



R. Collard Ltd.

124 CARDIFF ROAD, READING

Preliminary Risk Assessment





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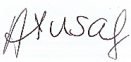
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1 INTRODUCTION AND OBJECTIVES

1.1 TERMS OF REFERENCE

WSP was instructed by the R Collard Limited (the Client) to undertake a Preliminary Risk Assessment (PRA) of 124 Cardiff Road, Reading, RG1 8NH (the Site) to support a planning application for the redevelopment of the Site. The Site location and layout plans are presented in **Appendix A**.

1.2 PROPOSED DEVELOPMENT

It is understood that the Client proposes to demolish the existing building and redevelop the Site with a single-storey shed which will be an extension of the existing shed to the west..

The purpose of the new building will be to extend the internal footprint of the operations of the waste depot located to the north and west of the Site. This allows for investment in better more advance waste and recycling plant, thus increasing the recycling rates of the current facility.

Proposed development plans are presented in **Appendix A**.

1.3 AIMS AND OBJECTIVES

The key aims of this assessment are to:

- Develop a preliminary Conceptual Site Model (CSM) to identify potential contamination risks associated with the proposed development of the Site;
- Evaluate likely contaminated land exposure pathways and their potential significance on identified receptors to support the proposed redevelopment; and
- Highlight environmental considerations (i.e. potential risks/constraints) with respect to ground, ground gas and groundwater conditions.

1.4 SCOPE OF WORKS

In order to meet the aims stated above, the following scope of works have been undertaken:

- Site walkover to document the current land use, potential sources of contamination, make observations of current potential impact and the setting of the Site;
- Review of publicly available historical maps and Site plans to identify former land uses and potentially contaminative activities on the Site and within the area surrounding the Site;
- Review of relevant publicly available information relating to hydrology, hydrogeology, neighbouring land use, ecologically sensitive uses and geology in order to establish the environmental setting of the Site;
- Develop a preliminary Conceptual Site Model (CSM) for the Site utilising the source-pathway-receptor contaminant linkage approach; and,
- Outline the environmental risks and / or opportunities with respect to ground, groundwater and ground gas conditions which may potentially arise as liabilities or constraints associated with the redevelopment of the Site.

1.5 LEGISLATIVE CONTEXT AND GUIDANCE

This report has been prepared in general accordance with:

- Part 2A of the Environmental Planning Act 1990; and,
- The National Planning Policy Framework (NPPF) 2019.

The following good practice and statutory guidance were considered and the assessment was undertaken in general accordance with:

- Environment Agency (EA) Land Contamination Risk Management (LCRM), 2020; and,
- CIRIA C552 'Contaminated Land Risk Assessment. A guide to good practice' (2001).

1.6 SOURCES OF INFORMATION

The following relevant sources of information were used in the production of this report:

- Groundsure Enviro + Geo Insight Report, Reference: GS-7281470, dated 16 November 2020;
- British Geological Survey (BGS) Online Viewer (<https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>) accessed 17 November 2020;
- BGS map – Reading, England and Wales Sheet 268, Solid and Drift Edition, 1:50 000 accessed 17 November 2020;
- Flood Maps for Planning Service (<https://flood-map-for-planning.service.gov.uk/>) accessed 17 November 2020;
- Defra's Multi-Agency Geographic Information for the Countryside MAGIC website (<https://magic.defra.gov.uk/MagicMap.aspx>) accessed 17 November 2020;
- Public Health England, UK Maps of Radon (<https://www.ukradon.org/information/ukmaps>) accessed 17 November 2020;
- Reading Borough Council Planning Portal (<http://planning.reading.gov.uk/>), accessed 23 November 2020;
- The Coal Authority Interactive Viewer (<http://mapapps2.bgs.ac.uk/coalauthority/home.html>) accessed on 17 November 2020;
- Zetica Risk Maps (<https://zeticauxo.com/downloads-and-resources/risk-maps/>) accessed 17 November 2020; and,
- Demolition / Refurbishment Asbestos Survey Report. 124-126 Cardiff Road, Reading, RG1 8HX. Airsafe Surveys Ltd, June 2020.

1.7 LIMITATIONS

This report is addressed to and may be relied upon by R Collard Limited. It may not be relied upon or transferred to any other parties without the express written agreement of WSP. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party. WSP cannot be held liable for third party information. Full details of the limitations are provided in **Appendix B**.

1.8 UNDERSTANDING RISK

It is important to recognise that any risks identified during the preliminary assessment such as those presented below, are perceived risks based on the recorded information reviewed. A more detailed assessment of the actual risks can only be assessed following intrusive investigations. The preliminary assessments presented herein are qualitative based on professional judgement following review of the available data and within the context of the existing / future use. The risk categories presented (Very Low, Low, Low to Moderate, Moderate, High, Very High) follow guidance presented in CIRIA Publication C552, Contaminated Land Risk Assessment – A Guide to Good Practice. CIRIA states that the risk levels should be based on an understanding of both the probability (likelihood) of a risk occurring and the magnitude of the potential consequence (severity) of a risk.

CIRIA defines four levels of probability and four levels of severity with relation to contaminated land, as presented in **Appendix C**.

2 SUMMARY OF THE SITE AND SURROUNDING AREA

2.1 SITE DESCRIPTION AND CURRENT USE

A Site Location Plan and Site Layout Plans are presented in **Appendix A**.

Table 2-1 provides a detailed summary of the Site and information obtained from a Site walkover undertaken by a representative of WSP on the 25 November 2020. Representative Site photographs from the walkover are presented in **Appendix D**.

Table 2-1 – Summary of Site Details

Detail	Comment
Name and Address of Site	124 Cardiff Road, Reading, RG1 8NH
National Reference Grid	470519, 174152
Site Area	0.12 Hectares (Ha)
Site Description and Current Use	The Site is rectangular in shape and currently comprises a disused single storey building with a car park directly to the south. The majority of the Site is occupied by a building which is currently utilised by the adjacent waste depot for empty bin storage. Anecdotal evidence suggests that the building was previously been utilised as a warehouse / production facility for dyes and cosmetics. The building was noted to be in poor condition with a leaking roof, damp and mould and evidence of unauthorised entry. A car parking area was noted to the south of the building and a vehicle access route was present to the west of the building. A narrow walkway was also present to the east of the building; vegetation and evidence of fly tipping was noted in the walkway. Skips belonging to the adjacent waste depot were noted to be stored in the external parts of the building. Access to the Site is from Cardiff Road to the south.
Site Setting and Surrounding Area	The Site is located within a mixed commercial and light industrial area. North and West – Waste and recycling depot. East – a parcel depot. South – Cardiff Road with various commercial / light industrial units beyond including an enameller, tyre centre and car service centre.
Surface Cover and Topography	The external areas of the Site were predominantly covered by tarmacadam of fair condition; occasional scarring and cracking was noted. Areas of concrete hardstanding were noted immediately to the south and north east of the building. The majority of the Site was noted to be relatively flat, however a slight slope (approximately 0.25 m) towards Cardiff Road was noted at the southern end of the Site.
Visual observations of Contamination	Red staining was noted on the floor in the north of the building. Anecdotally, the north of the building was previously used for dye storage and spraying operations.

Detail	Comment
Waste	Empty waste storage bins were noted to be stored within the building and empty skips were noted around the exterior of the building. Occasional litter was noted within the building as a result of unauthorised entry. Evidence of fly tipping was noted along the western boundary of the Site with wastes including general waste and upholstery.
Drainage	Various drainage covers were noted around the Site. It should be noted that drainage covers were not lifted during the walkover.
Invasive Species	Buddleia was observed growing within the hardstanding along the western boundary of the Site.

3 HISTORICAL LAND USE

3.1 HISTORY ON-SITE AND THE SURROUNDING AREA

Historical maps were obtained as part of the Groundsure report (**Appendix E**) and were reviewed to identify potentially contaminative former land uses on the Site and within a 500 m radius of the Site boundary.

A summary of the on-Site and off-Site features relevant to contaminated land are presented in **Table 3-1**.

Table 3-1 – Summary of Pertinent History of the Site and Surrounding Area

Date of Historical Map	On-Site	Off-Site
1877 - 1900	The Site comprises undeveloped land.	Undeveloped land is present adjacent to the Site in all directions. A track is present approximately 50 m east. An embankment and railway line approximately 100 m south. The railway line runs in an approximate east to west orientation. An engine shed, shed and sidings are present approximately 200 m south east.
1910 - 1913	No significant changes. A drainage ditch passes through the centre of the Site.	Cardiff Road is present adjacent to the south of the Site running in an east to west orientation. A printing works is located approximately 400 m east. The embankment and railway line to the south of the Site has expanded northwards and includes a number of small buildings approximately 75 m south of the Site. A tank is present 300 m south of the Site.
1932 - 1936	Allotment gardens are present in the southern part of the Site.	Allotment gardens extend to the east and west from adjacent to the Site. Unlabelled buildings are located 100 m east. Allotment gardens are located approximately 20 m south. Further expansion to the railway line, sidings and associated buildings to the south, now present approximately 50 m south. A coal yard is located 200 m south.
1959 - 1961	The central part of the Site is occupied by a works.	Allotment gardens are present adjacent to the east of the Site. Offices and a depot are present approximately 100 m east, with a coal yard beyond (220 m). The allotment gardens to the south are no longer present. A number of works and

Date of Historical Map	On-Site	Off-Site
		warehouses are present from approximately 20 m south. Further development of the railway line and sidings from 50 m south. The area includes a crane, and several tanks. There is a works adjacent to the west of the Site, and a warehouse approximately 50 m west. There is an unlabelled building approximately 75 m north west.
1969 - 1988	The Site is occupied by a metal works. From 1973, the Site is no longer labelled as a metal works and the building has been extending to the north. A builder's yard extends into the north western corner of the Site.	Significant development has occurred to the north and north east of the Site. A builder's yard is adjacent to the north and west with a series of works (including engineering, printing and chemical), depots (including vehicle), warehouses, with associated tanks and electrical substations from 100 m north and 50 m north east and north west of the Site. An electrical substation is located approximately 50 m north west. A parcel depot is located approximately 20 m east. There is a small structure located approximately 75 m east, which is potentially a fuel filling point. There is a vehicle depot and electrical substation located 120 m east. A diesel locomotive maintenance depot is located approximately 200 m south.
1993 - 2010	No significant changes.	Further expansion to the commercial / industrial areas to the north, north east, north west and west of the Site. There is a tank located approximately 75 m east which appears to be associated with the potential fuel filling point. The diesel locomotive maintenance depot to the south is labelled as a depot.
2020	No significant changes.	Depot to the south of the Site is no longer present.

Anecdotal evidence obtained during the Site walkover indicated that the building on the Site has previously been utilised as a warehouse / production facility for dyes and cosmetics, however the dates and details of these activities are unknown.

4 ENVIRONMENTAL SETTING

4.1 GEOLOGY

British Geological Survey (BGS) map 268 of Reading (1:50,000 scale Solid and Drift Edition) and the BGS Online Viewer indicate that the Site is underlain by a superficial geology comprising the Langley Silt Member which is underlain sequentially by Alluvium and the Kempton Park Gravel Member. The bedrock geology comprises the Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) (Chalk Group).

WSP has reviewed a publicly available BGS borehole log located approximately 50 m south west (SU77SW4). The BGS borehole log is presented in **Appendix F. Table 4-1** provides a summary of the borehole logs.

Table 4-1 – Ground Profile with Material Description

Stratum*	Depth to Top of Strata (m bgl)	Depth Base Strata to of (m bgl)	Typical Strata Description
Made Ground	0.00	1.52	Topsoil Chalk
Langley Silt Member / Alluvium	1.52	2.74	Clay
Kempton Park Gravel Member	2.74	8.53	Gravel
Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated)	8.53	>24.38	Rubble Chalk and Flint

* Inferred from log description

4.2 HYDROGEOLOGY AND HYDROLOGY

The Environment Agency classifies the units underlying the Site as follows:

- Langley Silt Member – Unproductive strata
- Alluvium – Secondary A Aquifer
- Kempton Park Gravel Member – Secondary A Aquifer
- Chalk Group – Principal Aquifer

The BGS borehole log (SU77SW4) noted the resting groundwater level to be at approximately 1.50 m below ground level (bgl).

There are four records of groundwater abstraction points located within 500 m of the Site. The closest are located approximately 110 m west and 145 m south east, which are held by Hillier Group of Companies, with the abstraction used for process water. There is a record of a groundwater abstraction located approximately 370 m east for drinking, cooking, sanitary and washing (small garden) held by Cox & Wyman Ltd.

The Site is not located within a Source Protection Zone (SPZ), and there are no SPZ located within 500 m.

The nearest surface water feature to the Site is an unnamed water course located 240 m north of the Site. The River Thames is located approximately 500 m north.

There are no surface water abstractions recoded within 500m of the Site.

4.3 FLOODING

The Site is located within an area classified by the EA as Flood Zone 2 indicating a medium probability of flooding. Given this a flood risk assessment would be required for development. Site is located within an area designated as having Moderate to High potential for groundwater flooding to occur.

The Groundsure report suggests that the Site is located within an area that is susceptible to surface water flooding from a 1 in 100 year rainfall event.

4.4 GROUND STABILITY

The ground stability hazards summarised in **Table 4-2** were outlined as part of the Groundsure Report (ultimately sourced from the BGS).

Table 4-2 - Summary of Ground Stability Hazards

Hazard	Potential
Shrinking or Swelling of Clay	Very Low
Running Sands	Negligible
Compressible Deposits	Negligible
Collapsible Deposits	Very Low
Landslides	Very Low
Ground Dissolution	Very Low

4.5 MINING

The Coal Authority interactive viewer confirmed that the Site is not located within a coal authority designated mining area.

The Groundsure report indicates that the Site is not located within an area where non-coal mining activities occurred.

4.6 RADON

Public Health England records indicate that the site lies within a lower probability Radon area (less than 1% of homes are estimated to be at or above the Action Level). No Radon protective measures are likely to be necessary in the construction of new dwellings or extensions.

4.7 PRELIMINARY HYDROGEOLOGICAL MODEL

Made Ground is considered likely to be present at the Site, however, the Environment Agency does not provide an aquifer classification for Made Ground deposits. Although there is the potential for groundwater to be present within Made Ground deposits, it is considered unlikely to be a continuous groundwater body, but rather localised pockets or perched water that are likely to be recharged via surface infiltration.

The Langley Silt Member is classified as unproductive strata, therefore it has the potential to act as an aquitard preventing the migration of perched groundwater within Made Ground to the Alluvium and Kempton Park Gravel Member (Secondary A Aquifers).

Groundwater within the Alluvium and Kempton Park Gravel Member is considered to be in hydraulic continuity with the underlying Chalk Group (Principal Aquifer).

Groundwater within the Alluvium and Kempton Park Gravel Member is considered likely to flow north, towards the unnamed water course and River Thames.

5 REGULATORY INFORMATION AND CONSULTATION

5.1 REGULATORY DATABASE

The Groundsure report includes information and data collected from several organisations including the Environment Agency, the Local Authority, the British Geological Survey (BGS), Department of Environment, Food and Rural Affairs (Defra), Health and Safety Executives (HSE) and the National Radiological Protection Board (NPRB).

It is considered that the information in **Table 5-1** represents those of the potential concern in relation to contamination at the Site. The full Groundsure report is provided in **Appendix E**.

Table 5-1 – Summary of Database Searches

Descriptor	Onsite	0-50 m	50-250 m	250-500 m	Details
Historical Landfill	0	0	1	1	Two records within 500 m of the Site. The closest is located approximately 190 m north and relates to a historical landfill which accepted commercial, household and liquid sludge. The last recorded acceptance of waste was in 1979.
Historical waste sites	1	0	0	3	One record on site which relates to a planning application submitted for the construction of a steel framed prefabricated building of 375 square meters to form a waste transfer, sorting and recycling centre.
Licensed waste sites	0	3	0	4	Seven records within 500 m of the Site, of which three records related to the waste site adjacent to the west of the Site. The records relate to HCl waste transfer and treatment and a recycling facility.
Waste exemptions	0	2	21	15	Thirty-eight records within 500 m of the Site, of which two relate to the waste site adjacent to the west. Both records relate to the storage of waste in a secure place. Other exemptions within 500 m of the Site include repair or refurbishment of WEEE, use of waste in construction and spreading of plant matter to confer benefit.
Recent industrial uses	0	10	44	-	Fifty-four records within 250 m of the Site including waste storage, processing and disposal, industrial furnishings and coatings, vehicle repair, testing and servicing and rubber silicones and plastics.
Current or recent petrol stations	0	0	1	1	Two records within 500 m of the Site, both of which are obsolete. The closest was approximately 220 m east.

Descriptor	Onsite	0-50 m	50-250 m	250-500 m	Details
Sites determined as contaminated land	0	0	0	1	One record located 365 m south relating to benzo(a)pyrene in Made Ground and compost probably from ash at the George Street allotments. The site is categorised as 'potentially contaminated land – remediated'.
Control of Major Accident Hazards (COMAH)	0	0	1	0	One record located approximately 190 m south west relating to Reading Calor Centre.
Hazardous substance storage/usage	0	0	1	0	One recorded located approximately 175 m south west relating to the storage, sale and distribution of liquified petroleum gas in cylinders and bulk.
Historical licensed industrial activities	0	0	0	3	Three records located 425 m south west relating to inorganic chemical processes.
Licensed industrial activities	2	0	0	0	Two records on Site relating to Organic Chemicals, hydrocarbons e.g. aromatics held by Kingfisher Colours Limited. Both records are either superseded or surrendered.
Licensed pollutant release	0	1	4	2	Seven records within 500 m of the Site, the closest is located 25 m south and relates to coating processes. No enforcements have been notified.
Licensed discharge to controlled waters	0	0	0	8	The closest record to the Site relates to the discharge of final/treated sewage effluent to ground (Made Ground overlying Alluvium), the license has been revoked.
Pollutant release to public sewer	0	0	1	1	The closest record to the Site is located approximately 105 m west.
List 1 and 2 Dangerous Substances	0	1	0	4	Five records within 500 m of the Site, of which two records are active. Both active records are located approximately 320 m north and relate to Mercury and Cadmium.
Pollution Incidents	0	0	1	3	The closest to the Site is located approximately 150 m west and relates to metal wastes. A minor impact to land was recorded.

5.2 SENSITIVE LAND USES

The Site is located within a surface water nitrate vulnerable zone (NVZ). No other sensitive land uses were identified on Site.

5.3 LOCAL AUTHORITY

The Environmental Protection Officer at Reading Borough Council was contacted via email on 17 November 2020 regarding environmentally pertinent information held relating to the Site. A response is pending, and the report will be updated with pertinent environmental information once the response has been received.

5.4 ENVIRONMENT AGENCY

The Environment Agency (EA) was contacted via email on 17 November 2020 regarding environmentally pertinent information held relating to the Site. A response is pending, and the report will be updated with pertinent environmental information once the response has been received.

5.5 PLANNING INFORMATION

A search of the Reading Borough Council planning portal was undertaken on 23 November 2020.

One historical planning application was identified relating to the Site. The planning application was made in November 1988 relating to a single storey extension to the rear of the existing industrial unit. The status of the application is 'determination made' however the result of the determination is not presented on the portal.

5.6 UNEXPLODED ORDNANCE (UXO)

A review of online Zetica mapping indicates that the Site is located within an area at low risk from unexploded ordnance. An excerpt from the map is presented in **Appendix G**.

6 PREVIOUS REPORTS

6.1 DEMOLITION / REFURBISHMENT ASBESTOS SURVEY REPORT. 124-126 CARDIFF ROAD, READING, RG1 8HX. AIRSAFE SURVEYS LTD, JUNE 2020.

An asbestos survey of the building currently present on the Site was undertaken. A summary is presented below:

- A total of eleven samples were collected of suspected asbestos containing materials;
- One sample tested positive for asbestos from the boiler cupboard flooring tiles. They were found to contain chrysotile (white) asbestos; and
- The report recommends that the asbestos is removed from the building prior to demolition.

7 PRELIMINARY CONCEPTUAL SITE MODEL

7.1 INTRODUCTION

The preliminary Conceptual Site Model (CSM) is based upon the environmental conditions of the Site as described in the previous sections and was developed in the context of a future commercial / light industrial development.

The assessment followed a risk-based approach with the potential environmental risk assessed qualitatively using the 'source-pathway-receptor' contaminant linkage concept introduced in the guidance documents (principally the LCRM guidance) on the practical implementation of the Environmental Protection Act 1990.

Environmental risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is primarily dependant on Site usage and environmental conditions.

The environmental risk assessment has been carried out by identifying and evaluating the significance of the following:

- Potential sources of contamination: these include actual or potentially contaminating materials and activities, located on or in the vicinity of the Site;
- Potential receptors of contamination: these include Site users; and,
- Potential pathways for contamination migration: these are routes or mechanisms by which contaminants migrate from the source to the receptor.

7.2 POTENTIAL SOURCES OF CONTAMINATION

Table 7-1 provides a summary of the potential sources of contamination that may be present at the Site, as well as the likely nature of such sources.

Table 7-1 – Potential Sources of Contamination

Potential Source	Potential Contaminants of Concern	Likely / Anticipated Distribution
ON-SITE		
Made Ground	A wide range of potential contaminants including asbestos, heavy metals, inorganics, petroleum hydrocarbons, polyaromatic hydrocarbons (PAH), BTEX (benzene, toluene, ethylbenzene and xylene), semi volatile organic compounds (SVOC), volatile organic compounds (VOC) and ground gases (methane and carbon dioxide).	Site wide
Historical uses as metal works, builders' yard, allotments, licensed industrial activities, dyes / cosmetics uses.	Heavy metals, inorganics (e.g. cyanide), petroleum hydrocarbons, PAH, BTEX, solvents and dyes, SVOC, VOC, pesticides and herbicides.	Site wide

Potential Source	Potential Contaminants of Concern	Likely / Anticipated Distribution
OFF-SITE		
Made Ground	A wide range of potential contaminants including asbestos, heavy metals, inorganics, petroleum hydrocarbons, PAH, BTEX, SVOC, VOC and ground gases (methane and carbon dioxide).	All directions
Current waste transfer site and recycling site.	Asbestos, heavy metals, inorganics (e.g. cyanide and sulphate), petroleum hydrocarbons, PAH, BTEX, and polychlorinated biphenyls (PCBs)	West and North
Railway, sidings, engine sheds, diesel locomotive maintenance depot and coal yard	Asbestos, heavy metals, inorganics (e.g. cyanide and sulphate), acids, phenols, petroleum hydrocarbons, solvents, PAH, BTEX, SVOC, VOC and PCBs.	South
Warehouses, works and depots including car service centre and enamellers.	A wide range of potential contaminants including asbestos, heavy metals, inorganics, petroleum hydrocarbons, PAH, BTEX, SVOC and VOC.	All directions
Tank and potential fuel filling point	Petroleum hydrocarbons, BTEX, PAH and fuel additives.	East
Various tanks and Electrical Substations	Petroleum hydrocarbons, BTEX, PAH, fuel additives, mineral oils and PCBs.	Predominantly North
Historical landfill	A wide range of potential contaminants including asbestos, heavy metals, inorganics, petroleum hydrocarbons, PAH, BTEX, SVOC, VOC and ground gases (methane and carbon dioxide).	North

7.3 POTENTIAL RECEPTORS

In the context of the proposed development of the Site, the following potential receptors were identified:

Human Health

- Future Site users and workers;
- Construction and maintenance workers; and,
- Third party neighbours.

Controlled Waters

- Groundwater within the Alluvium (Secondary A Aquifer), Kempton Park Gravel Member (Secondary A Aquifer) and Chalk Group (Principal Aquifer);
- Unnamed water course and River Thames 240 m and 500 m north of the Site, respectively; and,
- Groundwater abstractions located 110 m west, 145 m south east and 370 m east of the Site.

Building Fabric and Services

- Below ground services; and,
- Building structures.

7.4 PLAUSIBLE PRELIMINARY CONTAMINANT LINKAGES

Table 7-2 provides an evaluation of the potential contaminant linkages that were considered to be plausible on the basis of the information currently available for the Site and the proposed redevelopment of the Site with a commercial / light industrial property.

Table 7-2 – Preliminary Conceptual Site Model

Potential Contaminant Sources	Receptor	Pathways	Comments
ON-SITE			
■ Made Ground ■ Historical uses as metal works, builders' yard, allotments, licensed industrial activities, dyes / cosmetics uses.	Human Health ■ Future Site users and workers ■ Construction and maintenance workers ■ Third party neighbours	■ Dermal contact ■ Indirect ingestion of contaminants ■ Inhalation of dust / fibres ■ Ground gas / vapour migration	The proposed development plans suggest that the entire Site is to be covered by hardstanding or building cover, therefore, the direct contact pathways (i.e. dermal contact, ingestion, inhalation) are considered unlikely to be present as the hardstanding / building cover provides a break in the pathway. Given this, the risk to future Site users and workers and third-party neighbour is considered to be Low. During the redevelopment of the Site, there is the potential for the hardstanding to be temporarily removed or broken. The risk to third party neighbours during this time is considered to be Low-Moderate, however the risks can be managed using good construction practices (e.g. dust suppression, wheel washing etc.). Ground gas and vapours have the potential to accumulate in confined spaces and may pose a risk of asphyxiation or explosion. The Site has historically been redeveloped and therefore it is considered likely that Made Ground deposits are present, which have the potential to generate ground gas. The risk from ground gas is considered to be Low-Moderate. Construction workers or maintenance workers may come in to contact with contaminated soils/groundwater during ground works or maintenance works (e.g. dermal exposure or inhalation of vapours or ground gases). The risk is considered to be Low-Moderate, however these risks should be managed via Health and Safety protocols during the works.
	Controlled Waters	■ Surface run off and infiltration	The proposed development plans include building cover or hardstanding across the entire Site. Therefore, limiting the infiltration of surface water to the subsurface, thus limiting the

Potential Contaminant Sources	Receptor	Pathways	Comments
	- Groundwater within the Alluvium, Kempton Park Gravel Member (Secondary A Aquifers) and Chalk Group (Principal Aquifer) - Unnamed water course and River Thames 240m and 500m north of the Site, respectively - Groundwater abstractions located 110m west, 145m south east and 370m east.	Vertical and lateral migration within groundwater	leaching potential of contaminants to shallow groundwater. In addition, it is considered likely that the Langley Silt Member acts as an aquitard preventing the migration of shallow contaminants to the underlying aquifers within the Alluvium, Kempton Park Gravel Member and Chalk Group. Groundwater underlying the Site is considered likely to flow broadly towards the north. Therefore, the groundwater abstractions to the west, south east and east are considered to be either up-hydraulic gradient or across gradient, and are unlikely to be impacted by groundwater underlying the Site. Given the distance to the nearest surface water receptor (240 m), groundwater underlying the Site is considered unlikely to significantly impact surface water courses. The risk to controlled waters is considered to be Low-Moderate.
	Building Fabric and Services - Below ground services; and - Building structures.	- Direct contact - Permeation of hydrocarbons through plastic pipes	Given the historical uses, there is the potential for permeation of hydrocarbons into plastic pipes. The risk is considered to be Low-Moderate.
OFF-SITE			
- Made Ground - Current waste transfer site and recycling site. - Railway, sidings, engine sheds, diesel locomotive	Human Health - Future Site users and workers - Construction and maintenance workers - Third party neighbours	- Inhalation of windblown dust and asbestos fibres; - Migration of ground gas and volatile vapours	The majority of the areas surrounding the Site are covered with hardstanding, therefore it is considered unlikely that windblown dust and fibres from off-site sources will impact receptors on the Site. The risk to human health receptors from windblown dust and fibres from off-Site is considered to be Low. Ground gas and vapours generated from Made Ground, landfilling and tanks in the areas surrounding the Site may

Potential Contaminant Sources	Receptor	Pathways	Comments
maintenance depot and coal yard - Warehouses, works and depots including car service centre and enamellers - Tank and potential fuel filling point - Various tanks and Electrical Substations - Historical landfill			migrate laterally in the subsurface and accumulate in enclosed spaces which could pose a risk of explosion or asphyxiation. The risk is considered to be Low-Moderate .
	Controlled Waters Groundwater within the Alluvium, Kempton Park Gravel Member (Secondary A Aquifers) and Chalk Group (Principal Aquifer)	Vertical and lateral migration within groundwater	The areas surrounding the Site have historically had industrial land uses with the potential to impact groundwater underlying the Site. Groundwater at the Site is anticipated to flow to the north, therefore potential off-Site sources to the south of the Site have the potential to impact groundwater underlying the Site. Given this, the risk to controlled waters from off-site sources is considered to be Low-Moderate .
	Building Fabric and Services - Below ground services; and - Building structures.	Lateral migration of contaminants via impacted groundwater	Based on the historical land uses in the surrounding area, there is the potential for the migration of contaminants in groundwater from off-Site sources. The risk is considered to be Low .

8 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the Site walkover and desk-based assessment, the following conclusions and recommendations have been made in the context of the proposed commercial / light industrial development.

8.1 CONCLUSIONS

Earliest available mapping from 1877 suggests that the Site comprised undeveloped land until 1932 when allotment gardens are shown to be present in the south of the Site. From 1959, the central part of the Site was occupied by a works, later called a metal works. From 1973, the building was no longer labelled as a metal works and the building was been extending towards the north to match the Sites present-day layout. Anecdotal evidence from the walkover suggests that the Site has more recently been used as a warehouse / production facility for dyes and cosmetics.

Superficial deposits at the Site comprise the Langley Silt Member (unproductive strata), which is underlain sequentially by Alluvium (Secondary A Aquifer) and the Kempton Park Gravel Member (Secondary A Aquifer). The bedrock geology is recorded to be the Chalk Group (Principal Aquifer). A BGS borehole log from within the vicinity of the Site indicates that resting groundwater level is at 1.50 m bgl.

Groundwater abstraction points are located 110 m west, 145 m south east and 370 m east of the Site.

The nearest surface water feature to the Site is an unnamed water course located 240 m north of the Site. The River Thames is located approximately 500 m north of the Site. Groundwater within the Alluvium and Kempton Park Gravel Member is considered likely to flow north, towards the unnamed water course and River Thames.

The proposed development plans suggest that the entire Site is to be covered by hardstanding or building cover, therefore, the direct contact pathways (i.e. dermal contact, ingestion, inhalation) are considered unlikely to be present as the hardstanding / building cover provides a break in the pathway. Given this, the risk to future Site users and workers and third-party neighbour is considered to be **Low**.

During the redevelopment of the Site, there is the potential for the hardstanding to be temporarily removed or broken. The risk to third party neighbours during this time is considered to be **Low-Moderate**.

Given that the Site and surrounding have historically been developed, it is considered likely that Made Ground deposits are present, which have the potential to generate ground gas. The risk from ground gas is considered to be **Low-Moderate**.

Construction workers or maintenance workers may come in to contact with contaminated soils/groundwater during ground or maintenance works (e.g. dermal exposure or inhalation of vapours or ground gases). The risk is considered to be **Low-Moderate**, however these risks should be managed via Health and Safety protocols during the works.

The proposed development plans include building cover or hardstanding across the entire Site. Therefore, limiting the infiltration of surface water to the subsurface, thus limiting the leaching potential of contaminants to shallow groundwater. In addition, it is considered likely that the Langley Silt Member acts as an aquitard preventing the migration of shallow contaminants to the underlying

aquifers within the Alluvium, Kempton Park Gravel Member and Chalk Group. Given the distance to the nearest surface water receptor (240 m), groundwater underlying the Site is considered unlikely to significantly impact surface water courses. The risk to controlled waters is considered to be **Low-Moderate**.

There is the potential for permeation of hydrocarbons into plastic pipes. Given the current and former land uses at the Site, the risk is considered to be **Low-Moderate**.

8.2 RECOMMENDATIONS

The following is recommended based on this Preliminary Risk Assessment:

- In order to satisfy planning conditions, an intrusive ground investigation is likely to be required at the Site. The ground investigation should be compliant with current UK guidance e.g. BS10175 and include a Generic Quantitative Risk Assessment (GQRA) to allow the assessment of identified plausible contaminant linkages and if remedial measures may be required. Geotechnical testing could also be undertaken to inform foundation design for the future redevelopment. It is recommended that the ground investigation is designed based on the following technical objectives:
 - Characterisation of the ground and groundwater conditions underlying the Site;
 - Soil, groundwater and surface water sampling for contamination;
 - Groundwater and ground gas monitoring;
 - Provision of a GQRA to assess risks to human health and controlled waters; and,
 - An assessment of potential foundation design and geotechnical constraints.