Phase I Environmental Assessment
149 - 151 Heath Road Twickenham, TW1 4BN UK

On behalf of:
Price and Myers LLP

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Contents

Executive Summary

EAME has been commissioned by Price and Myers LLP (the "Client") to undertake a Phase I Environmental Assessment of 149 - 151 Heath Road, Twickenham, UK (the "Site"). It is understood that this report is required to support a planning application to redevelop the Site to include *'demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only i.e. no gardens are proposed'.*

It is clear (based on the prevailing information) that the Site was primarily used for residential purposes *circa* 1700 until 1913 when Saville House was demolished. Post that date two buildings were constructed on the Site forming the current 149 - 151 Heath Road property. The addition of the store at the rear of the property was added at a later date (although the exact date is unknown). Anecdotally the Site was operated as a home furnishing business by C R Scrubby.

The underlying superficial deposits have been classified by the Environment Agency (EA) as a Principal Aquifer although the Site is not located in a Source Protection Zone (SPZ) and there are no current groundwater abstraction licences associated with the Site or any other site within 1-km.

Although minor areas of Made Ground and potential contamination maybe encountered during the proposed Site redevelopment there is no evidence to suggest that the Site is significantly contaminated (based on the available information). The contamination risk is therefore **LOW** primarily because the previous operations did not use or store large volumes of potential pollutants.

It is important to remember that this conclusion only remains valid if the current proposals are implemented. Any changes to the proposed scope of works would invalidate the presented assessment.

Due to the age of the structure a refurbishment/demolition asbestos survey should be undertaken prior to demolition/site clearance

These issues are discussed in more detail in the remainder of this report.

1 Introduction

1.1 Background

Earth & Marine Environmental Consultants (EAME) is an independent multi-disciplinary environmental consulting practice that specialises in providing technical expertise and innovative solutions to complex and challenging environmental problems. EAME has considerable experience in contaminated land and redevelopment issues and has worked on hundreds of such cases. EAME is, therefore, qualified and experienced enough to provide an expert opinion on such issues in the context of this project.

EAME has been commissioned by Price and Myers LLP (the "Client") to undertake a Phase I Environmental Assessment of 149 - 151 Heath Road, Twickenham, UK (the "Site"). It is understood that this report is required to support a planning application to redevelop the Site to include *'demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only i.e. no gardens are proposed'.*

1.2 Scope of Works

The scope of works was to undertake a desk study using available information, and to place the Site in its environmental context. For there to be a significant risk requiring further investigation a source, pathway and receptor must all be present. In order to assess whether this is the case, background research is required to obtain relevant information about the Site and its surroundings and to assess the findings qualitatively. The scope of the assessment examined whether there is the potential for current and historic soil and/or groundwater contamination to be present, both at and in the vicinity of the Site, and to assess significance in terms of the potential to pose a risk to human health, controlled waters, building infrastructure, and the wider environment and identify any potential liabilities.

The scope of this assessment included the following:

- a site inspection by an experienced environmental consultant;
- a review of available historic maps to determine the land use history in the context of potentially contaminative activities;
- a review of environmental data relating to the Site and its surroundings using a proprietary third-party environmental database;

- desk-based assessment of site geology, hydrogeology and hydrology from published mapping and web-based sources to determine the Site's environmental setting and sensitivity;
- a web-based search of the Environment Agency (EA) website and other freely available sources of information to identify any potential issues relating to the Site and surrounding areas;
- enquiries with the Local Authority Environmental Health, Trading Standards (Petroleum Licensing) and Planning departments (where required) regarding possible/known issues relating to the Site; and
- provision of a qualitative contaminated land risk assessment based on Source-Pathway-Receptor as per current best practice detailed in the guidance document, Model Procedures for the Management of Land Contamination (CLR11) (Environment Agency, 2004).

2 Environmental Review

2.1 Introduction

This Environmental Assessment comprised the following elements:

- a site inspection;
- a review of historical land uses and activities at the Site and neighbouring land; and
- a search of environmental regulatory databases to obtain information on industrial processes, licensed landfill sites and data on pollution incidents.

The site inspection was undertaken by Steve Rowan (EAME) on 5th August 2016. All other information in this report has been obtained via public sources or from the Client's records.

2.2 Site Location and Setting

The Site is accessible from both Heath Road (northern side of the Site) and Saville road (eastern side of the Site), Twickenham, TW1 4BN, UK and is located at National Grid Reference (NGR) TQ 15676 73109 (51.445166, -0.33689350) (*Annex A, Figure 1*). The Site is located in an urban environment centrally with the town of Twickenham (an area of southwest London).

The following current activities have been identified surrounding the Site:

- NORTH – Heath Road beyond which are ground floor commercial properties with residential flats above.
- EAST – Saville Road beyond which is a relatively new development (Beaumont House) that contains 14 private one and two-bedroom apartments with commercial properties on the ground floor.
- SOUTH – Residential properties (with gardens) located along Saville Road.
- WEST – Ground floor commercial properties with residential flats above.

The Site is located in the jurisdiction of London Borough of Richmond upon Thames.

2.3 Site Description and Layout

The Site is approximately rectangular in shape and it occupies an approximate area of 0.1 hectares (ha) and lies at approximately 12 metres Above Ordnance Datum (AOD) (*Figure 2.1*).

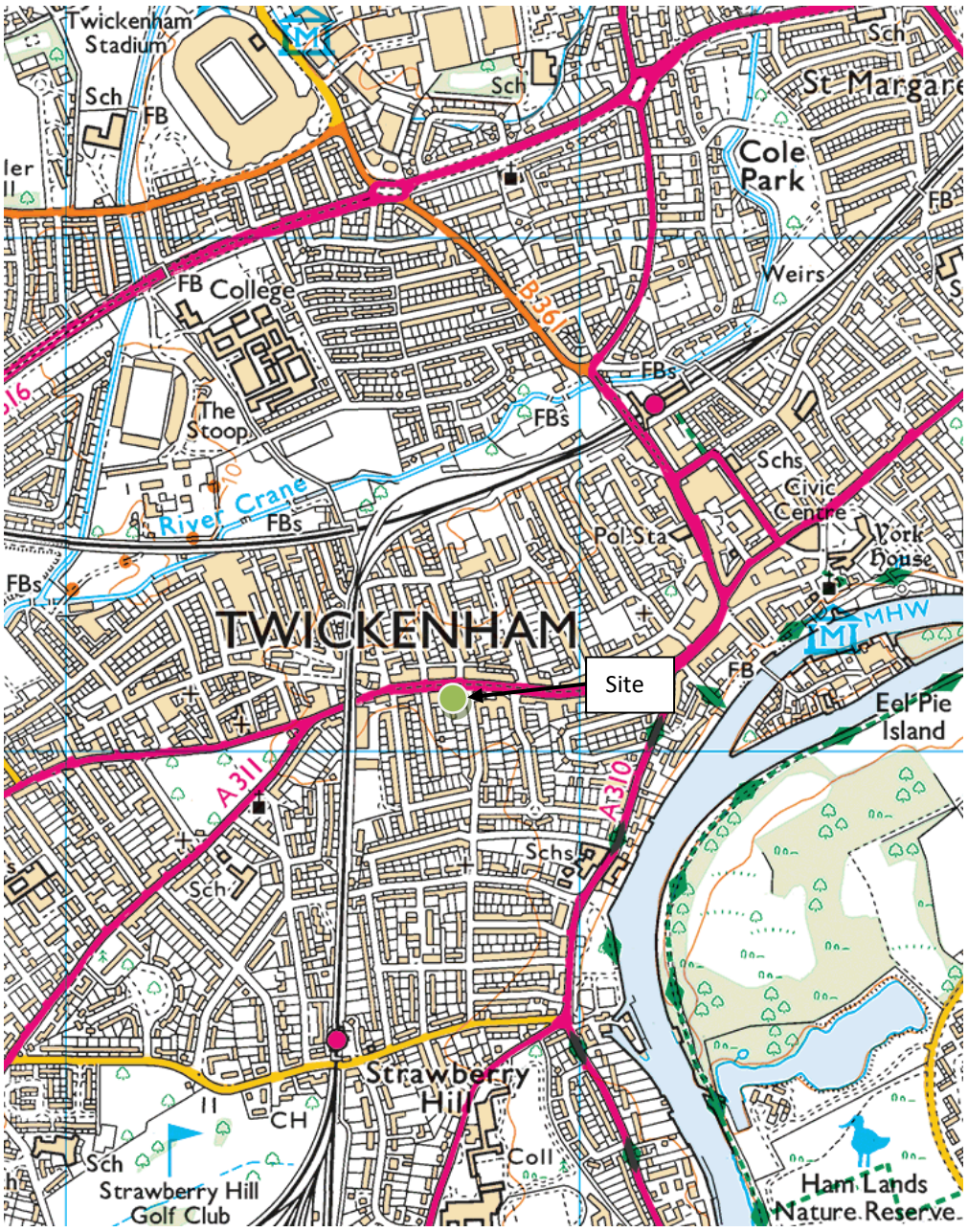

Figure 2.1: Site Location - *Ordnance Survey Map Extract (1:25,000)*

2.4 Prevailing On-site Environmental Conditions

The following section has been wholly derived from the Site inspection undertaken by Steve Rowan (EAME) on 5th August 2016 and summarises the prevailing on-site environmental conditions.

The Site is primarily composed of three distinct areas; the main building (149-151 Heath Road); a store located at the rear of the main building; and a concrete hard-standing vehicle parking area.

Photograph 2.1: *Yard and side of building and single storey store*

Photograph 2.2: *Adjacent residential property (Saville Road) and yard*

Photograph 2.3: *Main building (149-151 Heath Road)*

Underground Storage Tanks (USTs)

During the Site inspection no evidence of current or historic USTs (*i.e.* fill points, unexplained manhole covers, vent pipes, *etc.*) were observed. A single manhole cover was identified in the yard, however, the service tracing plan (DRWG No. 1517-20) identifies this as the foul sewer (*Photograph 2.4*).

Photograph 2.4: *Manhole cover located within the yard (foul sewer)*

Above Ground Storage Tanks (ASTs)

During the Site inspection no evidence of current or historic ASTs (*i.e.* fill points, bunds, pipework, *etc.*) were observed.

Other Storage (*i.e.* Intermediate Bulk Containers (IBCs) and drums)

No IBCs or drums were observed during the Site inspection.

Air Emissions

As the Site is currently disused there are no air emissions. During the inspection electrical heating systems were observed.

Environmental Permitted Activities

No active processes, requiring a permit, were observed during the Site inspection.

Waste

No commercial or industrial waste materials were observed during the Site inspection. The Site has recently been used as a squat hence small amounts of domestic type waste are present with the building (*Photograph 2.5*).

Photograph 2.5: *Domestic type waste within the building*

Water, Drainage and Wastewater

A drainage plan for the Site has not been made available for review and as such the nature of any on-site drainage systems, if present, cannot be confirmed. The Site layout plan (Project No. 1517, DRWG No. 1517-20, Scale 1:200, version 10) outlines a foul drain (manhole) on the eastern side of the garage/store (*Photograph 2.1*). It appears from the plan that all rainwater shed from the roofs drains to the local sewerage network.

The site has no current industrial wastewater discharges.

Water Abstraction

No evidence of surface or groundwater abstractions were identified during the Site visit.

Refrigerant Gases

The most harmful ozone-depleting substances (*e.g.* CFCs like R12) were banned in the 1990s. New equipment using less harmful HCFC refrigerants like R22 was banned in 2001 (or 2004 for small air-conditioning systems). From the end of 2009, the use of virgin HCFCs to service and maintain existing refrigeration and air-conditioning equipment (RAC) was banned in all EU Member States. Since 1st January 2010 it has been illegal to use virgin HCFCs to service RAC equipment. Only reclaimed and recycled HCFCs may be used. From 1st January 2015 it will be illegal to use any HCFCs to service RAC equipment *i.e.* recycled or reclaimed HCFC may no longer be used.

No suspected CFC or HCFC containing equipment was observed.

Polychlorinated Biphenyls (PCBs)

Any capacitor or transformer manufactured before 1976 may contain PCBs unless information is held to the contrary. It is also possible that there may be PCBs present in capacitors and transformers manufactured between 1976 and 1986. Even if the PCBs have been replaced by another liquid, significant amounts of PCBs may still be present. PCBs may occur as contaminants in the oil used in oil-filled electrical equipment[1]. Hydraulic fluids in lifts, hoists, heavy machinery from the same era are also known to contain PCBs.

No suspected PCB containing equipment was observed.

[1] http://www.hse.gov.uk/pubns/msa19.htm

Asbestos Containing Materials (ACMs)

Asbestos Containing Materials (ACMs) can be found in many parts of a building as:

- **Sprayed asbestos** – Fire protection in ducts and to structural steel work, fire breaks in ceiling voids *etc.*
- **Lagging** – Thermal insulation of pipes and boilers.
- **Asbestos insulating boards (AIB)** – Fire protection, thermal insulation, wall partitions, ducts, soffits, ceiling and wall panels.
- **Asbestos cement products, flat or corrugated sheets** – Roofing and wall cladding, gutters, rainwater pipes, water tanks.
- **Certain textured coatings** – Decorative plasters, paints.
- **Bitumen or vinyl materials** – Roofing felt, floor and ceiling tiles.

According to the Health and Safety Executive (HSE)[2] any buildings built or refurbished before the year 2000 may contain asbestos. The *Asbestos (Prohibitions) (Amendment) Regulations 1999* prohibited the import, supply and use of all asbestos containing products (except for minor exclusions).

Photograph 2.6: *Roof of single-storey store and two-storey main building*

[2] Health and Safety Executive (2012), Managing asbestos in buildings: A brief guide, INDG223(rev5), April 2012 (http://www.hse.gov.uk/pubns/indg223.pdf)

No (visible) Potential Asbestos Containing Materials (PACMs) were observed during the Site inspection. However, no asbestos survey has been undertaken on the building or the store. Given that ACMs can be hidden from sight within the structure of a building a refurbishment/demolition ACM survey should be undertaken.

2.4.1 Evidence of Uncontrolled Releases to Ground

No evidence of uncontrolled release(s) to ground was observed on the Site.

2.4.2 Evidence of Previous Intrusive Investigations

No evidence of previous intrusive investigations was observed.

2.5 Site History

Historical maps were obtained and reviewed by EAME to determine the historical development of the Site. These are presented in *Annex B.* This enabled an assessment to be made of the potential for contamination associated with former activities, both on-site and in the surrounding areas (*Table 2.2*).

Table 2.2: Site History

Date/Scale	Features On-site	Features Off-site
1865-1881 1:2,500	Buildings associated with Saville House (large residential property with extensive gardens).	North – Road beyond which is Heath House, Laurel Lodge and Grove House (large residential properties with extensive gardens). East – Buildings associated with Saville House (large residential property with extensive gardens). South – Gardens and a glasshouse (50 metres south) West – Twickenham House (large residential property with extensive gardens) with glasshouse (within 10 metres)

Table 2.2: Site History		
Date/Scale	**Features On-site**	**Features Off-site**
1896 1:2,500	Buildings and open space associated with Saville House.	North – No significant change. East – No significant change. South – No significant change. West – Twickenham House no longer shown.
1914-1915 1:2,500	Buildings and open space associated with Saville House.	North – Beyond the road is extensive terraced housing East – Glasshouse on eastern boundary. South – Glass house no longer shown. West – Clearance of glasshouses and large buildings. Residential housing with gardens is spreading north up Heath Gardens.
1934-1935 1:2,500	The Site contains two buildings and a large parcel of land (eastern part of site) with no buildings on.	North – No significant change. East – Clearance of glasshouse and other structures. Residential housing with gardens is spreading north up Saville Road. A large unnamed building is located 50 metres east. South – Residential housing with gardens is spreading north up Saville Road. West – Residential housing with gardens had spread north up Heath Gardens. The Site is now surrounded on all sides. A large unnamed building is located between 50-100 metres west.

Table 2.2: Site History		
Date/Scale	**Features On-site**	**Features Off-site**
1959-1961 1:2,500	No significant change.	North – No significant change. East – Beyond Saville Road is a large office block beyond which is a garage (within 50 metres). South – Residential housing with gardens along Saville Road. West – Residential housing with gardens along Heath Gardens. A large works is located between 50-100 metres east.
1971 1:1,250	No significant change.	North – No significant change. East – No significant change. South – No significant change. West – No significant change.
2016	No significant change.	North – No significant change. East – Beyond Saville Road is Beaumont House and a garage. South – Residential housing with gardens along Saville Road. West – Residential housing with gardens along Heath Gardens. A series of industrial units are located between 50-100 metres east (Heathlands Close).

The key stages in the development of the Site are outlined in *Figure 2.2*. The actual application Site area is outlined in *Figure 2.3*.

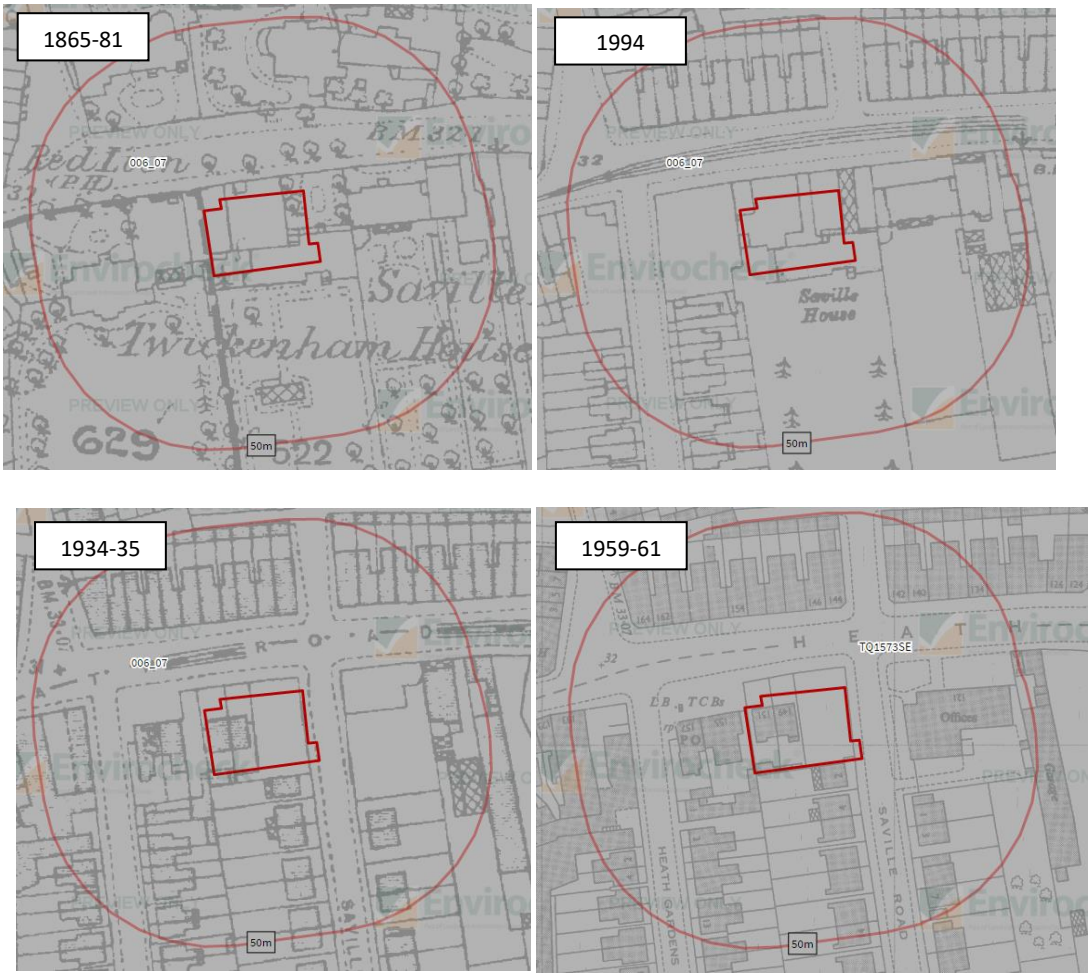

Figure 2.2: *Key stages in the Site Development (1873 – 1959/61)*

Landmark Envirocheck Report 91567167_1 Annex B

Figure 2.3: *Aerial photograph (April 2015)*

Google Earth Imaging with the permission of Google – Licensed to Earth and Marine Environmental Consultants Ltd

According to internet sources[3] Saville House was constructed *circa* 1700-1719 until it was demolished in 1913.

Figure 2.4: Saville House (1910)[3]

3 http://www.twickenham-museum.org.uk/house-details.php?houseid=128&categoryid=1

It is clear (based on the prevailing information) that the Site was primarily used for residential purposes *circa* 1700 until 1913 when Saville House was demolished. Post that date two buildings were constructed on the Site forming the current 149 - 151 Heath Road property. The addition of the store at the rear of the property was added at a later date (although the exact date is unknown). Anecdotally the Site was operated as a home furnishing business by C R Scrubby.

2.6 Regulatory Authority Information

2.6.1 Local Authority Planning Department

A web-based search of the London Borough of Richmond upon Thames planning records was undertaken on 25th July 2016. No records associate with the property were located.

2.6.2 Local Authority Environmental Health Department

Relevant information from the Local Authority is included within the Environmental Database Ref. 91567167_1 (*Annex B*).

2.6.3 Petroleum Licensing Authority

A written request for information has not been submitted to the local petroleum licensing authority as no evidence of historic or current use or storage of hydrocarbons has been identified.

2.6.4 Environment Agency

Records and information held by Environment Agency (EA) has been obtained from their website and is also contained in the Environmental Database Ref. 91567167_1 (*Annex B*).

2.7 Environmental Database

A commercial database search (provided by Landmark) was obtained to provide further information regarding the Site and the surrounding (*Ref:* Ref. 91567167_1). Relevant information and records are summarised below:

Sites Determined as Contaminated Land

The Site has not nor has any other site (within 500 metres) been determined as contaminated land under Section 78R of the *Environmental Protection Act 1990*.

Part A(1) and Part A(2) Environmental Permits

There are no former or current Part A(1) or Part A(2) environmental permits associated with the Site. The closest active environmental permit is operated by Proper Energy Limited (348 metres northwest) in relation to organic chemicals.

Part B Environmental Permits

There are no former or current Part B environmental permits associated with the Site. There are three active Part B permitted process within 500 metres *i.e.* 29 metres north (Beaucare Dry Cleaners, 390 metres east (Mel Dry Cleaners) and 494 metres east (Kings Clothes Care Specialists).

Radioactive Substances Authorisations

There are no records of Category 3 or 4 Radioactive Substance Authorisations (RSAs) relating to the Site or any other site within 500 metres.

Planning Hazardous Substance Consents and Enforcements

There no such consents or enforcements related to the Site or any other site within 500 metres. There are no records of Control of Major Accident Hazards (COMAH) and/or Notification of Installations Handling Hazardous Substances (NIHHS) on-site or associated with any other site within 500 metres.

Environment Agency Recorded Pollution Incidents

There are no EA recorded pollution incidents associated with the Site. There have been eight reported incidents within 500 metres of the Site.

EA Landfill Data (Current and Historic)

No records of any current landfills on-site or off-site within 1 km.

EA Licensed Waste Treatment, Transfer and Disposal Sites

There is no on-site licensed waste treatment, transfer and/or disposal activities. There is one off-site EA licensed waste treatment, transfer and/or disposal activities within 1 km of the Site (London Borough of Richmond Upon Thames, Central Depot, 576 metres northwest).

Petrol and Fuel Sites

There is are no Petrol Filling Station (PFS) within 500 metres of the Site.

The relevant extracts from the database are provided in *Annex B*.

2.7.1 Underground Pipelines and Transmission Assets

A search of the Linesearch before U dig database was undertaken on 15th October 2015. This database lists pipelines owned and/or operated by the following pipeline and transmission operators: AWE Pipeline, BOC Limited, BP Midstream Pipelines, BPA, Carrington Gas Pipeline, Centrica Energy, Centrica Storage Ltd, CLH Pipeline System Ltd, ConocoPhillips (UK) Ltd, Coryton Energy Co Ltd, CSP Fibre c/o Centara, EirGrid, Electricity North West Limited, E-on UK Plc, ESP Utilities Group, ESSAR, Esso Petroleum Company Limited, FibreSpeed Limited, Gamma, Humbly Grove Energy, HV Cables, IGas Energy, Ineos Enterprises Limited, Ineos Manufacturing, Lark Energy, Lightsource SPV Limited, Mainline Pipelines Limited, Manchester Jetline Limited, Marchwood Power Ltd, National Grid Gas and National Grid Electricity Transmission, Northumbrian Water Group, Npower CHP Pipelines, Oikos Storage Limited, Perenco UK Limited, Phillips 66, Premier Transmission Ltd, RWEnpower, SABIC UK Petrochemicals, Scottish Power Generation, Seabank Power Ltd, Shell Pipelines, Total, Transmission Capital, Vattenfall, Western Power Distribution, Wingas Storage UK Ltd and Zayo Group UK Ltd.

There are no reported underground or transmission assets on-site or in the immediate vicinity.

2.8 Contamination Potential

2.8.1 Site

The following potentially contaminative activities have been identified as having taken place on-site:

- **Demolition of previous residential structures** – It appears that Saville House was demolished and cleared during 1913 prior to redevelopment in the form of two brick properties and a vehicle car park (hard standing). These activities could have contributed to the presence of made ground on the Site *e.g.* coal fires would have been the principal means of heating the properties with ash disposal occurring locally.

Based upon the above information the potential for significant contamination to have arisen at the site as a result of the historic use is considered to be **LOW**. It should be borne in mind that none of the former uses involved the storage or use of significant quantities of potentially polluting materials and the site is densely developed and hard surfaced, limiting opportunities for ground contamination.

2.8.2 Surrounding Area

The following potentially contaminative activities have been identified as having taken place in the immediate surrounding area:

- **Glasshouses** – The large residential properties that dominated the area until the early 20th century typically included localised glasshouse horticulture. These activities can sometimes make use of hydrocarbons (to heat the glasshouses), the use of pesticides and sometimes the use of night soil (human excrement) as a soil improver and source of nutrients.

- **Unspecified Works** – A large unspecified works was located 50 metres west of the Site from the early 1930s until the 1990s when the site was cleared and the Heathlands Industrial Estate was created.

- **Garage** – A garage has been located (approximately 50 metres east of the Site) since the early 1930s. This is now operated by Mazda (MKG3000) in relation to car sales.

The above activities represent potential off-site sources of contamination that (if present) could potentially migrate beneath the Site; however, this would be largely governed by the underlying geological and hydrogeological conditions. As with the main Site, the likelihood of substantial volumes of polluting materials being present is low and the sites are hard surfaced limiting opportunities for spilled materials to cause soil and groundwater contamination. Based upon the above information the potential for contamination to have arisen in the immediate areas surrounding the Site is considered to be **LOW - MODERATE**.

3 Environmental Setting

3.1 Introduction

Desk-based research of the local geology, hydrogeology, hydrology and ecology was carried out in order to establish the potential for migration of contamination onto or away from the Site, and to assess the surface water and groundwater sensitivity of the surrounding area. Information was obtained from a number of sources, namely:

- inspection of the British Geological Survey (BGS) Geology of Britain Viewer[4];
- the BGS Lexicon of Named Rock Units[5];
- review of BGS held investigation borehole logs for the area[6];
- examination of the EA's on-line aquifer classification[7];
- a review of online web-based information searches.

3.2 Geology

According to the BGS Geology of Britain Viewer and BGS Geology Mapping (1:50,000, Sheet 270, South London, Bedrock and Superficial, 1998) (*Figure 3.1*) the Site is underlain by:

- **Superficial deposits** – Kempton Park Gravel Formation (Sand and Gravel). According to the BGS Lexicon of Named Rock Units the deposits consist of sand and gravel, locally with lenses of silt, clay or peat.
- **Bedrock deposits** – London Clay Formation (Clay and Silt). According to the BGS Lexicon of Named Rock Units the deposits mainly comprises 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

[4] http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html
[5] http://www.bgs.ac.uk/lexicon/
[6] http://www.bgs.ac.uk/data/boreholescans/home.html
[7] http://maps.Environment-agency.gov.uk/

other levels, thin beds of black rounded flint gravel occur in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

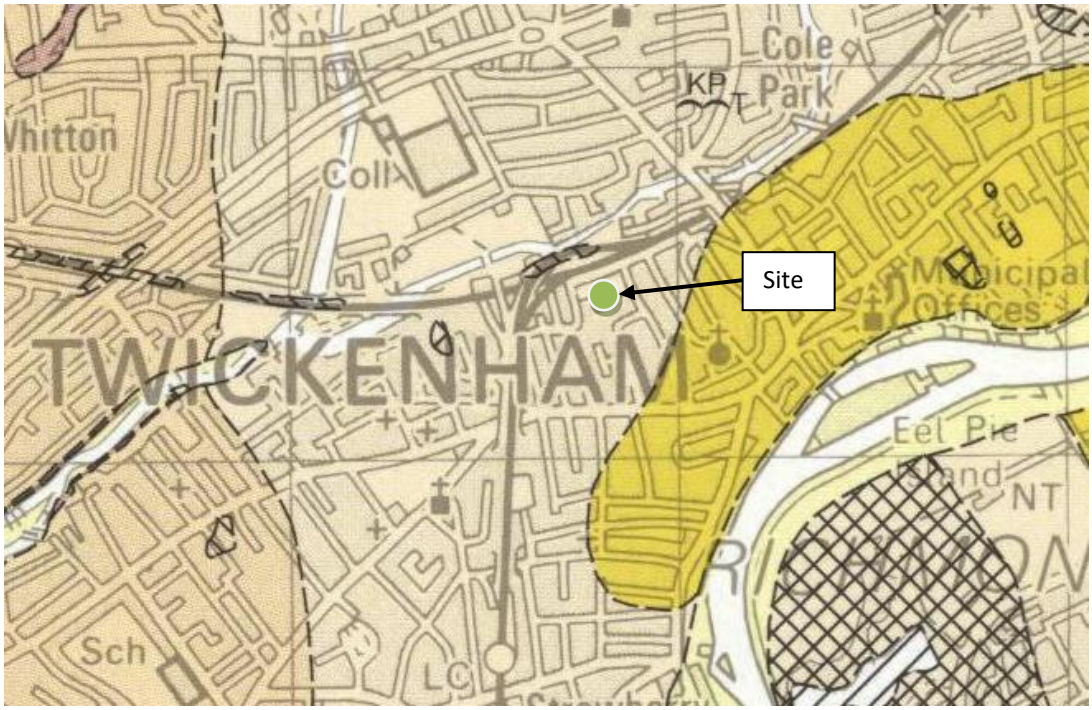

Figure 3.1: *BGS Geology, (1:50,000, Sheet 270, South London, Bedrock and Superficial, 1998)*

With reference to the on-line BGS Borehole Record Viewer, the nearest borehole log is located to the east of the Site (Ref. TQ17SE24 — 183 HEATH ROAD TEDDINGTON 515800,173100 Depth: 5.18m.). This appears, from the records, to be a shallow well dug in 1940. The geology encountered was gravel (2.6 metres) underlain by clay.

According to data issued by the Public Health England[8], the Site is located in an area where all parts of this 1-km grid square are in the lowest band of radon potential. Less than 1 % of homes above the Action Level.

3.3 Hydrogeology

The aquifer classification system was updated on 1st April 2010 which provided new aquifer designations to replace the old system of aquifer classifications, such as Major, Minor and Non-Aquifer. This new system is in line with the EA's Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) and is based on BGS mapping.

[8]http://www.ukradon.org/information/ukmaps

From a review of the EA on-line maps[9] the Site is located on:

- **Superficial deposits** – Principal Aquifer. These are layers of rock or drift deposits that have high intragranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
- **Bedrock deposits** – Unproductive strata.

The EA have defined Groundwater Source Protection Zones (SPZs) for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones are designated to protect the location from the risk of contamination from any activities that might cause pollution in the area, *i.e.* the closer the activity, the greater the risk. The maps show three main zones: an inner, an outer and the total catchment with a fourth zone of special interest, which the EA occasionally apply to a groundwater source. The third-party database and EA website indicate that the Site is not located within a SPZ.

The European WFD came into force in December 2000 and became UK law in December 2003. The EA has a duty to analyse the characteristics of the 11 River Basin Districts in England and Wales and assess the impact of human activity on the water bodies (including groundwater) within these districts. In addition, the EA are required to monitor the status of water bodies against the objectives set for them and prepare, review and keep an up to date a register of protected areas for each River Basin District whilst preparing and consulting on River Basin Management Plans. No current water quality data is available on the EA website.

According to the database, there are no groundwater abstraction licences associated with the Site or any other site within 1-km.

The EA have classified the Site has having a 'Major Aquifer Soil Class High Urban' *i.e.* soils of High Leaching Potential (U) are based on fewer observations than elsewhere. A worst case vulnerability classification is assumed, until proved otherwise.

3.4 Hydrology

For each River Basin District, the WFD requires a River Basin Management Plan to be published. These are plans that set out the environmental objectives for all the water bodies within the River Basin District and how they will be achieved. The plans are based upon a detailed analysis of the pressures on the water bodies and an assessment of their impacts. The plans must be reviewed and updated every six years. The ecological status of surface water

[9] http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

bodies is based on the following quality elements: biological quality, general chemical and physico-chemical quality, water quality with respect to specific pollutants (synthetic and non-synthetic), and hydromorphological quality. There are five classes of ecological status (*i.e.* high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a watercourse. There are no EA surface water monitoring locations within 1-km of the Site.

The closest surface water features are a loop of the River Crane (422 metres north) that flows in a northeast direction (discharging into the River Thames) and the River Thames (500 south southeast).

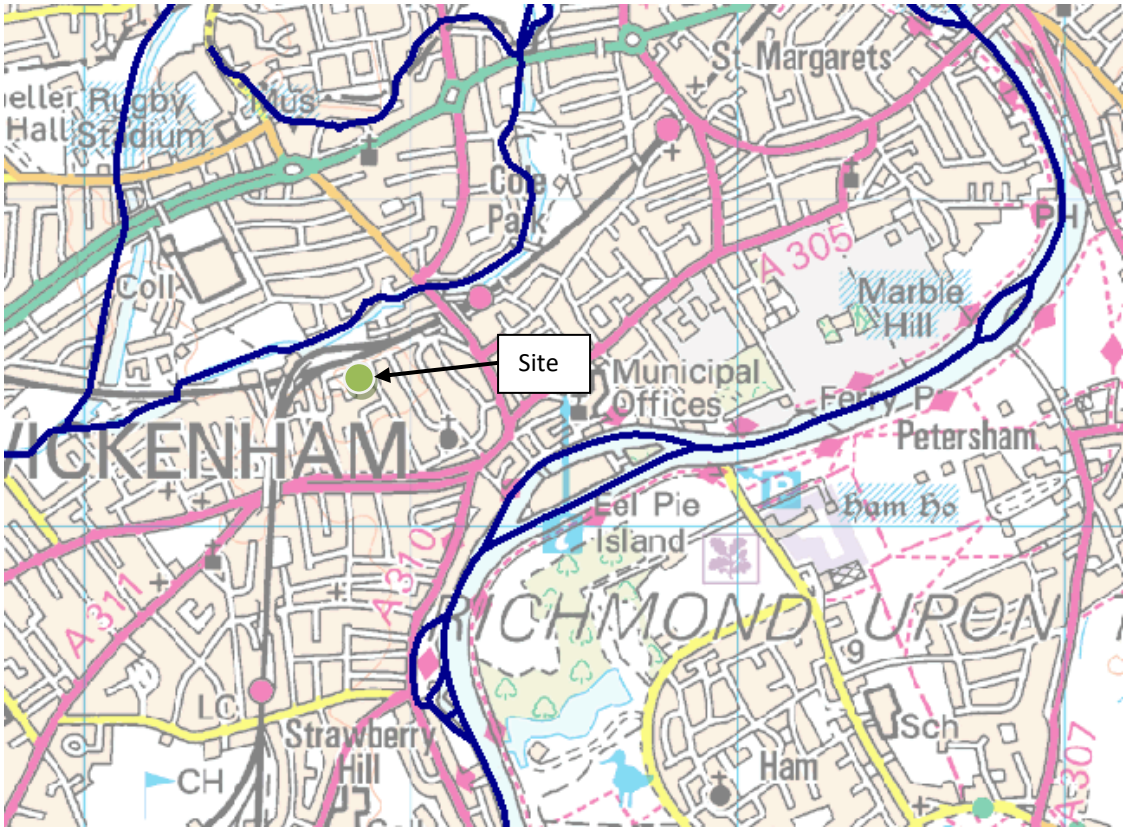

Figure 3.2: *EA identified mainline rivers*

There are no surface water abstraction licenses associated with the Site or any other site within 1-km.

According to the database, there are no Discharge Consents associated with the Site or any other site within 500 metres.

Nitrate Vulnerable Zones (NVZs) cover some 62% of England and indicate all land draining to waters that are affected by nitrate pollution. NVZs were implemented by the *Nitrate Pollution Prevention Regulations 2008*, which came into force on 1st January 2009. According to the EA website, the Site is not located in a NVZ with respect to surface water or groundwater.

3.5 Sensitive Land Uses

3.5.1 Ecological Receptors

The MAGIC website, managed by the Department for Environment, Food and Rural Affairs (Defra), was queried to locate Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar Sites, National Nature Reserves, Areas of Outstanding Natural Beauty (AONB), National Parks and Local Nature Reserves in the immediate and wider surrounds of the Site.

The only statutory designation, within 1-km, is the Ham Lands Local Nature Reserve (579 metres south east).

3.5.2 Protected Buildings

There are no listed buildings located on-site. The closest listed building (240 metres west) is a K6 Telephone Box at the Junction of the Green and Heath Road (Grade II, Reference 1254105).

3.5.3 Residential Receptors

Residential properties immediately (within 5 metres) border the Site to the south and west. Residential properties also are adjacent to the Site across Heath Road and Saville Road.

3.6 Significance of Environmental Setting

The significance of the environmental setting is considered by EAME to be as follows:

- **Groundwater [HIGH SENSITIVITY]** – The underlying Kempton Park Gravel Formation (Sand and Gravel) are classified as a Principal Aquifer. However, there are abstractions within 1-km of the Site.
- **Surface Water [MODERATE SENSITIVITY]** – There are two mainline rivers within 500 metres of the Site. However, there are no surface water abstractions within 1-km of the Site.

- **Ecological Sensitive Areas [LOW SENSITIVITY]** – With respect to sensitive land uses such as protected habitats and protected sites the Site is considered to be located in a low sensitivity setting. The only statutory designation, within 1-km, is the Ham Lands Local Nature Reserve (579 metres south east).

- **Protected Buildings and Structures [LOW SENSITIVITY]** – There are no listed buildings located on-site. The closest listed building (240 metres west) is a K6 Telephone Box at the Junction of the Green and Heath Road.

- **Residential Areas [HIGH SENSITIVITY]** – Residential properties immediately (within 5 metres) border the Site to the south and west. Residential properties also are adjacent to the Site across Heath Road and Saville Road.

4 Qualitative Risk Assessment

4.1 Introduction

Part 2A of the Environmental Protection Act 1990 ("Part 2A") provides the legislative framework for the contaminated land regime in England, Wales and Scotland. It provides for contaminated land to be identified and dealt with in a risk-based manner. The *Contaminated Land (England) Regulations 2006* (SI 2006/1380) set out provisions for procedural matters under Part 2A. The 2006 regulations have recently been modified with the introduction of *The Contaminated Land (England) (Amendment) Regulations 2012*, which came into force on 6th April 2012. This includes an amendment to Regulation 3(c) to take account of the updated definition of "controlled waters" in Section 78A(9) of the *Environmental Protection Act 1990*.

Section 78A(2) of Part 2A of the EPA 1990 defines contaminated land as "land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- pollution of controlled waters is being, or is likely to be caused".

Contaminated Land Statutory Guidance published in April 2012 provides for a new four category test which is intended to clarify when land does or does not need to be remediated, where Category 1 is deemed as being high risk and Category 4 as being low risk.

"Significant harm" is defined in the Guidance on risk based criteria and must be the result of a significant "pollutant linkage". The presence of a pollutant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. An initial assessment of pollutant linkage can be made qualitatively (*i.e.* through identifying these factors) and may be assessed using qualitative risk assessment models.

A conceptual model is an essential element of any site-specific environmental risk assessment. In this context, they are often simple representations of the hypothesised relationships between sources, pathways and receptors. For the purpose of this report, a basic conceptual model has been developed based on the principles of CLR11 and interpretation of information gathered during the Phase I review. Thus, this allows the identification of potential pollutant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the Site. Based on this interpretation, the

implications for potential liability associated with soil or water contamination at the Site can be evaluated.

4.2 Conceptual Site Model

The soil and groundwater conditions on the site, as identified through the Phase I assessment, have been summarised into a Conceptual Site Model (CSM), which defines the key sources, pathways and receptors that have been identified as being relevant to this site. The CSM concludes with potential pollutant linkages for the site given the current setting:

- **SOURCES** – the identification of contaminants within the soils and groundwater that represent potential pollution sources;
- **PATHWAYS** – the identification of the potential exposure mechanisms and migration pathways from the potential sources; and
- **RECEPTORS** – the identification of the potential receptors that could be sensitive to harm if exposed to these pollution sources.

Collectively, each of these scenarios would be considered a potential pollutant linkage that may require further assessment.

It is understood that this report is required to support a planning application to redevelop the Site to include the *'demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only i.e. no gardens are proposed'.*

Changes to the above proposals will invalidate the following risk assessment (*i.e.* a more sensitive land use has not been considered). A preliminary conceptual model is presented below in accordance with the guidance outlined within CLR11.

4.2.1 Identification of Potential Sources

Based on the information from the desk study, historical maps and published information, a summary of potential contaminant sources is provided below. These have been divided into sources resulting from current and historic uses both on and off-site.

- **(A) Demolition of previous residential structures (Category: Historic – On-site/Off-site)**
- **(B) Glasshouses (Category: Historic – Off-site)**

- **(C) Unspecified Works (Category: Historic/Current – Off-site)**
- **(C) Garage (Category: Historic/Current – Off-site)**

4.2.2 Identification of Potential Exposure Pathways

Exposure pathways are the potential routes and mechanisms by which potential on-site sources could be linked to the identified potential receptors and thereby expose them to potential harm. **Only plausible pathways need be considered**. The following potential exposure pathways have been identified at the site (note these do not assume a source is actually present):

- inhalation (*i.e.* dust and vapours);
- dermal contact (*i.e.* direct contact with contaminated materials);
- ingestion of contaminated ground;
- direct contact with buildings and services;
- vertical/horizontal migration of contaminants (within the soil/groundwater); and
- vertical/horizontal migration of ground gases.

4.2.3 Potential Receptors

Based on the site's environmental setting and the proposed future end use of the Site, the following potential receptors have been identified:

- groundwater (*i.e.* Principal Aquifer);
- construction workers;
- on-site buildings and services;
- surface water;
- future site users;
- off-site local residents and general public; and
- third-party land (*i.e.* the possibility of contamination migrating off-site onto third party land via contaminated groundwater, surface water run-off *etc.*).

4.2.4 Potential Pollutant Linkages

In order for there to be a plausible pollutant linkage there must be a source, receptor and pathway and a feasible linkage between them (a so called pollutant linkage). Consequently, even where a contaminant is identified, if there is no pathway for the contamination to reach a receptor, or no receptor then there can be no significant risk and remedial actions are not required. Furthermore, even if there is a complete pollutant linkage, it is possible that the contaminant concentration that can pass along the linkage does not represent a significant risk to human health or the environment. Central to this risk assessment process is the development of a 'conceptual model'. This is a descriptive and/or pictorial representation of the area of potential contamination, the surrounding environment and the processes acting on the contaminants by which they can move and come into contact with receptors (*e.g.* by leaching and migration into groundwater).

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, in order to assess risk both the likelihood and the consequences of an event must be taken into account. This report adopts the methodology for risk evaluation presented in the guidance document CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice (Rudland, Lancefield, & Mayell, 2001).

The method is qualitative and involves the classification of the magnitude of the potential severity or consequence of the risk occurring (*Table 4.1*).

Table 4.1: Classification of Consequence

Consequence	Definition
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the *Environment Protection Act 1990*, Part IIA. Short term risk of (significant) pollution of sensitive water resource. Catastrophic damage to building/property. A short term risk to a particular ecosystem, or organism forming part of such ecosystem.
Medium	Chronic damage to human health (significant harm). Pollution of sensitive water resources. A significant change in a particular ecosystem, or an organism forming part of such an ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.

Table 4.1: Classification of Consequence	
Consequence	**Definition**
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing *etc.*). Easily repairable effects of damage to buildings, structures and services.

The magnitude of the likelihood or probability of the risk occurring is estimated using *Table 4.2*.

Table 4.2: Classification of Probability	
Likelihood	**Definition**
High	There is a pollution linkage and an event that 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.
Likely	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that 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.
Low	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place and is even less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned using *Table 4.3*.

Table 4.3: Risk assessment matrix					
		Consequence			
		Severe	Medium	Mild	Minor
Likelihood of Occurrence	High	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

The description of the classified risks and likely actions required, in accordance with CIRIA C552, are:

- VERY HIGH RISK – There is a high probability that severe harm could arise to a designated receptor from an identified hazard OR, there is evidence that sever harm to a designated receptor is currently happening. This risk (if realised) is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.

- HIGH RISK – Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.

- MODERATE RISK – It is possible that harm could arise to a designated receptor from an identified hazard. However, if it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.

- LOW RISK – It is possible that harm could arise to a designated receptor from n identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

- VERY LOW RISK – There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

EAME has devised a conceptual model based on the information obtained to date through the desk-based study and the proposed end use of the Site. This is detailed in tabular format in *Table 4.4* and pictorially in *Annex A, Figure 3.*

The proposed Site layout (ground floor) is outlined in *Figure 4.1*.

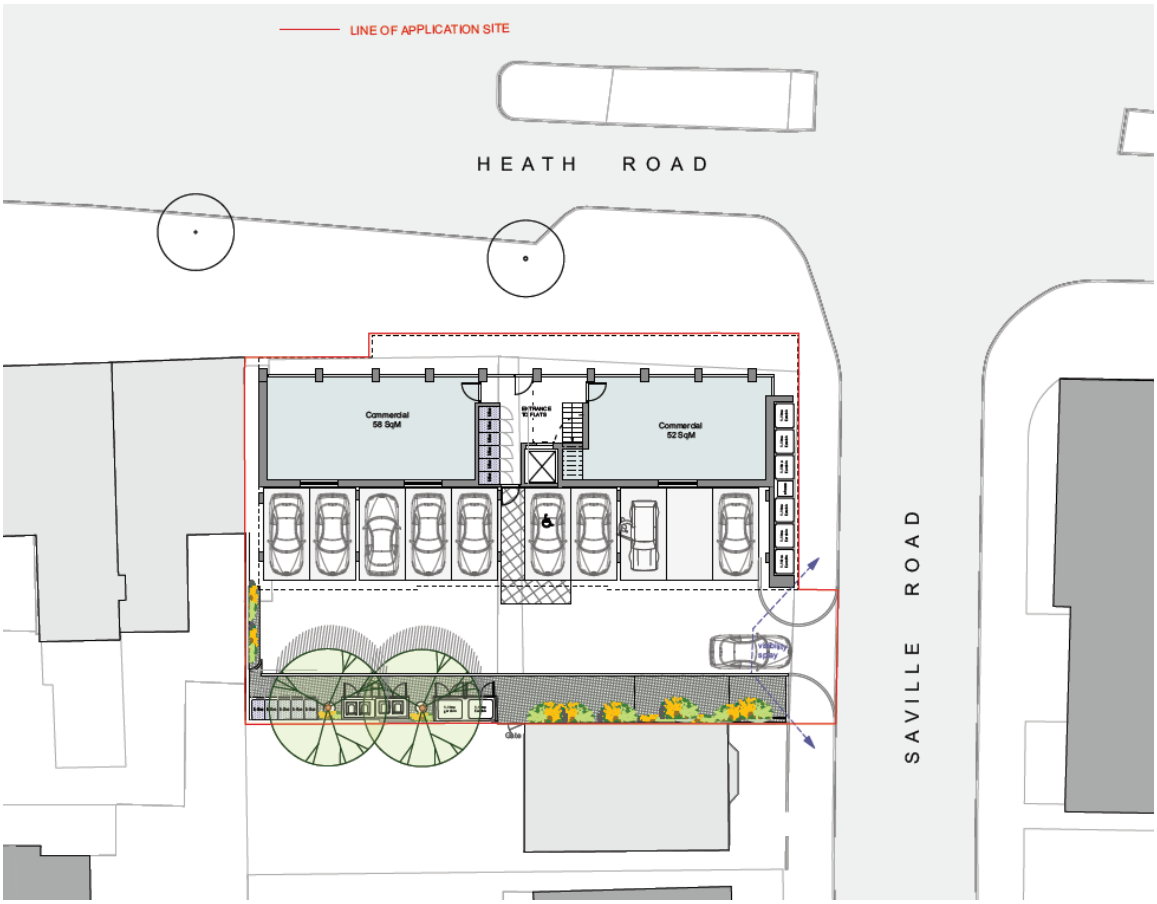

Figure 4.1: *Proposed ground floor Site layout*

Chassey Studio, 149-151 Heath Road, Twickenham, TW1 4BN, project No. 1517, Scale 1:200, DRWG No. 1517-21, Version 10

It is important to remember that the stated risk assessment only remains valid if the current proposals (*Figure 4.1*) are implemented.

Table 4.4: Conceptual Site Model		
Source		
(A) Demolition of previous residential structures (Category: Historic – On-site/Off-site) (B) Glasshouses (Category: Historic – Off-site) (C) Unspecified Works (Category: Historic/Current – Off-site) (C) Garage (Category: Historic/Current – Off-site)		
Pathway	**Receptor**	**Potential Pollutant Linkage & Significance**
Ingestion Inhalation Dermal contact	**HHR01 Human Health** Current Site users	**Likelihood [LOW] x Severity [MINOR] = VERY LOW** The Site is currently used as a car park whilst the main buildings are currently not in use although have been occupied by trespassers. The entire Site is hardstanding. There are no identified previous contaminative activities (sources) that could have significantly impacted the Site. As a result, there are no pollution linkages.
Ingestion Inhalation Dermal contact	**HHR02 Human Health** Future construction workers	**Likelihood [LOW] x Severity [MINOR] = VERY LOW** The redevelopment of the Site will involve ground disturbance of the shallow Made Ground. Where activities involve ground disturbance normal operational hygiene requirements and procedures will be applied. These would be sufficient to break any potential pollution linkages with the below ground materials (if indeed they are present).
Ingestion Inhalation Dermal contact	**HHR03 Human Health** Future Site users	**Likelihood [LOW] x Severity [MINOR] = VERY LOW** The proposed development will involve the demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only *i.e.* no gardens are proposed. The design would be sufficient to break any potential pollution linkages with the below ground materials (if indeed they are present).

Table 4.4: Conceptual Site Model		
Source		
(A) Demolition of previous residential structures (Category: Historic – On-site/Off-site) (B) Glasshouses (Category: Historic – Off-site) (C) Unspecified Works (Category: Historic/Current – Off-site) (C) Garage (Category: Historic/Current – Off-site)		
Pathway	**Receptor**	**Potential Pollutant Linkage & Significance**
Inhalation Dermal contact	**HHR04 Human Health** General public (off-site)	**Likelihood [LOW] x Severity [MINOR] = VERY LOW** The Site would not be accessible to the general public during the redevelopment phase. As the Site is not accessible the principal exposure mechanism would be via Site derived dust emissions. Dust control measures would be employed as part of the normal development controls and would be detailed within the Construction Environmental Management Plan (CEMP). Once the development is completed any potential pollution linkage would be broken.
Migration from impacted soils to groundwater	**CWR01 Controlled Waters** Groundwater	**Likelihood [LOW] x Severity [MINOR] = VERY LOW** Whilst the superficial deposits are classified as Principal Aquifer the underlying bedrock (Clay) is Unproductive strata. According to the environmental database, there are no groundwater abstraction licences associated with the Site or any other site within 1-km. There are no identified previous contaminative activities (sources) that could have significantly impacted the Site soils and hence (potentially) the shallow groundwater. As a result, there are no pollution linkages.

Table 4.4: Conceptual Site Model		
Source		
(A) Demolition of previous residential structures (Category: Historic – On-site/Off-site) (B) Glasshouses (Category: Historic – Off-site) (C) Unspecified Works (Category: Historic/Current – Off-site) (C) Garage (Category: Historic/Current – Off-site)		
Pathway	**Receptor**	**Potential Pollutant Linkage & Significance**
Groundwater flow to surface water bodies Direct run-off	**CWR02 - Controlled Water** Surface water	**Likelihood [LOW] x Severity [MILD] = VERY LOW** The closest surface water features are a loop of the River Crane (422 metres north) that flows in a northeast direction (discharging into the River Thames) and the River Thames (500 south southeast). There are no identified previous contaminative activities (sources) that could have significantly impacted the Site soils and hence (potentially) the shallow groundwater. As a result, there are no pollution linkages. Spillage and surface water run-off control measures would be employed as part of the normal development controls and would be detailed within the Construction Environmental Management Plan (CEMP).
Migration of land gas through soils	**BER01 - Built Environment** On-site buildings, services and structures	**Likelihood [LOW] x Severity [MILD] = VERY LOW** The proposed development will involve the demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only *i.e.* no gardens are proposed. Shallow Made Ground is likely to be disturbed/removed as part of the development. There is no evidence to suggest either on-site or off-site (within 250 metres) historic infilling.

Table 4.4: Conceptual Site Model		
Source		
(A) Demolition of previous residential structures (Category: Historic – On-site/Off-site) (B) Glasshouses (Category: Historic – Off-site) (C) Unspecified Works (Category: Historic/Current – Off-site) (C) Garage (Category: Historic/Current – Off-site)		
Pathway	**Receptor**	**Potential Pollutant Linkage & Significance**
Note: Direct contact of contaminants with building materials has not been assessed as this is determined as a geotechnical issue (*i.e.* outside scope of this environmental assessment). Potential for invasive species such as Giant Hogweed (*Heracleum mantegazzianum*), Himalayan Balsam (*Impatiens glandulifera*) and Japanese Knotweed (*Fallopia japonica*) has not been assessed as this is outside the scope of this environmental assessment. However, the National Biodiversity Network (NBN) Gateway reports none of the above species on-site or within 500 metres of the Site.		

5 Conclusions and Recommendations

5.1 Conclusions

The environmental assessment for this project centred on the likelihood of contamination being present either in the ground or groundwater on the Site and there being an exposure pathway to receptors such that there is the significant probability of significant harm occurring (SPOSH). Where such conditions exist then there is a need to mitigate that situation (*i.e.* break the pollutant linkage).

It is clear (based on the prevailing information) that the Site was primarily used for residential purposes *circa* 1700 until 1913 when Saville House was demolished. Post that date two buildings were constructed on the Site forming the current 149 - 151 Heath Road property. The addition of the store at the rear of the property was added at a later date (although the exact date is unknown). Anecdotally the Site was operated as a home furnishing business by C R Scrubby.

The significance of the environmental setting is considered by EAME to be as follows:

- **Groundwater [HIGH SENSITIVITY]** – The underlying Kempton Park Gravel Formation (Sand and Gravel) are classified as a Principal Aquifer. However, there are abstractions within 1-km of the Site.
- **Surface Water [MODERATE SENSITIVITY]** – There are two mainline rivers within 500 metres of the Site. However, there are no surface water abstractions within 1-km of the Site.
- **Ecological Sensitive Areas [LOW SENSITIVITY]** – With respect to sensitive land uses such as protected habitats and protected sites the Site is considered to be located in a low sensitivity setting. The only statutory designation, within 1-km, is the Ham Lands Local Nature Reserve (579 metres south east).
- **Protected Buildings and Structures [LOW SENSITIVITY]** – There are no listed buildings located on-site. The closest listed building (240 metres west) is a K6 Telephone Box at the Junction of the Green and Heath Road.
- **Residential Areas [HIGH SENSITIVITY]** – Residential properties immediately (within 5 metres) border the Site to the south and west. Residential properties also are adjacent to the Site across Heath Road and Saville Road.

The current planning proposal relates to the *'demolition of 149 – 151 Heath Road and the subsequent redevelopment of the ground floor as two commercial premises (with ten residential car parking spaces) and 10 residential flats spread over a further three floors. The design includes limited landscaping only i.e. no gardens are proposed'.*

Although minor areas of Made Ground and potential contamination maybe encountered during the proposed Site redevelopment there is no evidence to suggest that the Site is significantly contaminated (based on the available information). It appears that Saville House was demolished and cleared during 1913 prior to redevelopment in the form of two brick properties and a vehicle car park (hard standing). These activities could have contributed to the presence of Made Ground on the Site *e.g.* coal fires would have been the principal means of heating the properties with ash disposal occurring locally. The contamination risk is therefore **LOW**.

5.2 Recommendations

Recommendations for further works (as a minimum) include:

- Due to the age of the structure a refurbishment/demolition asbestos survey should be undertaken prior to demolition/site clearance.

References

Environment Agency. (2004). *Model Procedures for the Management of Land Contamination: Contaminated Land Report 11.* Environment Agency.

Rudland, D. J., Lancefield, R. M., & Mayell, P. N. (2001). *CIRIA C552: Contaminated Land Risk Assessment - A Guide to Good Practice.* CIRIA.

Annex A: Figures

Annex B: Historical Maps and Environmental Database

Annex C: Borehole Log