Phase I Desk Study, Site Reconnaissance & Phase II Site Investigation Report

at Sharpe's Recycle Oil Ltd,
Arlington Road,
Twickenham, TW1 2BB

for Sharpe's Recycle Oil Ltd

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EXECUTIVE SUMMARY

Issue 2 of this report comprises an update to a desk study and intrusive site investigation first undertaken in 2014/15. Design drawings for the proposed combined commercial (office) and residential redevelopment are now available. A second site walkover was undertaken and the report has been reviewed, modified and updated in light of any changes which have occurred in the interim period and in line with the current redevelopment proposals.

The site primarily comprises an oil recycling centre, with several assorted light industries in tenanted units, located in St. Margaret's, Twickenham, Middlesex. The site is bound to the west by a railway line, to the south and east by film studios and by flats to the north.

The site has been known as Arlington Works since circa 1935. Historic mapping from 1973 shows the site layout to be broadly consistent with current day. The site consists of a bunded, above ground tank farm and water treatment plant in the north east, a row of corrugated light industrial units in the east and a Victorian mews, housing additional light industrial units, in the southern half.

The site investigation comprised the drilling of five windowless boreholes to 3m to 4m bgl and three shell and auger holes to 10m to 20m bgl. Groundwater monitoring wells were installed in each of the shell and auger holes and one of the windowless sample holes.

The site is underlain by a thin mantle of Made Ground, over Kempton Park Gravel to between 5.9m and 7.95m below ground level (bgl). The underlying bedrock comprises London Clay and was encountered to the base of the boreholes. Groundwater was struck across the site and rests at between 2.7m and 3.3m bgl, within the Kempton Park Gravel.

Soil and groundwater samples were recovered and sent for laboratory analysis for geo-environmental and geotechnical parameters. Soil and groundwater data were used to complete a Tier 1 environmental assessment and to provide outline geotechnical design information.

The Tier 1 risk assessment has been completed on the basis of a future combined residential and office/commercial development. The assessment has identified that the Made Ground is contaminated with lead. Hotspots of asbestos, petroleum hydrocarbons and polyaromatic hydrocarbons have also been recorded. Groundwater is also impacted by petroleum hydrocarbons and Volatile Organic Compounds (VOCs) at levels above the Generic Assessment Criteria. However, the exceedances are generally marginal and no evidence of non-aqueous phase liquids was noted.

The geotechnical information has identified that the underlying London Clay is of high volume change potential. The design sulphate class is DS-3 and, assuming mobile

groundwater, the ACEC class is AC-3. The expected bearing capacity for the Kempton Park gravel is 100kPa, which would be sufficient for low-rise residential development. However, given the presence of loose materials at shallow depth, the presence of groundwater and the potential requirement for the excavation of below ground structures and contaminated soils, an allowance should be made for piled foundations.

Recommendations are provided for further intrusive site investigation. Following these works, a remediation method statement is likely to be required as part of the planning / re-development process.

Signed:	 Paul Adams BSc PhD MIEnvSc CSci
Countersigned:	 Tim Thorpe MSci FGS ARSM
Date:	18 June 2018
Revision:	Issue 2 – 2018 update

A INTRODUCTION

1 Authority

Leap Environmental Ltd (hereinafter referred to as LEAP) has been appointed by Sharpe's Recycle Oil Ltd (hereinafter referred to as 'the Client') to undertake a Phase I Desk Study and Phase II intrusive Site Investigation of a site referred to as Sharpe's Recycle Oil Ltd on Arlington Road in Twickenham. The original instruction was given in an email dated 2nd December 2014 and the instruction to update the report for a change to the proposed redevelopment was given on 9th May 2018. Both were signed by Dawn Roads on behalf of the Client.

2 Objective

LEAP understands that the site is currently owned by the Client and it is proposed to redevelop the site with 8 units providing 656m^2 of office / commercial space over 2 floors and 23 one to three bedroom residential units providing a total of 1,639m^2 of living space. The residential accommodation will comprise 2 buildings; the main building over 4 floors containing 20 units and a second, smaller block over 2 floors containing 4 units. The redevelopment will include car and cycle parking and soft landscaping as per the attached layout drawings in Appendix B.

The objectives of this report are to:

- Provide information on the geotechnical and environmental quality of the ground present on the site;
- Assess the potential health and other environmental risks posed by the site to the proposed development and other specifically identified receptors; and
- Assess the potential for offsite contamination to adversely affect the proposed development.

3 Previous Studies

LEAP has not been provided with any previous third party site investigation reports for the site. LEAP was provided with the Pollution Prevention and Control (PPC) application documentation for reference, which included details of the oil recycling processes and how the site is operated.

4 Scope of Works

This report describes a two-stage process whereby the site is investigated and risks assessed. The terms geotechnical and geoenvironmental are referred to throughout the report.

Geoenvironmental refers principally to the chemical nature of the ground and the degree of soil, water and/or land gas contamination and the impact that contamination may have on current or future development and also on the wider environment.

Geotechnical refers to all other aspects of the ground conditions and the impact they may have on the physical construction of existing or future development, principally foundations, slope stability, drainage, pavement and road design and groundwater control.

The investigation comprises two phases of work.

4.1 Phase 1 Scope

The first part of this report presents the results of a desk study and site reconnaissance. It provides a review of previous site investigation and remediation validation reports where they have been made available by the Client. The following sources of information have been reviewed also:

- Envirocheck database report;
- Envirocheck historical map search;
- Unexploded WWII aerial delivered bomb (UXB) regional risk maps produced by Zetica;
- Interrogation of the Environment Agency Web site on 18th December 2014;
- Interrogation of the World Wide Web on 18th December 2014 for general information pertaining to the site history; and
- Interrogation of planning records for the local area.

A site reconnaissance was carried out on 4th December 2014 and a re-visit made on 11th May 2018 as part of the report update. Current users of the site were interviewed and additional information was provided by the managing director, Dawn Roads.

The desk study and site reconnaissance have been used to develop an initial conceptual site model, which has been used to develop a strategy for an intrusive investigation. The initial site conceptual model is used to identify geotechnical and geoenvironmental hazards and the qualitative degree of risk associated with them. In terms of the geoenvironmental assessment, the conceptual site model is used to identify potential sources of contamination,

potential receptors and pathways by which the two may be connected. These are known as possible pollutant linkages and it is these pollutant linkages that are key to contaminated land risk assessment.

The Phase I investigation is also referred to as a Preliminary Investigation[1] .

4.2 Intrusive Investigation Scope

The Phase II work comprises intrusive investigation, onsite monitoring and laboratory analysis. The results of this are used to validate and/or update the initial site conceptual model. The scope of work included the following tasks:

- 3 No. 10m and 20m deep shell and auger boreholes, each with a combined gas/groundwater monitoring wells installed to 10m below ground level (bgl);
- 5 No. windowless boreholes drilled with a tracked rig;
- Geotechnical laboratory testing including: atterberg limit tests, particle size distribution tests and triaxial compression tests;
- Chemical laboratory testing of soils, including: LEAP standard soil suite tests, speciated petroleum hydrocarbon tests and tests for volatile and semi-volatile organic compounds.
- One groundwater monitoring visit, with groundwater chemical analyses to include metals, sulphate, phenol, boron, cyanide, sulphide speciated petroleum hydrocarbons (TPH CWG), polycyclic aromatic hydrocarbons (PAHs), volatile and semi-volatile organic compounds (VOCs and SVOCs);

The chemical laboratory testing has been carried out by Exova Ltd at its laboratories in Glasgow.

Selected samples of the soils have been classified by laboratory analysis for geotechnical design purposes. The laboratory testing has been carried out by Geolabs Ltd at its laboratories in Watford.

The final stage in the geoenvironmental assessment comprises a site-specific risk assessment and interpretation of the results. Preliminary recommendations for remediation have been provided based on various development assumptions which are detailed in the following section and in the text of this report. The risk assessment has been carried out in

[1] BS 10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice.

accordance with UK industry standards and in particular in accordance with CLR11[2] and BS10175:2011.

The final stage of the geotechnical assessment is the provision of preliminary soil parameters for use in geotechnical design and broad recommendations for appropriate foundation options. It is intended that the geotechnical assessment will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7[3].

5 Limitations

This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk.

Full details of the limitations are provided in Appendix A.

[2] Environment Agency, 2004. Model Procedures for the management of land contamination. Contaminated Land Report 11.

[3] Eurocode 7 (BS EN 1997-2:2007)

B PHASE I – DESK STUDY

6 Environmental Setting

6.1 Site Location and Description

The site is located in St Margaret's, between Twickenham to the southwest and Richmond to the northeast in southwest London. The site access road leads off Arlington Road to the east of the site. The site is bound by a railway line to the northwest, a film studio to the south and east and residential block of flats and associated parking and garages to the northeast. A car park used by the film studios is also included within the site area.

The approximate National Grid Reference of the site is TQ 169 743. The site area is approximately 3000m^2.

The site comprises a concrete access road with parking leading to an oil recycling treatment facility and a collection of buildings used for various industrial purposes, including a blacksmith's, other metal works and car body repairs. The buildings comprise two adjacent two storey Victorian coach houses and a small, brick-built toilet block in the southern part of the site and a row of corrugated iron sheds in the east of the site. A bunded above ground tank farm and water treatment system is present in the north western part of the site. This tank farm comprises approximately 20 tanks containing various oil/ water mixes. Further bunded and unbunded tanks were noted onsite along with three main areas of oil drum/ waste storage.

There is a telephone mast and associated electrical cabinets present in the southwest corner of site. The site also encompasses car parking in the southeast which is used by the neighbouring TW1 Film Studios.

The vast majority of the site is hardstanding; reinforced concrete in the north of site, around the tank farm; cobble stones between the two Victorian coach houses; poor quality concrete/ some gravel in the far south of site and blacktop in the film studios car park area.

The site has combined surface water and sewerage drains running from the far south of the site and the toilet block, through the centre of the main thoroughfare to the northern end of the tank farm and then along the driveway to Arlington Road. The drains adjacent to the tank farm are serviced by a sump pump which pumps liquids through the water treatment system. Treated water is then discharged to sewer.

The site topography is broadly level and the site has an elevation of approximately 5m Above Ordnance Datum (AOD). The hardstanding surrounding the tank farm slopes towards the bund ensuring that surface water flows into the drainage system.

6.2 Geology

The geology of the site has been ascertained by reference to the 1:50,000 British Geological Survey (BGS) sheet E270, solid and drift edition. The site is mapped as being underlain by Kempton Park Gravel over London Clay bedrock.

The nearest BGS borehole to the site is positioned at the end of the access road in Arlington Road. According to BGS borehole records it was drilled in February 1970 and encountered sand and gravel to 9.1m (logged as 30ft) over London Clay.

6.2.1 Kempton Park Gravel

Kempton Park Gravels are part of the former Flood Plain Gravel, which is the youngest of the three River Terrace Gravels that were laid down by the River Thames. The River Terrace Deposits consist of variable proportions of sand and gravel. They were deposited in a braided river system, an estimated 5km wide. Gravel dominated beds, generally less than 2m thick are cut through by broad shallow channels which are in-filled with tabular cross bedded gravelly sand in upward fining sequences. There are also impersistent beds of clayey and silty fine sand which are generally less than 1m thick.

6.2.2 London Clay Formation

The London Clay Formation is found extensively throughout the London Basin. The Formation mostly comprises thoroughly bioturbated, slightly calcareous silty clay to very silty clay. Beds of clayey silt and silty fine grained sand are found increasingly towards the west of its subcrop, near Reading.

At outcrop, the London Clay Formation is weathered to brown and may contain secondary carbonate nodules. This weathered or oxidized zone varies from about 3m to 6m in depth and may be less than 1m thick where the clay is overlain by superficial deposits. Below this it is generally blue grey in colour and fissured. The top few metres of unweathered clay and bottom of the weathered zone often contain gypsum crystals a source of sulphates.

London Clay is generally quite plastic and its volume change potential varies from medium to very high depending on the clay content

6.3 Radon

According to the Envirocheck database search the site is not within a radon affected area. No special protective measures are required in the construction of buildings on this site, in respect of radon gas.

6.4 Hydrogeology

The hydrogeology of the site has been ascertained from the Envirocheck data report. The source of the data is reported to be the Environment Agency Groundwater Vulnerability mapping.

The soils which directly underlie the site are classified as a principal aquifer. This aquifer is designated as a major aquifer of high vulnerability, it is highly permeable and leachable and located in an urban environment. This designation pertains to the Kempton Park Gravel. The underlying London Clay is classified by the Environment Agency as unproductive strata.

The site is not within a groundwater Source Protection Zone (SPZ). There is one water abstraction point within 500m of the site. It is situated approximately 240m northwest of the site, within the grounds of St Margaret's recreation grounds, and is used for feeding a decorative lake and pond. It is postulated that the groundwater flows in the Terrace Gravels would be dominated by the River Thames to the northeast, and to a lesser extent by the River Crane to the west, and their convergence to the north.

6.5 Surface Water Resources

The decorative pond/lake in the park 261m to the north west of site is also the nearest surface water feature. There is no surface water within the site or adjoining the site boundary.

The River Thames is approximately 425m to the northeast of the site at the closest point. However, the closest surface water for which the Environment Agency have surface water quality data is the River Crane, located approximately 445m west of the site, which has been awarded a river quality grade C. The Rivers Thames and Crane meet just over 1km north of the site.

According to the Environment Agency website, the site is adjacent to areas classed as at risk from extreme flooding from rivers, but benefitting from flood defences. The site itself is however, located in flood zone 1 (low risk of flooding).

6.6 Ecology

There are no areas of sensitive land use listed on the Envirocheck report within 1km of the subject site.

7 Site Usage

7.1 Current Land Use

The current site layout is shown in Figure 1, Appendix B.

The main site use is as an oil recycling depot, which occupies the northern part of the site. A row of corrugated sheds runs northeast-southwest in the eastern part of the site and houses several small light industrial uses, such as metal working. The Victorian mews buildings in the southern part of the site house further light industrial uses, including a small car

bodyshop, a blacksmith's and a furniture repair shop. The oil recycling office is located within these buildings over two floors.

The tank farm used in the oil recycling process is straight ahead, with a long corrugated iron shed opposite and round the corner. A waste storage area is located near the site entrance, in the north of site. To the north of the coach houses is an oil drum storage area.

In the southwestern corner of site, at the southern end of the cobbled lane, is a mobile phone mast and a toilet block. The far end of the corrugated shed is reached by passing round the southern end of the eastern Victorian mews buildings. This area of the site is surfaced in poor quality concrete, with a gravel section in the southeast. There are two small internally bunded plastic tanks, and drums stored in this area, along with a disused tanker. There is pedestrian access to the studio's car park from this part of the site.

The section of car park contained within the subject site boundary is triangular and located between buildings. The car park has blacktop surfacing and marked out bays.

7.2 Information Provided by Client into Oil Recycling Processes

The Client provided some details on the additional raw materials used in the processing of the waste oil mixtures. The details provided to LEAP are given in the table below:

Table 1: Raw materials currently / previously used in oil processing

Raw material	Nature of Chemical	Name of product	Manufacturer	Nature of Use and Destination	Volumes Used per Year (l)
Masking Agent	Fragrance oils (e.g. lavender and citrus oils)	Deodorant NA 242 (L) 64 Citrus Bouquet	Fragrance Oils Ltd	Used on rags and sprayed onto the concrete	10
Hydrogen Sulphide removing additive	Bleach	VPHS*	IBS Viridian Ltd	Added to water which then discharges into sewer	500
		MPOX 50*	MuSol Ltd		
		Sodium chlorite solution (25%)	-		
De-emulsifiers		101 and 303	Ebco Research	To separate oil and water. Oil with the additive is sold on, water discharged to sewer	1000
Water Conditioners		Polyaluminium chloride PAC∞	Not stated	As above	~300
		Flowpam∞		Polymer / flocculant	<10

*used in 2014/15 but no longer in 2018. ∞used in 2018.

The waste oil recycling plant operates for the bulking up and treatment of waste oils. Oil / water mixtures are pumped between various tanks and separated through a combination of heating, chemical addition and gravitational settlement. The resulting oil product is collected by tanker and sold on as fuel oil. The separated water is treated and discharged to the sewer.

According to the manufacturers safety data sheets (http://www.ebcoresearch.com/index.php/technical-information) the demulsifier '101' comprises a mixture of hydrocarbons, specifically aromatic hydrocarbons C10-13 and naphthalene, and surfactants. The chemical contents of demulsified '303' are not listed.

7.3 Evidence of Onsite Contamination

A walkover survey was originally carried out on 4th December 2014.

The main sources of contamination on the site are those related to the storage of oil. All known oil storage onsite is above ground. The main tank farm facility is the most significant potential source; this is partly mitigated by the tanks present being contained within a substantial bunded area. However, it is not known if the bund has always been present during the site's history.

Tankers regularly enter the site to unload waste oil and water mixes for treatment. This process is a significant potential source of contamination due to the potential for spillages. However, it is noted that the tanker loading/unloading area is surfaced with reinforced concrete that was in good condition at the time of the visit and an engineered drainage system is in place. It was reported by site operatives that the concrete covering was relatively new, replacing poorer quality concrete that was present previously. When the tank facility was first operational there was reportedly no hardstanding, indicating that the risk of historic releases to ground is high.

Anecdotal evidence of a previous second area of tanks (in the location of the current telephone mast) was provided onsite by the managing director. She stated that historically a second area of four tanks was present at the southern end of the Victorian coach houses and that an underground pipe connected this with the existing tank farm. She also indicated that circa 20-30 years ago this underground pipe had suffered a leak, and a contamination incident had occurred. It is understood that the tanks has been removed to facilitate installation of the phone mast. The fate of the pipeline is unknown.

Across the site there are various areas of stacked drums/ disused tanks and one old disused tanker truck in the south. It can be assumed that over the course of the history of the site, storage of emptied drums and tanks has been similar, and ad-hoc; and it is known that concrete surfacing has not always been present. As such, the entire site is considered at risk of low level contamination into near surface soils from residue associated with waste storage of this nature.

During the site walkover anecdotal evidence was provided of a boiler room at the northern end of the eastern coach house. It was suggested that historically boiler ash may have been dumped in this part of the site.

Revisit 11th May 2018

LEAP conducted a brief interview and site walkover with the client concluding the following:

No significant changes have occurred to the layout or processes occurring at the site since the time of the previous desk study and intrusive site investigation. The unit closest to the site entrance has changed from a hydraulic breaker service facility to a fireplace business. No notable spillages or environmental incidents have occurred since the previous works. Some slight changes to the chemicals used in the oil treatment process have occurred. These are detailed in Table 1.

The concrete hardstanding across the site was present by 1995 but operations involving oil treatment are understood to have commenced in circa 1960. Prior to oil treatment, the site was used for refurbishing oil drums and hence there is potential for solvents to have been handled and spray paints used at the site.

The below ground fuel pipeline carried recycled fuel oil (RFO).

The 205L drums stored on site are empty apart from those which contain the process chemicals. The storage area for the latter has a small bund on two sides to direct any releases towards the engineered drainage system.

Two of the four monitoring wells installed by LEAP in 2015 were observed during the walkover and appeared to be in a good, serviceable condition. Two further monitoring wells were observed on site at either end of the corrugated metal buildings. The client indicated that she understood that these were installed in response to an Environment Agency requirement but had no further knowledge of the reason(s) or dates. It is understood that they were installed by a non-specialist (a company specialising in underpinning buildings) rather than an environmental organisation. These wells were not mentioned in the first iteration of this report. It is assumed that they were either not found, were inaccessible or (when gauged) found to be unusable.

7.4 Neighbouring Land Use

The site is located in a generally residential area, except for the subject site itself, and the neighbouring film studios.

There are nine contemporary trade directory entries on the Envirocheck Report listed within 100m of the subject site. Three of these are inactive entries for a stone product manufacturer, wrought ironwork and oil and gas exploration services.

A railway line is located immediately west of the site, orientated northeast-southwest.

7.5 Site History

The history of the site has been ascertained with reference to the Ordnance Survey historical maps.

7.5.1 Historical Map Evidence

The earliest available mapping for the site is from 1870 and shows the site as an area of parkland within Twickenham Park, with the railway forming the north western site boundary, as it does today. A collection of buildings, presumably associated with the park (gardeners lodge etc.), are shown to the southeast of the site, with two pumps marked.

By the early 1890s much of Twickenham Park has been developed with large detached and semi-detached properties and Arlington Road is now shown. The coach houses are also shown onsite for the first time, with the access driveway indicated in its current position. Greenhouses are shown to the southeast of site and there is some evidence of earthworks to the south of site in the form of embankments and a mound.

There appears to be no significant change until the map from 1935 which shows extensive additional housing development in the surrounding area, the development of both the film studios (founded in 1913) to the southwest of the site and a motor works adjacent and the to the southeast of the site. The site is at this time labelled as the Arlington Works and there has been the addition of buildings, such that the site layout is similar to present day. Some of the greenhouses to the southeast of site have been removed and the film studios developed over the mounds previously shown to the southwest.

The aerial photograph from 1946 shows the Arlington Works site with a similar layout as the present day, but it appears to be without hardstanding surfacing and without the bunded tank farm. However, there is what appears to be storage of barrels onsite.

The map from 1973 appears to be the first one to show an outline of the present bunded tank farm, along with another area in the south western corner of the site.

The only significant change noted on the remaining maps is the change of use of the motor works site and the rear of the Arlington Works as an extension of the film studios site, car parking/ access for film studios. It is unclear from the historic maps at what date this change of use occurred.

7.5.2 Other Evidence

A search of the Richmond upon Thames Borough Council website did not result in any planning records relating to the Arlington Works site.

7.6 Unexploded Ordnance

The risks from unexploded ordnance have been assessed in accordance with CIRIA guidance[4]. A non-UXO specialist preliminary screening assessment has been carried out. The risks have been assessed by considering firstly the likelihood of military activities on, or in the vicinity of the site as determined from the desk study and historical review. Secondly the risk of UXO has been assessed by reference to the unexploded WWII aerial delivered bomb (UXB) regional risk maps produced by Zetica.

No past military use of the site or surrounding area has been discovered in the desk study. The site was developed prior to WWII and no bomb damage is noted on the site itself (although the film studios website indicates that the studios suffered a direct hit in circa 1939). The site has been extended and developed further since the end of WWII, which reduces the potential for undiscovered unexploded ordnance.

The Zetica risk map for South West London, covering the site, indicates a low to moderate risk. Hence, based on the historical assessment, the overall risk of UXO is rated as low.

7.7 Waste Planning and Landfill Records

There are no active landfill sites noted on the Envirocheck report within 2km of the subject site. There are two areas of historic landfill listed, though these are both located over 1km west of the site, and on this basis are not considered likely to impact the subject site.

7.8 Pollution

There is one registered pollution incident listed on the Envirocheck report within 500m of the site. It is listed at a location approximately 30m west of the site at Petersham Road (on the far side of the railway from the site). It was a category 3 - minor incident and from 1998 and no pollution was reportedly found. Given the date and the low severity it is not considered further.

There is one Local Authority Pollution Prevention and Control permit located within 500m. This is for Top Top Dry Cleaners, located approximately 200m west of the site on St Margaret's Road.

There is one onsite Environment Agency Pollution Prevention and Control permit registered to Sharpe's Recycle Oil Limited. Entries on the Envirocheck Report relate to an application dated 2007, for which LEAP has been provided the information from the Client in order to aid the site investigation. The application has been superseded by the effective permit from 13th March 2014 which lists two activities. The primary activity is "DISPOSAL

[4] CIRIA C681 2009. Unexploded ordnance (UXO) - A guide for the construction industry

OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT" and a second activity is listed as "TEMPORARY STORAGE OF HAZ WASTE […] WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED".

C PRELIMINARY CONCEPTUAL SITE MODEL

8 Environmental Risk Assessment

8.1 Conceptual Site Model

A risk based approach is used to assess contaminated or potentially contaminated land within the UK. For a potential risk to exist then there must be in place a pollutant linkage. I.e. there must be a source of contamination, a potential receptor and a pathway linking the two.

In order to quantify the magnitude of the risk then it is necessary to first calculate the potential exposure of the receptor as a result of all the individual active pollutant linkages affecting that receptor. Secondly it is necessary to ascertain "what is an acceptable exposure level for each of the identified receptors and contaminants?" Various numerical models are available to aid in the assessment and these are discussed in more detail in section F19 below.

The purpose of the Conceptual Site Model, in this instance, is to identify all of the potential pollutant linkages, by considering in turn, the potential sources, receptors and pathways.

8.2 Sources

8.2.1 Onsite Sources

The following potential sources of contamination have been identified on site:-

Table 2: Onsite sources of contamination

Source	Contaminants of Concern
Oil tank farm	Petroleum hydrocarbons (PHC) and PAHs
Waste storage areas	PHC and PAHs
Loading and unloading of tankers	PHC and PAHs
Past underground pipe work for transfer of oil	PHC and PAHs
Drainage via surface runoff of oil via interceptors to combined sewer	PHC and PAHs
Made ground	heavy metals, PAHs, asbestos
Car body works and former oil drum refurbishment works	VOCs, SVOCs
Metal works	Heavy metals, PAHs
Boiler ash	PAHs, heavy metals

8.2.2 Offsite Sources

The desk study has highlighted the following potential offsite sources of contamination:

Table 3: Offsite sources of contamination

Source	Distance from Site (m)	Contaminants of Concern
Motor Works	adjacent	PHC, PAH, VOCs and SVOCs
Film Studios*	adjacent	Chlorinated solvents (VOCs), ammonia and bromide

*assuming that film was developed/processed on site

8.3 Receptors

Potential receptors are those which may be impacted by any of the contaminants of concern identified above, and include the following:-

- Future residents and construction workers;
- Groundwater – Principal Aquifer of the Kempton Park Gravel;
- Surface Water – River Thames 425m northeast of site;
- Material construction of buildings and infrastructure; and
- Off-site neighbouring residents.

8.4 Pathways and Potential Pollutant Linkages

The current proposed development does not include private gardens (some ground floor apartments appear to have a private patio area). The remainder of the soft landscaping is in the form of public open space. However, as a conservative assessment, private gardens have been considered in the event that the design is modified or the patio areas are modified by residents in the future.

We therefore assume that all potential pollutant linkages involving resident humans and site contaminants will be active i.e. direct ingestion of soil, ingestion of soil attached to plants as well as via plant uptake, inhalation of indoor and outdoor vapour and of dust tracked back into the house and finally ingestion of water carried by plastic water pipes through contaminated ground.

Ground workers are at risk as a result from all of the above except for those involving edible plants.

The site is underlain by a principal aquifer of high leaching potential. Hence there is a potential pathway for leachate from soil pollutants and for mobile liquid contaminants to enter the groundwater. The water table is anticipated to be around 3m below ground surface on this site.

Given there is no landfill located within 1km of the site there is not considered to be an unacceptable risk of landfill gas migrating to the subject site.

8.5 Qualitative Risk Assessment of Pollutant Linkages

The potential pollutant linkages are summarised in the table appended in Appendix D and given a qualitative risk classification in accordance with current guidance. The details of the risk assessment methodology are presented in Appendix D.

8.6 Conclusions

The majority of potential pollutant linkages have been assessed by the Qualitative Risk Assessment provided in Appendix D as moderate risks based on the sensitivity of the receptor and the likely degree of contamination of the made ground from potential sources identified in the desk study.

There are also high risk potential pollutant linkages posed by potential asbestos contamination in the made ground. Asbestos contamination has the possibility for highly severe consequences in term of human health, even at very low concentrations and hence the severity of exposure is the driver for this high risk classification. The potential for asbestos to be present at this site is not considered to be any higher than any other typical redevelopment site where made ground is anticipated.

Potential risks to ground and surface water resources are modelled as moderate to low due to the sensitivity of the groundwater under the site. Whilst classified as a principal aquifer, the urban nature of the area and limited saturated thickness of the superficial indicates that the potential for the aquifer to be developed as a source of potable water is low. It is noteworthy that a potential offsite source of groundwater contamination exists namely, the film studios. If film was processed historically on site (and this may not have been the case) then chlorinated solvents could have entered the groundwater. The film studio site is considered to be hydraulically upgradient of the subject site and hence, there is potential for contamination to have migrated onto the site. Chlorinated solvents in groundwater can also present an indoor vapour inhalation risk.

The River Thames is the nearest controlled surface water resource to the site. However, as it is approximately 425m away, the potential for water contaminant migration to the River Thames is considered to be low.

D PHASE II - INTRUSIVE INVESTIGATION (2014/15)

9 Investigation Strategy and Findings

9.1 Investigation Rationale

A total of eight test holes were excavated across the site in order to give general coverage for soil contamination and geotechnical purposes. The three deep monitoring wells were located for triangulation purposes and a fourth shallower well was installed where contamination was identified below the groundwater level.

There were significant access constraints due to the site being operational during the works and due to the presence of underground services and the coverage achieved is considered to be the best possible during the continued operation of the site. No investigations were possible within/under buildings or the tank farms due to the site remaining operational throughout the duration of the works.

The site investigation locations are shown on Figure 1, Appendix B.

Given the potential contaminants identified in the conceptual site model, it was decided to focus on heavy metals and PAHs in the made ground and petroleum hydrocarbons, SVOCs and VOCs in natural soils around the water table, or where visual or olfactory evidence of contamination was observed. Environmental samples were also screened onsite for VOCs by use of a photo-ionisation detector (PID).

9.2 Field Work

9.2.1 Groundwater Monitoring Well Installations

Groundwater monitoring wells were installed within the three deep boreholes to the base of the Kempton Park Gravel. An additional well was installed within WS102, where contamination was observed in soils below the water table.

Details of all of the installations are given below:

Table 4: Borehole installation details

Borehole	Plain Well Screen and bentonite (mbgl)	Slotted Well Screen and gravel (mbgl)	Installation diameter (mm)
BH101	0 to 1mbgl	1 to 5mbgl	50mm
BH102	0 to 1mbgl	1 to 6mbgl	50mm
BH103	0 to 1mbgl	1 to 8mbgl	50mm
WS102	0 to 1mbgl	1 to 3mbgl	38mm

9.2.2 Groundwater Sampling and Monitoring

Groundwater levels and the presence/ thickness of floating product were measured during once return groundwater monitoring visit completed on 21st January 2015. Levels were measured using an oil-water interface probe.

During this visit samples were recovered using "Waterra" HDPE 0.5" diameter pipe, connected to a low flow down the hole pump.

Water was pumped from each well prior to sampling until consistent physio-chemical parameters were measured from the pumped water. Samples were then recovered directly from the pipe into glass amber bottles and clear glass vials and placed in cooled insulated boxes for transport to Exova Ltd for laboratory analysis.

Physio-chemical parameters measured on site comprised: temperature, pH, electrical conductivity (EC), total dissolved solids (TDS) and dissolved oxygen (DO).

9.2.3 Topographic Survey

Upon completion, the installed monitoring wells were surveyed to an arbitrary site datum point, set at 10mAOD at BH103. Elevations were measured using a dumpy level and are presented on the borehole logs in Appendix F.

9.3 Fieldwork Date and Weather Conditions

The intrusive investigations were undertaken in two phases, with the concrete coring and windowless sampling undertaken on Friday 19th and Monday 22nd December 2014, followed by the shell and auger drilling in the second phase, from 5th to 12th January 2015. At the time of the investigations, the weather was cool with occasional rain in January and some high winds.

9.4 Ground Conditions

The ground conditions are described in detail in the logs attached in Appendix F. In summary the soil conditions were as follows:

Table 5: Summary of soils encountered

Depth From (m)	Depth To (m)	Soil Type	Description
0.00	0.07-0.23	CONCRETE	Concrete. Reinforced in BH103 and WS104. (except BH101 which had a 50mm covering of blacktop and BH102 where there was no hardstanding)
0.05-0.23	0.55-1.10	MADE GROUND	Highly variable. Often comprising a dark grey sandy gravel sub-base with gravel and cobbles of brick, flint, concrete and often abundant ash over a more clayey blackish brown made ground with occasional fragments of other materials such as metal, chalk, shell etc.
0.55-1.10	1.40-1.70	silty sandy CLAY	Firm occasionally greenish orange brown silty sandy CLAY and rare flint gravel.
1.40-1.70	3.0-4.0+	gravelly SAND	Medium dense occasionally greenish, orange brown silty slightly gravelly SAND, with increasing grain size and gravel content with depth.
3.00-4.00	5.90-7.95	sandy GRAVEL	Medium dense to dense orange brown sandy GRAVEL of medium to coarse sub-rounded to angular flints and occasional flint cobbles.
5.90-7.95	6.50-8.20	Orange brown silty CLAY	Firm to stiff orange brown silty CLAY. (weathered London Clay Formation)
6.50-8.20	20m+	Blue grey silty CLAY	Very stiff fissured blue grey silty CLAY (London Clay Formation)

9.4.1 Groundwater

Groundwater was struck at depths of between 2.7 and 3.3m across the site, with the shallowest in the southwest (WS102) and deepest in the northeast (BH103).

Groundwater rest levels during the return monitoring visit ranged from 2.56m to 3.04m bgl. No evidence of Light Non-aqueous Phase Liquid (LNAPL) was detected during the monitoring round.

Based on the single groundwater monitoring visit and the elevation measured during this visit, the groundwater table is broadly flat. Based on the site setting, groundwater is anticipated to flow towards the north/ northeast, in the direction of the River Thames.

E GEOTECHNICAL APPRAISAL

10 Strata Encountered

10.1 Made Ground

The vast majority of the site is hard surfaced, mostly with concrete of variable quality. BH101, in the car park of the studios, was excavated through blacktop and BH102, in most southerly corner of the site, was excavated through shingle surfacing.

Made ground is inherently highly variable in composition and has been proven to between 0.55m and 1.10mbgl across the site. The made ground generally comprised sub-base type material of sandy gravel made ground with bricks, concrete, flints and ash over predominantly more sandy or clayey made ground with similarly composed gravel. WS102 was an exception to this as it had a layer of gravelly clay made ground under the concrete over a sandy gravel, both with flint, brick and ash.

In BH102 there was observed to be a layer of silty sand soils with some fine fragments of brick recovered within the layer, this was therefore assumed to be a disturbed layer, between 1.10 and 1.80mbgl.

10.2 Drift Deposits of Clay, Sand and Gravel

The natural drift deposits onsite are mapped as the Kempton Park Gravels. These were observed to comprise predominantly silty sandy clay soils down to 1.40-1.70m over silty occasionally gravelly or clayey sand to 3.0-4.0m over sandy gravel. As such, gravel was only encountered in two of the windowless holes, WS104 and WS105, situated towards the north end of the site. Occasional flint gravel was encountered throughout the sands in many of the other investigative holes.

Five samples of the highly variable drift deposits were tested for particle size distribution.

Table 6: Summary of PSD results for drift deposit samples

Hole ID	Depth	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH1	1.75	2.3	56.0	24.0	17.7
BH3	2.00	5.1	82.8	12.1	
BH2	3.50	9.2	89.6	1.2	
BH1	4.00-5.50	85.5	14.5	0.1	
BH3	4.50-7.50	94.9	5.0	0.0	

The results (given above in depth order) demonstrate how the deposits change with depth from more fine grained immature deposits to coarser grained mature gravels (mature = well sorted with consistent grain sizes and more rounded grains).

The shallow clay drift deposits were mostly firm with hand penetrometer measured unconfined compressive strengths of 140kPa in WS103 and 130kPa in WS105. A thin layer of clay in WS101 directly underlying the made ground 1.10-1.30 was soft, with a hand penetrometer result of 30kPa. One sample of the clayey sand from BH102 at 2.0m underwent an Atterberg Limit test for determination of plasticity index, and was found to be non-plastic.

SPT in-situ test results at 1.00m in the made ground and clay drift deposits gave 'N' values of 3 to 9 (loose). 'N' values increased to 15 to 19 in silty fine sand and up to 28 in the medium dense gravelly sand at 2.0m bgl. Gravels generally had 'N' values of 20 to 33 (medium dense) with one SPT 'N' value of 43 recorded in WS104 at 4.0m.

10.3 Silty Clay

Below the gravel drift deposits are stiff silty clays of the London Clay. The top of the clay was encountered at between 6.50-8.20m in the shell and auger boreholes. In each case a thin layer (between 0.2 and 0.6m) of firm to stiff orange brown "weathered" silty clay was observed over the stiff to very stiff dark bluish grey silty clay.

Hand penetrometer results in the orange brown silty clay were 100-180kPa (firm to stiff); increasing to 300 to 500+kPa (very stiff) in the dark bluish grey silty clay, increasing with depth.

Samples of orange brown silty clay from BH101 and BH102 were submitted for Atterberg Limit tests and were found to have liquid limits of 62% and 70% respectively and plastic limits of 21% and 23% respectively resulting in modified plasticity indices of 38% and 43% indicating high volume change potential.

A further three samples of dark bluish grey silty clay from 10 to 18m depth were submitted for Atterberg Limit tests and were found to have modified plasticity indices of 48 to 53% indicating high volume change potential.

SPT 'N' values were between 22 and 39 (increasing with depth) in the clay.

11 Swelling and Shrinkage

The silty clays at depth are classified as NHBC high Volume Change Potential, and an overall classification of NHBC **HIGH** Volume Change Potential (VCP) is recommended for the clay soils across the site.

12 Sulphates

Three samples of London Clay were tested for soil sulphates.

The measured sulphate content of a 2:1 water extract was in the range of 0.53 and 1.7 g/l, with a measured pH of 6.9-7.0. On this basis the soils are classified by the BRE[5] as sulphate design class DS-3 and, assuming a mobile groundwater table, the ACEC class is AC-3.

13 Groundwater

Groundwater strikes in boreholes were recorded at between 2.70 and 3.10mbgl. Standing groundwater levels ranged from 2.56m to 3.04m bgl when they were monitored on 21st January 2015.

The site is level, though monitoring well ground levels were surveyed on 21st January 2015, such that relative groundwater levels could be calculated and groundwater flow direction analysed. The site topography was shown to fall slightly from north to south with a change in elevation of 0.4m from BH103 to WS102.

Groundwater levels in the four wells varied by 35mm AOD across the site on the one monitoring visit. Long term groundwater monitoring was beyond the scope of works and would be required to fully assess the groundwater regime. The preliminary results from one visit suggest a very low hydraulic gradient and flow in an approximately north / north-easterly direction.

14 Soakage Potential

The gravel soils underlying the site are expected to be of high permeability. However, the high groundwater table onsite (~3mbgl) reduces the potential for storage and therefore soakaways are not considered appropriate form of surface water drainage for the proposed development.

Soakage testing was beyond the scope of this investigation.

15 Bearing Capacity and Foundations

Made ground is by nature highly variable, and will be subject to differential settlement. It is unsuitable as a founding stratum, and all foundations will require deepening through made ground to the underlying soils. The underlying drift deposits have been shown to be loose

[5] Building Research Establishment Special Digest 1: 2005. Concrete in aggressive ground. Part 1: Assessing the aggressive chemical environment.

to up to 2m depth. As such foundations should be deepened through the clay drift deposits to the underlying silty sand and gravelly sand soils below 2m.

These can be expected to have an allowable bearing capacity of around 100kPa which would be suitable for low-rise housing. However, it is noted that the construction of traditional strip or trench foundations in these strata would be complicated by the presence of groundwater and loose overlying soils. Furthermore, deepening would be required where soils are disturbed by removal of structures or contamination. As such, it is recommended that allowance is made for piled foundations for both the residential and office/commercial units.

15.1 Piling

For the ground conditions encountered on site, driven, bored or continuous flight augered (CFA) piles may be considered. However, given the close proximity of adjacent buildings surrounding the site, and their sensitivity, driven piles may be considered unacceptable due to noise and vibration nuisance. Therefore, conventional bored or CFA piles may be more suitable. Noting the potential for groundwater ingress, bottom fed CFA piles may be the most appropriate for the site.

Discussions should be held with the specialist piling contractors to assess the technical and financial merits of their various systems for the ground conditions encountered, and the depth and size of pile required, with an adequate safety margin.

The final pile design will be determined by the selected piling contractor as the method of pile formation will affect the bearing capacity. For the purpose of preliminary design, we have estimated the carrying capacity of a 15m long 400mm diameter CFA pile. We have adopted the following soil model in the calculation:-

Table 7: Soil model for preliminary pile design

Depth to base (m)	Soil Type
3.0	Superficial soils (Ignored in design)
7.5	Medium dense sandy GRAVEL
20	Stiff to very stiff (high VCP) silty CLAY.

Assuming an adhesion factor of 0.45 and an end bearing capacity factor (Nc) of 7.5 in the clay; a maximum ultimate adhesion of 100kN/m^2; and nil skin friction over the top 3m; then it is estimated that a 15m long 400mm diameter CFA pile should be capable of carrying a safe working load of about 290kN with a factor of safety of 2.5.

16 Floor Slabs

Suspended floor slabs should be provided if piled foundations are adopted or if foundations are deepened due to the presence of trees and shrinkable soils.

17 Excavations

Excavations in made ground and loose superficial soils are likely to be unstable and subject to collapse.

Excavations below in the gravelly sand and sandy gravel soils may be subject to running sands. As such any deep excavations may require stabilisation and excavations below the water table (around 3mbgl) will require shuttering and/or dewatering measures.

Appropriate health and safety precautions must be adhered to where man entry into excavations is required. Even stiff clay soils at shallow depth can collapse, particularly following wet weather, and great care should be taken at all times.

F GEO-ENVIRONMENTAL APPRAISAL

18 Testing Strategy

The scope of the investigation was restricted due to the site remaining operational during investigations. However, the maximum practicable site coverage was achieved by excavation of eight boreholes in total, three deep (10-20m) shell and auger boreholes and an additional five (3-4m deep) windowless sampler boreholes.

Soil samples were collected from the made ground and from natural soils in all boreholes. A range of samples of made ground and natural soils from above and below the water table were submitted for chemical testing. Samples were also screened onsite for VOCs.

19 Assessment Criteria

19.1 Human Health Assessment Criteria

Pollutant linkages containing human health have been risk assessed by comparing the soil laboratory test results to Tier 1 Site Assessment Criteria. These are based on published Category Four Screening Levels[6] (C4SLs) or LQM/CIEH Suitable 4 Use Levels (S4ULs)[7] (GAC) assuming a both residential (public open space) and residential with home-grown produce land uses. The residential with home-grown produce GAC is considered relevant even if private gardens are not proposed as it is protective of the risks posed by indoor vapour inhalation whereas POS (residential) does not consider this potentially active pathway.

In accordance with current HPA guidance[8], the assessment of PAHs has been carried out using a surrogate marker approach, whereby the assessment of risk from Benzo(a) Pyrene also captures potential risks from other carcinogenic PAHs that may be present. The threshold PAHs have been assessed individually.

In this report, the C4SL has been used as an assessment criterion for lead. It is noted, that this is significantly lower than previously accepted screening levels (less than half), but is based on current and evolving toxicological assessment carried out on behalf of DEFRA.

[6] Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. CL:AIRE, 2013.

[7] The LQM/CIEH S4ULs for Human Health Risk Assessment, Nathaniel P et al, 2015. Copyright Land Quality Management Ltd, reproduced with permission: Publication Number S4UL3509

[8] HPA Contaminated Land Information Sheet. Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs). Version 3. Health Protection Agency, 2010.

The C4SLs for Benzo-a-Pyrene, arsenic, cadmium, chromium (VI) and benzene have also been adopted as the most relevant assessment criteria. The use of C4SLs in a planning context has been endorsed by Defra and the UK Government.

19.1.1 Statistical Assessment

In assessing soil test results and comparing them to any threshold or screening value, an assessment must first be made as to how accurately the test results reflect the true mean of the contaminant level within the ground. In this assessment for each parameter where exceedance(s) have been recorded, the test data have been subjected to statistical assessment based on the methodology set out in *CIEH report 2008: Guidance on comparing Soil Contamination Data with a Critical Concentration*. The Upper Confidence Level or U_{95} value is thereby calculated as being the level at which we would be 95% confident that the true mean is **less** than this value. For the purposes of this assessment, a conservative approach has been adopted in the statistics. All non-detect values have been treated as being equal to half the limit of detection.

It should be noted that for the purposes of these assessments, no statistical outliers have been excluded. The CIEH guidance document that accompanies the statistics calculator states:

> ***outliers should be excluded from a dataset ONLY where they:***
>
> - *are obviously and demonstrably the result of an error that can be identified and explained,* ***or***
> - *clearly indicate that more than one soil population exists within the dataset and this can be justified by (or informs the further development of) the conceptual model*

19.2 Groundwater Assessment Criteria

As a tier one assessment, groundwater concentrations have been compared to UK environmental quality standards or drinking water standards, where these standards exist.

Speciated petroleum hydrocarbon (TPH-CWG) fractions have been compared to the laboratory limit of detection (LOD).

20 Analytical Test Results – Soils

20.1 Heavy Metals

Table 8: Summary of exceedances within made ground (eight samples)

Determinant	Max (mg/kg)	Arithmetic Mean (mg/kg)	UCL U_{95} (mg/kg)	Assessment Criteria (mg/kg)		Evidence Level (%)		Samples which exceed AC (Including outliers)
				Resi w HGP	POS Resi	Resi w HGP	POS Resi	
Arsenic	79	35.3	64.9	37	79	6	98	3 Resi w HGP. 1 POS Resi [WS102 0.50m 38mg/kg WS103 0.40m 79mg/kg WS104 0.50m 39mg/kg]
Lead	7,880	1,345	5,421	200	630	0	0	8 Resi w HGP. 2 POS Resi [WS101 0.40m 504mg/kg WS102 0.50m 642mg/kg WS102 1.00m 204mg/kg WS103 0.40m 7,880mg/kg WS104 0.50m 411mg/kg WS105 0.3-0.4m 374mg/kg BH101 0.40m 537mg/kg BH103 0.40m 209mg/kg]

Exceedances of the assessment criteria were recorded for arsenic and lead. Three of the eight samples exceeded the residential with home-grown produce GAC and one sample exceeded the POS (residential) GAC for arsenic. When subjected to statistical analysis, confidence levels of 6 and 98% were returned for residential with home-grown produce and POS (residential) respectively. Thus, the made ground soils as a population exceed the residential with home-grown produce criteria but not the POS criteria. Remediation would therefore be required in any private gardens but not in soft landscaped areas.

All eight of the samples exceeded the residential with home-grown produce GAC for lead whilst two samples exceeded the POS criteria. When subjected to statistical analysis, confidence levels of 0% were returned for both GACs. Thus, the made ground soils as a population exceed for criteria for lead and remediation would be required in both private garden **and** soft landscaping areas.

The maximum lead concentration of 7,880mg/kg was encountered in a sample from WS103 at 0.4m bgl. This is in the area where anecdotal evidence indicates boiler ash was deposited. The sample description indicates that abundant ash was present in this sample. This may

therefore represent a separate soil population from the remainder of the Made Ground. However, removing this one sample from the statistical analysis would not materially affect the results of the risk assessment when comparing against the residential with home-grown produce GAC (mean = 412mg/kg and UCL = 533mg/kg compared to a screening value of 200mg/kg – confidence level 1%). However, it would result in a 99% confidence level being returned against the POS GAC suggesting that from a public open space perspective, the rest of the site is not contaminated with lead.

No natural soils were analysed for heavy metals.

20.2 Polycyclic Aromatic Hydrocarbons (PAH)

Table 9: Summary of PAH exceedances in made ground (eight samples)

Determinant	Max (mg/kg)	Arithmetic Mean (mg/kg)	UCL U_{95} (mg/kg)	Evidence Level (%)	Assessment Criteria[a] (mg/kg)	Samples which exceed AC (Including outliers)
Benzo(a)Pyrene	6.9	2.06	5.29	94	5.0	WS102 1.00m 6.9mg/kg

a) *Residential with plant uptake and 2.5% SOM*

B[a]P in the made ground exceeded the residential with home-grown produce GAC for one of the eight samples tested (WS102 at 1.0m), and has an upper confidence limit of 5.29mg/kg. Therefore, there is marginal statistical evidence that the made ground might be contaminated with the carcinogenic PAHs for which B[a]P has been used as a marker compound. The result for WS102 at 1.0m may represent a contamination hotspot, as reflected in the field observation of hydrocarbon impact at this location. Removal of this sample from the statistical analysis would result in an adjusted mean of 1.37mg/kg and UCL of 1.97mg/kg – confidence level 100%. There were no exceedances when considering a public open space (residential land use).

There is no evidence that the made ground is contaminated with the threshold PAHs.

No natural soils were analysed for PAHs.

20.3 Petroleum Hydrocarbons (PHC)

Table 10: Summary of petroleum hydrocarbon exceedances (eight soil samples: 2 made ground and 6 natural soil)

Determinant	Results (mg/kg)	Generic Assessment Criteria (mg/kg) Residential with plant uptake		Samples that exceed assessment criterion	
		2.5% SOM MG	1% SOM Nat. Soils*	Made Ground	Natural Soils
PHC Aliphatic C8-10	<10-296	65	27	1 [WS104 0.23-0.30m 180mg/kg]	1 [WS102 3.70m 296mg/kg]
PHC Aliphatic C10-12	<10-1,218	330	130	1 [WS104 0.23-0.30m 1,218mg/kg]	2 [WS102 3.70m 1,070mg/kg, BH103 0.8m 170mg/kg]
PHC Aliphatic C12-16	<10-3,210	400	100	1 [WS104 0.23-0.30m 3,112mg/kg]	2 [WS102 3.70m 3,210mg/kg, BH103 0.8m 856mg/kg]
PHC Aromatic C8-10	<10-42	83	34	–	1 [WS102 3.70m 42mg/kg]
PHC Aromatic C10-12	<10-186	180	74	–	1 [WS102 3.70m 186mg/kg]
PHC Aromatic C12-16	<10-558	330	140	1 [WS104 0.23-0.30m 412mg/kg]	1 [WS102 3.70m 558mg/kg]
PHC Aromatic C16-21	<10-690	540	260	–	1 [WS102 3.70m 690mg/kg]

*No TOC data available for natural soils and hence, a 1% SOM has been conservatively adopted.

Of the eight samples tested (two made ground, two natural shallow clay soils, and four natural sand samples) three were found to be contaminated with petroleum hydrocarbons at levels above the assessment criteria for a residential with plant uptake end use. As there are varying strata within these data, statistical analysis is not appropriate. The three samples comprised one of oily sub-base excavated from just below the concrete slab at WS104, within the tank loading and unloading area, one of contaminated natural sand from below the water table in WS102, in the region of the below ground fuel pipeline and historic leak and one of sandy clay in BH103 where hydrocarbons were recorded down to circa 4m bgl on

the northern site boundary. There were no exceedances when considering a public open space (residential land use).

20.4 Volatile and Semi Volatile Organic Compounds

No significantly elevated concentrations of SVOC compounds were detected in the soil samples. Where VOC compounds were detected these were screened against SGVs and EIC/AGS/CL:AiRE (2009) where available. A single exceedance (trichloroethylene – WS104 0.23-0.3m 40µg/kg) was recorded when considering a residential with plant update land use. There were no exceedances when considering a public open space (residential land use). Other notable elevated concentrations of compounds where there are no GACs currently available comprised:

- 1,3,5 Trimethylbenzene WS102 3.7m 638µg/kg and WS104 0.23-0.3m 385µg/kg;
- tert-Butylbenzene WS102 3.7m 124µg/kg;
- sec-Butylbenzene WS102 3.7m 578µg/kg and
- p-Isopropyltoluene WS102 3.7m 124µg/kg.

20.5 Asbestos

All of the eight made ground samples tested for the LEAP suite were screened for the presence of asbestos containing materials and/or loose asbestos fibres. Loose fibres of chrysotile asbestos were detected in two of these eight samples, WS101 at 0.40m and BH103 at 0.40m. No quantification analysis was undertaken at the time of testing.

21 Analytical Test Results – Water

Samples from BH101, BH102 and BH103 were tested for the full suite of contaminants including metals, non-metals, pH, phenols, petroleum hydrocarbons, VOC and SVOC.

An additional sample was taken from WS102. Due to the limited water column in this well a grab sample was taken without full well development. Therefore, the water sampled was turbid and approximately 500ml in volume. This sample was tested for petroleum hydrocarbons and VOCs only.

The principal receptor comprises the underlying Principal aquifer and as such the most conservative of drinking water standards (DWS) and Environmental Quality Standards were prioritised to provide the GAC for controlled waters assessment.

Table 11: Summary of groundwater exceedances - petroleum hydrocarbons, VOCs and SVOCs

TPH Banded(Ali/Aro)	units	Tier 1 Assessment Criteria (µg/l)	BH101	BH102	BH103	WS102
C5-C6 Aliphatic	mg/l	0.01[a]	<0.01	0.03	<0.01	-
>C6-C8 Aliphatic	mg/l	0.01[a]	0.02	0.03	0.36	-
>C10-C12 Aliphatic	mg/l	0.01[a]	<0.01	0.03	0.01	-
>C12-C16 Aliphatic	mg/l	0.01[a]	0.02	0.02	0.09	-
>C16-C21 Aliphatic	mg/l	0.01[a]	0.12	0.17	0.12	-
>C21-C36 Aliphatic	mg/l	0.01[a]	0.12	3.05	0.25	-
>C36-C44 Aliphatic	mg/l	0.01[a]	0.02	1.07	0.02	-
>C8-C10 Aromatic	mg/l	0.01[a]	<0.01	0.01	<0.01	-
>C10-C12 Aromatic	mg/l	0.01[a]	<0.01	0.03	0.03	-
>C12-C16 Aromatic	mg/l	0.01[a]	0.03	0.04	0.12	-
>C16-C21 Aromatic	mg/l	0.01[a]	0.45	0.10	0.06	-
>C21-C36 Aromatic	mg/l	0.01[a]	<0.01	1.39	<0.01	-
>C36-C44 Aromatic	mg/l	0.01[a]	<0.01	0.38	<0.01	-
TPH C5-C44	mg/l	0.01[b]	0.78	6.32	1.06	-
TPH Speciated						
DRO	mg/l	0.01[b]	-	-	-	37.26
GRO	mg/l	0.01[b]	-	-	-	2.31
MRO	mg/l	0.01[b]	-	-	-	4.33
BTEX Compounds						
Benzene	µg/l	1[c]	<5	<5	<5	6
Toluene	µg/l	74/700[d]	<5	<5	<5	747
Total Xylenes	µg/l	30[e]	<10	<10	<10	373
Naphthalene	µg/l	2.4[e]	<5	<5	<5	160

a. *Assessment Criteria based on Laboratory Limit of Detection.*
b. *Assessment Criterion based on former (now withdrawn) target concentration for dissolve or emulsified hydrocarbons (10µg/l) – also the laboratory limit of detection.*
c. *Drinking Water Standard (DWS)*
d. *EQS/DWS*
e. *EQS*

Only values measured above the laboratory limit of detection have been taken forward for further consideration.

Whilst failures of GAC were noted in BH101, BH102 and BH103, no significantly elevated concentrations were noted. None of the measured concentrations are considered to be indicative of the presence of free-product.

Given the limited sample volume obtainable from WS102, only the diesel-range, gasoline-range and mineral-range bands could be analysed. The results were significantly higher in this

sample and could be indicative of free-product (LNAPL). Further investigation maybe necessary in this region of the site.

Detections of SVOCs within the water samples was limited to a single measured concentration of 2-methylnaphthalene was measured in BH102. The measured concentration of 2µg/l was only marginally above the laboratory limit of detection of 1µg/l. The SVOC suite analysed included the 16 common PAH compounds, excluding naphthalene.

Detections of VOCs were only noted in WS102. A summary of the detections is presented in Table 12.

Table 12: Summary of VOC detections in WS102

VOC detections	units	WS102
1,1-Dichloroethane (w)	µg/l	6
Chlorobenzene (w)	µg/l	45
Ethylbenzene (w)	µg/l	72
Styrene (w)	µg/l	7
iso-Propylbenzene (w)	µg/l	22
1,2,3-Trichloropropane (w)	µg/l	24
n-Propylbenzene (w)	µg/l	44
1,3,5-Trimethylbenzene (w)	µg/l	116
1,2,4-Trimethylbenzene (w)	µg/l	365
sec-Butylbenzene (w)	µg/l	25
n-Butylbenzene (w)	µg/l	52
4-isopropyltoluene (w)	µg/l	31
Naphthalene (VOC) (w)	µg/l	160

The majority of these compounds do not currently have tier I assessment criteria available for comparison. Where criteria are available, these are included in the screening table. Of those listed in Table 12 above, only naphthalene exceeded the assessment criteria. It is noteworthy that the suite of VOCs detected in the groundwater sample from WS102 correlate very strongly with those detected in soil at this location.

Table 13: Summary of groundwater tier I exceedances - metals and non-metals (3 samples)

Determinant (All total unless otherwise specified)	Measured Range (µg/l)	Tier I Assessment Criteria (µg/l)		Samples that exceed assessment criterion
		EQS*	DWS	
Copper	0.12-29.15	1	2,000	1 [BH102 29.15µg/l]
Nickel	5.53-5.93	4	20	3 [BH101 5.84µg/l, BH102 5.93µg/l, BH103 5.53µg/l]
Zinc	10.9-16.4	10.9	3,000	3 [BH101 16.4µg/l, BH102 10.9µg/l, BH103 10.9µg/l]

*Annual average values. Refer to notes at the foot of the screening table for more information

Exceedances of the Environmental Quality Standards were recorded for 3 metals. The exceedances are as a result of very conservative EQS criteria and are not considered to be representative of wider contamination. For this reason, they are not considered further.

22 Risk Assessment

A Tier 1 risk assessment has been undertaken for site soils and groundwater. Site soils have been screened against GAC protective of future residential receptors, as set out in Section 18.1. Groundwater concentrations have been screened against GAC that are protective of the underlying Principal aquifer.

Should significant groundwater contamination be noted then further assessment of controlled waters and vapour intrusion risk would be required as part of the final design. However, this is beyond the scope of this particular assessment.

22.1 Controlled Waters

Groundwater samples from four wells across the site showed some evidence of petroleum hydrocarbon contamination. The current groundwater dataset implies that there are two distinct contaminative sources across the site. First, groundwater beneath the majority of the site appears to be slightly impacted by light/medium to heavy end TPH fractions (>C8-C36). However, these values are not considered to be indicative of free-phase hydrocarbons and are only elevated for the less mobile and volatile TPH fractions. As such, the risk posed by the relatively minor exceedances to the identified receptors is considered to be low. Further sampling may be necessary to confirm this assessment.

Secondly, the turbid groundwater grab sample collected from WS102 contained elevated concentrations of VOCs, including BTEX compounds. These compounds were not seen elsewhere across the site. At this stage it is not known whether these compounds can be attributed to the sample turbidity, a localised site use, historic oil release or an historic off-site source. Data from a saturated soil sample in this location, along with the elevated DRO and MRO results, indicate that the historic oil release may have adversely affected local

groundwater quality. However, this borehole represents the most hydraulically upgradient sample point. Groundwater quality from the downgradient borehole indicates that any groundwater impact has not migrated across the site, let alone impacted off-site receptors.

This groundwater contamination, when viewed in light of the current and historic site use, is not considered to be severe. However, a DRO concentration of >37mg/kg could be indicative of free phase hydrocarbons ('LNAPL' or 'product'). Further monitoring and risk assessment will be required as part of the final design once improved access is available with the specific aim of minimising the requirement for future remediation.

Field observations of hydrocarbon impact and elevated measured hydrocarbon concentrations have been noted from site soils. However, any associated impacts to the underlying groundwater would most likely have been picked up in the current groundwater dataset. Further modelling of soil impact to groundwater is likely to be overly conservative and be of little benefit to the overall controlled waters risk assessment.

22.2 Human Health

22.2.1 Made Ground

The near surface made ground soils onsite have been found to be contaminated with metals (arsenic and lead when considering private gardens and just lead when considering public open space / soft landscaping areas). Loose asbestos fibres were detected in two samples (WS101 and BH103).

Hotspots of hydrocarbon contamination have been identified in two locations; WS102 contained elevated concentrations of PAHs and WS104 contained elevated concentrations of TPH fractions. However, further visual and olfactory evidence of hydrocarbon impact was noted across the site.

Given the history of the site, coupled with anecdotal evidence of a historical hydrocarbon release from an underground pipeline and the burial of boiler ash it is considered likely that undiscovered PAH and TPH impact is present at the site. This is likely to necessitate the localised removal of some impacted soil 'hotspots' and/or the import of clean cover soils in some soft landscaped areas.

22.2.2 Natural Soils

One sample of natural soil was found to be contaminated with petroleum hydrocarbons at levels in excess of GAC. This was a sample from WS102 from below the water table. Given the depth to the sample the GAC is not considered to be applicable as several of the constituent pathways, including direct contact and dust inhalation, will not be active. Furthermore, care should be taken when interpreting the results of soil samples collected from below the water table.

This sample may however, be indicative of a limited area of hydrocarbon impact. This sample was taken of soils which were observed to be black with an oily sheen and significant hydrocarbon odour. WS102 was located near a historic underground oil pipe. LEAP understands from anecdotal evidence that this pipe historically experienced a leak, which

may be a direct source for the contamination observed here. As such, the risk posed to future site users from vapour inhalation in this area of the site would benefit from further assessment/ mitigation.

22.2.3 Groundwater

The hydrocarbon impacts identified within BH101, BH102 and BH103 are not considered to present an unacceptable risk to future residential receptors or off-site neighbours via vapour intrusion. This is due to the low level of impact measured and the medium- to heavy-end nature of the contaminants. The presence of elevated VOC concentrations within WS102 could represent a source of vapour intrusion, although groundwater is noted to be at 3m bgl. Further assessment of this linkage may be warranted to confirm the need for vapour mitigation measures within the construction.

23 Conclusions and Recommendations

The Sharpe's Oil Recycle works on Arlington Road has a long history of industrial use both as an oil treatment and recycling facility and other industrial works prior to this.

LEAP's site investigation has indicated that the site is covered in a mantle of made ground under concrete hardstanding to a depth of 0.55-1.10m. This made ground was found to be contaminated with arsenic and lead and to contain hotspots of PAH, PHC and asbestos contamination. As such, proposed soft landscaping areas within the new development would likely require a clean cover layer of soils either replacing or placed above the made ground. Replacement would be preferable to covering as this would remove any potential indoor vapour intrusion risk posed by TPH/VOC-impacted soils. Furthermore, this would remove any 'source' material which could potentially impact controlled waters.

It is concluded that, in order to protect human health, any redevelopment of the site would likely have to include some provision for:

- Stripping hydrocarbon residues within made ground directly beneath the hardstanding in the area of the oil storage tanks and loading/unloading bay, plus if found in previously un-investigated areas;
- Excavation and disposal of any asbestos impacted made ground;
- Provision of a suitable clean cover layer in soft landscaping areas over heavy metal impacted made ground or in areas of residual hydrocarbon hotspots.

Risks from PHC contaminated groundwater to controlled waters and to the proposed development, in terms of the potential to cause a vapour risk, is considered to be low. However, the single round of groundwater monitoring completed to date indicates a possible contaminant plume in the vicinity of WS102. Further investigation and risk assessment would be required prior to any redevelopment of the site, but from LEAP's initial findings (one round of groundwater sampling and testing) it is anticipated that only minor remediation in terms of controlled waters would be required. This would likely take

the form of excavation and treatment/disposal of hotspots of impacted soils. Onsite treatment may be complicated by the size and nature of the site, and the close proximity of high sensitivity neighbours.

Recommendations for further work prior to development:

- Further intrusive investigation under current sheds, tank farm area and all other areas currently inaccessible following demolition;
- Further investigation and delineation of contaminated areas identified by this investigation (especially the below ground pipeline);
- Further groundwater monitoring; and
- (Potentially) detailed site specific quantitative risk assessment for groundwater.

Investigation below the building located between the telephone mast (former satellite tank farm) and the main tank farm (between which the pipeline is understood to have run) should be included in any further site investigation. A replacement (deeper) borehole for WS102 (in order to enable the recovery of higher quality groundwater samples) maybe necessary. An investigation into the condition of the two historical boreholes should also be undertaken. If viable, groundwater samples should be collected from these instruments.

Following the completion of the necessary additional site investigation, a remediation method statement is likely to be required as part of the planning process.

APPENDIX A

Limitations

LIMITATIONS

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk. Unless explicitly agreed otherwise in writing, this report has been prepared under LEAP's standard terms and conditions, as included in the quotation for this works.

This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed. LEAP cannot be held responsible for any disclosures or changes in regulation that are provided post production of this report, and will not automatically update the report.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development and site usage, timescales or clients specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an overall assessment of ground conditions on site. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7[9], although this is subject to the restrictions imposed on the investigation as listed above. For geotechnical design,

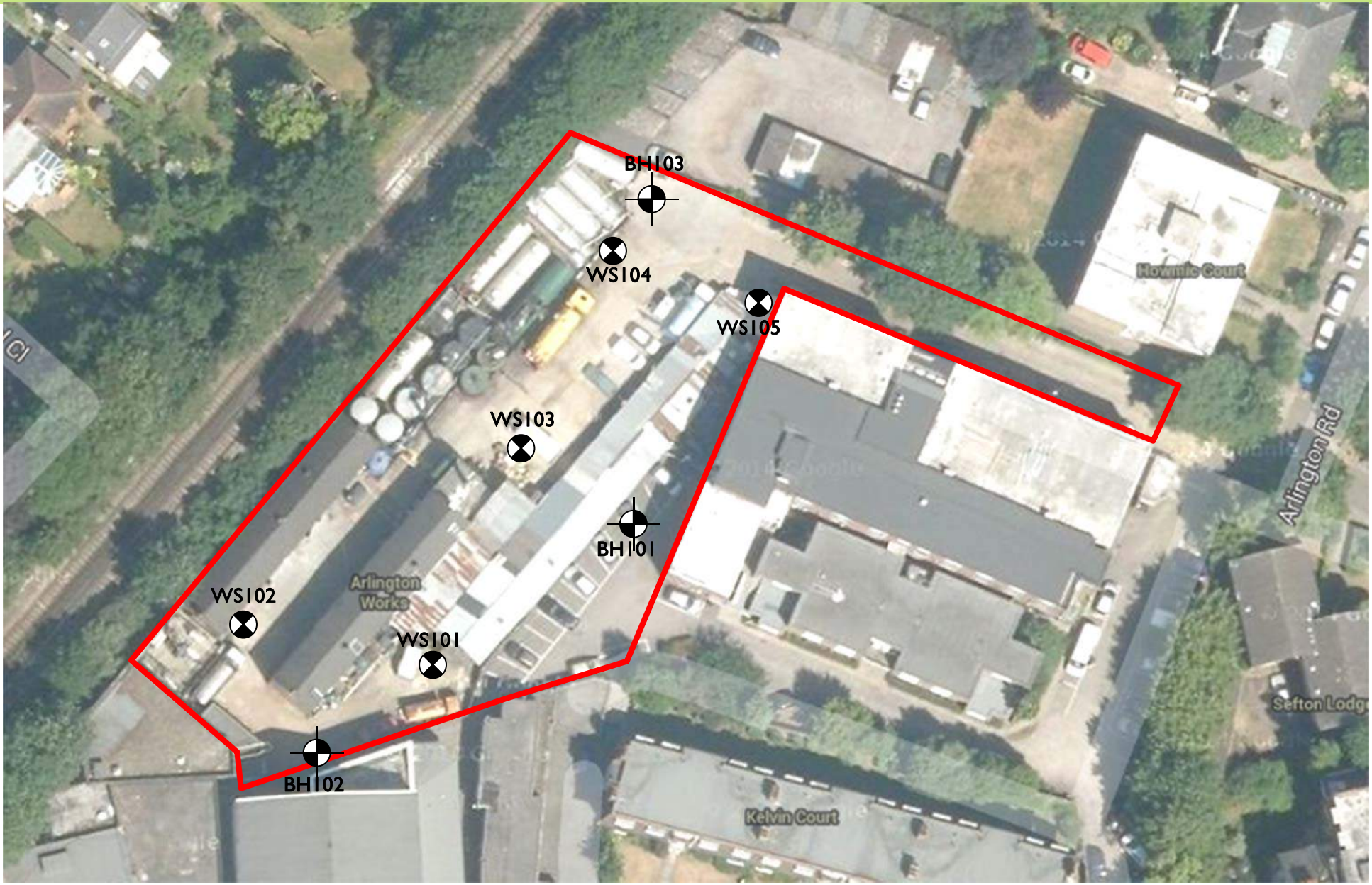
[9] BS EN 1997 Eurocode 7- Geotechnical Design - Part 1: General Rules (2004) and Part 2: Ground Investigation and Testing (2007)

Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this report will not meet the requirements of a Geotechnical Design Report (GDR), and should therefore be used for preliminary guidance only.

The presence of asbestos may be noted during the site walkover survey, intrusive investigations and/or from the results of contamination testing. However, this report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

APPENDIX B

Figures



leap environmental	**Client :**	Sharpes Recycle Oil Ltd	**Date :**	09/01/2014	**Project ID:**	LP00851
	Project :	Arlington Road, Twickenham	**Title :**	Site Investigation Locations	**Fig. No.**	1

Do not scale from this drawing

Car Parking

Site PTAL: 3

Site Density: 80.94 units/ha

Average Unit has 3 Habitable Rooms

Table 6.2 of The London Plan (MALP) March 2016 - Urban setting requires up to 1 space per unit as per car parking standards matrix

Refuse and Recycling Storage

Commercial
2.6 cubic meters per 1,000m²
= 1.7 cubic meters (1 x 1,100l eurobin)

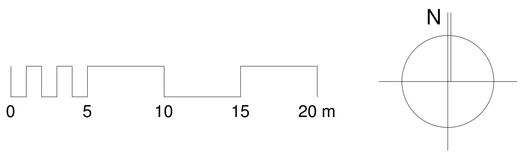
Residential
70l per bedroom refuse + 2 x 1,100l recycling
= 5630l (6 x 1,100l eurobin)

Cycle Storage

Commercial
1 per 90m² + 1 per 500m² (visitor)
= 8 cycles

Residential
1 per 1 bed unit + 2 per 2 bed unit + 1 per 40 units (visitor)
= 42 cycles

1 Proposed - Ground Floor Site Plan
1 : 200



Area Schedule - Offices

Level	Type	NSA(m²)	NSA(ft²)
Unit 1			
00 - Ground Floor	Office / Commercial	44 m²	470 ft²
01 - First Floor	Office / Commercial	44 m²	470 ft²
Unit 2			
00 - Ground Floor	Office / Commercial	44 m²	472 ft²
01 - First Floor	Office / Commercial	44 m²	472 ft²
Unit 3			
00 - Ground Floor	Office / Commercial	34 m²	367 ft²
01 - First Floor	Office / Commercial	34 m²	367 ft²
Unit 4			
00 - Ground Floor	Office / Commercial	39 m²	423 ft²
01 - First Floor	Office / Commercial	39 m²	423 ft²
Unit 5			
00 - Ground Floor	Office / Commercial	40 m²	429 ft²
01 - First Floor	Office / Commercial	40 m²	429 ft²
Unit 6			
00 - Ground Floor	Office / Commercial	46 m²	492 ft²
01 - First Floor	Office / Commercial	46 m²	492 ft²
Unit 7			
00 - Ground Floor	Office / Commercial	40 m²	427 ft²
01 - First Floor	Office / Commercial	40 m²	427 ft²
Unit 8			
00 - Ground Floor	Office / Commercial	42 m²	453 ft²
01 - First Floor	Office / Commercial	42 m²	453 ft²
Total		656 m²	7063 ft²

Area Schedule - Residential

Number	Type	No beds	No persons	NSA (m²)	NSA (ft²)
Unit 9	Residential	1	2	54 m²	581 ft²
Unit 10	Residential	2	3	61 m²	651 ft²
Unit 11	Residential	2	4	61 m²	651 ft²
Unit 12	Residential	1	2	52 m²	560 ft²
Unit 13	Residential	3	4	76 m²	822 ft²
Unit 14	Residential	3	4	76 m²	822 ft²
Unit 15	Residential	1	2	52 m²	560 ft²
Unit 16	Residential	2	4	75 m²	803 ft²
Unit 17	Residential	2	4	75 m²	803 ft²
Unit 18	Residential	1	2	52 m²	560 ft²
Unit 19	Residential	3	4	76 m²	822 ft²
Unit 20	Residential	3	4	76 m²	822 ft²
Unit 21	Residential	1	2	52 m²	560 ft²
Unit 22	Residential	2	4	75 m²	803 ft²
Unit 23	Residential	2	4	75 m²	803 ft²
Unit 24	Residential	1	2	52 m²	560 ft²
Unit 25	Residential	3	4	76 m²	822 ft²
Unit 26	Residential	2	4	69 m²	741 ft²
Unit 27	Residential	2	4	68 m²	734 ft²
Unit 28	Residential	2	4	74 m²	797 ft²
Unit 29	Residential	2	3	61 m²	656 ft²
Unit 30	Residential	2	3	61 m²	657 ft²
Unit 31	Residential	3	4	95 m²	1027 ft²
Unit 32	Residential	3	4	95 m²	1028 ft²
Total Units: 24				1639 m²	17645 ft²

Site Area Approx. 2965m²

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client
Sharpe Refinery Service Ltd.

Project
Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing
PROPOSED
Mixed Use Scheme
Ground Floor Site Plan

Scale	Date	Drawn	Checked
1 : 200@A1	14/05/18	PF	CH

BrookesArchitects
Upstairs at The Grange
Bank Lane, London SW15 5JT
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			Rev. No.
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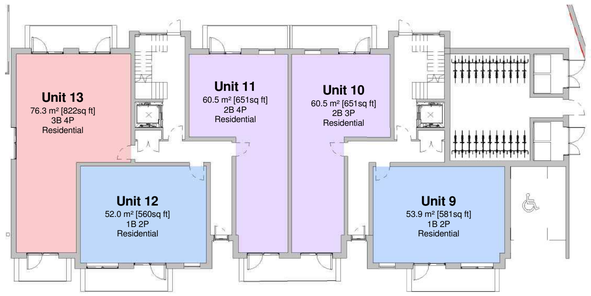

1 Main Building - Ground Floor Plan
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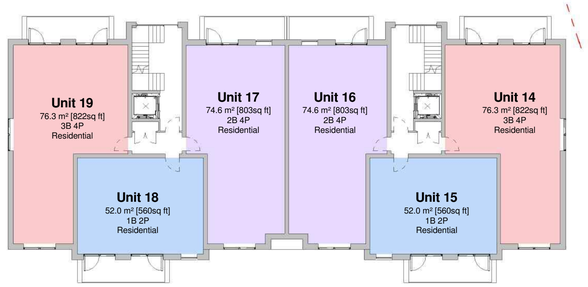
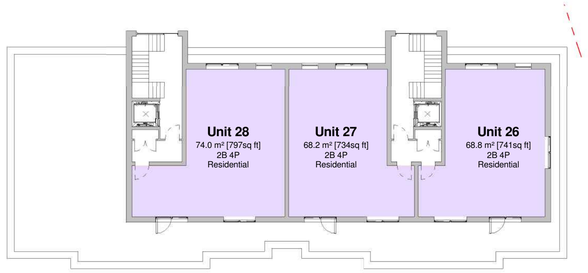


2 Main Building - First Floor Plan
1 : 200

3 Main Building - Second Floor Plan
1 : 200



4 Main Building - Second Floor Plan
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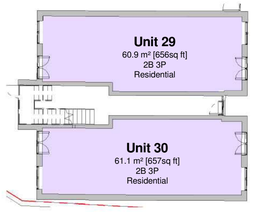

5 Small Block - Ground Floor Plan
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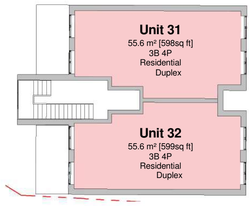
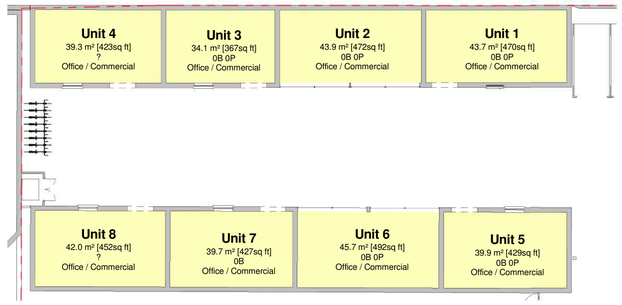
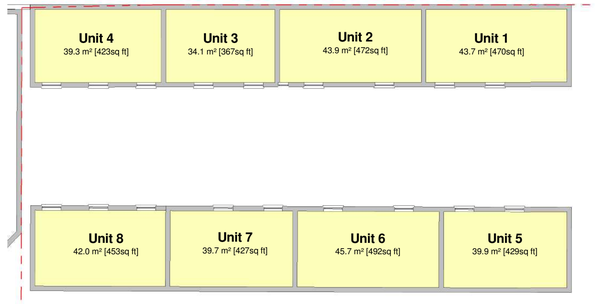


6 Small Block - First Floor Plan
1 : 200

7 Small Block - Second Floor Plan
1 : 200



8 Mews Buildings - Ground Floor Plan
1 : 200



9 Mews Buildings - First Floor Plan
1 : 200

Area Schedule - Offices			
Level	Type	NSA(m²)	NSA(ft²)
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Total Units: 24				1639 m²	17645 ft²

1 Bedroom
3 Bedrooms
2 Bedrooms
B1 (A) Office

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client
Sharpe Refinery Service Ltd.

Project
Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing
PROPOSED
Mixed Use Scheme
Floor Plans

Scale	Date	Drawn	Checked
1 : 200@A1	14/05/18	PF	CH

BrookesArchitects
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www.brookesarchitects.co.uk

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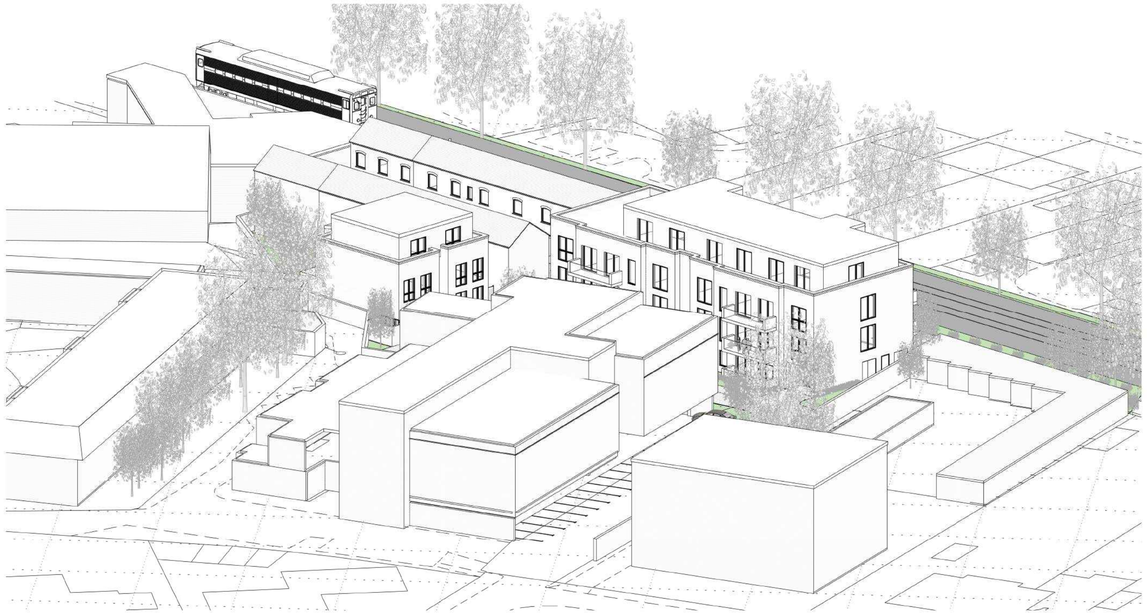
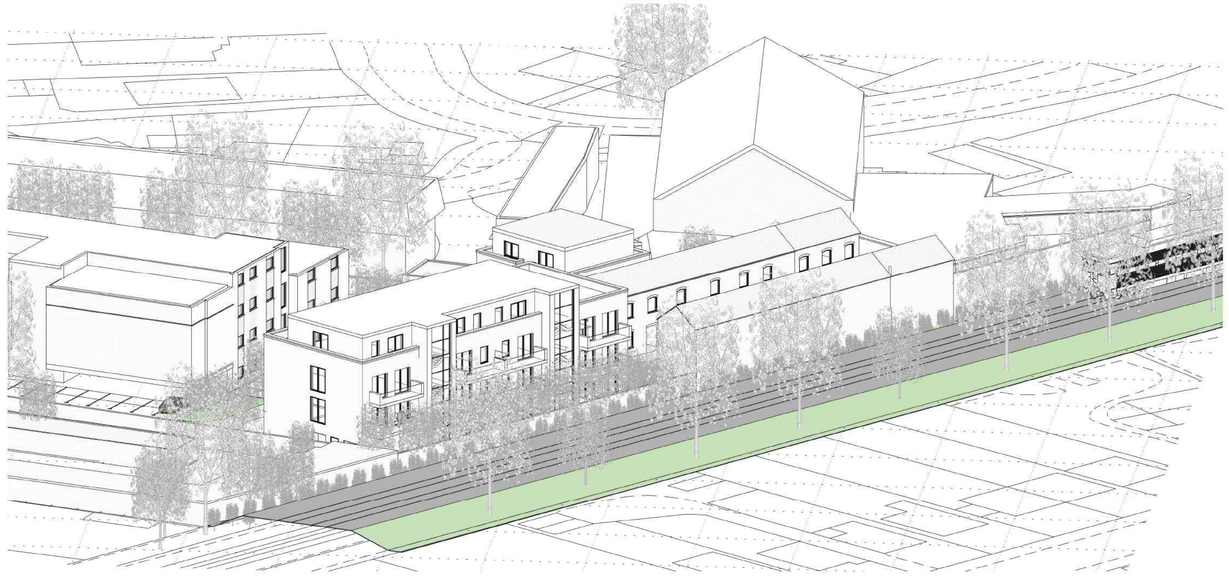
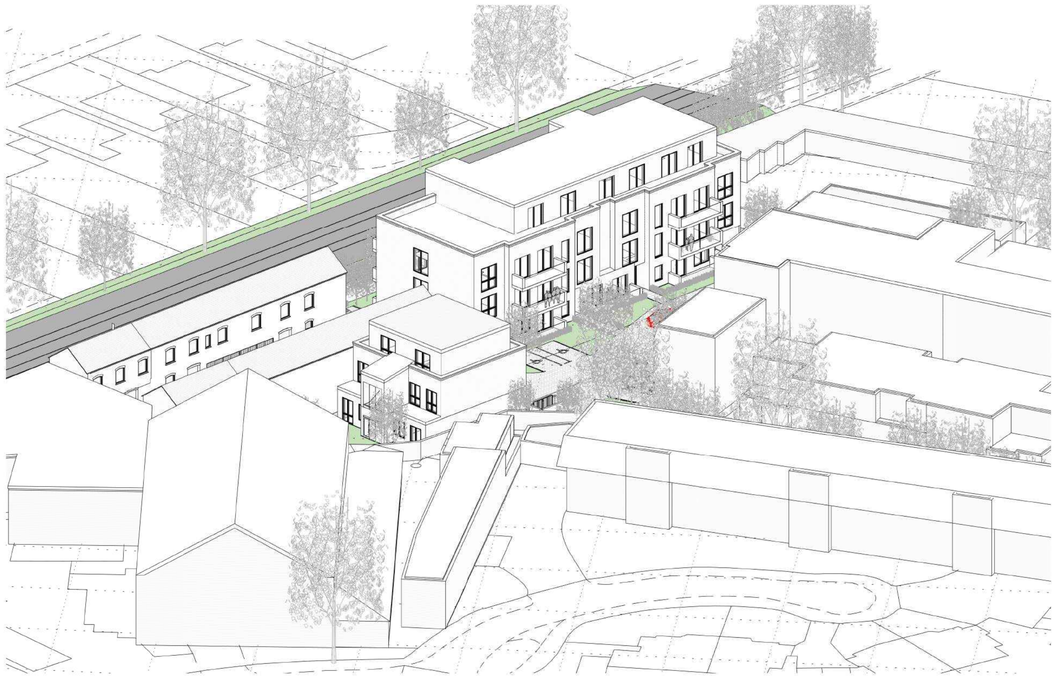


1 3D - East - Proposed



2 3D - North - Proposed



3 3D - South - Proposed

4 3D - West - Proposed

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client
Sharpe Refinery Service Ltd.

Project
Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing
PROPOSED
Mixed Use Scheme
Orthographic Views

Scale	Date	Drawn	Checked
@A1	14/05/18	PF	CH

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4786	3	12	Rev. No. P2

Do not scale from this drawing

1 Perspective 1

2 Perspective 2

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client
Sharpe Refinery Service Ltd.

Project
Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing
PROPOSED
Mixed Use Scheme
Perspective Views 1

Scale	Date	Drawn	Checked
@A1	14/05/18	PF	CH

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			Rev. No.
4786	3	13	P2

Do not scale from this drawing

1 Perspective 3

3 Perspective 5

2 Perspective 4

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client

Sharpe Refinery Service Ltd.

Project

Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing

PROPOSED
Mixed Use Scheme
Perspective Views 2

Scale	Date	Drawn	Checked
@A1	14/05/18	PF	CH

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Do not scale from this drawing

1 Front Elevation
1 : 100

2 Rear Elevation
1 : 100

PRELIMINARY

Rev	Description	Issued	Dwn	Chk
2	Issued to Consultants	17/05/2018	PF	CH
1	Updated Design	14/05/2018	PF	CH

Client
Sharpe Refinery Service Ltd.

Project
Redevelopment of:
Arlington Works
Twickenham TW1 2BB

Drawing
PROPOSED
Mixed Use Scheme
Elevations - Main Block

Scale	Date	Drawn	Checked
1 : 100@A1	14/05/18	PF	CH

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4786	3	20	Rev. No. P2

APPENDIX C

Historic Maps and Environmental Database Searches

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
62647315_1_1

Customer Reference:
LP851

National Grid Reference:
516970, 174380

Slice:
A

Site Area (Ha):
0.33

Search Buffer (m):
1000

Site Details:

Sharpe Refinery Services, Arlington Works
23 Arlington Road
TWICKENHAM
TW1 2BB

Client Details:

Mrs H Smith
Leap Environmental Ltd
The Atrium Business Centre
Curtis Road
Dorking
Surrey
RH4 1XA

Prepared For:

Sharpe's Recycle Oil Ltd
Arlington Works
Arlington Road
Twickenham
TW1 2BB

Contents

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	18
Hazardous Substances	-
Geological	20
Industrial Land Use	30
Sensitive Land Use	-
Data Currency	41
Data Suppliers	47
Useful Contacts	48

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Natural England Copyright Notice

Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v49.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			1	9
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control	pg 3	2	1		
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 4		1	3	3
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 5			Yes	
Pollution Incidents to Controlled Waters	pg 5		1	3	27
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality	pg 10			2	
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 10				2
Water Abstractions	pg 11		1		4 (*18)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 16	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 16	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 16	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 16	Yes	Yes	n/a	n/a
Flooding from Rivers or Sea without Defences	pg 17		Yes	n/a	n/a
Areas Benefiting from Flood Defences	pg 17	Yes	Yes	n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines	pg 17			Yes	n/a
Detailed River Network Offline Drainage					n/a

Envirocheck®

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 18				2
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 18	2			
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites	pg 19		1		
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 20	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 20	Yes		Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 25		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 28	Yes			
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities	pg 28				1
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 28	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 29	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 29	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards				n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Envirocheck®

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 30	1	19	35	72
Fuel Station Entries	pg 40				1
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: Leander Estates Ltd. Property Type: Toys & Sports Goods Location: Richmond Slipways, 1 Ducks Walk, East Twickenham, Middlesex Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTWC.2604 Permit Version: 1 Effective Date: 30th June 1988 Issued Date: 30th June 1988 Revocation Date: 2nd December 1999 Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Saline Estuary Receiving Water: River Thames **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	495	3	517460 174650
2	**Discharge Consents** Operator: Thames Water Utilities Ltd Property Type: Sewerage Network - Sewers - Water Company Location: Anyand Park Road, Twickenhamanyand Park Roadtwickenham Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.2369 Permit Version: 2 Effective Date: 3rd September 2010 Issued Date: 3rd September 2010 Revocation Date: Not Supplied Discharge Type: Public Sewage: Storm Sewage Overflow Discharge Environment: Saline Estuary Receiving Water: Tidal Thames **Status: Varied under EPR 2010** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	620	3	516500 173900
2	**Discharge Consents** Operator: Thames Water Utilities Ltd Property Type: Sewerage Network - Sewers - Water Company Location: Anyand Park Road, Twickenhamanyand Park Roadtwickenham Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.2369 Permit Version: 1 Effective Date: 2nd November 1989 Issued Date: 2nd November 1989 Revocation Date: 2nd September 2010 Discharge Type: Public Sewage: Storm Sewage Overflow Discharge Environment: Saline Estuary Receiving Water: Tidal Thames **Status: Temporary Consents (Water Act 1989, Section 113)** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	620	3	516500 173900
3	**Discharge Consents** Operator: Frank Hodgson And Associates Property Type: Undefined Or Other Location: Cholomondely Walk, Richmond, Surrey Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Ctwc.2560 Permit Version: 1 Effective Date: 22nd June 1988 Issued Date: 22nd June 1988 Revocation Date: 8th May 1991 Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Saline Estuary Receiving Water: R. Thames: Port Of London Dock **Status: Authorisation revokedRevoked** Positional Accuracy: Located by supplier to within 10m	A14NW (E)	665	3	517650 174650

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	**Discharge Consents** Operator: Sports-Drome Ltd. Property Type: Recreational & Cultural Location: Clevedon Road, Twickenham, Middlx Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Ctmr.0071 Permit Version: 1 Effective Date: 1st August 1976 Issued Date: 1st August 1976 Revocation Date: 18th February 1992 Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Saline Estuary Receiving Water: Thames **Status: Authorisation revokedRevoked** Positional Accuracy: Manually corrected supplier location	A14SE (E)	668	3	517700 174300
5	**Discharge Consents** Operator: Port Of London Authority Property Type: Domestic Property (Single) Location: Lock Keepers Cottage Richmond Lock Riverside Richmond Surrey Tw9 2qj Authority: Environment Agency, Thames Region Catchment Area: Thames - Kingston/Teddington Reference: Casm.2556 Permit Version: 1 Effective Date: 8th December 2006 Issued Date: 8th December 2006 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Tidal Thames **Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A18NE (N)	690	3	516990 175110
6	**Discharge Consents** Operator: Haslemere Estates (Development) Ltd. Property Type: Undefined Or Other Location: Richmond Riverside Development,Richmond, Surrey. Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTWC.0101 Permit Version: 1 Effective Date: 25th June 1985 Issued Date: 25th June 1985 Revocation Date: 4th December 1998 Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Saline Estuary Receiving Water: River Thames Tidal **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A14NE (E)	701	3	517710 174590
7	**Discharge Consents** Operator: Drs B Johal And C Goldwyn Property Type: Hospitals Location: The Temporary Surgery, 67 Cambridge Road, East Twickenham, Middlesex Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: Cntm.0684 Permit Version: 1 Effective Date: 29th January 1993 Issued Date: 29th January 1993 Revocation Date: 22nd December 1995 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Land/Soakaway Receiving Water: River Gravels On Londonclay **Status: Authorisation revokedRevoked** Positional Accuracy: Located by supplier to within 100m	A14SE (E)	780	3	517780 174150

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
8	**Discharge Consents** Operator: Thames Water Utilities Limited. Property Type: Sewerage Network - Sewers - Water Company Location: Petersham Road, London Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CSAB.0525 Permit Version: 1 Effective Date: 5th October 1987 Issued Date: 5th October 1987 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Saline Estuary Receiving Water: R.Thames (Tidal) **Status:** **Post National Rivers Authority Legislation where issue date > 31/08/1989** Positional Accuracy: Located by supplier to within 100m	A14NE (E)	852	3	517890 174390
9	**Discharge Consents** Operator: Mr S Pannifer Property Type: Domestic Property (Single) Location: 2b Cole Park Road, Twickenham, Middlesex Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: Ctwc.2291 Permit Version: 1 Effective Date: 21st March 1988 Issued Date: 21st March 1988 Revocation Date: 12th August 1996 Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Freshwater Stream/River Receiving Water: River Crane **Status:** **Authorisation revokedRevoked** Positional Accuracy: Located by supplier to within 100m	A7SW (SW)	974	3	516200 173700
10	**Integrated Pollution Prevention And Control** Name: Sharpe'S Recycle Oil Limited Location: Arlington Oil Reclamation Facility, Arlington Works, Arlington Road,,, TWICKENHAM, Middlesex, TW1 2BB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: ZP3535VS Original Permit Ref: Jp3332me Effective Date: 13th March 2014 **Status:** **Effective** Application Type: Variation App. Sub Type: Minor Positional Accuracy: Located by supplier to within 10m Activity Code: 5.6 A(1) a) Activity Description: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED Primary Activity: N Activity Code: 5.3 A(1) a) (ii) Activity Description: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT Primary Activity: Y Activity Code: 0.0 Associated Process Activity Description: Associated Process Primary Activity: N	A13SW (SW)	0	3	516970 174380
10	**Integrated Pollution Prevention And Control** Name: Sharpes Recycle Oil Limited Location: Arlington Oil Reclamation Facility, Arlington Works, Arlington Road,,, TWICKENHAM, Middlesex, TW1 2BB Authority: Environment Agency, Thames Region Permit Reference: JP3332ME Original Permit Ref: Jp3332me Effective Date: 18th October 2007 **Status:** **Effective** Application Type: Application App. Sub Type: New Positional Accuracy: Manually positioned to the address or location Activity Code: 5.3 A(1) (B) Activity Description: Other Waste Disposal; Waste Oils Greater Than 10T/Day Primary Activity: Y Activity Code: 0.0 Associated Process Activity Description: Associated Process Primary Activity: N	A13NE (E)	12	3	516996 174385

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	**Integrated Pollution Prevention And Control** Name: Sharpes Recycle Oil Limited Location: Arlington Oil Reclamation Facility, Arlington Works, Arlington Road,,, TWICKENHAM, Middlesex, TW1 2BB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: JP3332ME Original Permit Ref: Jp3332me Effective Date: 18th October 2007 **Status: Superseded By Variation** Application Type: Application App. Sub Type: New Positional Accuracy: Automatically positioned to the address Activity Code: 5.3 A(1) (B) Activity Description: Other Waste Disposal; Waste Oils Greater Than 10T/Day Primary Activity: Y Activity Code: 0.0 Associated Process Activity Description: Associated Process Primary Activity: N	A13SW (W)	0	3	516942 174370
12	**Local Authority Pollution Prevention and Controls** Name: Tip Top Dry Cleaners Location: 159 St Margarets Road, Twickenham, Tw1 1rd Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: LBRUT/DC/30 Dated: 27th March 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A13SW (W)	199	4	516715 174379
13	**Local Authority Pollution Prevention and Controls** Name: Kingwell Whitby & Mills Location: 31 Winchester Road, St Margarets, TWICKENHAM, Middlesex, TW1 1LE Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: EP/M/94/01/P1 Dated: 19th July 1994 Process Type: Local Authority Pollution Prevention and Control Description: PG1/1Waste oil burners, less than 0.4MW net rated thermal input **Status: Authorisation revokedRevoked** Positional Accuracy: Automatically positioned to the address	A13SW (W)	258	4	516656 174372
14	**Local Authority Pollution Prevention and Controls** Name: Rosslyn Clinic Location: 15 Rosslyn Road, TWICKENHAM, Middlesex, TW1 2AR Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: M94/01 Dated: 20th July 1994 Process Type: Local Authority Air Pollution Control Description: PG5/4 General waste incineration processes under 1 tonne an hour **Status: Application Refused Or Cancelled** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	326	4	517343 174277
15	**Local Authority Pollution Prevention and Controls** Name: Noble Dove Dry Cleaners Location: 374 Richmond Road, Twickenham, Tw1 2dx Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: LBRUT/DC/18 Dated: 27th March 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	466	4	517490 174277
16	**Local Authority Pollution Prevention and Controls** Name: Esso Petroleum Co Ltd Location: West London Terminal, Bedfont Road, Staines, Middlesex, TW19 7LZ Authority: London Borough of Hounslow, Environmental Health Department Permit Reference: PPC083 Dated: 28th July 1999 Process Type: Local Authority Air Pollution Control Description: PG1/13 Processes for the storage, loading and unloading of petrol at terminals **Status: Authorised** Positional Accuracy: Located by supplier to within 100m	A8SE (S)	768	5	517100 173600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
17	**Local Authority Pollution Prevention and Controls** Name: Regency Of Richmond Location: 18 Hill Street, Richmond, Tw9 1tn Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: 20 Dated: 29th March 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Authorisation revokedRevoked** Positional Accuracy: Manually positioned to the address or location	A14NE (E)	815	4	517786 174714
18	**Local Authority Pollution Prevention and Controls** Name: Shell Oak Lane Location: 5-11 Richmond Road, TWICKENHAM, Middlesex, TW1 3AB Authority: London Borough of Richmond upon Thames, Environmental Health Department Permit Reference: 17/PVR Dated: 31st December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A7SE (SW)	964	4	516459 173508
	Nearest Surface Water Feature	A13NW (NW)	261	-	516828 174646
19	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Petersham Road, RICHMOND Authority: Environment Agency, Thames Region Pollutant: General Note: No Pollution Found Incident Date: 18th January 1998 Incident Reference: 37268 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13NW (W)	34	3	516900 174400
20	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Ranlagh Drive Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 27th November 1991 Incident Reference: SE910329 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A18SE (NE)	439	3	517170 174810
20	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 10th November 1995 Incident Reference: SE950535 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A18SE (NE)	441	3	517200 174800
20	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: The Avenue, TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Storm Sewage Note: Not Supplied Incident Date: 4th November 1997 Incident Reference: THSE1997030760 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A18SE (N)	469	3	517150 174850

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
21	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 22nd January 1996 Incident Reference: SE960028 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A18SW (N)	505	3	516800 174900
22	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 22nd August 1994 Incident Reference: NE940636 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	532	3	516400 174500
23	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: St Margarets, TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Chemicals - Unknown Note: Confirmed As A Pollution Incident Incident Date: 1st December 1994 Incident Reference: N1940387 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	566	3	516400 174600
24	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Richmond Lock Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 24th June 1994 Incident Reference: SE940198 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A18SE (N)	582	3	517001 175001
25	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Northcote Road, ST MARGARETS Authority: Environment Agency, Thames Region Pollutant: Miscellaneous - Unknown Note: Confirmed As A Pollution Incident Incident Date: 12th April 1995 Incident Reference: N1950180 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	615	3	516400 174700
26	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Orchard Road, TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 13th February 1989 Incident Reference: N1890077 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NW (W)	615	3	516300 174400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
27	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: RICHMOND Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 19th February 1995 Incident Reference: SE950071 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	639	3	517600 174695
27	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: RICHMOND Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 19th August 1991 Incident Reference: SE910234 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	642	3	517600 174700
28	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Under Bridge, RICHMOND Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: Not Supplied Incident Reference: SE960458 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	693	3	517700 174595
28	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: RICHMOND Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 24th March 1992 Incident Reference: SE920099 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	694	3	517700 174600
29	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: TWICKENHAM Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 15th March 1992 Incident Reference: N1920146 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A12NW (W)	727	3	516200 174500
30	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: RICHMOND Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 18th December 1998 Incident Reference: THSE1998041565 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	769	3	517800 174495

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
30	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Richmond Bridge Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 28th August 1990 Incident Reference: SE900246 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	770	3	517800 174500
31	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: River Lane Authority: Environment Agency, Thames Region Pollutant: Miscellaneous - Unknown Note: Confirmed As A Pollution Incident Incident Date: Not Supplied Incident Reference: SE940437 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	782	3	517820 174400
32	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Richmond Slipway Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 17th February 1989 Incident Reference: SE890068 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	822	3	517800 174700
33	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: RICHMOND Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 1st September 1991 Incident Reference: SE910253 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	869	3	517900 174500
34	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: D/S Richmond Lock Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 28th March 1989 Incident Reference: SE890097 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A18NW (N)	881	3	516900 175300
35	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: 46 Napier Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 17th August 1992 Incident Reference: SE920271 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	887	3	516390 175100

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
36	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Upper Tidal Thames Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 21st May 1997 Incident Reference: THSE1997032240 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A18NW (N)	894	3	516800 175300
37	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Haliburton Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 7th May 1996 Incident Reference: N1960241 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	953	3	516405 175195
37	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: 46 Napier Road Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 17th September 1993 Incident Reference: SE930300 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	956	3	516400 175195
37	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: 461 Napier Road Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 13th July 1993 Incident Reference: SE930225 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	960	3	516400 175200
38	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Napier Road Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 26th August 1990 Incident Reference: SE900261 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	959	3	516350 175160
39	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Talbot Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 11th September 1990 Incident Reference: N1900100 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	982	3	516460 175265

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
40	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Talbot Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 18th March 1990 Incident Reference: N1900120 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	986	3	516460 175270
40	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Haliburton Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Miscellaneous - Unknown Note: Confirmed As A Pollution Incident Incident Date: 14th March 1991 Incident Reference: N1910126 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	988	3	516500 175295
40	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Talbot Road, ISLEWORTH Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 2nd December 1989 Incident Reference: N1890619 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	993	3	516500 175300
	River Quality Name: Crane GQA Grade: River Quality C Reach: Duke Of N'S R (Lower) - Tideway Estimated Distance (km): 3.4 Flow Rate: Flow less than 0.31 cumecs Flow Type: River Year: 2000	A12NE (W)	446	3	516491 174509
	River Quality Name: Not Supplied GQA Grade: Unclassified Tidal River Reach: Not Supplied Estimated Distance (km): Not Supplied Flow Rate: Not Supplied Flow Type: Not Supplied Year: 1995	A18SE (NE)	484	3	517260 174824
41	**Substantiated Pollution Incident Register** Authority: Environment Agency - Thames Region, South East Area Incident Date: 16th September 2003 Incident Reference: 190377 Water Impact: Category 2 - Significant Incident Air Impact: Category 4 - No Impact Land Impact: Category 4 - No Impact Positional Accuracy: Located by supplier to within 10m Pollutant: Inorganic Chemicals : Other	A12NW (W)	703	3	516232 174535
42	**Substantiated Pollution Incident Register** Authority: Environment Agency - Thames Region, South East Area Incident Date: 14th August 2003 Incident Reference: 181948 Water Impact: Category 2 - Significant Incident Air Impact: Category 4 - No Impact Land Impact: Category 4 - No Impact Positional Accuracy: Located by supplier to within 10m Pollutant: Pollutant Not Identified: Not Identified	A7NW (SW)	997	3	516139 173734

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
43	**Water Abstractions** Operator: St Margarets Res Grounds Licence Number: 28/39/34/0006 Permit Version: 100 Location: Borehole At St. Margaret'S Lake, Twickenham Authority: Environment Agency, Thames Region Abstraction: Private Non-Industrial Amenity: Lake And Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 20 Yearly Rate (m3): 7168 Details: St. Margaret'S Lake, Twickenham Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 8th October 1982 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A13NW (NW)	241	3	516800 174600
44	**Water Abstractions** Operator: D G Tilles & R H Tilles Licence Number: 28/39/34/0008 Permit Version: 103 Location: The Exiles Ground, Twickenham- Borehole A Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: The Exiles Ground, Twickenham Authorised Start: 01 October Authorised End: 30 September Permit Start Date: 24th April 2003 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	960	3	517840 173860
44	**Water Abstractions** Operator: D.G.Tilles & R.H.Tilles Licence Number: 28/39/34/0008 Permit Version: 102 Location: Borehole At The Exiles Ground, Twickenham Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: The Exiles Ground, Twickenham Authorised Start: 01 October Authorised End: 30 September Permit Start Date: 14th September 2001 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	960	3	517840 173860
44	**Water Abstractions** Operator: Threadneedle Property Part. Licence Number: 28/39/34/0008 Permit Version: 101 Location: Borehole At The Exiles Ground, Twickenham Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: The Exiles Ground, Twickenham Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 31st March 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	960	3	517840 173860

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
44	**Water Abstractions** Operator: Cable & Wireless (Meadowbank) Ltd Licence Number: 28/39/34/0008 Permit Version: 100 Location: Borehole At The Exiles Ground, Twickenham Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 56 Yearly Rate (m3): 5300 Details: The Exiles Ground, Twickenham Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 15th October 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A9NE (SE)	960	3	517840 173860
	Water Abstractions Operator: Trustees Of Ham Polo Club Licence Number: 28/39/35/0008 Permit Version: 101 Location: River Thames At Ham Polo Club, Petersham, Surrey Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Tidal Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Ham Polo Club - Petersham Surrey Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 23rd June 2004 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4NW (S)	1130	3	517330 173290
	Water Abstractions Operator: Trustees Of Ham Polo Club Licence Number: 28/39/35/0008 Permit Version: 101 Location: River Thames At Ham Polo Club, Petersham, Surrey Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Tidal Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Ham Polo Club - Petersham Surrey Authorised Start: 01 May Authorised End: 31 October Permit Start Date: 23rd June 2004 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4NW (S)	1130	3	517330 173290
	Water Abstractions Operator: Trustees Of Ham Polo Club Licence Number: 28/39/35/0008 Permit Version: 100 Location: River Thames At Ham Polo Club, Petersham, Surrey Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Tidal Daily Rate (m3): 227 Yearly Rate (m3): 3410 Details: River Thames At Ham Polo Club, Petersham, Surrey Authorised Start: 01 May Authorised End: 30 September Permit Start Date: 1st October 1981 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4NW (S)	1130	3	517330 173290

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Royal Mid Surrey Golf Club Licence Number: 28/39/35/0006 Permit Version: 100 Location: Borehole B Gravel At Royal Mid Surrey Golf Club, Richmond Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Gravel At Royal Mid Surrey Golf Club, Old Deer Park, Twickenham Road, Richmond, Surrey Authorised Start: 01 March Authorised End: 31 October Permit Start Date: 28th March 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A24SW (N)	1370	3	517450 175700
	Water Abstractions Operator: Royal Mid Surrey Golf Club Licence Number: 28/39/35/0006 Permit Version: 100 Location: Borehole A Gravel At Royal Mid Surrey Golf Club, Richmond Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 480 Yearly Rate (m3): 43000 Details: Gravel At Royal Mid Surrey Golf Club, Old Deer Park, Twickenham Road, Richmond, Surrey Authorised Start: 01 March Authorised End: 31 October Permit Start Date: 28th March 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A24NW (N)	1420	3	517460 175750
	Water Abstractions Operator: The Trustees Of Royal Mid-Surrey Golf Club Licence Number: 28/39/35/0006 Permit Version: Not Supplied Location: Royal Mid-Surrey Golf Club, Old Deer Park, Twickenham Road, RICHMOND Authority: Environment Agency, Thames Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 480 Yearly Rate (m3): 43000 Details: Not Supplied Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A24NW (N)	1420	3	517460 175750
	Water Abstractions Operator: The Garvin Honey Co Ltd Licence Number: 28/39/36/0040 Permit Version: Not Supplied Location: Garvin House, ISLEWORTH Authority: Environment Agency, Thames Region Abstraction: Cooling Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 45 Yearly Rate (m3): 11365 Details: River Gravel Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A22SW (NW)	1460	3	516100 175600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Richmond Athletics Assoc Ltd Licence Number: 28/39/35/0009 Permit Version: 100 Location: Gravel At Richmond Athletics Ground, Kew Foot Road, Richmond Authority: Environment Agency, Thames Region Abstraction: Sports Grounds/Facilities: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 75 Yearly Rate (m3): 15911 Details: Gravel At Richmond Athletics Ground, Kew Foot Road, Richmond, Surrey Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A24SE (NE)	1472	3	517800 175650
	Water Abstractions Operator: Petersham Nurseries Limited Licence Number: 28/39/35/0004 Permit Version: 102 Location: Gravels At 143 Petersham Road, Richmond, Surrey Authority: Environment Agency, Thames Region Abstraction: Horticulture And Nurseries: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Petersham Nurseries, Petersham Road, Richmond, Surrey Authorised Start: 01 October Authorised End: 30 September Permit Start Date: 15th May 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5NW (SE)	1491	3	518080 173320
	Water Abstractions Operator: Petersham Nurseries Limited Licence Number: 28/39/35/0004 Permit Version: 101 Location: Gravels At 143 Petersham Road, Richmond, Surrey Authority: Environment Agency, Thames Region Abstraction: Horticulture And Nurseries: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Gravels At 143 Petersham Road, Richmond, Surrey Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 11th November 2001 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5NW (SE)	1491	3	518080 173320
	Water Abstractions Operator: Petersham Nurseries Limited Licence Number: 28/39/35/0004 Permit Version: 101 Location: Gravels At 143 Petersham Road, Richmond, Surrey Authority: Environment Agency, Thames Region Abstraction: Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Gravels At 143 Petersham Road, Richmond, Surrey Authorised Start: 01 October Authorised End: 30 September Permit Start Date: 11th November 2001 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5NW (SE)	1491	3	518080 173320

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Petersham Nurseries Limited Licence Number: 28/39/35/0004 Permit Version: 100 Location: Gravels At 143 Petersham Road, Richmond, Surrey Authority: Environment Agency, Thames Region Abstraction: Horticulture And Nurseries: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 27 Yearly Rate (m3): 227 Details: Gravels At 143 Petersham Road, Richmond, Surrey Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 9th July 1973 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A5NW (SE)	1519	3	518100 173300
	Water Abstractions Operator: Petersham Nurseries Limited Licence Number: 28/39/35/0004 Permit Version: 100 Location: Gravels At 143 Petersham Road, Richmond, Surrey Authority: Environment Agency, Thames Region Abstraction: Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Gravels At 143 Petersham Road, Richmond, Surrey Authorised Start: 01 October Authorised End: 30 September Permit Start Date: 9th July 1973 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5NW (SE)	1519	3	518100 173300
	Water Abstractions Operator: Thames Water Utilities Ltd Licence Number: 28/39/37/0007 Permit Version: 1 Location: D.Of Northumberland- Mogden Sewage Treatment Wrks, Isleworth Authority: Environment Agency, Thames Region Abstraction: Water supply related: General Use (Low Loss) Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Mogden Stw, Isleworth Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st January 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A16SW (W)	1584	3	515410 174860
	Water Abstractions Operator: Thames Water Utilities Ltd Licence Number: Th/039/0037/004 Permit Version: 1 Location: Duke Of Northumberland River - Mogden Sewage Treatment Works Authority: Environment Agency, Thames Region Abstraction: Water supply related: General Use (Low Loss) Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Mogden Stw, Isleworth, Middlesex Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2013 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A16SW (W)	1587	3	515406 174858

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Thames Water Utilities Ltd Licence Number: Th/039/0037/001 Permit Version: 1 Location: Duke Of Northumberland River - Mogden Sewage Treatment Works Authority: Environment Agency, Thames Region Abstraction: Water supply related: General Use (Low Loss) Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Na Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 12th August 2009 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A16SW (W)	1587	3	515406 174858
	Water Abstractions Operator: Richmond Golf Club Licence Number: 28/39/35/0005 Permit Version: 101 Location: Richmond Golf Club - Borehole 'C' Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Richmond Golf Club, Sudbrook Park Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 1st October 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1972	3	518250 172830
	Water Abstractions Operator: Richmond Golf Club Licence Number: 28/39/35/0005 Permit Version: 100 Location: Richmond Golf Club - Borehole 'C' Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Richmond Golf Club, Sudbrook Park Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 11th February 1974 Permit End Date: 30th September 2007 Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1972	3	518250 172830
	Groundwater Vulnerability Soil Classification: Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SW (E)	0	3	516974 174382
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A13SW (E)	0	2	516974 174382
	Superficial Aquifer Designations Aquifer Designation: Principal Aquifer	A13SW (E)	0	2	516974 174382
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NE (NE)	0	3	517013 174407
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NW (NW)	9	3	516933 174406

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13NW (NW)	16	3	516928 174405
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13SW (W)	192	3	516724 174333
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NW (NW)	11	3	516930 174407
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13NW (NW)	192	3	516875 174593
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NE (E)	230	3	517251 174478
	Areas Benefiting from Flood Defences Type: Area Benefiting from Flood Defences Boundary Accuracy: As Supplied	A13NE (NE)	0	3	517013 174407
	Areas Benefiting from Flood Defences Type: Area Benefiting from Flood Defences Boundary Accuracy: As Supplied	A13NW (NW)	9	3	516933 174406
	Flood Water Storage Areas None				
	Flood Defences None				
45	**Detailed River Network Lines** River Type: Down stream of High Water Mark River Name: Not Supplied Hydrographic Area: D006 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: Thames (Tidal) Water Course Reference: TH00	A18SE (NE)	465	3	517231 174814
	Detailed River Network Offline Drainage None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
46	**Historical Landfill Sites** Licence Holder: Not Supplied Location: St. Maragrets, Isleworth, Hounslow, London Name: Crane Avenue Allotments Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD11058 First Input Date: 31st December 1949 Last Input Date: 31st December 1961 Specified Waste Type: Not Supplied EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 5540/0088 BGS Ref: Not Supplied Other Ref: 8HO085	A12NE (W)	589	3	516353 174547
47	**Historical Landfill Sites** Licence Holder: Willmont Brothers Location: Isleworth, Hounslow, London Name: Ivybridge Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD11374 First Input Date: 31st December 1955 Last Input Date: 31st December 1966 Specified Waste Type: Deposited Waste included Inert and Industrial Waste EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 5540/0035 BGS Ref: Not Supplied Other Ref: 8HO037, HOU038	A12NW (W)	866	3	516062 174517
48	**Licensed Waste Management Facilities (Locations)** Licence Number: 83207 Location: Arlington Works, Arlington Road, Twickenham, Middlesex, TW1 2BB Operator Name: Sharpe Refinery Service (Hydro Carbons) Ltd Operator Location: Arlington Works, Arlington Road, Twickenham, Middlesex, TW1 2BB Authority: Environment Agency - Thames Region, South East Area Site Category: Special Waste Transfer Stations **Licence Status: Modified** Issued: 28th February 1995 Last Modified: 4th February 1999 Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NE (NE)	0	3	516986 174406
48	**Licensed Waste Management Facilities (Locations)** Licence Number: 83207 Location: Arlington Works, Arlington Road, Twickenham, Middlesex, TW1 2BB Operator Name: Sharpe Refinery Service (Hydro Carbons) Ltd Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Special Waste Transfer Stations **Licence Status: Modified** Issued: 28th February 1995 Last Modified: 4th February 1999 Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NE (NE)	0	3	516986 174406
	Local Authority Landfill Coverage Name: London Borough of Richmond Upon Thames - Has no landfill data to supply		0	10	516974 174382
	Local Authority Landfill Coverage Name: London Borough of Hounslow - Has no landfill data to supply		525	5	516423 174551

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	**Registered Waste Treatment or Disposal Sites** Licence Holder: Sharpe Refinery Serv'(Hydrocarbon) Ltd Licence Reference: DL587 Site Location: Arlington Works, 21 Arlington Road, TWICKENHAM, Middlesex, TW1 2BB Operator Location: As Site Address Authority: Environment Agency - Thames Region, South East Area Site Category: Transfer - with treatment Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 28th February 1995 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Sheet & Light Ferrous Metal Scrap Waste Oils Prohibited Waste: Clinical - As In Control.Waste Regs'92 Pcbs/Pcts Contrary To 75/439/Eec Spec.Waste (Epa'90:S62/1996 Regs)N.O.S Waste N.O.S. Waste With Dangerous Constituents Waste With Flash .Pt < 60 C Waste With Toxic Constituents	A13SW (S)	28	3	516975 174335

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: London Clay	A13SW (E)	0	2	516974 174382
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SW (E)	0	6	516974 174382
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SE (E)	0	6	517000 174382
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SE (NE)	344	6	517140 174735
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NW (S)	349	6	516974 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NE (S)	356	6	517000 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NE (S)	363	6	517000 173992

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NE (S)	363	6	517042 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NE (S)	366	6	517042 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SE (N)	393	6	517000 174812
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NE (SE)	422	6	517211 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	579	6	516974 175000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SE (N)	581	6	517000 175000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	588	6	516860 175000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A19SW (NE)	643	6	517514 174824
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A19SW (NE)	690	6	517362 175000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A14NE (E)	734	6	517755 174547
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8SE (S)	780	6	517109 173590
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A14NE (E)	832	6	517870 174405

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	851	6	516075 174509
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	854	6	516076 174527
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	854	6	516076 174527
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NE (N)	868	6	517000 175288
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12SW (W)	914	6	516000 174382
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12SW (W)	914	6	516000 174334

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	915	6	516000 174421
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	916	6	516024 174581
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	926	6	516000 174511
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A15SW (E)	962	6	518000 174382
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A7NW (W)	983	6	516000 174000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A3NW (S)	991	6	516768 173371

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A15SW (E)	993	6	518000 174143
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516963, 174576 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 62.00 mg/kg Lead Measured Concentration: 303.00 mg/kg Nickel Measured Concentration: 25.00 mg/kg	A13NW (N)	155	2	516963 174576
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517197, 174257 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.70 mg/kg Chromium Measured Concentration: 59.00 mg/kg Lead Measured Concentration: 329.00 mg/kg Nickel Measured Concentration: 24.00 mg/kg	A13SE (SE)	205	2	517197 174257
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516711, 174248 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.70 mg/kg Chromium Measured Concentration: 66.00 mg/kg Lead Measured Concentration: 838.00 mg/kg Nickel Measured Concentration: 33.00 mg/kg	A13SW (SW)	233	2	516711 174248
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517138, 174705 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 27.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 70.00 mg/kg Lead Measured Concentration: 253.00 mg/kg Nickel Measured Concentration: 24.00 mg/kg	A13NE (NE)	329	2	517138 174705

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516389, 174188 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 25.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 78.00 mg/kg Lead Measured Concentration: 456.00 mg/kg Nickel Measured Concentration: 40.00 mg/kg	A12SE (W)	553	2	516389 174188
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517277, 173817 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 17.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 64.00 mg/kg Lead Measured Concentration: 105.00 mg/kg Nickel Measured Concentration: 18.00 mg/kg	A8NE (SE)	616	2	517277 173817
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517675, 174285 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 22.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 64.00 mg/kg Lead Measured Concentration: 569.00 mg/kg Nickel Measured Concentration: 23.00 mg/kg	A14SE (E)	646	2	517675 174285
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516728, 173723 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 70.00 mg/kg Lead Measured Concentration: 473.00 mg/kg Nickel Measured Concentration: 30.00 mg/kg	A8NW (S)	657	2	516728 173723
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517702, 174887 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 57.00 mg/kg Lead Measured Concentration: 368.00 mg/kg Nickel Measured Concentration: 26.00 mg/kg	A19SE (NE)	829	2	517702 174887

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516761, 175229 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 67.00 mg/kg Lead Measured Concentration: 279.00 mg/kg Nickel Measured Concentration: 30.00 mg/kg	A18NW (N)	832	2	516761 175229
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516270, 173829 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 16.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 77.00 mg/kg Lead Measured Concentration: 509.00 mg/kg Nickel Measured Concentration: 23.00 mg/kg	A7NW (SW)	836	2	516270 173829
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517250, 175250 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 58.00 mg/kg Lead Measured Concentration: 219.00 mg/kg Nickel Measured Concentration: 20.00 mg/kg	A18NE (N)	878	2	517250 175250
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516155, 174814 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 13.00 mg/kg Cadmium Measured Concentration: 0.70 mg/kg Chromium Measured Concentration: 53.00 mg/kg Lead Measured Concentration: 151.00 mg/kg Nickel Measured Concentration: 15.00 mg/kg	A17SW (NW)	883	2	516155 174814
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 516755, 173443 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.00 mg/kg Cadmium Measured Concentration: 0.80 mg/kg Chromium Measured Concentration: 69.00 mg/kg Lead Measured Concentration: 800.00 mg/kg Nickel Measured Concentration: 27.00 mg/kg	A8SW (S)	922	2	516755 173443

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 517660, 173671 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 52.00 mg/kg Lead Measured Concentration: 257.00 mg/kg Nickel Measured Concentration: 23.00 mg/kg	A9SE (SE)	948	2	517660 173671
	BGS Urban Soil Chemistry Averages Source: British Geological Survey, National Geoscience Information Service Sample Area: London Count Id: 7189 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.30 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13SW (E)	0	2	516974 174382
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Man-Made Mining Cavities Easting: 517700 Northing: 174700 Distance: 731 Quadrant Reference: A14 Quadrant Reference: NE Bearing Ref: NE Cavity Type: Water Collection Shaft with 2 Galleries Commodity: Water Solid Geology Detail: London Clay, Lambeth Group, Thanet Sand Formation, Upper Chalk Formation Superficial Geology Detail: Kempton Park Gravels	A14NE (NE)	731	7	517700 174700
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SW (E)	0	2	516974 174382

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**Contemporary Trade Directory Entries** Name: Sharpe Industrial Services Ltd Location: Arlington Works, 23, Arlington Road, Twickenham, TW1 2BB Classification: Tank Cleaning & Repairing **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (W)	0	-	516942 174370
51	**Contemporary Trade Directory Entries** Name: Twickenham Location: 23-27, Arlington Road, Twickenham, TW1 2AZ Classification: Blacksmiths & Forgemasters **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	10	-	517015 174381
52	**Contemporary Trade Directory Entries** Name: Able Refrigeration Location: 1 Kelvin Dr, Twickenham, Middlesex, TW1 2AJ Classification: Domestic Appliances - Servicing, Repairs & Parts **Status: Active** Positional Accuracy: Manually positioned to the road within the address or location	A13SW (S)	36	-	516970 174323
53	**Contemporary Trade Directory Entries** Name: The Senate Location: Film Studios Novelo Lodge, Twickenham, Middlesex, TW1 2AW Classification: Office Furniture & Equipment **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A13SW (SW)	47	-	516902 174311
53	**Contemporary Trade Directory Entries** Name: Cast Iron Co Ltd Location: 8, Old Lodge Place, Twickenham, TW1 1RQ Classification: Wrought Ironwork **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	57	-	516862 174338
53	**Contemporary Trade Directory Entries** Name: Fusion Oil & Gas Location: 8, Old Lodge Place, Twickenham, TW1 1RQ Classification: Oil & Gas Exploration Supplies & Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	57	-	516862 174338
54	**Contemporary Trade Directory Entries** Name: Arlington Auto Precision Location: Unit 8,Arlington Rd, Twickenham, Middlesex, TW1 2AZ Classification: Car Body Repairs **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A13NE (NE)	58	-	517047 174449
54	**Contemporary Trade Directory Entries** Name: P J Location: 35, Arlington Road, Twickenham, TW1 2AZ Classification: Car Body Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	64	-	517049 174455
55	**Contemporary Trade Directory Entries** Name: Medici Stone Ltd Location: Unit 3,Arlington Rd, Twickenham, Middlesex, TW1 2AZ Classification: Stone Products - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (SE)	59	-	517072 174338
56	**Contemporary Trade Directory Entries** Name: Capital Vehicle Location: 120, St. Margarets Road, Twickenham, Middlesex, TW1 2AA Classification: Garage Services **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	121	-	516848 174259
56	**Contemporary Trade Directory Entries** Name: Taste International Ltd Location: 120, St. Margarets Road, Twickenham, Middlesex, TW1 2AA Classification: Glove Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	122	-	516848 174259
57	**Contemporary Trade Directory Entries** Name: Yellow Wedge Cheese Location: 6, Crown Road, Twickenham, TW1 3EE Classification: Cheese Makers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	175	-	516853 174192

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
58	**Contemporary Trade Directory Entries** Name: Pack Saddle Leather Ltd Location: 1, Broadway Avenue, Twickenham, Middlesex, TW1 1RH Classification: Leather Merchants & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	192	-	516734 174296
59	**Contemporary Trade Directory Entries** Name: Wheels Location: 95, St. Margarets Road, TWICKENHAM, TW1 2LJ Classification: Car Dealers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (S)	193	-	516944 174156
59	**Contemporary Trade Directory Entries** Name: Everest Motors Servicing Location: 91, St. Margarets Road, Twickenham, TW1 2LJ Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	196	-	516952 174154
60	**Contemporary Trade Directory Entries** Name: Tip Top Location: 159, St. Margarets Road, Twickenham, TW1 1RD Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (W)	201	-	516714 174379
61	**Contemporary Trade Directory Entries** Name: Peace & Plenty Location: 22, Crown Road, Twickenham, TW1 3EE Classification: Fireplaces & Mantelpieces **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	206	-	516865 174153
61	**Contemporary Trade Directory Entries** Name: Nigel Hare Location: 32, Crown Road, Twickenham, Middlesex, TW1 3EE Classification: Shutters - Internal **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	235	-	516871 174121
62	**Contemporary Trade Directory Entries** Name: Causer Cars Location: 16a, Crown Road, Twickenham, TW1 3EE Classification: Car Body Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	212	-	516828 174163
62	**Contemporary Trade Directory Entries** Name: Crown Classic Cars Ltd Location: 16d, Crown Road, Twickenham, TW1 3EE Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	228	-	516810 174155
63	**Contemporary Trade Directory Entries** Name: S R Cleaning Location: 37, Crown Road, Twickenham, Middlesex, TW1 3EJ Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	252	-	516913 174097
63	**Contemporary Trade Directory Entries** Name: Sayani Pharmaceuticals Location: 38, Crown Road, Twickenham, TW1 3EH Classification: Chemists' & Pharmacists' Suppliers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	261	-	516884 174092
63	**Contemporary Trade Directory Entries** Name: Autobahn Location: 47a, Crown Road, Twickenham, TW1 3EJ Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	275	-	516922 174074
63	**Contemporary Trade Directory Entries** Name: Marble Drycleaners Location: Flat 4, 47, Crown Road, Twickenham, TW1 3EJ Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (S)	283	-	516924 174066

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
63	**Contemporary Trade Directory Entries** Name: Auto Gallery Location: 47, Crown Road, Twickenham, TW1 3EJ Classification: Car Dealers - Used **Status: Active** Positional Accuracy: Manually positioned to the address or location	A13SW (S)	283	-	516924 174066
64	**Contemporary Trade Directory Entries** Name: Kingwell Whitby & Mills Location: 31, Winchester Road, Twickenham, TW1 1LE Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	263	-	516651 174377
65	**Contemporary Trade Directory Entries** Name: The French Correction Location: Amyand Park Road, Twickenham, TW1 3HY Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned in the proximity of the address	A13SW (SW)	264	-	516755 174150
66	**Contemporary Trade Directory Entries** Name: L A Bower Location: 34, Park House Gardens, Twickenham, TW1 2DE Classification: Art Restoration & Picture Cleaning **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	271	-	517220 174591
67	**Contemporary Trade Directory Entries** Name: Mariya Cleaning Services Location: 40, The Grove, St. Margarets Road, Twickenham, TW1 1RB Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (W)	286	-	516638 174438
68	**Contemporary Trade Directory Entries** Name: Kukri Sports Ltd Location: 41, St. Margarets Road, Twickenham, Middlesex, TW1 2LL Classification: Sports Equipment Manufacturers & Distributors **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SE (SE)	289	-	517202 174148
69	**Contemporary Trade Directory Entries** Name: Z P M Location: 29, St. Stephens Gardens, Twickenham, TW1 2LT Classification: Bathroom Fixtures - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	316	-	517146 174088
70	**Contemporary Trade Directory Entries** Name: N T N Maintenance Ltd Location: 7, Ailsa Road, Twickenham, TW1 1QJ Classification: Air Conditioning Equipment & Systems **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	320	-	516730 174642
71	**Contemporary Trade Directory Entries** Name: Kwik-Fit Location: 353, Richmond Road, Twickenham, TW1 2EJ Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	357	-	517378 174280
71	**Contemporary Trade Directory Entries** Name: Kwik-Fit Location: 353, Richmond Road, Twickenham, TW1 2EJ Classification: Tyre Dealers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (E)	357	-	517378 174280
72	**Contemporary Trade Directory Entries** Name: Blowup Location: 146, Amyand Park Road, Twickenham, TW1 3HY Classification: Photographic Processors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	377	-	516678 174069
73	**Contemporary Trade Directory Entries** Name: Mobile Ultrasound Ltd Location: 33, Napoleon Road, Twickenham, TW1 3EW Classification: X-Ray Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (SW)	398	-	516795 173975

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
74	**Contemporary Trade Directory Entries** Name: Bodywise Ltd Location: 348, Richmond Road, Twickenham, TW1 2DU Classification: Toiletries **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	417	-	517425 174235
74	**Contemporary Trade Directory Entries** Name: The Press Gang Location: 360, Richmond Road, Twickenham, TW1 2DX Classification: Ironing & Home Laundry Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	444	-	517459 174250
74	**Contemporary Trade Directory Entries** Name: The Press Gang Location: 360, Richmond Road, Twickenham, TW1 2DX Classification: Ironing & Home Laundry Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (E)	444	-	517459 174250
75	**Contemporary Trade Directory Entries** Name: Toprail Systems Ltd Location: 6, Drummond Place, Twickenham, TW1 1JN Classification: Storage & Shelving Systems Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	429	-	516594 174076
76	**Contemporary Trade Directory Entries** Name: Call Print Ltd Location: 377, Richmond Road, Twickenham, TW1 2EF Classification: Printers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	438	-	517466 174300
76	**Contemporary Trade Directory Entries** Name: Noble Dove Location: 374, Richmond Road, Twickenham, TW1 2DX Classification: Laundries & Launderettes **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	467	-	517490 174275
76	**Contemporary Trade Directory Entries** Name: Noble Dove Location: 374, Richmond Road, Twickenham, TW1 2DX Classification: Laundries & Launderettes **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (E)	467	-	517490 174275
76	**Contemporary Trade Directory Entries** Name: Tass & Co Location: 382, Richmond Road, Twickenham, TW1 2DY Classification: Wallpapers & Wall Coverings **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	487	-	517516 174297
76	**Contemporary Trade Directory Entries** Name: Quality Waste Services Ltd Location: 384, Richmond Road, Twickenham, Middlesex, TW1 2DY Classification: Waste Disposal Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	491	-	517521 174303
77	**Contemporary Trade Directory Entries** Name: The Grove Garage Location: 47, St. Margarets Grove, Twickenham, TW1 1JF Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (W)	441	-	516473 174374
77	**Contemporary Trade Directory Entries** Name: Britannia Carton Makers & Print Finishers Location: 47, St. Margarets Grove, Twickenham, Middlesex, TW1 1JF Classification: Print Finishers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12SE (W)	441	-	516473 174374
77	**Contemporary Trade Directory Entries** Name: Eagle Crown Productions Location: 47, St. Margarets Grove, Twickenham, Middlesex, TW1 1JF Classification: Photo & Digital Imaging Bureaus **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12SE (W)	441	-	516473 174374

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
77	**Contemporary Trade Directory Entries** Name: Eickemeyer Location: 47, St. Margarets Grove, Twickenham, Middlesex, TW1 1JF Classification: Veterinary Equipment Manufacturers **Status: Active** Positional Accuracy: Manually positioned to the address or location	A12SE (W)	441	-	516473 174374
78	**Contemporary Trade Directory Entries** Name: Rheological Ltd Location: Drummond Pl, Twickenham, Middlesex, TW1 1JN Classification: Air Compressors **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A12SE (SW)	479	-	516549 174052
79	**Contemporary Trade Directory Entries** Name: Churchill Garage Location: 193, Richmond Road, Twickenham, TW1 2NJ Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	490	-	516968 173860
80	**Contemporary Trade Directory Entries** Name: Tfse Location: 5, Moor Mead Road, Twickenham, TW1 1JS Classification: Catering Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	490	-	516467 174162
81	**Contemporary Trade Directory Entries** Name: Richmond Bridge Mot Centre Location: 415, Richmond Road, Twickenham, TW1 2EF Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NW (E)	495	-	517532 174422
81	**Contemporary Trade Directory Entries** Name: Richmond Bridge Mot Centre Location: Ryde Place, Twickenham, Middlesex, TW1 2EH Classification: Mot Testing Centres **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A14NW (E)	497	-	517535 174388
81	**Contemporary Trade Directory Entries** Name: London Letterbox Marketing Location: 419, Richmond Road, Twickenham, TW1 2EX Classification: Distribution Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NW (E)	510	-	517548 174403
81	**Contemporary Trade Directory Entries** Name: All Round Cleaning Services Location: Richmond Bridge House, 419, Richmond Road, Twickenham, TW1 2EX Classification: Carpet, Curtain & Upholstery Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NW (E)	510	-	517548 174403
82	**Contemporary Trade Directory Entries** Name: The Jam Factory Location: 10, Normanhurst Drive, Twickenham, TW1 1NA Classification: T-Shirts **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	498	-	516514 174660
83	**Contemporary Trade Directory Entries** Name: Tiger Motors Location: 33 Alexandra Rd, Twickenham, Middlesex, TW1 2HE Classification: Garage Services **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14SW (E)	501	-	517512 174228
84	**Contemporary Trade Directory Entries** Name: Richmond Valet Location: 398, Richmond Road, Twickenham, TW1 2DY Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	517552 174330
84	**Contemporary Trade Directory Entries** Name: Richmond Valet Houseproud Services The Location: 398, Richmond Road, Twickenham, TW1 2DY Classification: Dry Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	517552 174330

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
84	**Contemporary Trade Directory Entries** Name: Cleaning Direct Location: 398, Richmond Road, Twickenham, Middlesex, TW1 2DY Classification: Dry Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	517552 174330
85	**Contemporary Trade Directory Entries** Name: Eat Yer Greens Location: Willoughby House,439 Richmond Rd, Twickenham, Middlesex, TW1 2AG Classification: Children & Babywear - Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A14NW (E)	539	-	517575 174432
86	**Contemporary Trade Directory Entries** Name: Farm Energy Location: The White Cottage, Cambridge Park, Twickenham, TW1 2JU Classification: Windmills & Wind Power Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	543	-	517530 174157
87	**Contemporary Trade Directory Entries** Name: Cleaners Twickenham Location: 256, St. Margarets Road, Twickenham, TW1 1PR Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	571	-	516627 174884
88	**Contemporary Trade Directory Entries** Name: Port Of London Authority Location: The Lock House, Ranelagh Drive, Twickenham, TW1 1QZ Classification: Boatbuilders & Repairers **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SW (N)	574	-	516966 174995
89	**Contemporary Trade Directory Entries** Name: R D Campbell & Co Ltd Location: 27, Orleans Road, Twickenham, TW1 3BJ Classification: Perfume Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NW (S)	621	-	516945 173728
90	**Contemporary Trade Directory Entries** Name: Richmond Bridge Boat Hire Location: Bridge Boat House,Riverside, Richmond, Surrey, TW9 1TH Classification: Boatbuilders & Repairers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14NW (NE)	626	-	517590 174686
91	**Contemporary Trade Directory Entries** Name: A B A Alpha Location: 110, Amyand Park Road, Twickenham, TW1 3HP Classification: Washing Machines - Servicing & Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A7NE (SW)	635	-	516530 173856
92	**Contemporary Trade Directory Entries** Name: The Pure H2o Co Ltd Location: 70, Gordon Avenue, Twickenham, Middlesex, TW1 1NQ Classification: Water Coolers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	639	-	516405 174748
93	**Contemporary Trade Directory Entries** Name: Marble Cleaning Services Location: 17, Leeson House, Haggard Road, Twickenham, TW1 3AJ Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (SW)	645	-	516705 173744
94	**Contemporary Trade Directory Entries** Name: The Mineralogical Society Location: 12, Baylis Mews, Twickenham, TW1 3HQ Classification: Scientific Apparatus & Instruments - Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A7NE (SW)	674	-	516454 173868
95	**Contemporary Trade Directory Entries** Name: Baby Rucks Ltd Location: 16, Kilmorey Gardens, Twickenham, TW1 1PY Classification: Children & Babywear - Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SW (NW)	698	-	516647 175045