homegrown produce'*** land-use scenario, as this was considered the most appropriate land-use scenario.

Where a contaminant of concern's GAC varies according to the Soil's Organic Matter (SOM), the SOM recorded for each uncontaminated soil type was used to derive the appropriate GAC for each soil type. A SOM value of 1%, the most conservative value, was utilised.

A summary of the analytical results and the comparison to the determinands adopted screening value are presented in the table overleaf.

Soil Contamination Test Results and Screening Values					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
INORGANICS					
Asbestos	3	ND	ND	ND	No
Cyanide (total)	3	<1	<1	24	No
Phenols	3	<0.035	<0.035	280	No
METALS					
Arsenic	3	6.76	9.78	37	No
Boron	3	<1	<1	290	No
Cadmium	3	<0.02	0.287	11	No
Chromium (III)	3	12.2	17.1	910	No
Chromium (Hexavalent)	3	<0.6	<0.6	6	No
Copper	3	10.6	27.4	2400	No
Lead	3	28.6	36.2	200	No
Mercury	3	<0.1	<0.1	1.2	No
Nickel	3	10.4	16.6	130	No
Selenium	3	<1	1.54	250	No
Vanadium	3	24.7	26.8	410	No
Zinc	3	47.5	66.1	3700	No
TOTAL PETROLEUM HYDROCARBONS (TPHs)					
Aliphatic >C5 - C6	2	<0.01	<0.01	42	No
Aliphatic >C6 - C8	2	<0.01	<0.01	100	No
Aliphatic >C8 - C10	2	<0.01	<0.01	27	No
Aliphatic >C10 - C12	2	<1	<1	130	No
Aliphatic >C12 - C16	2	<1	<1	1100	No
Aliphatic >C16 - C21	2	<1	<1	65000	No
Aliphatic >C21 - C35	2	3.02	6.91	65000	No
Aliphatic >C35 - C44	2	<1	<1	65000	No
Aromatic >C5 - C7	2	<0.01	<0.01	70	No
Aromatic >C7 - C8	2	<0.01	<0.01	130	No
Aromatic >C8 - C10	2	<0.01	<0.01	34	No
Aromatic >C10 - C12	2	<1	<1	74	No
Aromatic >C12 - C16	2	<1	<1	140	No
Aromatic >C16 - C21	2	<1	<1	260	No
Aromatic >C21 - C35	2	6.62	10.5	1100	No
Benzene	3	<0.001	<0.001	0.087	No
Toluene	3	<0.001	<0.001	130	No
Ethylbenzene	3	<0.001	<0.001	47	No
m,p-Xylene	3	<0.002	<0.002	56	No
o-Xylene	3	<0.002	<0.002	60	No
POLYCYCLIC-AROMATIC HYDROCARBONS					
Acenaphthene	3	<0.008	<0.008	210	No
Acenaphthylene	3	<0.012	<0.012	170	No
Anthracene	3	<0.016	<0.016	2400	No
Benzo(a)anthracene	3	0.0364	0.095	7.2	No
Benzo(a)pyrene	3	0.0404	0.119	2.2	No
Benzo(b)fluoranthene	3	0.0598	0.145	2.6	No
Benzo(ghi)perylene	3	0.0293	0.0789	320	No

Benzo(k)fluoranthene	3	0.0196	0.053	77	No
Chrysene	3	0.0417	0.103	15	No
Dibenzo(a,h)anthracene	3	<0.023	<0.023	0.24	No
Fluoranthene	3	0.0814	0.192	280	No
Fluorene	3	<0.01	<0.01	170	No
Indeno(1,2,3-cd)pyrene	3	0.0307	0.085	27	No
Naphthalene	3	<0.009	<0.009	2.3	No
Phenanthrene	3	0.0246	0.0507	95	No
Pyrene	3	0.072	0.173	620	No
MARKER FOR VOLATILE ORGANIC COMPOUND					
Methyl tert-butyl ether (MTBE)	3	< 0.005	< 0.005	49	No
<p>The derivation of the Soil Assessment Criteria used within this report can be seen within Appendix G. The soil concentrations were typically compared to the LQM/CIEH Suitable for Use Levels (S4UL) (2014), based upon the assumption of 1% soil organic matter. A screening value for Lead is based on the Category 4 Screening Levels (C4SLs). Where no S4UL or C4SL is available for Cyanide, a SoBRA acute GAC is assigned. Where no S4UL or C4SL is available for MTBE, a CL:AIRE 2010 GAC is assigned. Where exceedances are noted, the trial hole and depth of sample is recorded.</p>					

The proposed development includes areas of soft-landscaping, where shallow rooted vegetation may be exposed to aggressive ground conditions. The previous table compares the results of the laboratory analysis to GAC that is protective of Human Health and therefore different GAC is required for vegetation.

Soil Contamination Test Results and Screening Value					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
Copper	3	10.6	27.4	100	No
Nickel	3	10.4	16.6	60	No
Zinc	3	47.5	66.1	200	No
<p>The derivation of the Soil Assessment Criteria used within this report can be seen within Appendix G. The soil concentrations were compared to BS3882:2015 <i>Specification for Topsoil</i> and based on differing pH. For the purpose of conservatism, the pH of the soils have been assumed to be below 6 within this table. Where exceedances are noted, the trial hole and depth of sample is recorded.</p>					

7.3.2. Soil Assessment

The comparison between the laboratory analysis and the assessment criteria indicates that the determinands were identified at below the adopted screening values and are not considered to represent an unacceptable risk to future receptors.

Asbestos

No asbestos has been identified during the testing, however, an **Asbestos Management Strategy** should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination.

7.3.3. Water Supply Pipe Risk Assessment

As part of the proposed development it is expected that new water supply pipes will be installed at the site. Water supply pipes have the potential to be exposed to contaminants in the ground that can

lead to unacceptable concentrations within the drinking water. If a risk is identified, specialist pipes that are protective of the drinking water are required.

A pipe selection risk assessment should be submitted to the water supply company as part of the development based on the supplier’s assessment criteria. An indication of whether there is likely to be a risk can be seen tabulated below, where the PE pipe thresholds are based on *UKWIR Contaminated Land Assessment Guidance, 2014*.

Pipe Selection Risk Assessment			
Determinand	PE Pipe Threshold (mg/kg)	Laboratory Analysis Range (mg/kg)	Was the Threshold Exceeded?
Total BTEX and MTBE	0.1	< 0.01	No
Total VOCs	0.5	-	No
Total SVOCs	2	-	No
Phenols	2	< 0.035	No
TPH EC5 – EC10 (aliphatics and aromatics)	2	< 0.01	No
TPH EC10 – EC16 (aliphatics and aromatics)	10	< 1	No
TPH EC16 – EC40 (aliphatics and aromatics)	500	< 1 – 10.5	No
Naphthalene	5	< 0.09	No

The results indicate that no determinands were above the threshold for the use of a PE pipe at the site.

7.4. Groundwater Risk Assessment

In the UK, the water environment is protected under a number of regulatory regimes, mainly governed by the Environment Agency. The Environment Agency is consulted when there may be a risk to Controlled Waters, or where a pollution incident has occurred historically. The Water Framework Directive is implemented in various guises covering groundwater, surface water and drinking water supply.

A study of the aquifer maps on the DEFRA website revealed the site was underlain by a **Secondary A Aquifer** comprising the superficial Head Deposits (Valley Gravel) underlain by the Lambeth Group also classified as a Secondary A Aquifer. **Unproductive Strata** comprising bedrock deposits of the London Clay Formation may be encountered in the extreme south-east corner.

Examination of the Environment Agency records showed that the site was located within an Inner Zone – subsurface activity only (Zone 1c) Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. Inner Zone – subsurface activity only (Zone 1c) Groundwater Source Protection Zone (SPZ) extends the Zone 1 where the aquifer is confined and may be impacted by deep drilling activities.

No surface water features were present within a 250m radius of the site.

From analysis of hydrogeological and topographical maps the actual groundwater table was anticipated to be encountered at shallow to moderate depth perched within the Head Deposits (Valley Gravel) above the London Clay Formation. Some amounts of groundwater however may be present

at shallower depths within Made ground. It was considered that groundwater was flowing in a southerly direction in line with local topography.

During the site investigation Topsoil was encountered to a maximum depth of 0.60m bgl, overlying slightly clayey sandy gravel of the Head Deposits to the base of the boreholes at a maximum depth of 3.00m bgl. Groundwater was not encountered.

Given the history of the site and the Unproductive Strata, it is not expected that the soils on-site represent an unacceptable risk to controlled water receptors. No further action is considered necessary.

The findings of this risk assessment should be agreed with the Environment Agency.

7.5. Ground Gas Risk Assessment

The only on-site source of ground gases was anticipated to be limited Made Ground and therefore classified as 'Low risk', where the pragmatic approach to ground gas risk assessment presented within the CL:AIRE research bulletin RB17 and included within Annex D of BS8485:2015+A1:2019 can be considered.

7.5.1. Pragmatic Approach

The alternative approach to ground gas risk assessment considers the uncertainty from the measurement of ground gas concentrations and flow rates in monitoring wells for low-risk sites and removes the need for monitoring. Low risk sites typically comprise:

- Natural soils with high carbonate content (e.g. chalk);
- Natural soils that can produce gases (e.g. alluvium, peat etc.);
- Made Ground between 1.00m to 5.00m, with low organic content; and
- Areas of flooded mine workings, unless a building is to be within 20m of shaft or adit.

The method considers the gas generation potential of the soils from data that is not subject to external influences, for example atmospheric pressure can change the recorded flow and concentrations of ground gas during spot monitoring, or a rising groundwater level can displace ground gases in pore spaces. Determination of the characteristic situation is based on the total organic carbon (TOC) of the soils, coupled with any organic-rich material identified within the borehole logs, such as wood gravels. TOC is easily analysed by the laboratory and can also be calculated by the equation outlined below.

$$\text{Total Organic Carbon (TOC)} = 0.58 \times \text{Soil Organic Matter (SOM)} = 1.33 \times \text{Degradable Organic Carbon (DOC)}$$

As part of the ground investigation works, six samples were submitted to the laboratory for analysis, which identified TOC to vary between 1.26 and 1.96% in the Topsoil. Topsoil was identified to a maximum depth between 0.20m and 0.60m bgl.

7.5.2. Data Quality

A review was made of the quality of the available data for the site, which can be viewed in the table below. CIRIA Report C665 (2007), BS 8485:2015+A1:2019 and BS 8576:2013 stress the need for risk assessments to be based on good quality data and give guidance as to best practice in this respect.

Review of Data Quality

Data Type	Current Understanding	UK Practice	Recommendation
Geological and hydro-geological conditions	The CSM identified the site to be located on Topsoil overlying permeable strata of the Head Deposits. Groundwater was not encountered.	CIRA C665 & C659, Wilson and Card (1999) and BS 8485 recommend that geology and hydrogeology be fully understood.	The geological and hydrogeological model is understood to a standard that will not comprise the findings of the risk assessment. No further action required.
Soil Laboratory Analysis	A dataset of soil analysis from 6No. samples of the Topsoil have identified a range of TOC concentrations between 1.26% and 1.96%.	CL:AIRE RB17 outlines an approach to ground gas risk assessment away from the influences that directly affect ground gas monitoring. It should typically be used on sites with limited sources identified in the CSM and Made Ground with average thickness <3m and maximum thickness <5m. TOC should be < 6%.	The TOC concentrations are below the limit of 6% in order to use the soil derived approach for the risk assessment. No further action required.

7.5.3. Risk Assessment

The intrusive investigation has revealed a maximum thickness of Topsoil of 0.60m overlying Head Deposits comprising granular soils. Limited degradable material has been identified. The introduction of oxygen to the ground through redevelopment may lead to an initial increase of ground gas generation as degradable material within the soils present on-site may act as source of ground gas. The soils at the site are considered to be of variable permeability (low to high) in nature and pathways for ground gas migration will be present.

Using the soil derived method, it is considered that a TOC value of <1% within soil is unlikely to pose an unacceptable risk from ground gases and the site can be characterised as Characteristic Situation CS1. Any value between 3 and 6% warrants classification as a Characteristic Situation CS3. Any value over 4% requires investigation through ground gas monitoring. Any site with Made Ground <1.00m bgl will have a limited gas generation potential from the organic carbon present and consideration should be given to this thickness within the risk assessment.

An alternative approach for ground gas risk assessment (CL:AIRE RB17) can be considered utilising measured concentrations from soil parameters that are independent of influencing factors such as atmospheric pressure and groundwater level. Total Organic Carbon (TOC) was tested on 3No. samples with the analytical results ranging between 1.26 and 1.96%. Furthermore, it is considered that a thickness of <0.90m would not generate sufficient ground gas to pose an unacceptable risk.

Based on the soil derived method outlined and the maximum TOC concentration encountered, the soils from site would warrant classification as Characteristic Situation CS1, based solely on the maximum TOC. It should be noted that this only represents the assessment from an on-site source.

A review of the Phase I Desk Study has identified off-site sources of ground gas within an influencing distance of the site comprising two historical landfill sites (9m north and 214m south-east) that warrant investigation through ground gas monitoring. **In accordance with CIRIA C665, it is anticipated**

that a minimum of six spot monitoring visits will be required to complete the ground gas risk assessment.

7.6. Vapour Risk Assessment

The CSM has identified sources and associated contaminants that may pose a risk through the vapour pathway. The investigation should comprise analysis of soil samples taken from appropriate horizons. During the monitoring of the standpipes, a PID should be used in order to identify whether a total VOC concentration is present. Should the PID identify anything over 10ppm, analysis by canister and/or testing of the groundwater should be undertaken.

7.7. Updated Conceptual Site Model

Following completion of the Phase 2 Site Investigation, the CSM, inclusive of associated risk, within Section 2.8 of this report was re-evaluated.

For ease of reference and understanding, the risks have been re-assigned within this risk assessment against three possible levels / categories, summarised in the table below.

Risk Categories used in the Tabulated CSM	
Low Risk	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is not considered to be an unacceptable risk to receptors.
Moderate Risk	Regarding this potential SPR linkage, the site is suitable for the proposed end-use however remediation and/or further investigation is required.
High Risk	Regarding this potential SPR linkage, the site is not suitable for proposed end-use and there is an unacceptable risk to receptors. Urgent action required in the short term.

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(On-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
<ul style="list-style-type: none"> No potential sources for contamination identified. <p>No elevated levels noted during investigation.</p>	<ul style="list-style-type: none"> Direct ingestion of soil and soil derived dust Dermal contact of soil and soil derived dust Inhalation of dust (indoors and outdoors) with elevated concentration of determinands Ingestion of home-grown produce, and soils attached Direct ingestion of groundwater Inhalation of volatile vapour (indoors and outdoors) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development Site operatives during maintenance works Neighbours and public 	Low
	<ul style="list-style-type: none"> Direct uptake of groundwater Direct uptake of determinands in the soil 	<p>Flora and Fauna</p> <ul style="list-style-type: none"> Vegetation within soft landscaped areas Ecological Receptor (Clapham Common) 	Low
	<ul style="list-style-type: none"> Anthropogenic (man-made) pathways Vertical and lateral migration in permeable strata Surface water runoff 	<p>Controlled Waters</p> <ul style="list-style-type: none"> Secondary A Aquifer (Head Deposits and Lambeth Group) 	Low
<p>Aggressive ground conditions with Made Ground and natural ground, including groundwater:</p> <ul style="list-style-type: none"> Sulphates, PAH/TPH. <p>The sulphates fell into Class DS-1 and AC-1</p>	<ul style="list-style-type: none"> Direct contact with aggressive ground conditions 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buried Concrete Underground services (water pipes) 	Low
<p>Ground gases generated by Made Ground:</p> <ul style="list-style-type: none"> Methane, Carbon Dioxide, Hydrogen Sulphide, and Carbon Monoxide. <p>Based on soil analysis, the site falls into the CS1 classification.</p>	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Inhalation of Asphyxiating gases Explosion (methane only) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development (especially in confined spaces) Site operatives during maintenance works in confined spaces Neighbours and public 	Low
	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Explosion (methane only) 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buildings Confined spaces Underground services 	Low

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
<p>Made Ground from nearby works:</p> <ul style="list-style-type: none"> Asbestos, PAHs, TPHs, VOCs, Sulphates, and Metals. <p>No elevated levels noted during investigation.</p>	<ul style="list-style-type: none"> Direct ingestion of soil and soil derived dust Dermal contact of soil and soil derived dust Inhalation of dust (indoors and outdoors) with elevated concentration of determinands Direct ingestion of groundwater Inhalation of volatile vapour (indoors and outdoors) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development Site operatives during maintenance works Neighbours and public 	Low
	<ul style="list-style-type: none"> Direct uptake of groundwater 	<p>Flora and Fauna</p> <ul style="list-style-type: none"> Vegetation within soft landscaped areas 	Low
		<p>Controlled Waters</p> <ul style="list-style-type: none"> Secondary A Aquifer (Head Deposits and Lambeth Group) 	Low
<p>Aggressive ground conditions associated with impacted groundwater;</p> <ul style="list-style-type: none"> Sulphates, PAH/TPH. <p>The sulphates fell into Class DS-1 and AC-1</p>	<ul style="list-style-type: none"> Direct contact with aggressive ground conditions 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buried Concrete Underground services (water pipes) 	Low
<p>Ground gases generated by infilled ground excavations and Historical Landfill Sites 9m north and 214m south-east:</p> <ul style="list-style-type: none"> Methane, Carbon Dioxide, Hydrogen Sulphide, and Carbon Monoxide. <p>In accordance with CIRIA C665, it is anticipated that a minimum of six</p>	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Inhalation of Asphyxiating gases Explosion (methane only) 	<p>Human Health</p> <ul style="list-style-type: none"> End Users (Residents/Future site visitors) Construction workers during development (especially in confined spaces) Site operatives during maintenance works in confined spaces Neighbours and public 	Moderate
	<ul style="list-style-type: none"> Migration through anthropogenic & natural pathways Explosion (methane only) 	<p>Building Materials and Services</p> <ul style="list-style-type: none"> Buildings Confined spaces Underground services 	Low

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
spot monitoring visits will be required to complete the ground gas risk assessment.			

8. CONTAMINATION RECOMMENDATIONS AND REMEDIATION STRATEGY

Based on the results of the intrusive works, chemical analyses and risk assessments undertaken, the following has been identified that requires further action:

- In accordance with CIRIA C665, it is anticipated that a minimum of six spot monitoring visits will be required to complete the ground gas risk assessment from off-site sources.

Based on the results of the intrusive works, chemical analyses and risk assessments undertaken, no remediation is required. Soft landscaped areas and gardens will need a 100-150mm nominal capping to act as a growing medium. The potential for Topsoil re-use can be explored by further testing, as the site is considered greenfield and the proposed development is quite large.

An Asbestos Management Strategy should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination.

8.1. Water Supply Pipes

The Water Supply pipe risk assessment indicated that the use of PE pipes is appropriate at the site and no further measures are required.

8.2. Groundwater

No risk to controlled waters was considered to be present from the site.

The findings of this risk assessment should be agreed with the Environment Agency.

8.3. Ground Gas and Vapours

In accordance with CIRIA C665, it is anticipated that a minimum of six spot monitoring visits will be required to complete the ground gas risk assessment from off-site sources. With regards to the risk from vapours, BTEX-MTBE analysis did not show elevated levels that may indicate further testing may be needed.

8.4. Discovery Strategy

There may be areas of contamination that have not been identified during the course of the intrusive investigation (e.g. underground storage tanks). Such occurrences may be discovered during the construction phases for the redevelopment of the site.

Groundworkers should be instructed to report to the Site Manager any evidence for such contamination; this may comprise visual indicators, such as fibrous materials within the soil, discolouration, or odours and emission. Upon discovery advice must be taken from a suitably qualified person and then the Local Authority will need to be informed.

8.5. Imported Material

It is not envisaged that soils will be brought onto site as part of the development works, however, any soil which is to be imported onto the site must undergo chemical analysis to prove that it is suitable for the purpose for which it is intended.

The soil must be fit for purpose and must either be supplied with traceable chemical laboratory test certificates or be tested, prior to placing (ideally) and after placing, to ensure that the future receptors (human health and vegetation) cannot come into contact with compounds that could be detrimental to their health. The compounds that are to be tested for are those given in the Generic Assessment Criteria, which can be viewed in Appendix G of this report.

8.6. Waste Disposal

The excavation of foundations and other soils is likely to produce waste which will require classification and then recycling or removal from site.

Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal, all waste must be classified as either: Inert; Non-hazardous; or Hazardous.

The Environment Agency's Hazardous Waste Technical Guidance (WM3) document outlines the methodology for classifying wastes. Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal.

Following the investigation, 3No. samples of Topsoil were submitted to the analytical laboratory to undergo a suite of testing for contamination testing, as discussed in the previous sections. Sampling depths were chosen to reflect the receptor of concern, human health, and typically comprised a surface or near surface sample and periodically to 1.00m bgl. Any horizon where olfactory or visual evidence of contamination was present was also sampled.

Based on a risk phase analysis of the chemical laboratory test results, in accordance with EC Hazardous Waste Directive and undertaken by Ground and Water Limited, all of the Topsoil samples encountered on-site were NON-HAZARDOUS. The results of the assessment are given within Appendix H.

It is important to note that whilst we consider our in-house assessment tool to be an accurate interpretation of the requirements of WM3, therefore producing an initial classification in accordance with the guidance, this method classifies soils as either non-hazardous or hazardous and landfill operators have their own assessment tools and can often come to different conclusions. As a result, some landfill operators could refuse to take apparently suitable waste. It is recommended that the receiving landfill views the results of this assessment and the chemical laboratory results to determine their own classification.

In addition to the samples described above, 1No. sample of Topsoil was scheduled to undergo Waste Acceptance Criteria (WAC) testing with single batch leachate from samples with a range of depths. The results indicate that the sample conformed to the Inert Waste Classification.

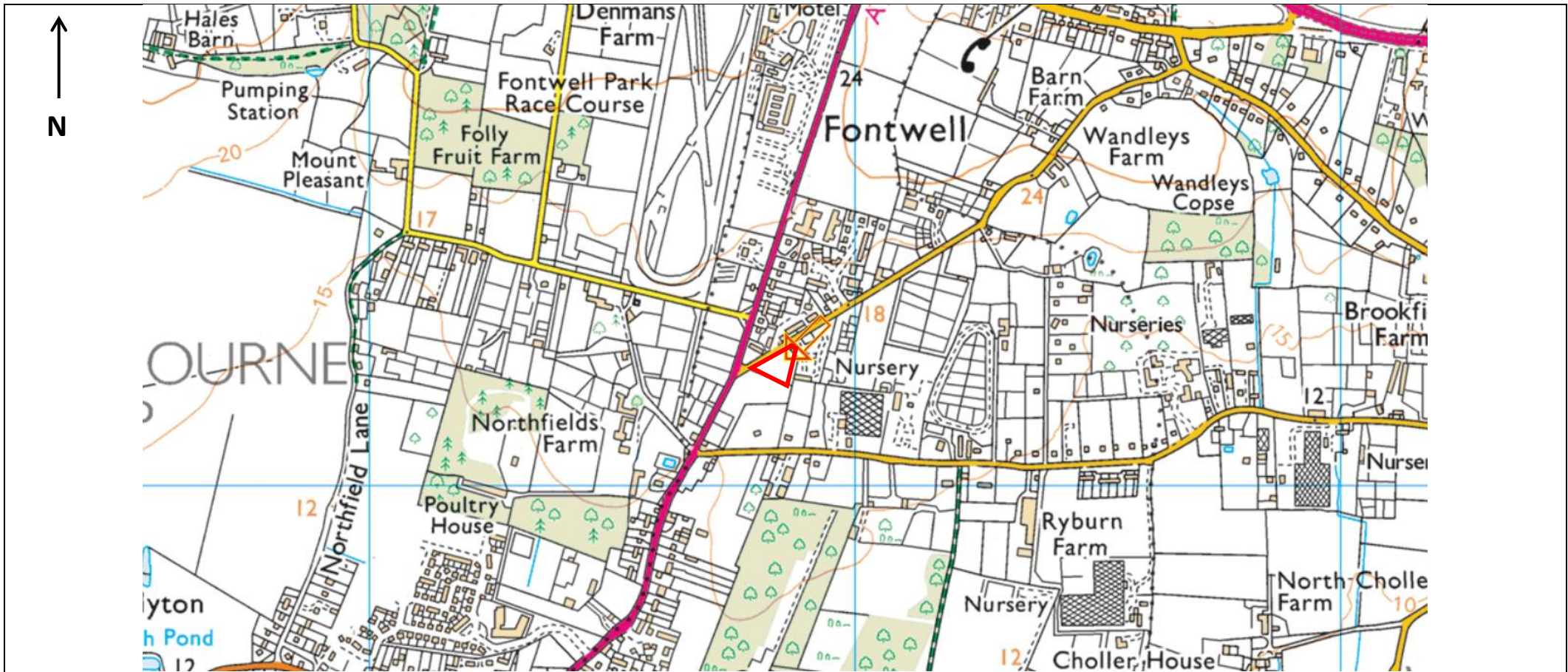
8.7. Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust would be generated as a result of construction activities.


The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

FIGURES



— APPROXIMATE SITE BOUNDARY


NOTE: NOT TO SCALE

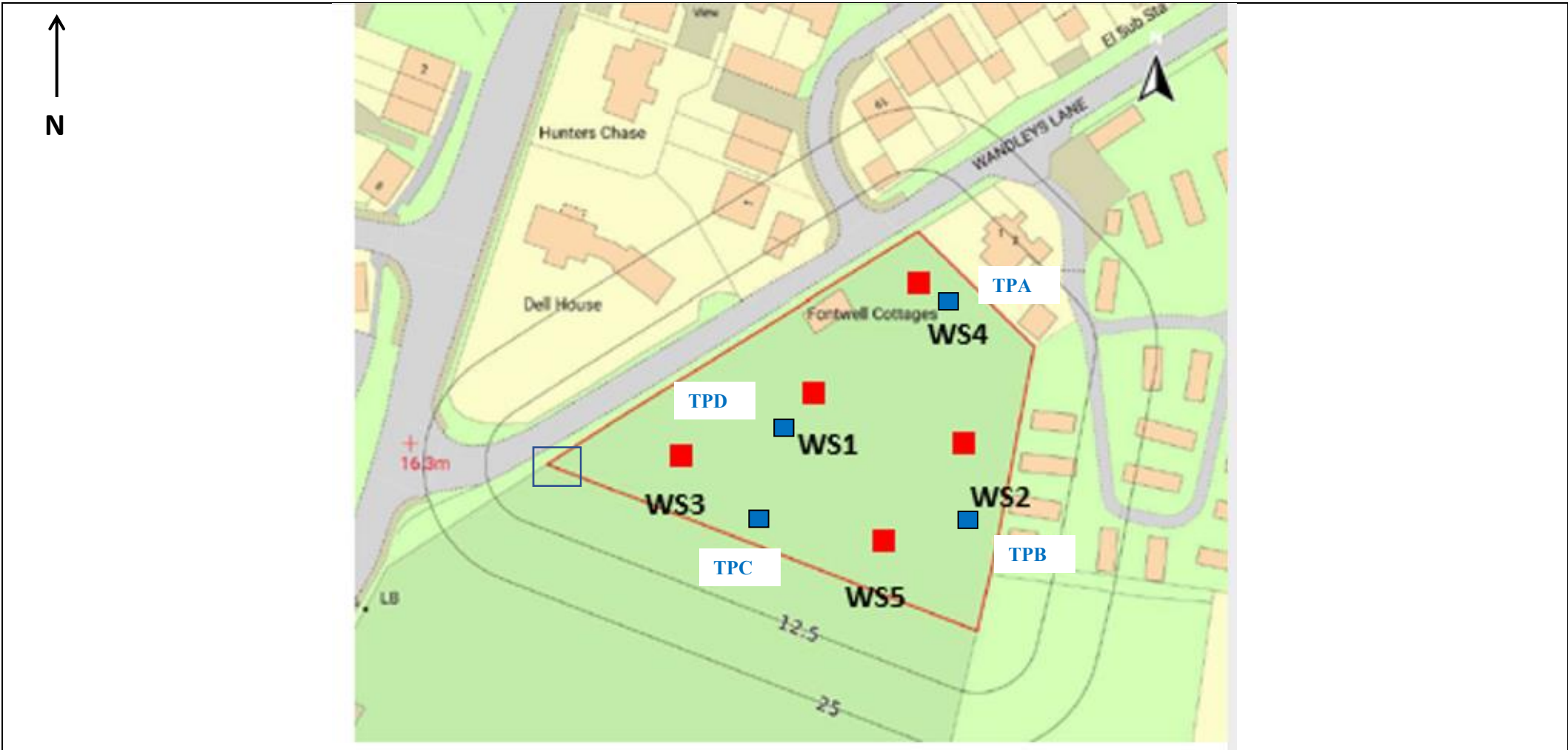
Project:		Land South of Wandleys Lane, Fontwell, Eastergate, West Sussex PO20 3SE		<p>Figure 1</p> 
Client:	Landquest UK (Southern) Limited	Date:	February 2024	
	Site Location Plan	Ref:	GWPR5373	



Project:	Land South of Wandleys Lane, Fontwell, Eastergate, West Sussex PO20 3SE	
Client:	Landquest UK (Southern) Limited	Date: February 2024
	Proposed Development Plan	Ref: GWPR5373


Figure 2





— APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:		Land South of Wandleys Lane, Fontwell, Eastergate, West Sussex PO20 3SE		<p>Figure 3</p> 
Client:	Landquest UK (Southern) Limited	Date:	February 2024	
	Trial Hole Location Plan	Ref:	GWPR5373	