EARTH ENVIRONMENTAL & GEOTECHNICAL

Phase I GeoEnvironmental Desk Study

57 Fortress Road Camden

February 2022

For

Debtal Architecture

On behalf of

Sharer Investment Ltd

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PHASE I GEOENVIRONMENTAL DESK STUDY

57 FORTRESS ROAD

CAMDEN, LONDON

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Report No. A4593/22 **FEBRUARY 2022**

Report Title:	**57 Fortress Road, Camden** **Phase I GeoEnvironmental Desk Study**
Report Reference:	**A4593/22 FDS**
Client:	**Sharer Investments Ltd**
Issue Date:	**8th February 2022**
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1.0 INTRODUCTION

Appointment

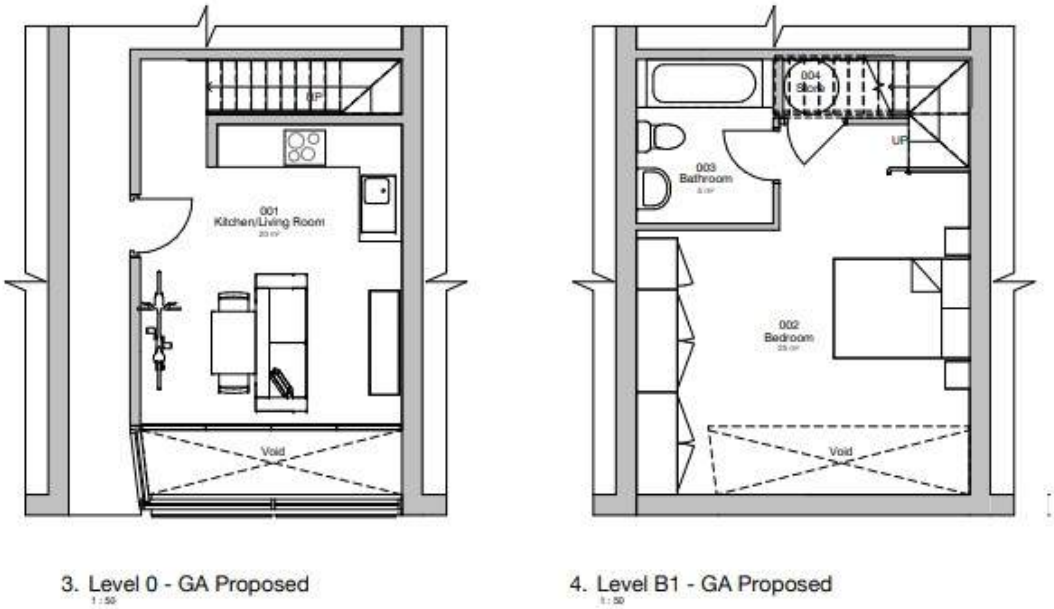
1.1 Earth Environmental & Geotechnical Ltd has been commissioned by Debtal Architecture on behalf of Sharer Investments Ltd (The Client) to undertake a Phase I GeoEnvironmental Desk Study for a proposed development at 57 Fortress Road, Camden, London required to support a planning application to London Borough of Camden Council.

1.2 It is understood that the client wishes to convert the basement and ground floor from commercial premises to a self-contained 1 bedroomed apartment.

1.3 Access is from the frontage on Fortress Road.

1.4 A proposed development plan for the site is shown in Figure 1 below.

Figure 1 Proposed Development Plan



Objective

1.5 The purpose of the Desk Study is to collate available geological and environmental data for the site (and its environment) and provide a preliminary geotechnical and geo-environmental appraisal, with a site-specific conceptual model. This enables a preliminary assessment of geo-environmental risks to be undertaken and, if necessary, provides information for the design of a Phase 2 Ground Investigation.

Scope

1.6 The Phase I Environmental Desk Study comprises of a site reconnaissance visit and a review of the following information sources, some of which was provided by the client.

- British Geological Survey online maps.
- Google Earth imagery.
- Environment Agency online mapping data.
- Historical Ordnance Survey maps.
- The site and surrounding areas environmental, geological and mining data presented in the site specific GroundSure Reports (Appendix 1).
- Coal Authority Interactive Viewer.
- London Borough of Camden Council Planning Portal.

2.0 SITE LOCATION AND DESCRIPTION

2.1 The site is located on Fortress Road in Camden, London approximately 0.6 km northeast of Kentish Town and 1.7 km north of the centre of Camden Town. The National Grid Reference for the centre of the site is TQ 29004 85554 (X:529004, Y:185554) with the closest postcode being NW5 1AD.

2.2 The site is one of a line of three storey, brick built, Victorian terrace houses, most of which have shop fonts below. The front door opens out on to Fortress Road and looks out onto a yard to the rear.

2.3 The site is currently vacant and previously served as a commercial property with a shop front at ground level.

2.4 The maximum dimensions of the proposed site are 5m north to south and 26m east to west. The site occupies an area of approximately 130m$^{2.}$

2.5 The general surrounding area comprises predominantly of terraced residential properties, laid out in streets or squares with yards or small gardens. To the south, Fortress Road joins Kentish Town Road, along which is there is Kentish Town Underground Station, approximately 350m from the property. Approximately 200m to the west of the site there is an area of commercial buildings and sheds as well as former warehouses that have been converted into studio apartments with associated offices, cafes, gyms and nurseries.

2.6 A location plan is shown below as Figure 2, together with a recent site photograph as Figure 3 (overleaf).

Figure 2 Site Location Plan

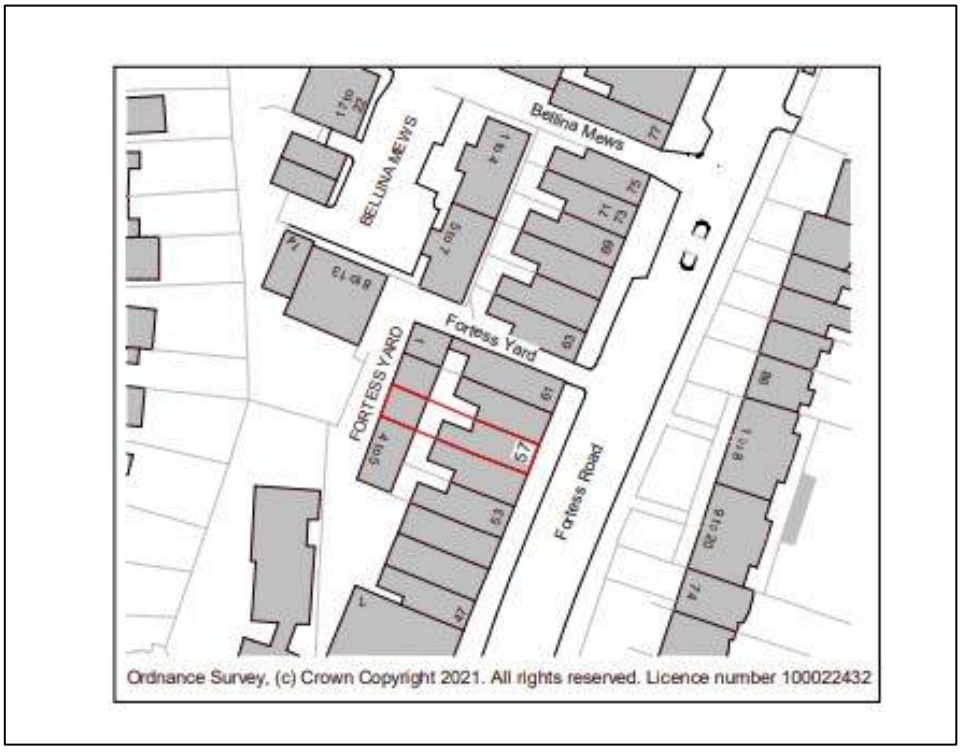


Figure 3 Site Photograph

Site Utility Services

2.7 Site service plans have not been obtained for the site on behalf of the client. The status of all services should be checked prior to any development (including site investigation) commencing.

3.0 ENVIRONMENTAL SETTING

3.1 The geology of the site is covered by British Geological Survey (BGS) online data and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).

3.2 Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).

Ground Workings

3.3 There are 6 records of historical surface ground workings identified within 250m of the property. The closest records refer to an unspecified heap, 169m to the northwest mapped in 1958. Other records refer to unspecified heaps and unspecified ground workings.

3.4 According to the BGS, there is no record of a British Pit within 500m of the site.

Mining and Other Underground Workings

3.5 Reference to the Coal Authority Interactive viewer shows the site is not located within an identified coal mining area.

3.6 There are no records of natural cavities within 500m of the site.

3.7 There are no records for non-coal mining areas identified within 1km of the site.

3.8 There are no records of non-coal mining cavities, which may result in subsidence, located within 1km of the site.

3.9 There are 24 records for historical underground working features, identified from Ordnance Survey mapping, within 1km of the site. The closest three records refer to a tunnel 308m northwest of the site, mapped between 1958 and 1974. Other records also refer to tunnels and an unspecified shaft.

3.10 There are no areas of brine extraction, gypsum extraction, tin mining or clay mining on the site.

Radon Potential

3.11 The site is not located in a Radon Affected Area. Less than 1% of the properties on site are estimated to be above the Action Level. Therefore, radon protection measures are not required.

Geology

3.12 The BGS states that the site is not underlain by artificial made ground deposits.

3.13 The site is not shown to be underlain by any superficial deposits.

3.14 The solid geology beneath the site is mapped as the Eocene London Clay Formation; a poorly laminated, blue-grey or grey-brown, silty to very silty clay with some layers of sandy clay.

3.15 There are no records of linear features within 500m of the site boundary.

3.16 There are no records of landslips within 500m of the site.

3.17 There are 5 BGS borehole records identified within 250m of the site. The closest boreholes are 110m northeast and 133m northeast at Eleanor Palmer School on Lupton Street, both of which encountered; firm, fissured, brown, silty, clay to a depth of 3.5-5m above stiff, fissured, brown, silty, clay.

3.18 The site is in an area where the hazard rating is moderate regarding shrink swell clays, very low for running sands, collapsible deposits, landslides and negligible for compressible deposits and dissolution of soluble rocks.

Hydrogeology and Hydrology

3.19 There are no records of a superficial aquifer.

3.20 The London Clay Formation beneath the property is classified by the Environment Agency (EA) as an unproductive aquifer having a mixed flow type and low to moderate permeability.

> ***Unproductive Aquifer*** *'Rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.'*

3.21 Due to the aquifer beneath the site being classed as unproductive, there is no recharge potential therefore ground water is not classed as vulnerable, however the soil leaching potential is assessed as low.

3.22 There are 10 ground water abstraction licence records within 2km of the site. The closest historical licence, issued in 2012, held by Greenwich Leisure Ltd for 2 boreholes at Kentish Town Sport Centre located 875m south of the site.

3.23 There are 2 surface water abstraction licence records within 2km of the site. The closest licence is for a point at Southampton Bridge on Regents Canal held by the Canal and River Trust (1612m south) for the use of water for non-evaporative cooling issued in 2007.

3.24 There are 2 potable water abstraction licence records within 2km of the site. The closest licence is the borehole at Kentish Town Sports Centre mentioned above.

3.25 The site is not located within a Source Protection Zone or within the Source Protection Zone of a confined aquifer.

3.26 There are no water network entries within 250m of the site.

3.27 There are no water surface water features identified within 250m of the site.

3.28 There are no records of a Water Framework Directive (WDF) surface water body located on site.

3.29 There are no records of a Water Framework Directive (WDF) groundwater body located on site.

Landfill & Waste Management Activity

3.30 There are no records for current Environment Agency/Natural Resource Wales landfill records within 500m of the site.

3.31 There are no records of a BGS/DoE non-operational landfill sites within 500m of the site.

3.32 There are no records of a historical landfill from the Local Authority and Historical Mapping records within 500m of the site.

3.33 There are no records of an historic Environment Agency/Natural Resource Wales landfill within 500m of the site.

3.34 There are 5 records of historical waste sites from the Local Authority and Historical Mapping records within 500m of the site. The closest record is 444m south, referring to a car breakers yard, dated 1952.

3.35 There are 4 records of current Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site. The closest record 458m southwest, refers to Regis Road Recycling Centre, the licence for which was renewed in 2019.

3.36 There are 22 records of a waste treatment, transfer or disposal site which are exempt from needing a permit within 500m of the site. All the closest records refer to the sorting and de-naturing of controlled drugs for disposal at DH Roberts Chemist,165 Fortress Road, 247m north of the property.

Industrial Land Use Information

3.37 There are194 records of potentially contaminative historical land uses identified within 500m of the site, however all are greater than 100m away. The closest record refers to a fire station 122m to the south at 20 Highgate Road. Other records within 200m refer to an electricity generating station 166m northwest of the site, unspecified heaps, bottling stores, unspecified commercial and industrial premises and unspecified ground workings.

3.38 There are 19 records of current potentially contaminative land uses identified within 250m of the site. The closes record refers to Lakis Meat Products at 61 Fortress Road. Other records within 100m of the site refer to repair and servicing of electrical equipment, construction, transport and haulage and vehicle repair and testing.

3.39 There are 42 records of historical tanks identified within 500m of the site. The closest record refers to an unspecified tank 172m east of the site dated 1981.

3.40 There are 77 records of historical energy features identified within 500m of the site, all of which refer to electricity substations and a generating station. The closest record refers to a substation 173m to the east of the site, dated 1992.

3.41 There are 42 records of historical garages within 500m of the site. The closest record is a garage 66m east dated 1975.

3.42 There is 1 record for a current petrol or fuel sites within 500m of the site. This refers to an obsolete Pace petrol station at 138-140 Highgate Road, 420m to the northwest of the site.

3.43 There are no records of historical petrol or fuel sites within 500m of the property.

3.44 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.

3.45 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.

3.46 There are 2 historical railway and tunnel features identified within 250m of the site. These refer to railway sidings 235m southwest of the property.

3.47 There are no historical railway lines identified within 250m of the site.

3.48 There are no current active railway line records identified within 250m of the site.

3.49 There is 1 underground railway lines or tunnel identified within 250m of the site. This refers to a tunnel for the Northern Line, 17m to the east of the property, at a depth of 27.74m.

3.50 The site is not within 500m of the route of the High Speed 2 rail project.

3.51 The site is not within 500m of the route of the Crossrail 1 rail project.

Environmental Permits, Incidents and Registers

3.52 The Groundsure Report includes records of environmental permits, incidents and registers within 500m of the site, which are summarised in Table 1 below.

Table 1: Environmental Permits, Incidents and Registers within 500m of the Site

Permit/Incident/Register	Number
Sites Determined as Contaminated Land under Part 2A EPA 1990	1
Dangerous or Hazardous (COMAH and NIHHS) Sites	0
Regulated Explosive Sites	0
Planning Hazardous Substance Consents and Enforcements	0
Historical Licensed Industrial Activities (IPC)	0
Part A (1) and IPPC Authorised Activities	0
Part A (2) and Part B Activities and Enforcements	21
Licensed Discharge Consents	0
Pollutant Release to Surface Waters (Red List)	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Substantiated Pollution Incidents (Category 1 and 2)	1
Pollutant Release to Public Sewer	0
Pollution Inventory Substances, Wastes and Radioactive Wastes	0
Category 3 or 4 Radioactive Substance Authorisations	0

3.53 There is 1 record of a site determined as contaminated land 164m southeast of the property at 8 Ascham Street identified in 2011. This refers to a former metal plating works which has the potential for lead and cadmium contamination. The site has now been classed as remediated by the council and now updated to "formerly contaminated land".

3.54 There are 21 records of licenced pollutant releases (Part A(2)/B) regulated under the Environmental Permitting Regulations 2016 for the release of substances of the environment within 500m of the site. The closest record is 142m south of the property, which refers to a licence held by M & A Coachworks at 1-36 Fortress Grove for respraying vehicles.

3.55 There is 1 record of a substantiated pollution incidents (since 2006), recorded within 500m of the site. This refers to an incident in 2002, 406m northeast of the property relating to firefighting runoff, which was classified as having a minor impact on water and air (category 3).

3.56 There are no other records of Environmental Permits, Incident or Registers within 500m of the site.

Environmentally Sensitive Sites

3.57 There are no records of Sites of Special Scientific Interest (SSSI) within 2km of the site.

3.58 There are no Conserved Wetland sites (Ramsar sites) or Special Areas of Conservation (SAC) within 2 km of the site.

3.59 There are no Special Protection Area of Conservation (SPA) of Special Areas of Conservation (SAC) within 2 km of the site.

3.60 There are no National Nature Reserves (NNR) within 2km of the site, however there are 2 Local Nature Reserves (LNR) the closest one being Belsize Wood, 1477m west of the property.

Ecology

3.61 An ecological assessment of the site falls outside the brief of this report. Where considered necessary, advice should be sought from an ecological specialist in this respect.

3.62 There are three areas designated as priority habitats under the Natural Environment and Rural Communities Act 2006. The closest of these refers to a deciduous woodland 168m northwest of the property.

3.63 The site is within an area classified as **urban land** See Appendix 1 for details.

Archaeology

3.64 An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist in this respect.

3.65 There are 8 records of Listed Buildings within 250m of the site. The closest records are on Fortress Road, numbers 96 and 98 and numbers 44-94. All listed in 1974. Approximately 55m east of the property lies the Kentish Town Conservation Area, designated by the local council in 1985.

3.66 There are no records of Ancient Monuments or Registered Parks and Gardens within 250m of the site

3.67 There are no records of World Heritage Sites within 250m of the site.

Potential Flood Risks

3.68 Detailed assessment of flood risks is outside the scope of this report. However, the site does not lie within 50m of an Environment Agency Zone 2 and Zone 3 floodplain.

3.69 There are no records of flood risk from rivers and sea (RoFRaS) within 50m of the site.

3.70 There are no records of historical flood events recorded within 250m of the site.

3.71 There are no records of flood defences located within 250m of the site.

3.72 There are no records of areas benefiting from flood defences located within 250m of the site.

3.73 There are no records of areas used for flood storage within 250m of the site.

3.74 The highest risk of surface water flooding occurring on-site (because of extreme rainfall) in a 1 to 30 year return period according to data from the Ambiental Risk Analytics surface water FloodMap is **negligible.**

3.75 The highest risk of groundwater flooding occurring on-site, based on the Ambiental Risk Analytics 1 in 100 year 5m Digital Terrain Model is **negligible.**

Previous Site Investigations

3.76 A planning application (2021/5607/P) was submitted by the client in November 2021 for a change of use of part of the basement and ground floor from commercial use to a self-contained flat. Accompanying this application was a Landmark Search by Argyll Environmental (26/01/2021) which passed the contamination risk but identified a flood risk for surface water within 250m of the property, issues with the natural ground stability and identified the property being within 2km of the proposed HS2 route.

3.77 Daylight and Noise Assessments were also submitted with the above application.

4.0 SITE HISTORY

4.1 The historical development of the site has been determined by reference historical plans and Google Earth imagery. The reviewed historical plans comprise only readily available records and may be limited; however, the information available to date indicates that additional searches are unlikely to add to our understanding of the site. The earliest available historical mapping covering the site dates to 1871.

4.2 The site history is summarised in Table 2, below, followed by selected extracts from maps and aerial photographs.

Table 2: Summary of Site History

Date	On-Site History	Surrounding Land Use History
1873 1:10,560 1871 1:2,500	The site is the garden of a semi-detached house on "Junction Road"	Fortress Road was formally Junction Road, which on the western side had several semi-detached houses set back from the road with gardens and on the eastern side terraced houses with gardens to the rear. St Marys Chapel and the Vicarage were 50m to the south on the western side of the road. Kentish Town had open fields to the northeast. The railway stations, Gospel Oak, Highgate Road were the focus of residential development extending out along Highgate Road. St John the Baptist Church lies 450m to the southwest. There is no evidence of heavy industry other than the railways and engine sheds.
1894 1: 10,560 1896 1:1,056	The semi-detached house has been demolished and a row of terraced houses built in place of the houses and gardens. There is an outhouse on the rear of the building.	Fortress Road now has a tramway along it and is lined both sides with terraced houses. Behind the properties on the western side of the road near number 57 is a yard with stables, a piano manufacturer and a cycle works. There is a public house (Junction Tavern) on the end of the western terrace and a boy's school on the east side of the road. The surrounding area is now almost entirely built up of residential housing in terraces, squares, crescents and blocks. Only a small area, 750m to the northwest remains open and a small area close to Highgate Station. There is a brick works 550m to the southwest.
1920 1:10,5601 1915-1916 1:2,500	No significant change	The railway sidings in Kentish Town have expanded significantly. There is a bottling store 250m to the southwest An electric generating station has been constructed on the vacant land near Highgate Station 250m to the northwest. There are Locomotive sheds 450m to the west and a miniature rifle range 400m to the north.

Date	On-Site History	Surrounding Land Use History
1938 1:10,560 1936 1:2,500	No significant change	There is a furniture factory in Fortress Yard 40m north of the property. The piano works is now down the street to the south near to the Catholic Church. 250m to the southwest there is a picture theatre, church bottling stores and depository. 250m to the southwest there is a wallpaper factory. 100m south there is a fire station. The electricity generating station has been dismantled and an iron works in its place and allotment gardens on the land near Highgate Station.
1948-1952 1:10,560 1952 1:1,250	No significant change.	The tram way on Fortress Road has been dismantled. There is a dressing factory in Fortress Yard. A Hall at number 85 Fortress Road. 100m southeast there is a motor body factory and garage 100m to the southwest there is a dental engineering works. 250m to the southwest there is a coachbuilding works, heavy chemicals warehouses, cabinet works, garage and cinema.
1965-1968 1:10,000 1963-1968 1:2,500	No significant change.	Some of the railways have been dismantled and a shaft is identified on the map 500m to the east. The industry to the southwest is now: Exhibition works, warehouses, a clothing factory, engineering works. There is a factory and garage 100m to the southeast and “factories” in Fortress Yard.
1971-1975 1:10,000 1973-1976 1:2,500	No significant change.	An old people’s home and blocks of sheltered housing has been built on the vacant land near Highgate Station. The industrial buildings to the southwest of the site are occupied by works, warehouses and daycentres. The R.C. Church on Fortress Road becomes a Methodist Church
1981-1985 1:1,250	No significant change.	No significant change.
1990-1991 1:1,250	No significant change.	No significant change.
2003 1:10,000	No significant change.	Houses have been built on the site of the furniture factory in Fortress Yard.
2022	No Significant change	The industrial units to the southwest near the railway have become apartments, office spaces, gyms and cafes.

Figure 4 OS Map Extract 1871

Figure 5 OS Map Extract 1896

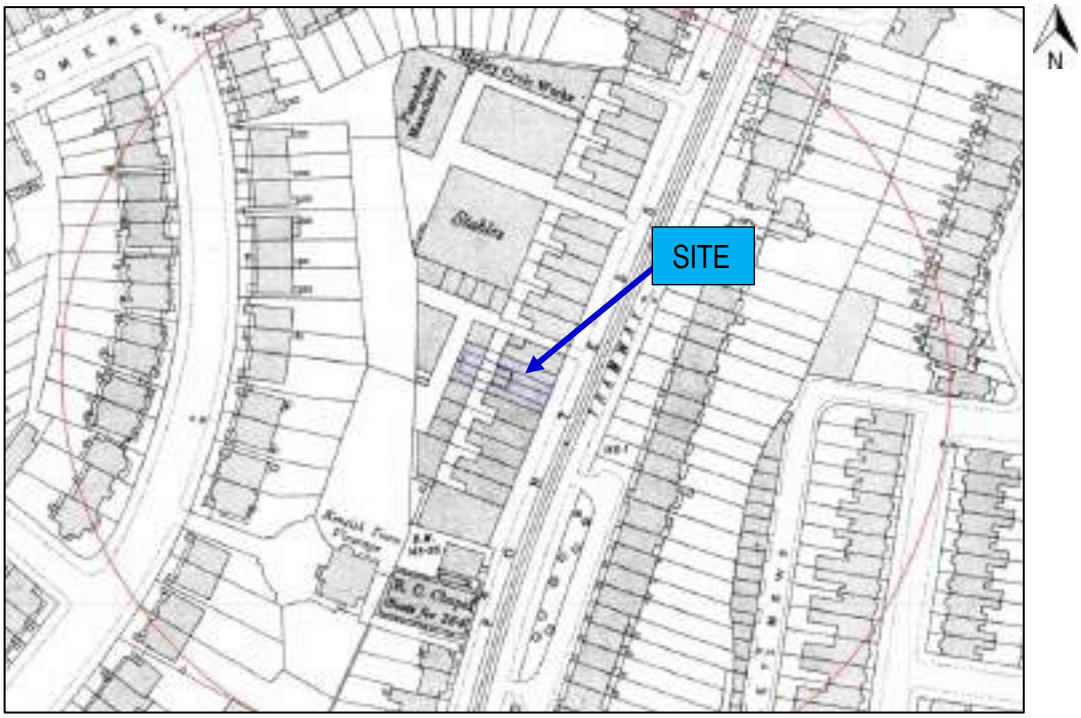


Figure 6 OS Map Extract 1920

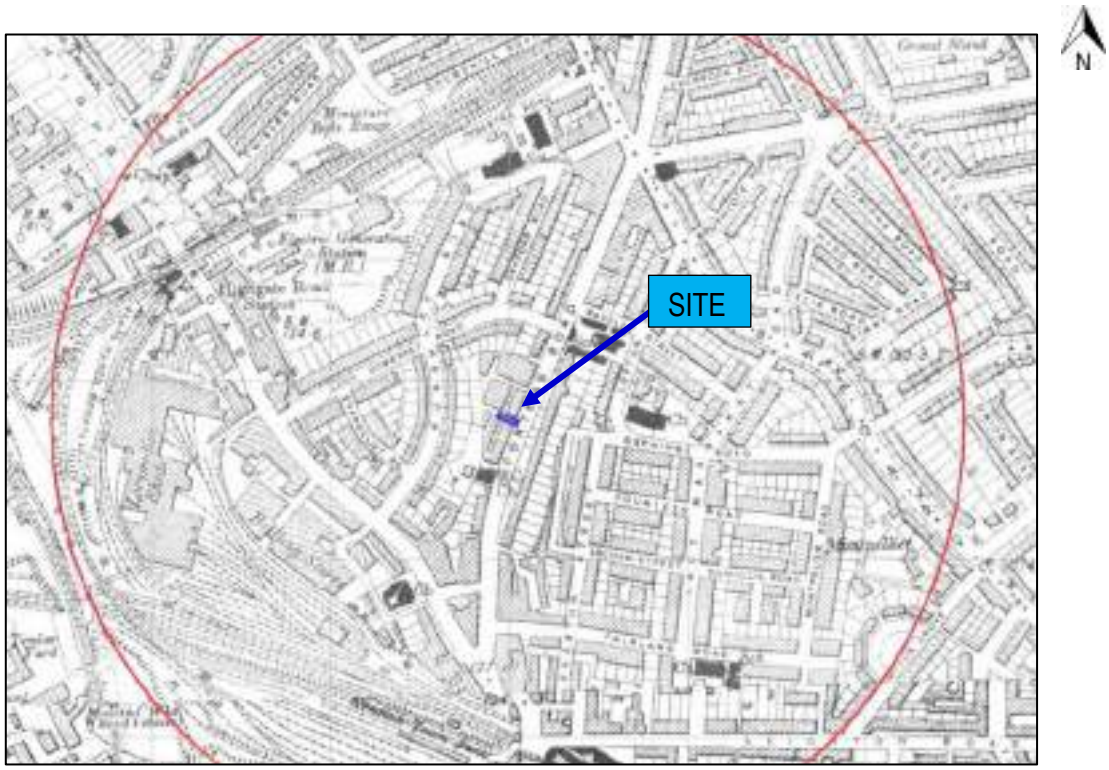


Figure 7 OS Map Extract 1936

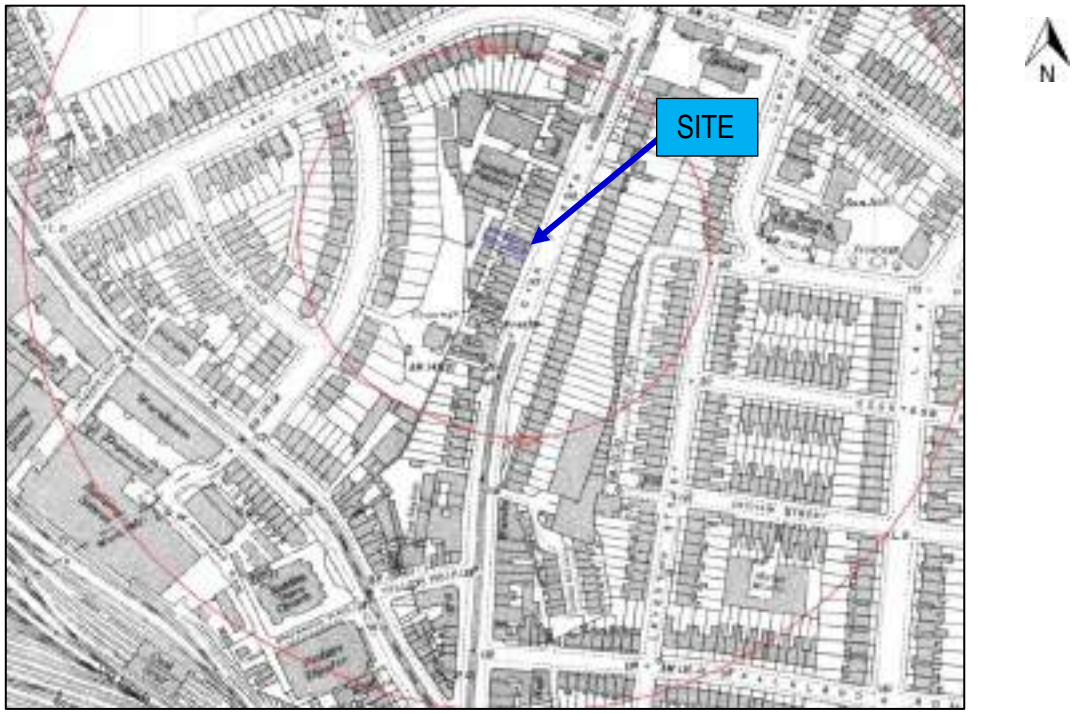


Figure 8 OS Map Extract 1963

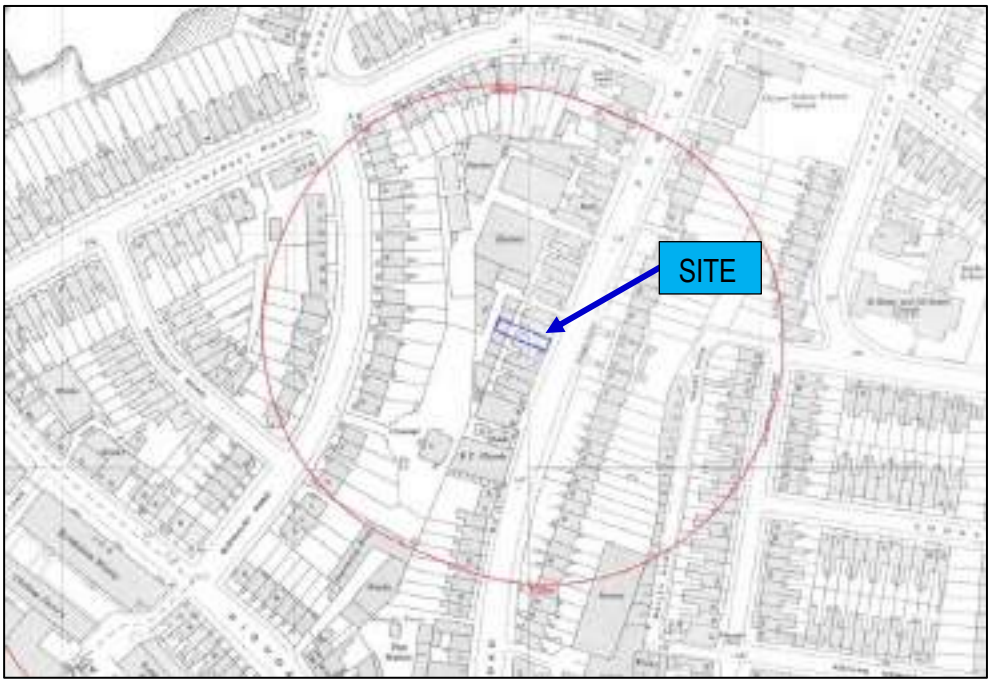


Figure 9 OS Map Extract 1971

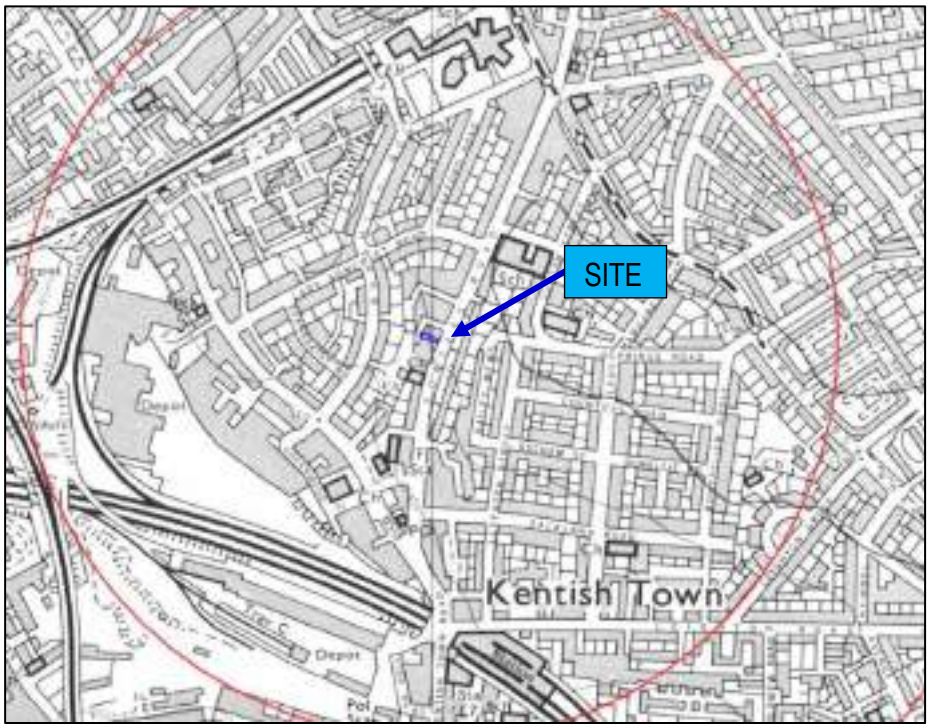


Figure 10 OS Map Extract 1991

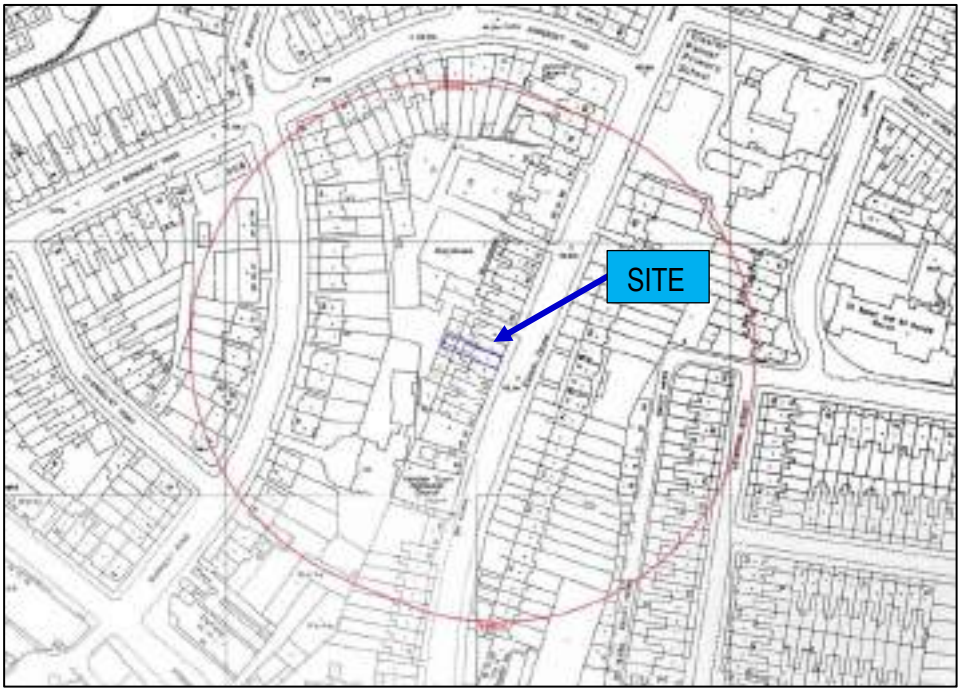


Figure 11 Google Earth Image 2022

5.0 WALKOVER SURVEY

5.1 A walkover survey was completed on 26th January 2022. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3 respectively.

5.2 The site access is from Fortress Road to the west.

5.3 The site is currently being developed and undergoing a change of use from a commercial property to a self-contained apartment over two floors.

5.4 The property overlooks a small yard to the rear which backs onto a residential property in Fortress Yard.

5.5 The foundations and ground surface of the property will remain the same.

5.6 There were no obvious signs of contamination identified at the property or in the surrounding area.

5.7 The surrounding area is residential housing (brick three storey terrace houses) above shop fronts.

5.8 A site features plan is presented as Figure 12 overleaf.

Figure 12 Site Features Plan

6.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

6.1 The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by DEFRA and the EA Model Procedures for the Management of Land Contamination, CLR11(2004).

6.2 Table 5 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 3 and Table 4 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and CLR11.

6.3 Table 5 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.

6.4 The PCM/PRA is based on a continued residential end use.

Table 3: Consequence, Probability and Risk

Probability	Consequence,	Risk
High Likelihood- There is a pollution linkage and an event either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution	Very High – acute risk to the human health likely to result in significant harm. Risk of severe or irreversible effect on ground/surface water quality. Catastrophic damage to buildings / property.	Very High – there is a high potential that the source-pathway-receptor scenarios may give rise to harm to human health, or the environment and remedial action is likely to be required.
Likely – there is a pollution linkage, and all the elements are present, which means that it is probable an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	High – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	High – it is likely that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks
Low likelihood– there is a pollutant linkage and circumstances are possible for an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term	Moderate – Long term or short-term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. Reduced reliability of a supply at a groundwater or surface water abstraction source	Moderate – it is possible that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, however it is either relatively unlikely that such would be severe, or if any harm were to occur it is more likely that harm would be mild.
Unlikely – there is a pollution linkage, but circumstances are such that it is doubtful that an event would occur even in the very long term.	Low – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	Low – it is possible that harm could arise at the source, however it is likely that this would at worst be mild.
		Very Low – it is unlikely that the source-pathway-receptor scenarios will give rise to an impact on human health or the environment.

Table 4: Estimation of Level of Risk by Comparison of Consequence and Probability

		Consequence			
		High	**Moderate**	**Low**	**Very low**
Probability	**High Likelihood**	Very High	High risk	Moderate risk	Moderate to low risk
	Likely	High risk	Moderate risk	Moderate to low risk	Low risk
	Low Likelihood	Moderate risk	Moderate to low risk	Low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk	Very low risk

Potential Sources

6.5 Historically the site has always been a three-storey residential building built in the late 1800s. There has been a shop below the premises and Fortress Road had a tramway from the late 1800's until late 1940's. Fortress Yard to the rear has been occupied by stables, furniture factories, works, a piano factory and most recently residential apartments. The closest heavy industry and railway lines were over 200m away to the southwest.

6.6 Potential on-site sources of contamination may be asbestos containing materials (ACM) exposed during the renovation.

6.7 Potential off-site sources of pollution include contaminants that have been mobilised from the electrical generating station, furniture works or railway and industries to the south. However, these are considered far enough away not to be a risk.

6.8 There is limited potential for the presence of contamination associated with the following:

- Asbestos containing materials (ACM) in the existing building
- Made Ground within the existing yard to the rear.

Potential Receptors

6.9 The following receptors have been considered for the construction and operational stages of the proposed redevelopment.

- Current site users;
- Adjacent land users;
- Future land users;
- Construction workers during site development works;
- Surface water and Groundwater within the underlying aquifer

Potential Pathways

6.10 The following pathways have been considered for the construction and operational stages of the proposed redevelopment.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils.
- Downward vertical migration of leachate to surface waters and shallow groundwater.
- Vertical or lateral migration of ground gas.

Table 5: Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Potential soil contamination E.g., Heavy Metals, PAH, TPH.	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Low	Very Low	The site is currently being developed as a self-contained apartment and undergoing a change of use from a commercial premises. There are no obvious signs of contamination. The risk is therefore considered to be **VERY LOW**.
		Adjacent land users	Low Likelihood	Low	Low	Residences are located on either side and to the rear of the property. There are no obvious signs of contamination. The risk is considered **LOW.**
		Future land users	Low Likelihood	Low	Low	The proposed development consists of a change of use from a commercial property to a self-contained apartment. The floor and yard are surfaced in concrete. The risk to future site users via direct exposure is **LOW.**
		Construction Workers	Low Likelihood	Low	Low	No contaminants were noted on site. Exposure time will be minimal. The risk to construction workers is considered **LOW.**
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Unlikely	Low	Very Low	The site has drainage in place and the London Clay Formation is classified as an unproductive aquifer. The risk to groundwater is therefore considered **VERY LOW.**
	Lateral migration in surface waters	Surface water	Unlikely	Low	Very Low	The site has drainage in place. There are no surfaces water features within 250m of the site. The risk to surface waters is **VERY LOW.**
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Low	Very Low	The historic use of the site has been residential and commercial (a shop on the ground floor). Shallow made ground is anticipated in the yard area. No nearby sources of ground gas were identified. This risk to current site users is therefore **VERY LOW**
		Adjacent land users	Unlikely	Low	Very Low	The historic use of the site has been residential and commercial (a shop on the ground floor). No nearby sources of ground gas were identified. The risk to adjacent site users from ground gas is therefore considered **VERY LOW.**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Future land users	Low likelihood	Low	Low	The historic use of the site has been residential and commercial (a shop on the ground floor). No nearby sources of ground gas were identified. modern construction practices will provide a barrier and ventilation. There is low potential for radon gas and no radon protection measures should be implemented, therefore the risk is considered **LOW.**
		Construction Workers	Low likelihood	Low	Low	The historic use of the site has been residential and commercial (a shop on the ground floor). No nearby sources of ground gas were identified. The risk to construction workers from ground gas is considered **LOW.**
Asbestos Containing Material (ACM)		Current Site Users	Unlikely	Moderate	Low	Asbestos was not observed on site however there is the possibility that material containing asbestos may be uncovered during the refurbishment. Asbestos is only harmful when disturbed. The risk to current site users is **LOW.**
		Adjacent land users	Unlikely	Moderate	Low	Residences are located on either side of the site and to the rear. Asbestos is only harmful when disturbed. Dust control measures (dampening down) should be implemented as part of good site working practices. Therefore, the risk is considered **LOW**.
		Future land users	Low Likelihood	Moderate	Moderate to Low	The proposed development consists of a change of use from a commercial property to a self-contained flat. The material on site will be removed, with necessary safety measures in place. The risk is considered **MODERATE TO LOW.** An asbestos survey will reduce the risk to **LOW**
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to potential asbestos during the redevelopment. The duration will be short term. The risk is considered **MODERATE TO LOW.** An asbestos survey and appropriate health and safety measures (in line with CDM and other relevant health and safety guidance) would reduce the risk to **LOW.**

7.0 GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT

7.1 In addition to the environmental hazards there are also geotechnical hazards associated with the stability of the ground including load bearing capacity, slope stability and effects of ground mining activities. Local Authorities follow NPPF (2012) which requires that a site is suitable for its new use considering of ground conditions and land instability, including from natural hazards to former activities such as mining. A summary of the geotechnical considerations is provided below in Table 6.

Table 6: Summary of Geotechnical Hazards

Geohazards:	
Highly Compressible Ground	Negligible risk.
Collapsible Soils	Very low risk.
Swelling Clay	Moderate risk.
Running Sand	Very low risk
Ground Dissolution	Negligible risk.
Landslip	Very low risk.
Mining & Quarrying	There is no mining or quarrying in the area.
Geotechnical Design Considerations	
Site Clearance	Not required.
Trees	None.
Existing Buildings/Obstructions	Existing building and foundations.
Foundations	The foundations are already in place and no ground investigation is required.
Floor Slabs	Any redesign should consider the original foundations and ground conditions on site.

Geotechnical Design Considerations	
Groundwater	Exact groundwater conditions are not known at this stage. The highest risk of groundwater flooding occurring on-site, based on the Ambiental Risk Analytics 1 in 100-year 5m Digital Terrain Model is negligible.
Earthworks	Earthworks will not be necessary.
Slopes	The site is developed and level.
Retaining Walls	There are no retaining walls other than those in the foundations of the building.
Chemically aggressive ground conditions	Chemically aggressive ground conditions are not expected at this site. However, an intrusive geotechnical investigation would be necessary to confirm this.

8.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

8.1 Historically the site has always been a garden of a residential property or a residential property making up part of a brick built Victorian terrace with a shop below. No contamination was identified on site. The only access is from Fortress Road to the south. Fortress Yard 50m to the northeast is now housing, however there was a furniture factory and a piano maker on the site in the past.

8.2 The only potential current onsite sources of contamination could be the possibility of asbestos which may be encountered during refurbishment. Made ground is present within the small yard.

8.3 Potential off-site sources of contamination identified from historical maps, the electrical generating station, fire station and commercial properties 200m to the southwest are considered far enough away not to be a risk to any site development.

8.4 It is understood that the client wishes to redevelop the commercial property into a self-contained apartment over two floors.

8.5 The solid geology on site comprises of the Eocene London Clay Formation which is an unproductive aquifer. There is no made ground on site and no superficial deposits. The foundations of the property are not being altered therefore any natural instability in the ground in the area is mitigated.

8.6 The site is not located in a Radon Affected Area, as less than 1% of the properties are above the Action Level.

8.7 Given the historical land use and the fact the basement and yard are covered with concrete, the overall risk from soil contamination to end users and construction workers is concluded to be **LOW**. However, the risk from asbestos is **MODERATE** to **LOW.**

8.8 The risk to controlled waters is concluded to be **LOW** based on the current drainage of the site and the site not being proximal to any water bodies

8.9 Given the historical land uses, the risk from ground gas to end users and construction workers is **LOW**

8.10 **The site is not located within 50m of a Zone or Zone 3 floodplain.** The risk of groundwater flooding is considered **NEGLIGIBLE** based on the Ambiental Risk Analytics 1 in 100-year 5m Digital Terrain Model.

Recommendations

8.11 An intrusive investigation is not required in this case.

8.12 If during construction material containing asbestos is suspected or encountered, work should cease, and testing carried out to determine its nature before work can re-commence.

8.13 It is recommended that an asbestos survey should be prepared by a specialist asbestos consultant prior to commencing redevelopment to accurately identify any potential asbestos containing materials (ACMs) in the existing structures.

APPENDIX 1

GROUNDSURE REPORTS

APPENDIX 2

SITE PHOTOGRAPHS

<table>
<tr><td>Earth Environmental & Geotechnical Ltd

Tel: 0161 975 6088
Email: info@earthenvironmental.co.uk
Web: www.earthenvironmental.co.uk</td><td>SITE PHOTOGRAPHS</td></tr>
<tr><td>Job No.: A4593/22</td><td>Site: Fortress Road, Camden</td></tr>
<tr><td>Plate 1 Viewing west towards the property from Fortress Road</td><td>Plate 2 Viewing north along Fortress Road, number 57 on the left</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 26th January 2022</td><td>Date: 26th January 2022</td></tr>
<tr><td>Plate 3 Viewing south along Fortress Road, number 57 on the right</td><td>Plate 4 View of the interior of the property looking east.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 26th January 2022</td><td>Date: 26th January 2022</td></tr>
</table>

<table>
<tr><td>Earth Environmental & Geotechnical Ltd

Tel: 0161 975 6088
Email: info@earthenvironmental.co.uk
Web: www.earthenvironmental.co.uk</td><td>SITE PHOTOGRAPHS</td></tr>
<tr><td>Job No.: A4593/22</td><td>Site: Fortress Road, Camden</td></tr>
<tr><td>Plate 5 View of the interior of the property (the void space) looking west.</td><td>Plate 6 View of the rear of the property looking west</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 26th January 2022</td><td>Date: 26th January 2022</td></tr>
<tr><td>Plate 7 View inside the property looking west</td><td>Plate 8 Viewing from upper floor into the yard below.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 26th January 2022</td><td>Date: 26th January 2022</td></tr>
</table>

Figure 13 Site Walkover Photo Locations

APPENDIX 3

SITE WALKOVER NOTES

WALK OVER SURVEY REPORT

Site: Fortress Road, Camden **Date:** 26th January 2022

Job No: A4593/22 **Undertaken By:** Heidi Richards

Purpose of Site Walkover:
1) Provide further information for the Desk Study Report.
2) Identify potential contamination sources, pathways and receptors.
3) Identify geotechnical features and potential geohazards.
4) Determine locations for exploratory boreholes.

Desk Study features checked during site visit	**Feature and Information required**	**Present**	**Description / Comments**
Site Setting	Description required for: Town/Country/Suburb Setting Industrial/Residential/Retail Usage Current Site use (if undertaking security and access to the site)		Urban Redevelopment
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	Yes/~~No~~ Yes/~~No~~	Shop fronts
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		Flat and residential
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	 ~~Yes~~/No ~~Yes~~/No ~~Yes~~/No ~~Yes/No~~	

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Topography	Description required for: Are there apparent differences between site and surrounding area? (If yes describe the presence of retaining walls, and slopes). Is there evidence of Made Ground / Fill on site?	Yes/~~No~~ Yes/~~No~~	Residential property
Site Boundaries and Neighbours	Description required for: Type of boundary demarcation (if any) on each side of site, usage of adjacent land and name of industrial/commercial occupiers. Note any adjacent features such as water course and other potentially environmentally sensitive uses (residential, school, infirmary, SSSI etc)		Residential property 57 Fortress Road
Vegetation	Are there any vegetation/trees on or close to site (if yes describe locations, type, maturity, etc) Is there any evidence of poor health / distress?	~~Yes~~/No ~~Yes~~/No	Non
Ground Surface	Are there areas of hardstanding and estimate the split between hard and soft cover? (If yes describe locations, types and conditions). Is there any evidence of any spillages or staining?	Yes/~~No~~ Yes/~~No~~	Foundations and concrete

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Drainage	Are there any drain covers / soakaways (if yes describe locations) Are there any outfalls/water courses on site (note the condition of water courses in open water courses. discolouration, odour, eutrophication, oily sheen, gas bubbling water, clear or cloudy) Where a watercourse runs alongside or crosses a site are there any differences in visible water quality upstream and downstream of the site?	Yes/~~No~~ ~~Yes~~/No ~~Yes~~/No	Drainage established no water courses
Electrical Equipment	Are there any electricity sub stations on or adjacent to the site? Are there any electrical transformers, capacitors, pylons etc on site?	Yes/~~No~~	Services to property
Buildings	Is there any evidence of asbestos construction materials e.g., roofing, insulation materials. Do any buildings have basements? Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	~~Yes/~~No Yes/~~No~~ ~~Yes~~/No	Building on site no asbestos noted Basement to be developed

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Landfilling	Is there any evidence of gas protection measures (gas membrane, gravel-filled trenches, venting pipes, etc)?	~~Yes~~/No	No
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment? Fugitive Source: is there any stockpiled material / windblown dust / vapour process?	~~Yes~~/No ~~Yes~~/No	N/A
Storage of fuels & Chemicals	Are there any drums / containers (if yes, describe quantity, full /empty, stored on hard standing / soft landscaping, bunding)? Are there any above ground fuel tanks (if yes, describe locations, volumes, how many, bunding, used / disused, condition?) Is there any evidence of underground fuel tanks (fuel pumps, covers, vent pipes, how many and how large, fill point, used / disused, and condition)?	~~Yes~~/<u>No</u> ~~Yes~~/No ~~Yes~~/No	N/A
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts? Are emergency procedures / equipment in place?	~~Yes~~/No ~~Yes~~/No	No

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Waste	Are there any waste skips present on site? Are waste storage facilities adequate? Is there any litter/fly tipped material?	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	~~Yes~~/No	NA
Access / Further Investigations	If a Phase 2 Investigation is likely to be required, describe any access problems including headroom where relevant, services, overhead cables, restricted access areas, confined spaces, trafficked areas, etc that are likely to affect investigation scope/techniques. Identify possible site office and storage locations. Identify possible water supply		No.
Site Environs	Are there any local features that could have a harmful influence e.g., landfill, industrial processes, railway land? Are there any sensitive water features/courses near to the site?	~~Yes~~/No ~~Yes~~/No	Residential area with shop fronts
Local Knowledge / Anecdotal Evidence			
Site Dimensions	Describe shape of Site in plan and measure dimensions.		Residential property dimensions on plans

APPENDIX 4

REPORT LIMITATIONS

LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd based on a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that, expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2022 and should be read considering any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full of those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.