

CRE8 STRUCTURES LLP
505-511 ARCHWAY ROAD, LONDON, N6
4HX

GEO TECHNICAL AND
GEOENVIRONMENTAL DESK STUDY
REPORT

Draft

December 2021



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CRE8 STRUCTURES LLP

505-511 ARCHWAY ROAD, LONDON, N6 4HX

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1 INTRODUCTION

It is proposed to redevelop a site located at 505-511 Archway Road, N6 4HX, London. The site is bounded by Archway Road to the north-east, Bakers Lane to the south-east, residential terrace houses to the south-west and commercial buildings (shop and services) to the north-west.

The site is currently occupied by a commercial building and associated parking space. It is proposed to redevelop the site by constructing a multi-storey building, ranging between 2 to 4-storeys, with no basement.

Geotechnical Consulting Group LLP (GCG) has been instructed by CRE8 Structures LLP (CRE8), to undertake a geotechnical and geo-environmental desk study for the site. CRE8 are the structural engineers for the project. GCG has appointed Horizon Consulting Engineers Limited (HCE) to undertake a geo-environmental desk study of the site.

This report collects general topographical, geological and historical information on the site from a number of sources. It is also intended to identify any relevant constraints to the development and to inform on the ground investigation (GI) requirements for design. Only geotechnical and geo-environmental issues have been considered within this work.

2 DESCRIPTION OF THE SITE

2.1 Location

The site is situated in the London Borough of Haringey, approximately centred at Ordnance Survey grid reference TQ 27943 88495, see Figure 1.

The site is roughly orientated along a northwest-southeast axis. It is bounded by the by Archway Road to the north-east, Bakers Lane to the south-east, residential terrace houses to the south-west and commercial buildings (shop and services) to the north-west (see Figures 2 and 3).

The site footprint is shown on Figure 2, and it is about 45 m long with widths ranging from 15 m to 30 m.

2.2 Topography

There is limited information regarding the topography of the site. Figure 2 indicates that the ground level along the Archway Road adjacent to the site varies between approximately +94 m above Ordnance Datum (mOD) southeast of the site to +91 mOD north of the site. The site itself is occupied by buildings and a central parking area.

2.3 Brief history of the site

The site is currently occupied by commercial buildings on the southeast and northwest side and a central hard standing car park area (see Figure 2 and Figure 3). The building heights range from 1 to 2 storeys. The businesses on site appears to include a hand car wash service, window tinting service and car performance garage.

Historical maps indicates that part of the site situated on the Archway Road side was initially constructed over sometime in the 1880s or 1890s, with what appears to be residential houses. These 2 buildings seem to have remained present until the 1980s, while various buildings were constructed and then demolished on the other half of the site. The site appears to have been redeveloped around 1980, at which time existing buildings were cleared and new buildings were constructed. Some of these later buildings are possibly still on the site, such as the building situated in the south-east corner.

2.4 Proposed redevelopment

The redevelopment proposals are still at a preliminary stage. However, it is understood that the development will require demolition of the existing buildings. Following demolition, it is envisaged that the work will involve earthworks for enabling works (e.g. levelling of the site within footprints of the proposed building), excavations for new foundations and construction of a multi-storey building. The footprint of the planned building will be roughly L-shaped along the southeast boundary (Bakers lane) and the northeast boundary (Archway Road). The building height will vary between 2 to 4 storeys. It is understood that no basement is planned.

Figure 4 shows the preliminary footprints of the proposed building at ground level as of October 2021 and Figure 5 shows some of the envisaged options regarding the building height. It should be noted that the layout and/or configuration of buildings are subject to change as the design evolves.

3 SITE SURROUNDINGS

3.1 Neighbouring structures

The site is surrounded by a number of residential and/or commercial properties (see Figures 2 and 3):

- 96 to 107 North Hill, which comprise of 7 residential Terrace Houses which appears to be masonry structures ranging from 2 to 3-storey above ground;
- A one storey commercial building along the northwest site boundary which appears to be a masonry structures;
- 513 Archway Road which is occupied by a petrol station, including a one storey masonry building;
- On the other side of Archway Road, there is a commercial one storey buildings.

It is unknown if any of these buildings have basements as well as the type of foundations.

3.2 Nearby tunnels

GCG understands that searches for deep utilities services within and around the site are being carried out by others.

Based on information provided by Transport for London (Reference [1]), London Underground Limited (LUL)/DLR has no assets within 50 metres of the site. However, Reference [1] note the possible presence of LUL cable duct in the area.

3.3 Surface railway assets

GCG has not found evidence of active Network Rail (NR) assets near the site. However, the presence of NR assets near the site was mentioned in email correspondence with Transport for London (Reference [1]). GCG has contacted the relevant NR department to query this but has not yet received a response from NR.

3.4 Utilities

It is understood that the searches on the existing utilities within and around the site are being undertaken by others. HCE obtained some utilities plan (for electricity and gas supply - see Appendix 1).

Based on the HCE report, we note the presence of the following assets in the vicinity of the site:

- National Grid's assets: An underground cable is indicated as running along the pavement on North Hill road to the southwest of the site (see Figure 6).
- Cadent Gas Ltd's assets: The map indicates the presence of a gas main running along the northeast border of the site (that is along Archway road pavement) as shown in Figure 7.

Some of the above utilities may be affected by the proposed works and may require assessment. There may be other utilities which may require similar assessments (such as for example waste and clean water assets of Thames Water Utilities Limited). In addition, some of these assets may be very sensitive, though it would seem unlikely that they would impose constraints on the layout and/or configuration of the currently proposed structures.

The 'as-built' locations and nature of the utilities within and around the site are to be established, and the assessment criteria is to be obtained from asset owners (if any).

4 SITE HISTORY

4.1 Historical maps

Historical maps of the site covering a period between 1864 and 2021 have been acquired and are included in HCE's report (see Appendix 1).

Mapping from the 1865 shows the site to be part of a residential area but the site itself was not constructed over at the time and was probably the garden of a residential property. The subsequent 1896 map indicates that two residential buildings have been constructed on the northeast side of the site (along the equivalent of the current Archway Road). The map also shows the presence of railway sidings about 50 m to the northeast of the site. The two residential properties appear to have remained on site until 1975, with some side buildings being constructed and demolished over time. In particular, an additional central building is present on the 1950 map. The site appears to remain as such (with the two original buildings and the central one) until the 1980s, at which time the previous buildings appear to have been demolished and a new building of similar footprint to the current one is shown on the southeast side of the site. It is also noted that the part of sidings closest to the site was converted to a builders merchant's yard as shown on the 1973-74 map.

5 NATURAL AND MAN-MADE HAZARDS

5.1 Risk of flooding

The enviro insight data for the site has been acquired from Groundsure and is included in HCE report (see Appendix 1). This suggests that the site is at very low risk (i.e., <0.1% annual probability) of flooding from rivers and the sea. No other significant risks are highlighted for the site.

5.2 Unexploded Ordnance (UXO)

A 'Preliminary Unexploded Ordnance (UXO) Risk Assessment' for the site has been carried out by 1st Line Defence Limited, and it is included as an Appendix to this report (see Appendix 2).

The report states that the borough in which the site was situated during WWII sustained an overall high density of bombing; and in particular a bomb strike was recorded approximately 25 m to the east of the site and a land mine approximately 95 m to the west. It also states that as a result, the *“western sector of the site may be at a potential risk from the ‘J-curve effect’, whereby an item of UXO could have travelled underground from its point of entry and come to rest underneath an adjacent area”*.

The preliminary assessment concluded that the possibility of UXO contamination cannot be confidently discounted at this site. Further research is recommended in the form of a 'Detailed UXO Risk Assessment'. In the absence of such an assessment, it recommended undertaking appropriate UXO risk mitigation measures for any intrusive works on the site.

6 EXPECTED GROUND CONDITIONS AND ANOMALIES

The ground conditions across the area of the site have been established on the basis of record information available within the site and in its vicinity. The geo insight data acquired from Groundsure is included in HCE's report (see Appendix 1).

6.1 British Geological Survey (BGS) maps

The BGS maps of the area show that the site is underlain by London Clay Formation, with no superficial deposits indicated (see Figure 8). Geological sections and contours shown in Reference [2] indicate that the Lambeth Group, Thanet Sand and Chalk underlie the London Clay Formation in the same order of succession.

6.2 Borehole data

There is no borehole information available within the footprint of the site. The BGS database has several borehole records available in the area surrounding the site (see Figure 9). All boreholes are situated more than 300 m away from the site. However, the geology of the area is assumed to be relatively coherent so that these boreholes provide a broad overview of the stratigraphical profile. Figure 9 also shows the stratigraphy encountered at a selected number of borehole locations.

Based on the borehole data discussed above, the deeper BGS borehole data within 1.4 km of the site, and the information shown on the geological contours and geological sections in Reference [2], the following stratigraphy is inferred for the site as a preliminary ground model:

<i>Stratum</i>	<i>Top elevation</i>	<i>Thickness</i>
Made Ground	+92 mOD to +95 mOD	0.5 m to 3 m
London Clay Formation	about +92 mOD	about 110 m
Lambeth Group	about -15 mOD	-

A site-specific ground investigation will be required to ascertain the stratigraphy across the site.

6.3 Lost rivers

The site is situated slightly outside of the map of the 'Lost Rivers of London' (Reference [4]). The available map indicates presence of branches of the Fleet to the south of the site (up to Highgate area - see Figure 10). However, in the absence of any mapped geological deposits associated with rivers, it is considered unlikely that a lost river lies within or in the immediate vicinity of the site.

6.4 Drift filled hollows

Drift filled hollows are sometimes associated with lost rivers. Reference [4] identified a number of drift-filled hollows in Central London, see Figure 11. It indicates that no drift-filled hollows were identified in the vicinity of the site. Although drift-filled hollows cannot be ruled out, there is no indication that they will be encountered on this site based on the available information.

7 EXPECTED GROUNDWATER CONDITIONS

There is very limited information regarding the groundwater conditions at the site. Water bearing layers may be locally present within the Made Ground above the London Clay. Groundwater level within the London Clay is likely to be close to the top of the clay.

The London Clay is an impermeable layer which constitutes an aquiclude. In the London region, a deep aquifer is present in the Chalk, Thanet Sand and granular units of the Lambeth Group.

Groundwater levels will need to be investigated through a site-specific ground investigation that includes groundwater level monitoring.

The groundwater level in the deeper (Chalk) aquifer, as of January 2018, was at about -12 mOD in the area of the site, see Figure 12.

8 EXPECTED GEOTECHNICAL PROPERTIES

There is very limited data regarding the geotechnical properties of the ground. Some of the BGS borehole logs mentioned above gives the results of in-situ Standard Penetration Tests (SPT N values). Figure 13 shows the profile of undrained shear strength derived from these BH log data for the London Clay. It should be noted that these BHs are quite far from the site (ranging from 355 m to 1350 m away from the site), and therefore may not be representative of the site conditions.

The undrained shear strength of London Clay appears to increase with depth below the top of the London Clay, although the data in Figure 13 is highly variable, probably due to the large distances between some of the BH locations. Figure 13 shows a preliminary overall trend established on the basis of the closest BH with SPT data (borehole TQ28NE425 situated about 357 m from the site) which is approximately $S_u \text{ (kPa)} = 35 + 8z$, where z is the depth from the top of the LC. It is noted that this is an unusually low value of undrained shear strength for the top of the London Clay.

However, as noted above, the data is very limited and come from BHs located at about 355 m to 1350 m away from the site. Site-specific ground investigation should be carried out to establish the ground properties at the site.

9 EXPECTED GEO-ENVIRONMENTAL CONDITIONS

GCG has appointed HCE to undertake a geo-environmental desk study of the site. Their report is included in Appendix 1.

In summary, with regards to contamination, the risks are considered to be low to medium. Their findings or observations are as follows:

- *“Historical mapping suggests the Site was previously residential land-use with conversion for industrial land-use in the late 20th century. The Site is currently used as a garage and car wash. Made Ground present is likely to be associated with the former demolition works and hence has the potential to contain anthropogenic materials including asbestos. There is the potential for oil / fuel spills to have caused contamination within the near surface soils.*
- *Shallow groundwater is unlikely to be present. Given the likely depth to the abstraction bearing aquifers and thickness of cohesive soils beneath the Site, it is unlikely for residual contamination beneath the Site to have impacted controlled waters.*
- *The Site is located in close proximity to transport infrastructure including road, rail and a former tramway. Although off-Site sources of contamination are present, it is unlikely for contaminants including ground gas to have migrated however further assessment of this risk is deemed necessary. The historical brick field to the south-east of the Site is also a potential source of ground gas.”.*

It is recommended a ground investigation be undertaken in order to profile the depth and nature of any underlying Made Ground and to confirm the assumptions made” in HCE’s report.

Further details are provided in HCE’s report, see Appendix 1.

10 RECOMMENDATIONS

10.1 Foundation options

The development involves construction of a 2-to-4-storey building along the south-east (Bakers Lane) and north-east (Archway Road) side of the site.

Based on the available information, there are no London Underground Limited (LUL)/DLR passing under or near the site that would restrict the options for foundation.

Considering the height of the building and the expected soil profile (Made Ground underlain by a large thickness of London Clay), spread foundations (pads, strips or a raft) bearing on the London Clay, should be capable of supporting the development.

At near ground surface, the preliminary estimate of the strength of the London Clay would suggest that an allowable net bearing pressure of around 70kPa would be attainable, subject to assessment of settlements. However, as noted above, the near surface strength of the London Clay from BGS borehole records appears to be relatively low; it is possible that this value could be increased significantly with site specific investigation.

At present, the site is covered by hard-standing and buildings but thin strips of green area (with vegetation and trees) are running along the southeastern and northeastern borders of the site. It is not known if this vegetation will be removed as part of the new development, nor whether the new development will include green areas and tree planting. Both the removal and the introduction of trees may affect the

behaviour of the ground. Any existing, proposed or recently felled trees will need to be considered in choosing the depth of spread foundations.

The foundation options and bearing pressures suggested above are obviously subject to the results of the site-specific investigation. In particular, it was assumed that the thickness of Made Ground above the London Clay is limited. Piles may need to be considered if the depth of Made Ground or the depth required by consideration of tree root action makes spread foundations impractical or if the ground investigation reveals natural ground unsuitable for spread foundations.

Whatever foundation system is adopted, consideration will need to be given to the potential influence of existing/new vegetation on the clay soil. The London Clay here is likely to be a high volume change potential soil, as defined by both the BRE and NHBC (References [6] and [7]). Removal of existing trees could result in swelling of the ground, while retained existing trees or new planting could result in soil shrinkage; both of these impacts will need to be considered in foundation design.

10.2 Ground investigation

A site specific ground investigation will be required in order to inform the design development. It should have the following objectives:

- determine the nature of the underlying strata and their boundaries within the site;
- establish the groundwater levels;
- provide geotechnical parameters for the design of new foundations and for carrying out Ground Movement Impact Assessment (GMIA) of the properties or assets that will be affected by the proposed development;
- identify any other factors that may influence the geotechnical design or construction of the works;
- to confirm the presence or absence of contaminants with regards to the proposed end use;

Based on existing site conditions and anticipated ground conditions, for the purposes of design development, the following ground investigation is recommended, though this may need to be refined when the proposed structure is more defined:

- 2 No. Cable Percussion (CP) boreholes to determine the stratigraphy within the site to a depth of 20 to 30 mBGL;
- Up to 2 days of Window Sampling or dynamic probing (approx. 6 to 8 Nos.) to determine the variation in thicknesses of the Made Ground and/or

superficial deposits (if present) across the site and for geo-environmental investigation purposes. These should prove the top surface of London Clay Formation or to the limit of Window Sampling technique, whichever is greater. These can also be used to probe the conditions across the site including potential buried obstructions relating to its former use.

- Trial Pits (TPs) to establish the nature of buried obstructions in the ground relating to its former use, and for geo-environmental investigation purposes.
- Samples are to be taken at all exploratory holes, as appropriate, for undertaking geotechnical and geo-environmental laboratory tests in order to establish geotechnical design parameters and to confirm the presence or absence of contaminants with regards to the proposed end use. Areas where suspected or known sources of contamination are or were present should be specifically targeted.
- Standpipes and piezometers should be installed in the exploratory boreholes for gas and/or groundwater monitoring across the site.

10.3 Geotechnical design issues

Geotechnical issues that need to be addressed are as follows:

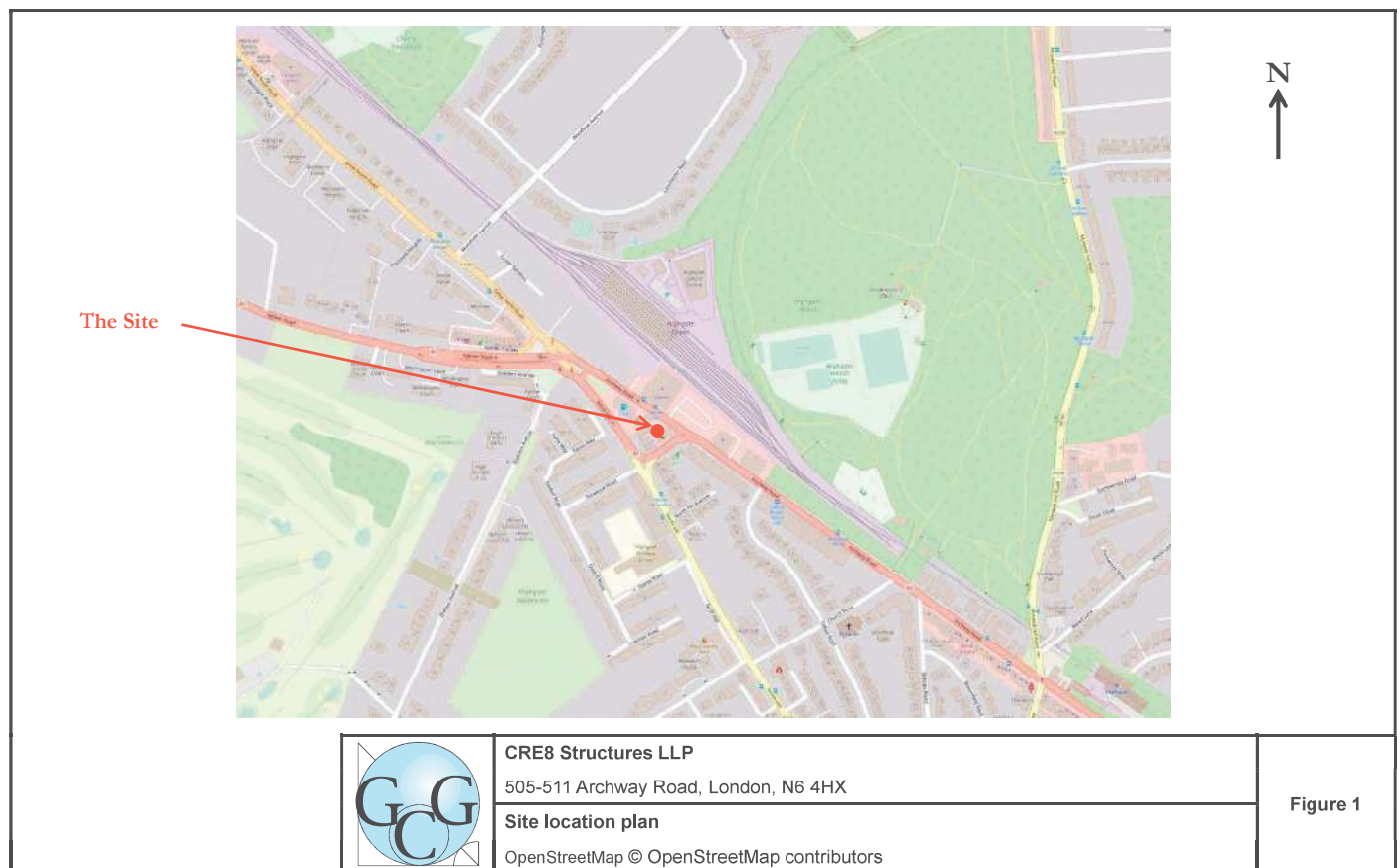
- Assessment of the effects, if any, of proposed development on the existing assets in its vicinity (i.e. nearby residential and commercial buildings, any utilities as may be required). The assessments will have to consider the movements associated with the demolition of existing buildings, earthworks for enabling works, excavations for the foundations, installation of piles (if any), and construction of the new building.
- Construction issues related to the potentially variable nature of the Made Ground and/or superficial deposits (if present).
- Choice of appropriate foundations for the proposed buildings, taking into account existing, proposed and removed vegetation.

11 REFERENCES

- [1] TFL (2021) Email from TFL (SMBLocationEnquiries@tfl.gov.uk) sent to Mike Crilly (m.s.crilly@gcg.co.uk) on 24 November 2021 at 13:38 with subject: "RE: 505-511 Archway Road, London N6".
- [2] British Geological Survey. 2006. North London. England and Wales Sheet 256. Bedrock and Superficial Deposits. 1:50,000.
- [3] Barton, N. 1962. The lost rivers of London. London: Historical Publications.

- [4] Flynn, A.L., Collins, P.E.F., Skipper, J.A., Pickard, T., Koor, N., Reading, P. and Davis, J.A., (2021). *Buried (drift-filled) hollows in London—a review of their location and key characteristics*. Quarterly Journal of Engineering Geology and Hydrogeology, 54(3).
- [5] Environment Agency. 2018. Management of the London basin Chalk aquifer. Status Report – 2018, dated August 2018.
- [6] BRE. 1993 Low-rise buildings on shrinkable clay soils: part 1. Digest 240
- [7] NHBC. 2020. Standards Chapter 4.2

FIGURES







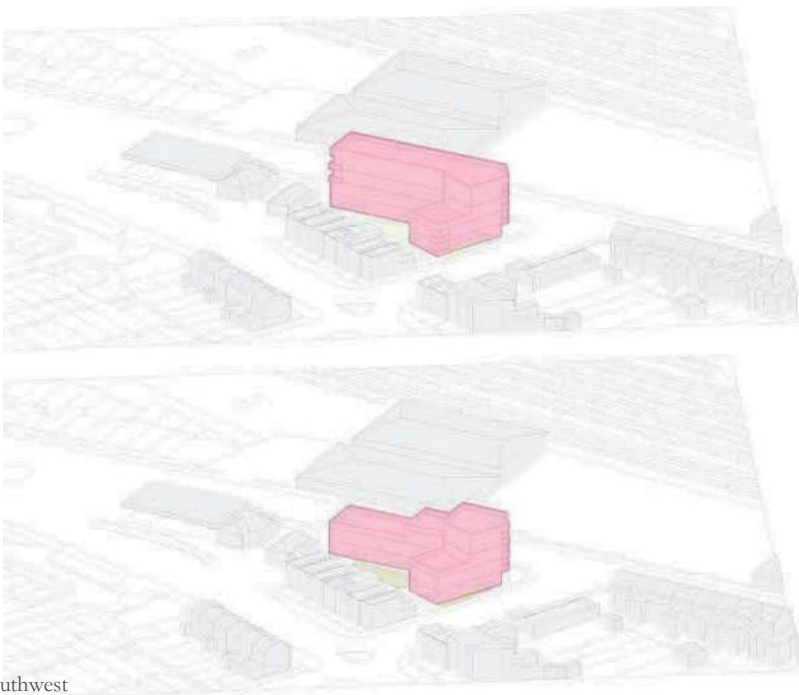
CRE8 Structures LLP
505-511 Archway Road, London, N6 4HX

Existing site (3D view)

The footprint of the site shown in the figure is approximate

Figure 3





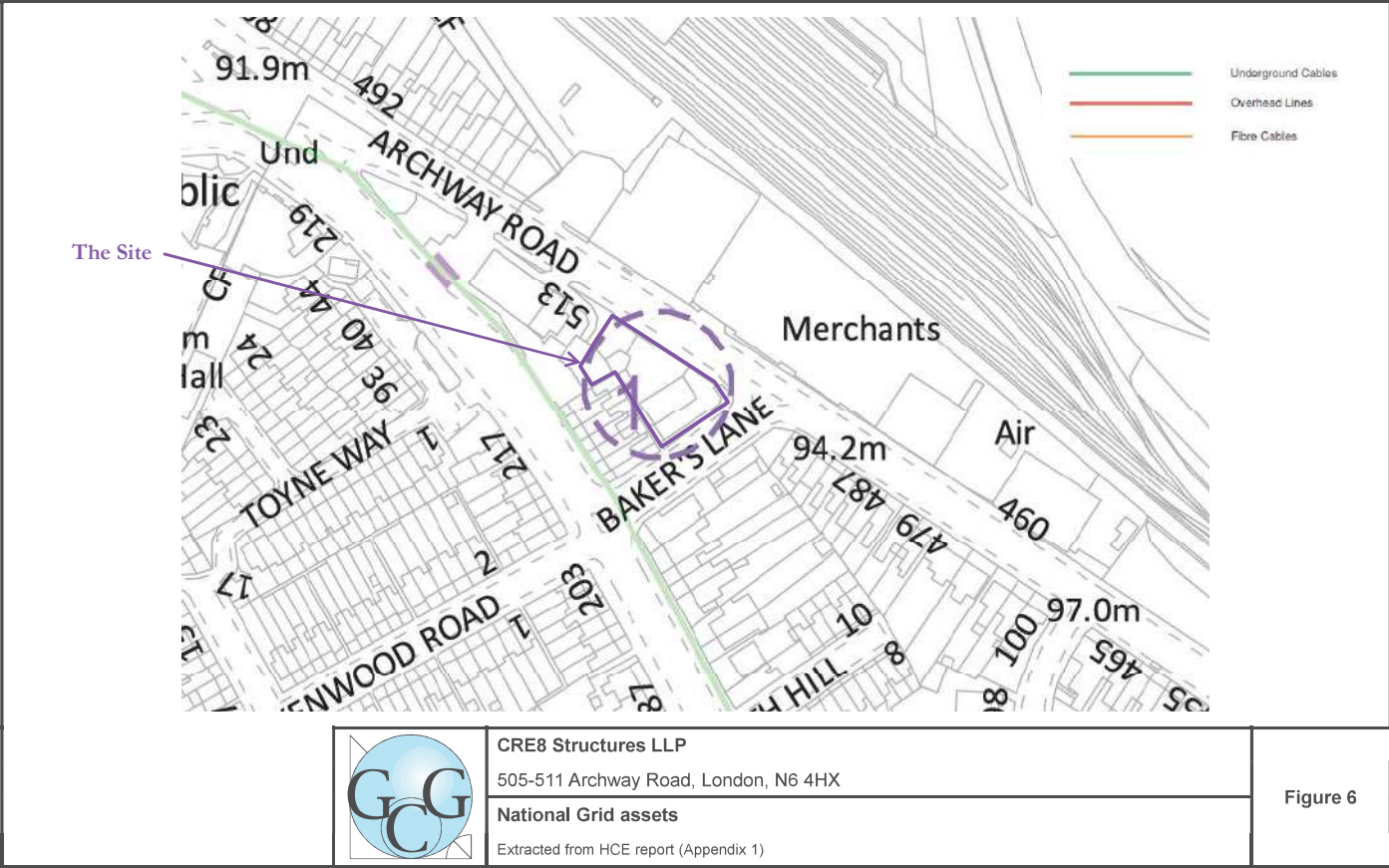
Aerial view from the southwest

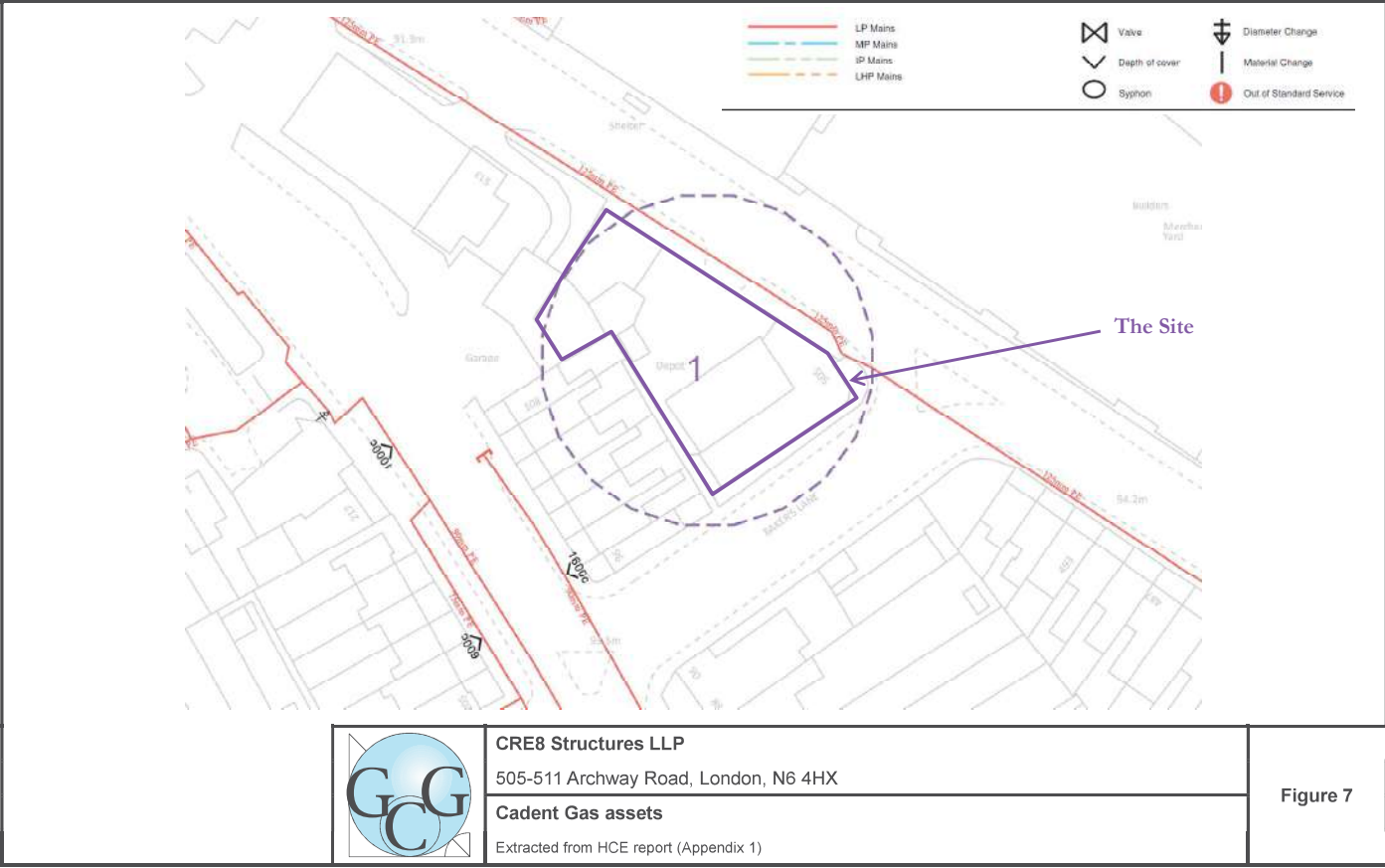


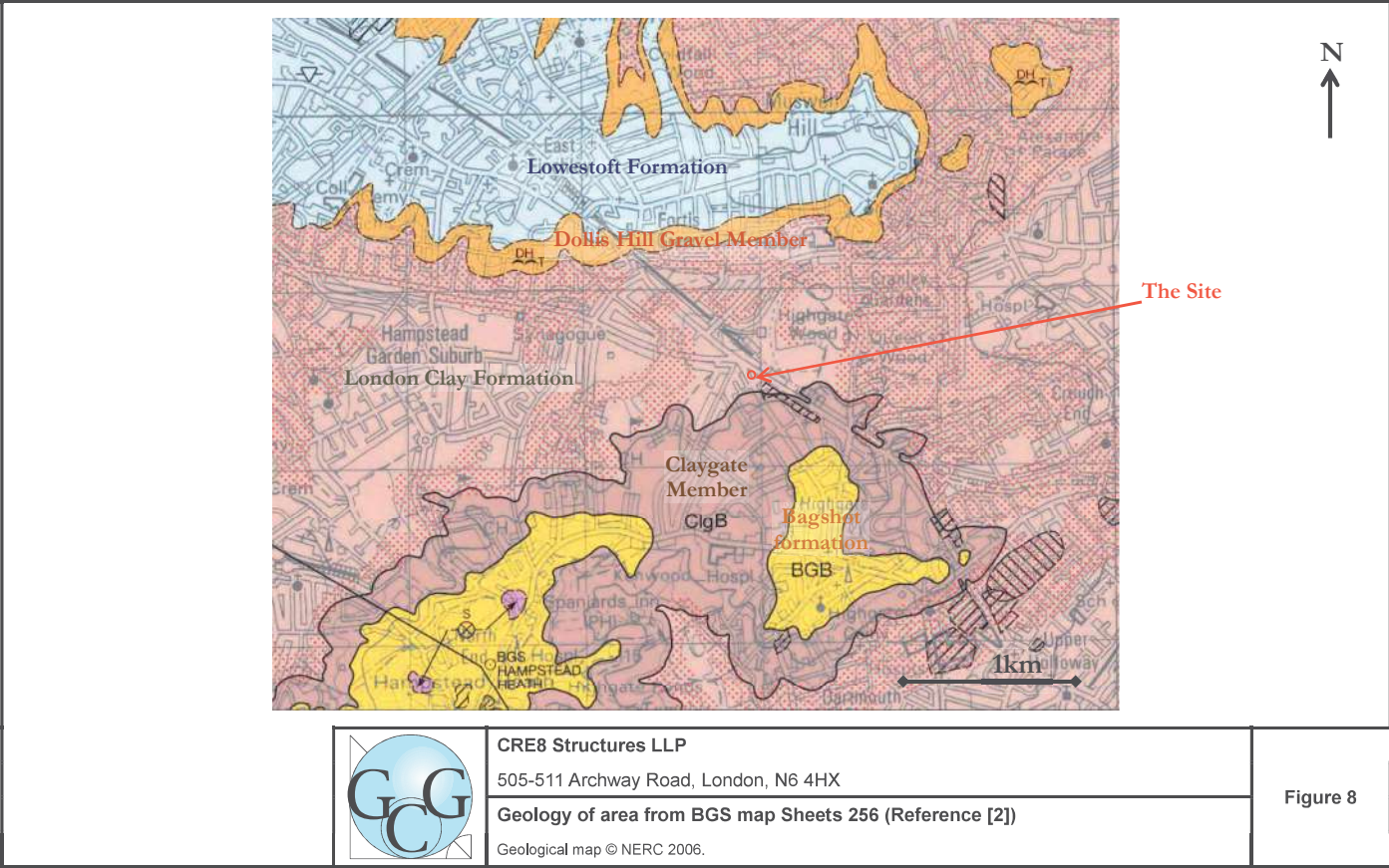
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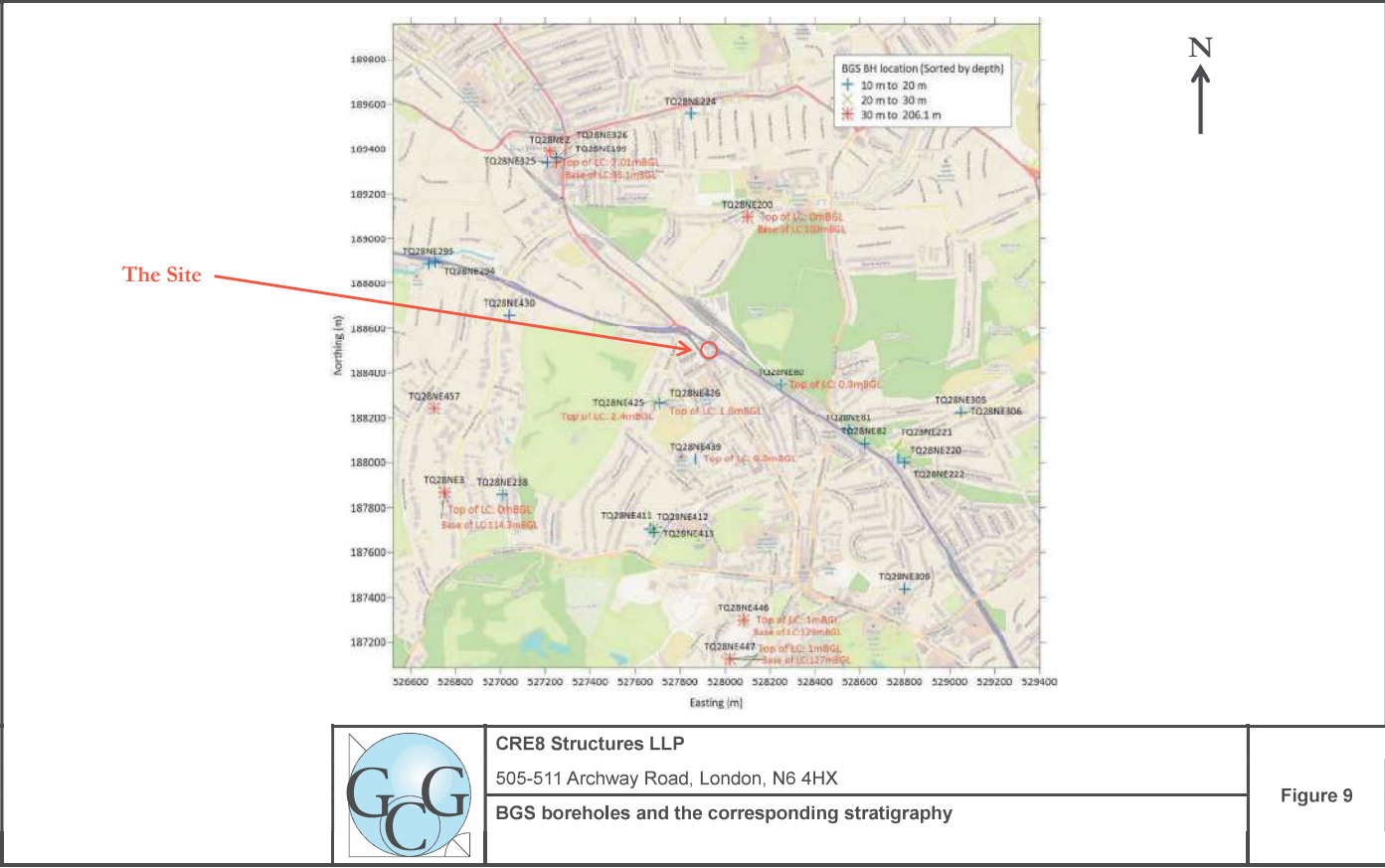
Aerial views of some of the option for the proposed building
As of October 2021, these are subject to change as the design evolves.

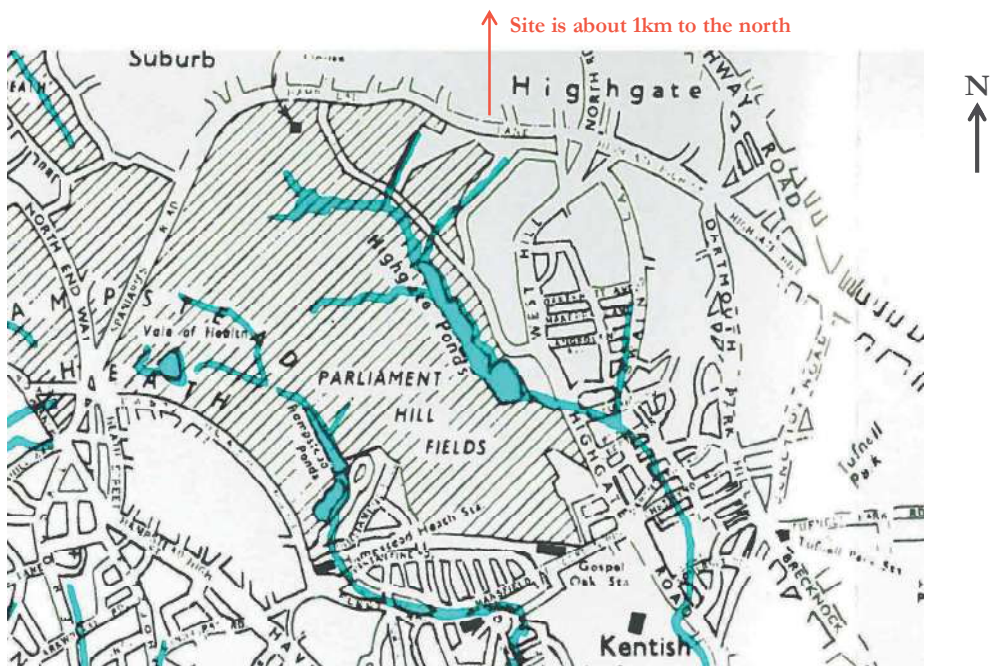
Figure 5







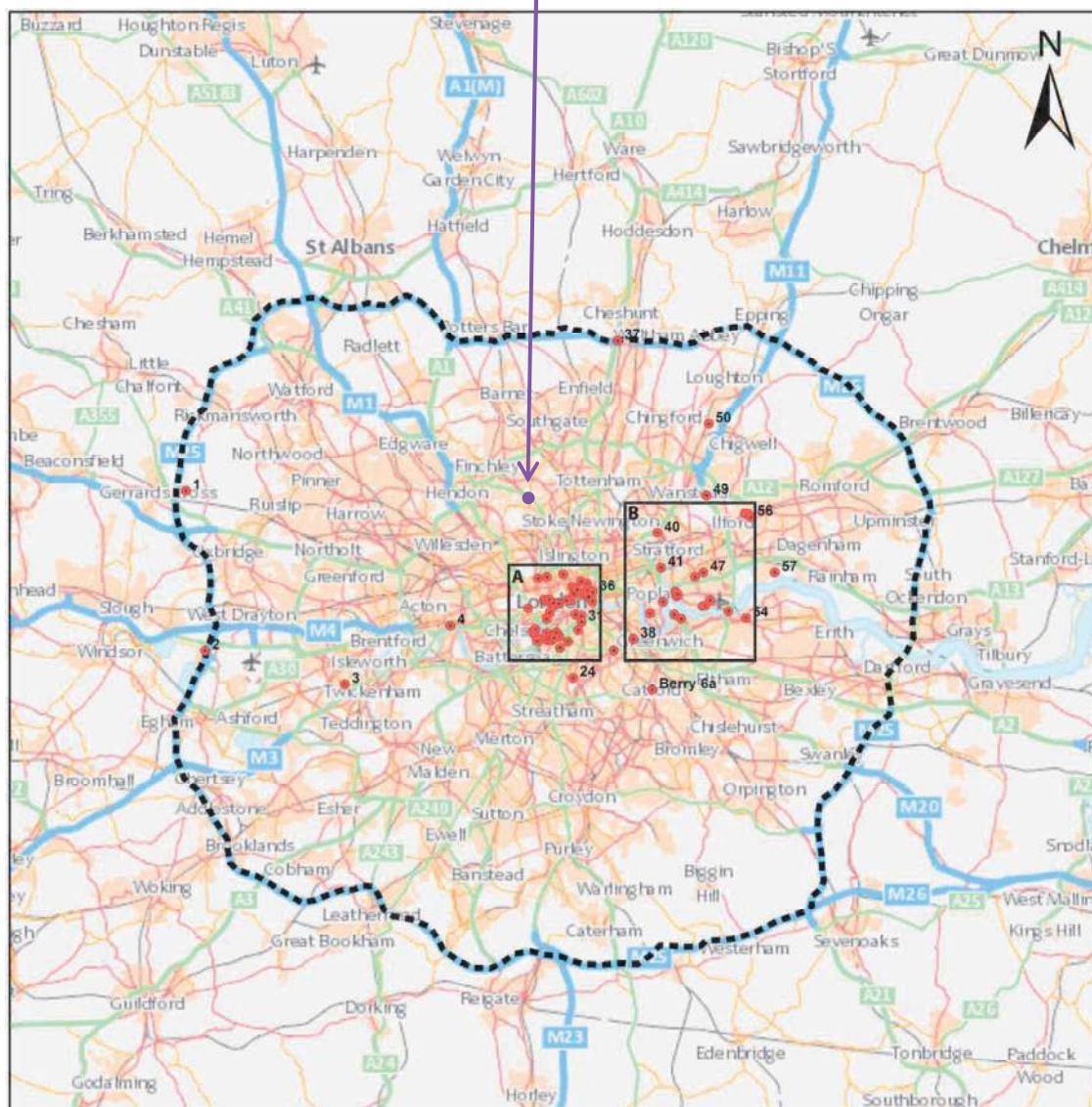




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Map of the historical rivers of London in the vicinity of the site
Map extracted from Reference [3]

Figure 10

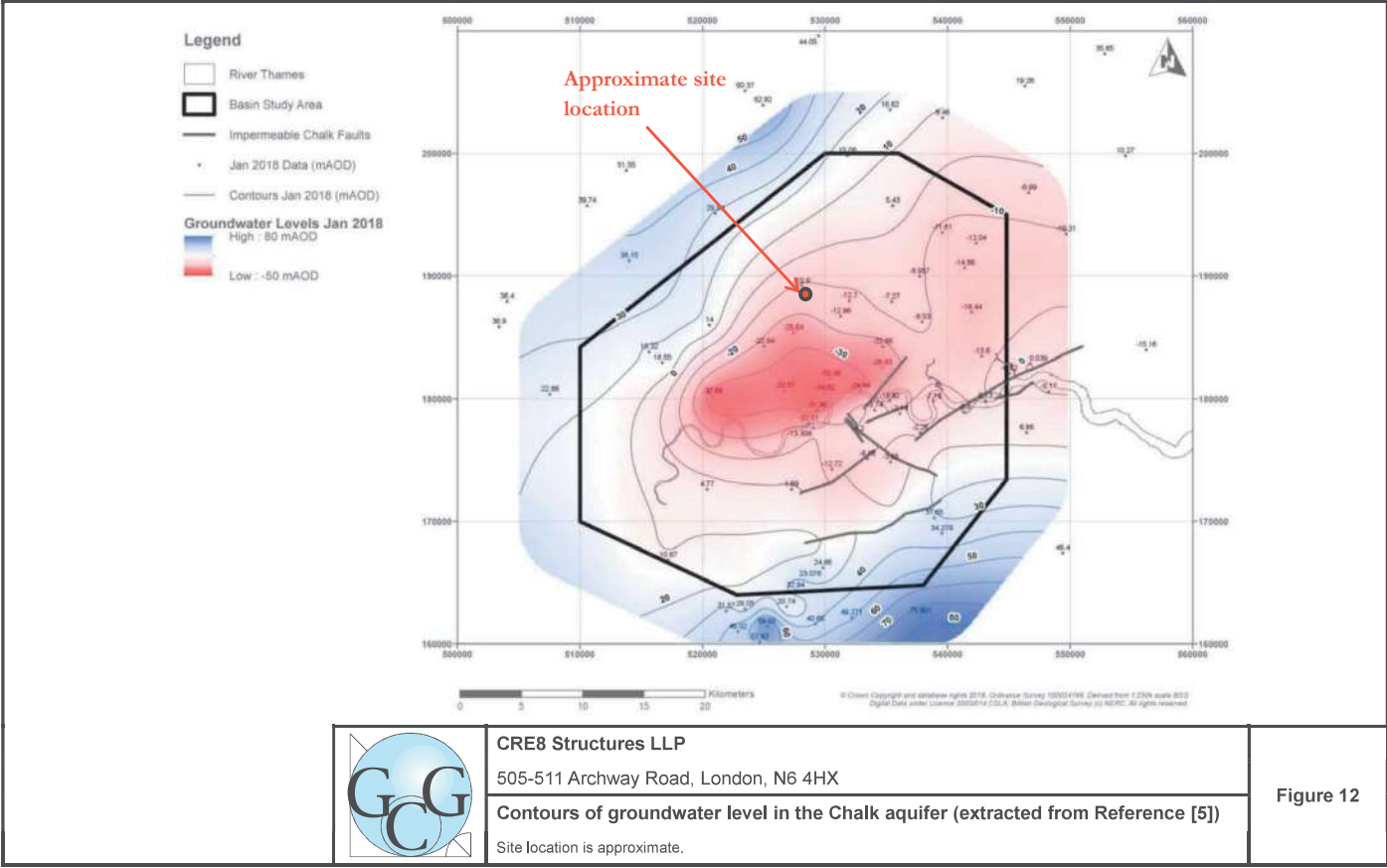
Site approximate location

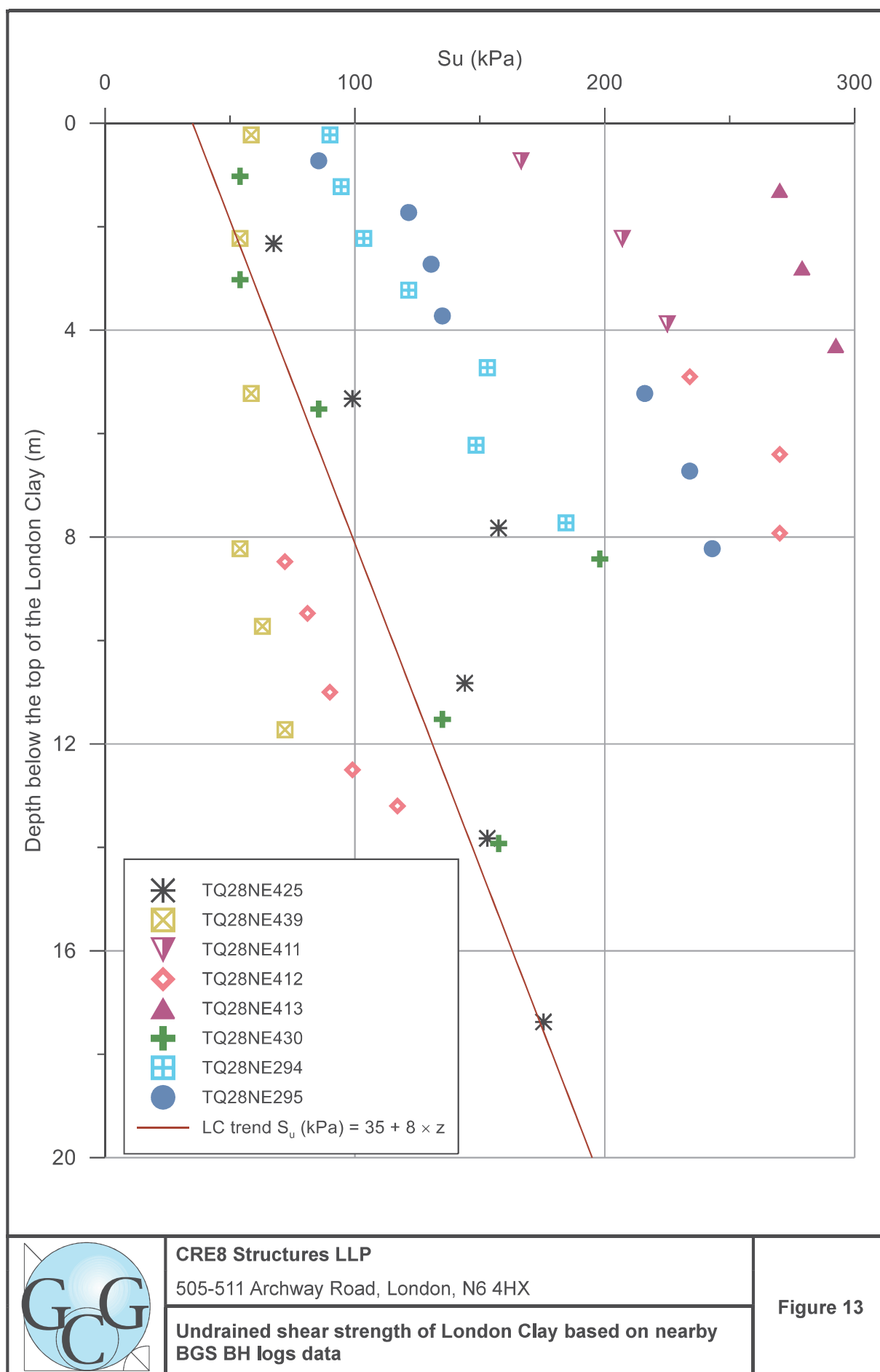


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**Mapped extents of known scour hollows in the London area
(extract from Reference [4])**

Figure 11





APPENDIX 1 – HORIZON CONSULTING ENGINEERS' DESK STUDY REPORT

Transport, Environment & Design

505-511 Archway Road,
London
Tier 1 Preliminary Risk
Assessment

December 2021



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- Appendix G Approach to Risk Evaluation

Revision Schedule

Revision	Author	Description	Date
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Executive Summary

Topic	Discussion
Commission & Background	Horizon Consulting Engineers Limited (Horizon) was commissioned by Geotechnical Consulting Group LLP (GCG) on behalf of Cre8 Structures LLP to undertake a Tier 1 Preliminary Risk Assessment (PRA) comprising a desktop study and walkover for land at 505-511 Archway Road, Highgate, London (N6 4HX). It is understood that the land is being considered for re-development which is currently without planning permission. At the time of issuing this report, details of the proposed scheme have not been confirmed although it is likely the development will comprise redevelopment for multi-storey residential buildings.
Setting	The Site is located on a large triangular traffic island on Archway Road and is bound by a one-way traffic system to the south and east, residential properties to the west and a fuel station to the north. The approximate Site centre is located at Ordnance Survey grid reference: 527942E, 188497N. The businesses on-Site include a hand car wash service, window tinting service and car performance garage. The Site consists of several small buildings which border the perimeter and central yard / access area. Access is via a gated entrance off Archway Road to the east.
History	In summary, earliest mapping from 1865 shows the Site to be part of a residential property (or possibly part of the Wellington Inn) with the wider area mostly agricultural land or woodland. A brick field is present 100 m south-east. Mapping from 1896 shows the Site to be developed for two new residential properties with surrounding residential development including the brick field. Sidings of a railway are present 50 m north of the Site with an associated carriage shed 100 m north. In 1913, the road adjacent to the east of the Site is shown as a tramway. A depot known as Western Highways Depot is also present 100 m west of the Site. In 1950, the tramway is now a road again and additional buildings are present in the centre of the Site. Mapping from 1975 indicates part of the sidings to the north to be converted for use as a builder's merchants. By 1990, the Site is labelled as a depot with what appears to be exiting layout of the Site (following the Site walkover).
Ground Model	The ground conditions at the Site are likely to comprise a layer of Made Ground overlying the London Clay Formation. The London Clay Formation is anticipated to be greater than 20 m metres thick beneath the Site. Shallow groundwater is not anticipated to be present beneath the Site. The London Clay Formation is classified as Unproductive Strata and is interpreted to act as an aquitard, limiting the potential downward migration of contaminants to potentially sensitive receptors at depth. The risk from ground hazards is generally anticipated to be low apart from the potential for shrink-swell clay.
Initial CSM	In summary, although a small number of potential contaminant linkages have been identified at the Site the risks are generally considered to be low to medium and the Sites suitable for their proposed residential redevelopment on the proviso that the following considerations are taken into account: • Historical mapping suggests the Site was previously residential land-use with conversion for industrial land-use in the late 20th century. The Site is currently used as a garage and car wash. Made Ground present is likely to be associated with the former demolition works and hence has the potential to contain anthropogenic materials including asbestos. There is the potential for oil / fuel spills to have caused contamination within the near surface soils. • Shallow groundwater is unlikely to be present. Given the likely depth to the abstraction bearing aquifers and thickness of cohesive soils beneath the Site, it is unlikely for residual contamination beneath the Site to have impacted controlled waters. • The Site is located in close proximity to transport infrastructure including road, rail and a former tramway. Although off-Site sources of contamination are present, it is unlikely for contaminants including ground gas to have migrated however further assessment of this risk is deemed necessary. The historical brick field to the south-east of the Site is also a potential source of ground gas. It is recommended a ground investigation be undertaken in order to profile the depth and nature of any underlying Made Ground and confirm the assumptions in this PRA.
Health, Safety & Environmental Management	During investigation works, potential health, safety and environmental risks to workers, users of neighbouring sites and off-site environmental receptors are considered to be low to medium. Notwithstanding this, plant, chemicals and materials should be stored, managed and used in accordance with Environment Agency guidelines and best practice to mitigate against any potential risks.

1. Introduction

1.1 Commission

- 1.1.1 Horizon Consulting Engineers Limited (Horizon) was commissioned by Geotechnical Consulting Group (GCG) on behalf of Cre8 Structures LLP to undertake a Tier 1 Preliminary Risk Assessment (PRA) comprising a desktop study for land at 505-511 Archway Road, Highgate, London (N6 4HX).
- 1.1.2 This project was undertaken in accordance with Horizon's email fee proposal dated 15 November 2021.

1.2 Background

- 1.2.1 It is understood that the land is being considered for re-development which is currently without planning permission. At the time of issuing this report, details of the proposed scheme have not been confirmed although it is likely the development will comprise redevelopment for multi-storey residential buildings. A proposed development layout of the Site is included in **Appendix A**.

1.3 Aims and Objectives

- 1.3.1 In view of the above, the purpose of this report is as follows:
- characterisation of the Site including developing an initial conceptual site model (CSM) identifying potential risks to human health and the environment associated with the Site's proposed use based on desk-based information sources and previous reports; and
 - develop recommendations for further assessment / remediation as required.

1.4 Data Sources

- 1.4.1 Horizon has reviewed documents on Haringey Borough Council's planning portal associated with the Site. In addition, Horizon has been supplied with a Groundsure information pack provided by GCG.

1.5 Methodology

- 1.5.1 The approach, scope and methodology of this Tier 1 PRA have been developed and conducted in general accordance with Client requirements and UK guidance and standards including documents published by the Environment Agency, DEFRA, British Standards Institute (BSI), Construction Industry Research and Information Association (CIRIA) and Contaminated Land: Applications in Real Environments (CL:AIRE).
- 1.5.2 Horizon has followed a phased approach to evaluation of geoenvironmental risks, with the initial CSM developed on the basis of the desk-based assessment and Site walkover.

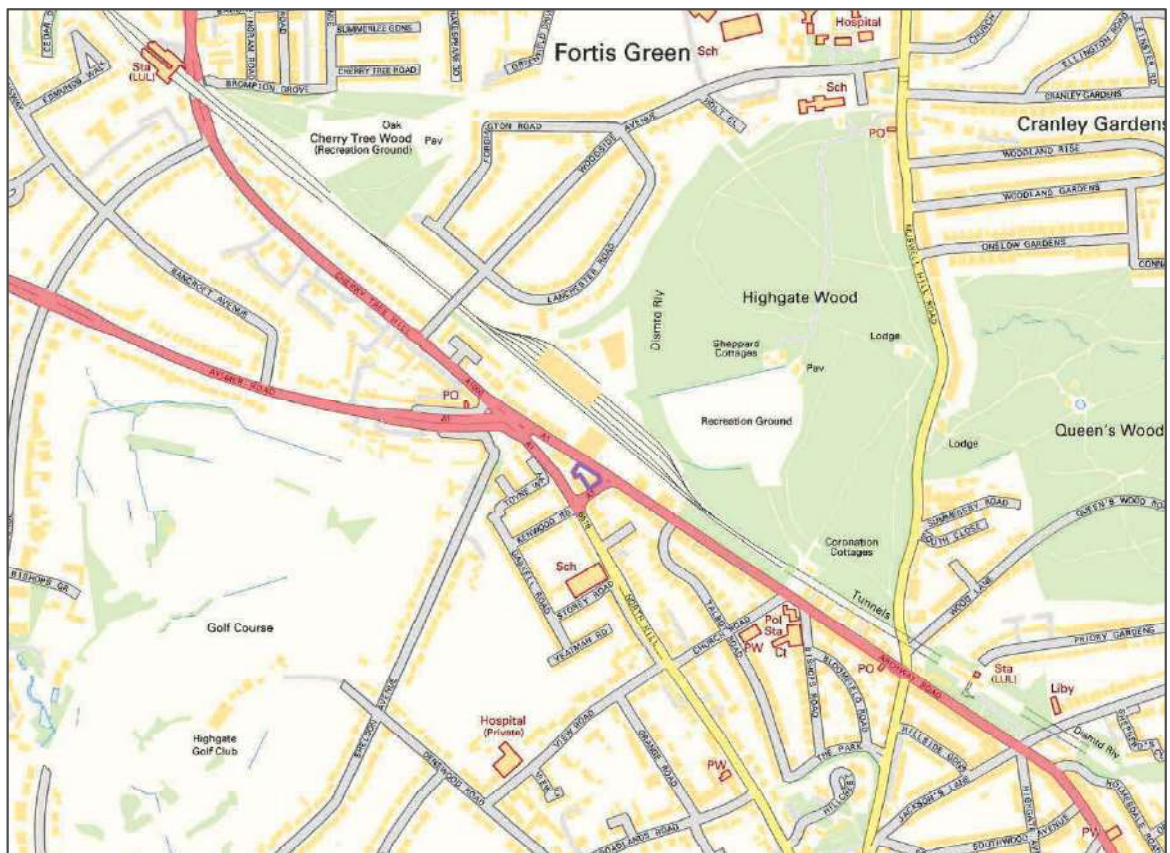
2. Existing Conditions

2.1.1 Data on the existing conditions at the Site has been collated based on the findings of a Site walkover survey, review of historical reports and publicly available information supported by a Groundsure report (reference EMS-738056_960047, 15 November 2021) included in **Appendix B**.

2.2 Location

2.2.1 The Site is located on a large triangular traffic island on Archway Road and is bound by a one-way traffic system to the south and east, residential properties to the west and a fuel station to the north. The approximate Site centre is located at Ordnance Survey grid reference: 527942E, 188497N.

2.2.2 A Site location map is provided as **Figure 2-1** with the approximate Site boundary shown in purple.



Contains Ordnance Survey data © Crown Copyright and database right 2021

Figure 2-1: Site Location Plan

2.3 Site Description & Walkover Survey

2.3.1 A representative from Horizon conducted a walkover survey on 27 November 2021. Photographs from the survey are presented in **Appendix C**.

2.3.2 The businesses on-Site include a hand car wash service, window tinting service and car performance garage. The Site consists of several small buildings which border the perimeter and central yard / access area. Access is via a gated entrance off Archway Road to the east.

- 2.3.3 A small two-storey building of brick construction is located in the east of the Site. The ground floor of the building is used as toilets and a changing room area. The first floor was unable to be accessed. A single storey garage unit with a corrugated metal roof is located to the west of this building and is used for car washing. On the other side of the yard area in the north of the Site is the window tinting service and car performance garage made of several small single-storey garage units.
- 2.3.4 The Site is flat and is covered by hardstanding with drainage collected by a drain along the centre of the yard area. Several chemical containers were noted in the car washing area of the Site however there was no evidence of these containers leaking. There was no evidence of underground storage tanks or contamination from oils on the surface of the hardstanding but the possibility of these cannot be ruled out.
- 2.3.5 The surrounding land is predominantly flat and is mostly in residential and commercial use. A railway tube line runs north-west to south-east approximately 50 m north-east of the Site. This locality also includes Highgate Tube Depot.

2.4 Geology

- 2.4.1 Underlying geology is shown on BGS records to comprise the London Clay Formation comprising *“bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions (‘cementstone nodules’) and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.”* Superficial deposits are not mapped at the Site.
- 2.4.2 A small area of artificial ground is mapped approximately 100 m south-east of the Site and is believed to be related to an infilled brick field.
- 2.4.3 BGS borehole logs located within the vicinity of the Site (300 m south-west) are included in **Appendix D**. The records indicate the underlying geology to predominantly comprise a firm becoming stiff grey brown silty clay of the London Clay Formation to at least 20 m depth. No groundwater was encountered in the three boreholes carried out.

2.5 Hydrogeology

- 2.5.1 The London Clay member is classified as an Unproductive Aquifer, defined as *“rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow”*.
- 2.5.2 The Site is not located in a Source Protection Zone (SPZ) as there are no SPZs within the vicinity of the Site.
- 2.5.3 There are no records of groundwater abstraction within the vicinity of the Site.

2.6 Local Water Features & Flooding

- 2.6.1 The nearest surface water is a drainage ditch located on a golf course located 400 m west of the Site. The ditch drains to the Mutton Brook.
- 2.6.2 There are no records of licensed surface water abstractions within 1 km of the Site.
- 2.6.3 There are no active discharge consents within 500 m of the Site. Two historical consents have been present at the railway depot to the north-east of the Site.

- 2.6.4 The Site lies within Flood Zone 1, defined as “*land having a less than 1 in 1,000 annual probability of river or sea flooding.*”

2.7 Geological Hazards

- 2.7.1 The Site is not located in an area where coal mining is considered likely to have occurred historically.
- 2.7.2 Information on the potential risks from natural ground subsidence is published in the Groundsure report (**Appendix B**) and summarised in **Table 2-1** below. In summary, the Site is considered to be of low to moderate risk with respect to subsidence hazards.

Hazard	Hazard Rating*	Comment
Shrink swell clay	Moderate	Ground conditions predominantly high plasticity.
Landslides	Very Low	Slope instability problems are unlikely to be present.
Ground dissolution of soluble rocks	Negligible	Soluble rocks are either not thought to be present, or are not prone to dissolution.
Compressible deposits	Negligible	Compressible strata are not thought to occur.
Collapsible deposits	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.
Running sand	Very Low	No indicators for running sand identified.
Notes: *rating based on BGS dataset		

Table 2-1: Natural Ground Subsidence Hazards

2.8 Natural & Urban Soil Chemistry

- 2.8.1 Horizon has inspected the background soil chemistry data (presented in the Groundsure report in **Appendix B**). Elevated concentrations of lead within the topsoil of the area (in the region of 200 mg/kg) may be expected based upon the available dataset.
- 2.8.2 The London Clay Formation is identified as having the potential for nodular lumps of pyrite to be present, with the potential for concrete attack to occur¹.

2.9 Site History

- 2.9.1 The history of the Site has been assessed based on Ordnance Survey historical maps from various scales (reproduced in **Appendix E**).
- 2.9.2 In summary, earliest mapping from 1865 shows the Site to be part of a residential property (or possibly part of the Wellington Inn) with the wider area mostly agricultural land or woodland. A brick field is present 100 m south-east. Mapping from 1896 shows the Site to be developed for two new residential properties with surrounding residential development including the brick field. Sidings of a railway are present 50 m north of the Site with an associated carriage shed 100 m north. In 1913, the road adjacent to the east of the Site is shown as a tramway. A depot known as Western Highways Depot is also present 100 m west of the Site. In 1950, the tramway is now a road again and additional buildings are present in the centre of the Site. Mapping from 1975 indicates part of the sidings to the north to be converted for use as a builder's merchants. By 1990, the Site is labelled as a depot with what appears to be existing layout of the Site (following the Site walkover).

¹ BRE (2005) Concrete in Aggressive Ground. SD1

2.9.3 Details of the key features noted on historical maps within a 500 m radius are summarised in the table below.

Feature	Date of OS Map Feature Identified		Location (distance)	Description
	First	Last		
Residential Property (#1)	1865	1879	On-Site and adjacent	Site is mostly a garden of a residential property.
Wellington Inn	1865	1991	North Adjacent	A public house was present since earliest mapping to up to 1991. The Site was re-developed as a fuel station.
Brick Field	1865	1879	South-east 100 m	A small brick field was present to the south-east before being developed for residential properties.
Residential Property (#2)	1896	1975	On-Site	The Site was re-developed as a residential property at the end of the 19 th century.
Sidings and Carriage Shed	1896	2021*	North-east 50 m	A historical railway and depot are located to the north.
Western Highways Depot	1913	1975	West 100 m	Appears to be re-developed for residential properties after 1975.
Tramway	1913	1935	East Adjacent	A tramway was temporarily present on the road to the east as shown on mapping between 1913 and 1935.
Builders Merchants	1975	2021*	North 50 m	Part of the railway sidings becomes a builders merchants in the 1970s.
Depot	1990	2021*	On-Site	The Site is labelled as a depot in 1990.
Fuel Station	2003	2021*	North Adjacent	Wellington Inn re-developed as a fuel depot as shown on mapping from 2003 onwards.
Notes: *Present at time of report issue.				

Table 2-2: Summary of Key Features from Historical Mapping

2.10 Public Database Search

2.10.1 A review of the public database records (presented in **Appendix B**) indicates that the principal off-Site sources located in the vicinity of the Site are related to the historical brick field to the south-east, railway sidings to the north-east and the fuel station to the north. A summary of key observations from the public database records is presented in **Table 2-3** below.

Land Use	Comments
Current and Historical Industrial Sites & Tanks	There ten records of historical tanks within 500 m of the Site The nearest is located 40 m north-west of the Site. Other than the builders merchants and railway depot, there are no other notable records of industrial sites.
Garage & Motor Vehicle Repair Facilities	A motor vehicle repair garage is currently on-Site and is likely to have been present since before the Site was first mapped as a depot in 1990. A fuel station is present to the north of the Site.
Pollution Incidents	No records.
Radioactive / Hazardous Substance Storage & Use	No records.
Contaminated Land	No sites designated as "contaminated land" under Part 2A ² within a 500 m radius of the Site.

Table 2-3: Summary of Potentially Contaminative Land Uses

² DEFRA. 1990. Part 2A of the Environmental Protection Act. HMSO

2.11 Pollution Prevention and Control

- 2.11.1 There is one record of historical or present licensed activities relating to the fuel station to the north of the Site.

2.12 Landfill & Waste

- 2.12.1 There are no landfills or waste facilities recorded within 2 km of the Site.

2.13 Ground Gas & Radon

- 2.13.1 The Site is located in an area where less than 1% of the homes are estimated to be at or above the action level as defined by Public Health England (formerly Health Protection Agency). On that basis radon protection measures would not be required for future development.
- 2.13.2 The Site is located in an area where potentially significant sources of ground gas may be present. This includes the likely presence of significant Made Ground deposits located on-Site and within the vicinity (historical brick field).

2.14 Sensitive Land Uses

- 2.14.1 The Site is not located within the vicinity of a sensitive land use.

2.15 Unexploded Ordnance

- 2.15.1 A preliminary unexploded ordnance (UXO) survey has not been provided at this stage however is likely to be required prior to the re-development.

2.16 Utilities

- 2.16.1 Utilities plans obtained by Horizon are included in **Appendix F** which show underground electricity and gas supply within the roads that surround the Site.
- 2.16.2 Reference should be made to current plans and relevant utility company requirements prior to breaking ground at the Site.

2.17 Haringey Borough Council

- 2.17.1 The local authority has been contacted regarding any information they may have available for the Site. To date, no response has been received. It is noted on the council's website that it states: *"To date no sites have been formally determined as contaminated land in the borough of Haringey. We therefore do not hold a register at present"*.
- 2.17.2 Horizon are not aware of recent planning applications / permissions for the Site after reviewing the Haringey Borough Council planning portal.

3. Ground Model

- 3.1.1 The ground model has been developed on the basis of a review of historical maps and publicly available information supported by a Groundsure report pack. The ground model presented has been developed for the purposes of evaluating geoenvironmental risks associated with the Site; reference should be made to GCG's geotechnical reports for additional details relating to ground conditions.
- 3.1.2 It is anticipated that the Site is underlain by a layer of Made Ground directly overlying the bedrock of the London Clay Formation. The London Clay Formation is anticipated to be greater than 20 m in depth. Superficial deposits are not anticipated beneath the Site.
- 3.1.3 Perched / laterally discontinuous groundwater may be present within the Made Ground and London Clay Formation, however the London Clay Formation is classified as Unproductive Strata and is interpreted to act as an aquitard, limiting the potential for downward migration of contaminants.
- 3.1.4 The Site is considered to be generally of low risk with respect to ground hazards although the risk of shrink swell clay is considered to be moderate.
- 3.1.5 The Site is not located within a Source Protection Zone and there are no water abstractions within the vicinity of the Site.
- 3.1.6 Based upon the Site's history it is likely that a layer of Made Ground is present, which may contain contamination associated with the Site's historical use.

4. Initial Conceptual Site Model

4.1 Rationale

4.1.1 The initial CSM described in Section 4 is the principal output of this report. The CSM has been developed by Horizon on the basis of the information presented in the preceding sections and the proposed activities on the Site. The UK contaminated land regime and associated guidance documents^{3,4} set out a risk-based framework of the assessment of contaminated sites. A source-pathway-receptor linkage is required to exist in order for a risk to be present. This means that there has to be a contaminant present, a receptor that could be harmed by this contaminant, and a pathway linking the two.

4.1.2 Under the planning regime all receptors (humans, controlled waters, ecological habitats and buildings) are considered if there is the potential for them to be adversely affected by exposure to contamination. **Table 4-1** shows the receptors which have been identified as being at potential risk from contamination at the Site.

Feature	On-Site	Off-Site	Rationale
Humans	Yes	Yes	The proposed redevelopment of the Site will introduce new residential receptors on-Site in addition to the off-site residential properties
Ecological systems	No	No	There are no statutory designated sites of a type listed in Table 1 of DEFRA guidance ⁵ identified within a 500 m radius of the Site.
Property (e.g. crops/livestock)	No	No	The Site is not located near to such property.
Property (e.g. buildings/services)	Yes	Yes	Existing buildings on Site which will be demolished and replaced by new buildings and services.
Property (domestically grown produce)	No	No	It is assumed that the proposed redevelopment of the Site will not include residential gardens used for the purposes of growing produce.
Controlled waters (groundwater)	No	No	The London Clay Formation is classified as unproductive aquifer.
Controlled waters (surface water)	No	No	No surface water features have been identified on the Site, with the closest small feature lying 400 m to the west.

Table 4-1: Rationale for including potential receptors in initial CSM

4.1.3 Risks to construction workers (e.g. associated with building construction) have not been considered as part of the CSM. Whilst construction workers may be exposed to contamination through direct contact, ingestion and inhalation pathways, any potential risks are to be managed and mitigated are to be addressed through the activity specific health and safety plan, risk assessment and associated methods of work. On that basis, potential risks to construction workers are not considered further in this CSM.

4.1.4 **Table 4-2** below presents the CSM developed for the Site with further justification for the risk ranking presented in Section 4.2. The CSM is a qualitative assessment based on Horizon's professional judgement with reference to the risk evaluation procedure described in **Appendix G**. In order to focus the CSM on those pathways with the potential to be significant, identified potential sources have not been included in the table where a receptor (as set out in **Table 4-1** above) is not considered to be present on-Site.

³ <https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks/stage-1-risk-assessment>

⁴ DEFRA (2012) Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance

SOURCE			PATHWAY		RECEPTOR		ASSESSMENT	
Primary Source	Secondary Source	Hazard	Pathway		Receptor		Risk Ranking	Rationale / Mitigation Measures
On-Site Sources								
Made Ground soils associated with the Site's historic use	Made Ground [Typical contaminants include heavy metals, hydrocarbons, asbestos, phenols, solvents, oils / lubricants.]	Health effects	Dermal contact, ingestion and inhalation of contaminated soil and/or dust derived from contaminated soil.		Humans (on-site)		Low to medium	It is possible for contamination to be present beneath the Site. Chemical testing of soil samples will be required to determine if any remedial measures are required. Assuming residential gardens are not included in the proposed development, then the principal exposure pathways are likely to be via inhalation of vapours from contamination present within the Made Ground.
		Degradation of underground services and structures.	Direct contact		Humans (off-site)		Low to medium	
		Degradation of water quality.	Leaching of contaminants from soil.		Property (buildings and services)		Low	The potential for chemical attack and degradation of existing services is considered to be low. However chemical testing of soils will be required for new water supply pipe to be laid within Made Ground to confirm the presence / absence of contamination.
	Ground gas derived from Made Ground.	Health effects Damage to buildings from explosion.	Ground gas migration through the subsurface and build-up in confined spaces.		Controlled waters (groundwater & surface water)		Low	Shallow groundwater is unlikely to be present. The significant thickness of cohesive London Clay beneath the Site will act as barrier to contaminant migration. There are no sensitive hydrogeological receptors within the vicinity of the Site.
Background soil chemistry	Elevated metals [Elevated background concentrations of metals and / or sulphate]	Health effects Degradation of underground services and structures.	Dermal contact, ingestion and inhalation of contaminated soils/dusts.		Humans (on-site)		Low to medium	Made Ground may be a potential source of ground gas. Depending on the nature and thickness of Made Ground, gas monitoring may be required if habitable ground floor spaces are proposed.
			Direct contact		Property (buildings & services)		Low to medium	
Off-Site Sources								
Off-Site sources of contamination including railway sidings and brick field	[Typical contaminants include heavy metals, hydrocarbons, phenols, solvents, oils / lubricants and asbestos].	Health effects	Migration via groundwater before dermal contact or ingestion of contaminated soil.		Humans (on-site)		Low	It is unlikely for significant contamination to have migrated at shallow depths onto Site given the absence of groundwater and cohesive nature of the underlying soils.
		Degradation of underground services and structures.	Migration via groundwater and inhalation of vapours derived from contaminated groundwater.				Low	
			Vapour phase migration through vadose zone.				Low	
	Ground gas derived from Made Ground.	Health effects	Migration via groundwater before direct contact.		Property (buildings & services)		Low	It is unlikely for groundwater to be at a depth at the Site where it would impact underlying services.
		Damage to buildings from explosion.	Ground gas migration through the subsurface and build-up in confined spaces.		Humans (on-site)		Low to medium	
					Property (buildings & services)			The off-site sources within the vicinity of the Site are unlikely to produce significant sources of ground gas that could migrate onto Site with the presence of Made Ground on-Site being the most likely source.
Notes: Rationale for risk ranking presented in Appendix G .								

Table 4-2: Initial Conceptual Site Model

5. Conclusions and Recommendations

- 5.1.1 **Table 4-2** summarises the initial CSM and details the most likely plausible contaminant linkages which have been identified at the Site associated with the proposed development. The initial CSM also presents the results of a relative risk screening and prioritisation exercise which has sought to identify the relative significance of identified contaminant linkages in terms of the severity of the impact and / or likelihood of occurrence.
- 5.1.2 In summary, although a small number of potential contaminant linkages have been identified at the Site the risks are generally considered to be low to medium and the Sites suitable for their proposed residential redevelopment on the proviso that the following considerations are taken into account:
- Historical mapping suggests the Site was previously residential land-use with conversion for industrial land-use in the late 20th century. The Site is currently used as a garage and car wash. Made Ground present is likely to be associated with the former demolition works and hence has the potential to contain anthropogenic materials including asbestos. There is the potential for oil / fuel spills to have caused contamination within the near surface soils.
 - Shallow groundwater is unlikely to be present. Given the likely depth to groundwater and thickness of cohesive soils beneath the Site, it is unlikely for residual contamination beneath the Site to have impacted controlled waters.
 - The Site is located in close proximity to transport infrastructure including road, rail and a former tramway. Although off-Site sources of contamination are present, it is unlikely for contaminants including ground gas to have migrated however further assessment of this risk is deemed necessary. The historical brick field to the south-east of the Site is also a potential source of ground gas.
- 5.1.3 It is considered that an intrusive investigation will be required in order to confirm ground conditions and obtain geoenvironmental samples in order to confirm the presence or absence of contamination within the Made Ground with regard to the proposed end use and the assumptions in the CSM. It is considered that this may be conducted in conjunction with investigations to support foundation design, and should comprise a series of shallow exploratory holes across the Site to confirm the depth and nature of the Made Ground along with conditions at the London Clay Formation interface. Based upon the information available it is recommended that this comprises a series of trial pits across the Site to enable a thorough investigation of the Made Ground composition.
- 5.1.4 Depending on the nature of the ground conditions on-Site, shallow ground gas monitoring wells may be required.
- 5.1.5 Soil and groundwater (if present) samples should be analysed for a range of commonly occurring contaminants, with the analysis tailored in accordance with the Site history, including an asbestos screen on all Made Ground samples.
- 5.1.6 Data Quality Objectives (DQO) should be developed in advance of the investigation to define the type and quality of field and laboratory data required to achieve the project objectives. The DQO's should be developed with reference to the ground model and initial CSM developed in this report, the circumstances of the proposed development and with reference to relevant guidelines in order to define minimum data requirements and quality control procedures.

5.2 Health, Safety & Environmental Management

5.2.1 During investigation works potential health, safety and environmental risks to workers, users of neighbouring sites and off-site environmental receptors are considered to be low. Notwithstanding this, plant, chemicals and materials should be stored, managed and used in accordance with Environment Agency guidelines and best practice to mitigate against any potential risks. This includes:

- Storage of chemicals in designated locations with specific measures to prevent leakage and release of their contents;
- On-site provisions to contain a serious spill or leak through the use of booms, bunding and absorbent material;
- Water spraying loose stockpiles and exposed soils, sheeting of outdoor skips and sheeting of waste vehicles, amongst others to mitigate air borne dust;
- Covering / sheeting temporary skip storage, with arrangements made for any hazardous waste arisings; and
- Washing down and cleaning equipment in a designated area.

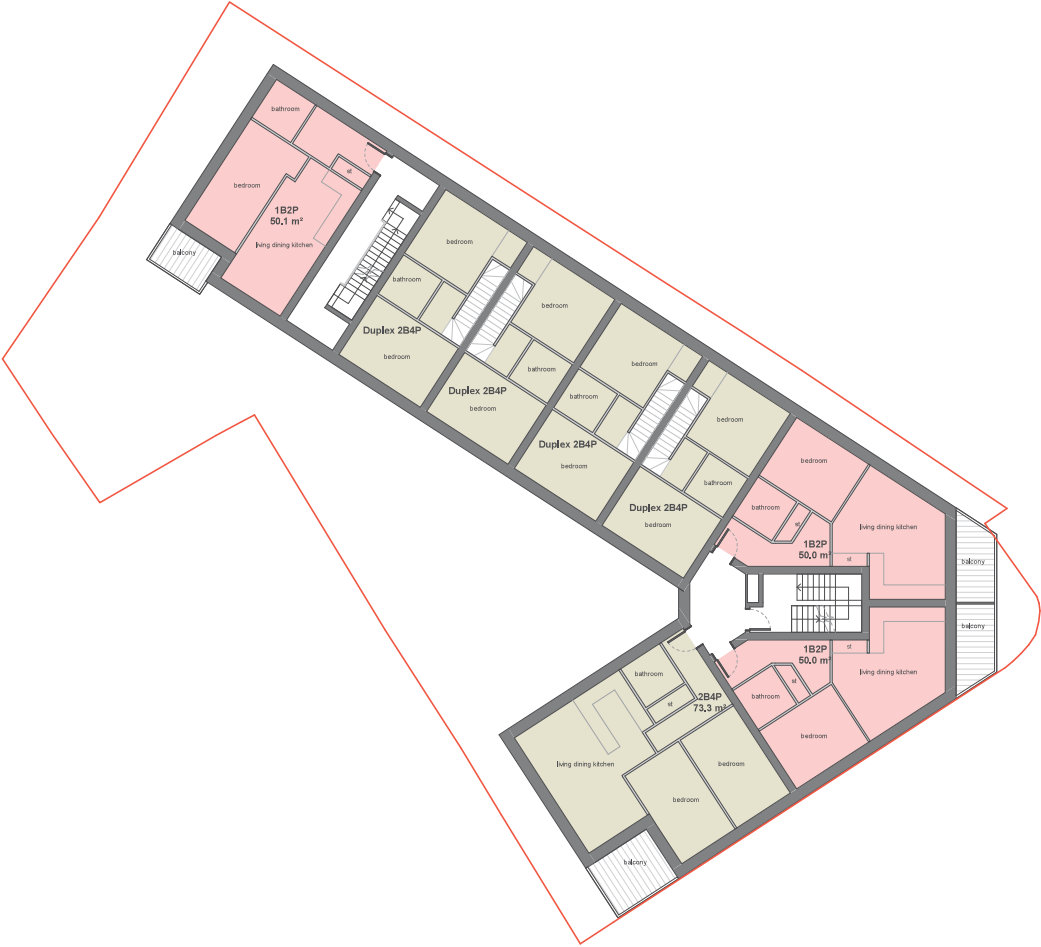
Appendix A

Site Plan

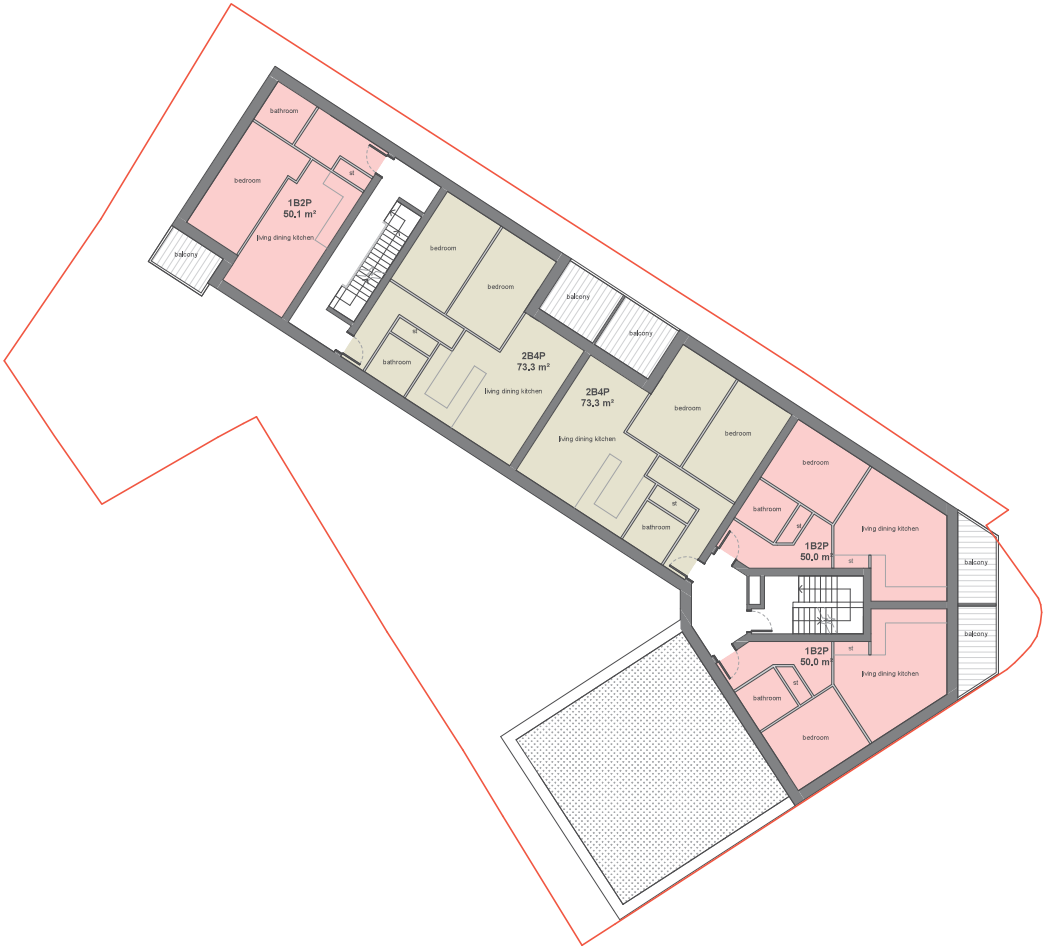
Indicative block and flat layout - Ground floor



Indicative block and flat layout - First floor



Indicative block and flat layout - Second floor plan



Indicative block and flat layout - Third floor plan



Appendix B Groundsure Report

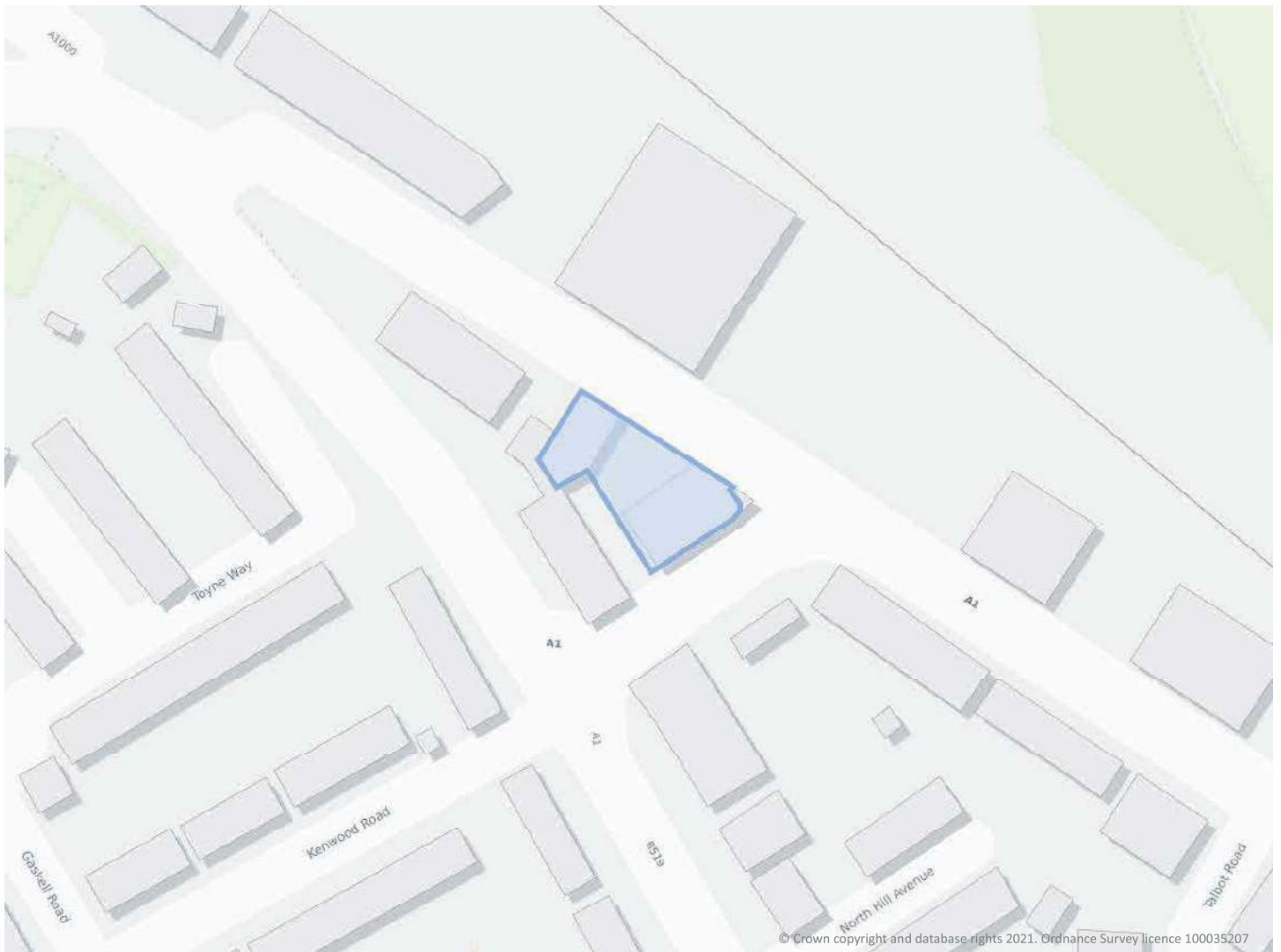
527939 188498

Order Details

Date: 15/11/2021
Your ref: EMS_738056_960047
Our Ref: EMS-738056_960047
Client: emapsite

Site Details

Location: 527939 188498
Area: 0.09 ha
Authority: [London Borough of Haringey](#)



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Summary of findings

p. 2 **Aerial image**

p. 8

OS MasterMap site plan

p.12 groundsure.com/insightuserguide

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
<u>13</u>	<u>1.1</u>	<u>Historical industrial land uses</u>	0	18	30	18	-
<u>16</u>	<u>1.2</u>	<u>Historical tanks</u>	0	1	1	8	-
<u>17</u>	<u>1.3</u>	<u>Historical energy features</u>	0	0	4	4	-
17	1.4	Historical petrol stations	0	0	0	0	-
<u>18</u>	<u>1.5</u>	<u>Historical garages</u>	2	0	5	11	-
19	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
<u>20</u>	<u>2.1</u>	<u>Historical industrial land uses</u>	0	21	44	25	-
<u>24</u>	<u>2.2</u>	<u>Historical tanks</u>	0	1	1	14	-
<u>25</u>	<u>2.3</u>	<u>Historical energy features</u>	0	0	10	10	-
26	2.4	Historical petrol stations	0	0	0	0	-
<u>26</u>	<u>2.5</u>	<u>Historical garages</u>	6	0	11	19	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
28	3.1	Active or recent landfill	0	0	0	0	-
28	3.2	Historical landfill (BGS records)	0	0	0	0	-
29	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
29	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
29	3.5	Historical waste sites	0	0	0	0	-
29	3.6	Licensed waste sites	0	0	0	0	-
<u>29</u>	<u>3.7</u>	<u>Waste exemptions</u>	0	0	1	2	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
<u>31</u>	<u>4.1</u>	<u>Recent industrial land uses</u>	1	2	3	-	-
<u>32</u>	<u>4.2</u>	<u>Current or recent petrol stations</u>	0	0	1	1	-
<u>32</u>	<u>4.3</u>	<u>Electricity cables</u>	0	1	2	3	-
33	4.4	Gas pipelines	0	0	0	0	-
33	4.5	Sites determined as Contaminated Land	0	0	0	0	-



33	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
34	4.7	Regulated explosive sites	0	0	0	0	-
34	4.8	Hazardous substance storage/usage	0	0	0	0	-
34	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
34	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
34	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	2	0	0	-
35	4.12	Radioactive Substance Authorisations	0	0	0	0	-
35	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	2	0	-
36	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
36	4.15	Pollutant release to public sewer	0	0	0	0	-
36	4.16	<u>List 1 Dangerous Substances</u>	0	0	0	4	-
36	4.17	List 2 Dangerous Substances	0	0	0	0	-
37	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
37	4.19	Pollution inventory substances	0	0	0	0	-
37	4.20	Pollution inventory waste transfers	0	0	0	0	-
37	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
38	5.1	Superficial aquifer	None (within 500m)				
39	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
40	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
41	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
41	5.5	Groundwater vulnerability- local information	None (within 0m)				
42	5.6	Groundwater abstractions	0	0	0	0	0
42	5.7	Surface water abstractions	0	0	0	0	0
42	5.8	Potable abstractions	0	0	0	0	0
42	5.9	Source Protection Zones	0	0	0	0	-
43	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
44	6.1	<u>Water Network (OS MasterMap)</u>	0	0	3	-	-



45	<u>6.2</u>	<u>Surface water features</u>	0	0	2	-	-
45	<u>6.3</u>	<u>WFD Surface water body catchments</u>	1	-	-	-	-
46	<u>6.4</u>	<u>WFD Surface water bodies</u>	0	0	0	-	-
46	6.5	WFD Groundwater bodies	0	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
47	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
47	7.2	Historical Flood Events	0	0	0	-	-
47	7.3	Flood Defences	0	0	0	-	-
48	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
48	7.5	Flood Storage Areas	0	0	0	-	-
49	7.6	Flood Zone 2	None (within 50m)				
49	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
50	<u>8.1</u>	<u>Surface water flooding</u>	1 in 1000 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding					
52	<u>9.1</u>	<u>Groundwater flooding</u>	Negligible (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
53	<u>10.1</u>	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	0	2
54	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
54	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
54	10.4	Special Protection Areas (SPA)	0	0	0	0	0
54	10.5	National Nature Reserves (NNR)	0	0	0	0	0
55	<u>10.6</u>	<u>Local Nature Reserves (LNR)</u>	0	0	0	0	5
55	<u>10.7</u>	<u>Designated Ancient Woodland</u>	0	0	1	0	5
56	10.8	Biosphere Reserves	0	0	0	0	0
56	10.9	Forest Parks	0	0	0	0	0
56	10.10	Marine Conservation Zones	0	0	0	0	0
56	10.11	Green Belt	0	0	0	0	0
56	10.12	Proposed Ramsar sites	0	0	0	0	0



57	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
57	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
57	10.15	Nitrate Sensitive Areas	0	0	0	0	0
57	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
58	<u>10.17</u>	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
59	<u>10.18</u>	<u>SSSI Units</u>	0	0	0	0	3
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
61	11.1	World Heritage Sites	0	0	0	-	-
62	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
62	11.3	National Parks	0	0	0	-	-
62	<u>11.4</u>	<u>Listed Buildings</u>	0	1	5	-	-
63	<u>11.5</u>	<u>Conservation Areas</u>	1	0	0	-	-
63	11.6	Scheduled Ancient Monuments	0	0	0	-	-
63	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
64	<u>12.1</u>	<u>Agricultural Land Classification</u>	Urban (within 250m)				
65	<u>12.2</u>	<u>Open Access Land</u>	0	0	1	-	-
65	12.3	Tree Felling Licences	0	0	0	-	-
65	12.4	Environmental Stewardship Schemes	0	0	0	-	-
65	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
66	<u>13.1</u>	<u>Priority Habitat Inventory</u>	0	0	6	-	-
67	13.2	Habitat Networks	0	0	0	-	-
67	<u>13.3</u>	<u>Open Mosaic Habitat</u>	0	0	1	-	-
67	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
69	<u>14.1</u>	<u>10k Availability</u>	Identified (within 500m)				
70	<u>14.2</u>	<u>Artificial and made ground (10k)</u>	0	0	1	0	-
71	14.3	Superficial geology (10k)	0	0	0	0	-

71	14.4	Landslip (10k)	0	0	0	0	-
72	14.5	<u>Bedrock geology (10k)</u>	1	0	1	0	-
73	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
74	15.1	<u>50k Availability</u>	Identified (within 500m)				
75	15.2	<u>Artificial and made ground (50k)</u>	0	0	1	0	-
76	15.3	Artificial ground permeability (50k)	0	0	-	-	-
77	15.4	Superficial geology (50k)	0	0	0	0	-
77	15.5	Superficial permeability (50k)	None (within 50m)				
77	15.6	Landslip (50k)	0	0	0	0	-
77	15.7	Landslip permeability (50k)	None (within 50m)				
78	15.8	<u>Bedrock geology (50k)</u>	1	0	1	0	-
79	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
79	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
80	16.1	BGS Boreholes	0	0	0	-	-
Page	Section	Natural ground subsidence					
81	17.1	<u>Shrink swell clays</u>	Moderate (within 50m)				
82	17.2	<u>Running sands</u>	Very low (within 50m)				
83	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
84	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
85	17.5	<u>Landslides</u>	Very low (within 50m)				
86	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
88	18.1	Natural cavities	0	0	0	0	-
89	18.2	BritPits	0	0	0	0	-
89	18.3	<u>Surface ground workings</u>	0	2	20	-	-
90	18.4	<u>Underground workings</u>	0	0	0	7	16
91	18.5	Historical Mineral Planning Areas	0	0	0	0	-



91	18.6	Non-coal mining	0	0	0	0	0
91	18.7	Mining cavities	0	0	0	0	0
92	18.8	JPB mining areas	None (within 0m)				
92	18.9	Coal mining	None (within 0m)				
92	18.10	Brine areas	None (within 0m)				
92	18.11	Gypsum areas	None (within 0m)				
92	18.12	Tin mining	None (within 0m)				
93	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
94	19.1	<u>Radon</u>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
95	20.1	<u>BGS Estimated Background Soil Chemistry</u>	2	2	-	-	-
95	20.2	<u>BGS Estimated Urban Soil Chemistry</u>	2	4	-	-	-
96	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
97	21.1	<u>Underground railways (London)</u>	0	0	1	-	-
98	21.2	Underground railways (Non-London)	0	0	0	-	-
98	21.3	Railway tunnels	0	0	0	-	-
98	21.4	<u>Historical railway and tunnel features</u>	0	17	44	-	-
100	21.5	Royal Mail tunnels	0	0	0	-	-
101	21.6	<u>Historical railways</u>	0	0	1	-	-
101	21.7	<u>Railways</u>	0	0	1	-	-
101	21.8	Crossrail 1	0	0	0	0	-
101	21.9	Crossrail 2	0	0	0	0	-
102	21.10	HS2	0	0	0	0	-

