



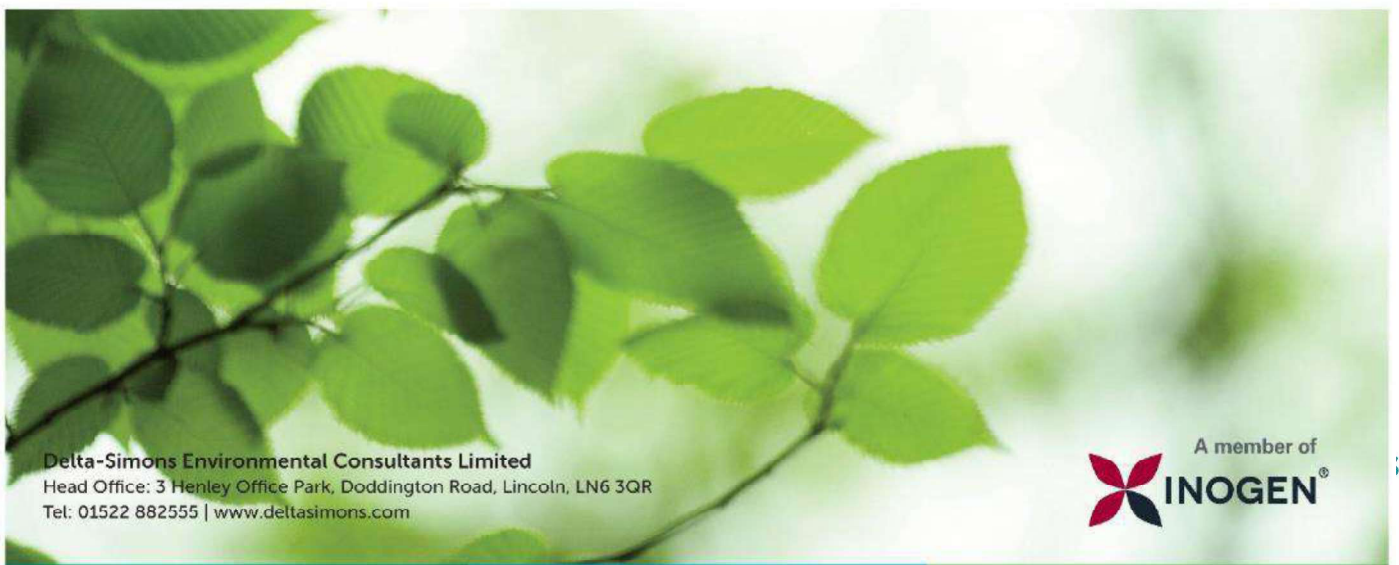
Preliminary Risk Assessment

Brunel Retail Park, Reading

Presented to Mayfair Capital Investment Management Limited

Issued: October 2020

Delta-Simons Project No. 18-0642.02



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Report Details

Client	Mayfair Capital Investment Management Limited
Report Title	Preliminary Risk Assessment
Site Address	Brunel Retail Park, Rose Kiln Lane, Reading RG2 0HS
Project No.	18-0642.02
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
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About us

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Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from ten locations - Lincoln, Birmingham, Bristol, Dublin, Leeds, London, Manchester, Newcastle, Norwich and Nottingham - we employ over 100 environmental professionals, bringing experience from across the private consultancy and public sector markets.

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Executive Summary

Brief	Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Quod on behalf of Mayfair Capital Investment Management Limited (the "Client") to prepare a Preliminary Risk Assessment of Brunel Retail Park, located on Rose Kiln Lane, Reading RG2 0HS in the context of a proposed redevelopment of the Site to a commercial/ light industrial use.
Site Use & Surrounding Area	The Site is occupied by a retail park with customer car parking, service yards and small areas of soft landscaping. The Site is located within a predominantly commercial/ light industrial area.
Environmental Setting	The Site is considered to be of moderate environmental sensitivity given the presence of a Secondary A Aquifer beneath the Site, the presence of an adjacent surface watercourse, and the commercial/ industrial use of the surrounding area.
Contamination Potential Sources	There is considered to be limited potential for current on-Site activities to result in land contamination. The western part of the Site was historically worked as a clay pit for the production of bricks and tiles and subsequently infilled, a landfill is also recorded in the eastern part of the Site. The western part of the Site was also used as a scrapyard. Potential sources of contamination identified in the surrounding area include kilns, a tramway, sludge beds, commercial/ industrial facilities with associated above-ground storage tanks, two petrol filling stations and an adjacent historical landfill and wider areas of infilled ground associated with historical clay and sand and gravel extraction. Limited intrusive investigation undertaken prior to the recent extension of the building on-Site did not identify any significant soil contamination to be present. Basic ground gas protection measures are understood to have been incorporated into the two eastern-most units of the current development.
Contaminated Land Risk Associated with Ownership	There is considered to be a low risk of enforcement action by the regulatory authorities under Part 2A of the Environmental Protection Act, the Water Resources Act or the Environmental Damage Regulations. The potential for legal action by surrounding landowners / third parties based on the potential for contamination to migrate off-Site (ongoing or historically) is considered to be low.
Development Considerations	Widespread significant contamination is considered unlikely and the preliminary risk assessment has determined a low risk to moderate of soil / groundwater contamination, in the context of the proposed commercial / light industrial end use. Services are recommended to be placed in clean corridors with upgraded water supply pipework. The potential for aggressive ground chemistry to be present should be assessed through site investigation and implementation of appropriate design sulphate class for buried concrete should also be confirmed as part of the usual design process.
Recommendations	Given that the proposed redevelopment requires the demolition of the existing buildings and the construction of new buildings, it is anticipated that an intrusive Site investigation would be undertaken to support the design process. It is anticipated that an environmental site investigation would be undertaken in conjunction with a geotechnical investigation. This will help to establish the Site-specific ground model and shallow groundwater regime (if present) at the Site and enable an assessment of foundation and engineering solutions to be made.
This is intended as a summary only. Further detail and the limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by Quod on behalf of Mayfair Capital Investment Management Limited (the “Client”) to prepare a Preliminary Risk Assessment of Brunel Retail Park, located on Rose Kiln Lane, Reading RG2 0HS (the “Site”).

1.2 Context & Purpose

The aim of this report is therefore to support the submission of a planning application for the proposed redevelopment to a commercial / light industrial use. To that end this report assesses the likely environmental issues associated with soil and groundwater conditions that may affect the proposed redevelopment of the Site.

This report is designed in general accordance with guidance on Land Contamination: Risk Management pages of the [GOV.UK](https://www.gov.uk) web pages, the relevant requirements of the National Planning Policy Framework 2019 (NPPF) (paragraphs 170 & 178-180)¹ and the Planning Practice Guidance (Land Affected by Contamination)².

1.3 Scope of Works

The following scope of works has been undertaken:

- ▲ Review of the environmental setting of the Site, including the current use / status of the Site and surrounding area, and review of the Site’s geology, hydrogeology and hydrology;
- ▲ Review of the historical activities of the Site and surrounding area;
- ▲ Review of regulatory information relating to the Site;
- ▲ Review of the Local Authority’s online planning records for the Site;
- ▲ Consultation with and review of information from the Local Authority in relation to Part 2A of the 1990 Environmental Protection Act;
- ▲ Completion of a Site reconnaissance by undertaking a visual inspection of readily accessible areas of the Site;
- ▲ Development of an outline Conceptual Site Model and undertake a Preliminary Risk Assessment with respect to potential contamination focussed on the proposed land use;
- ▲ Identification of potential contamination risks and / or liabilities associated with the proposed acquisition of the Site; and,
- ▲ Provision of commentary on potential land contamination and geotechnical constraints in the context of the proposed development.

In completing this Preliminary Risk Assessment, Delta-Simons has utilised the following data sources and third party information:

- ▲ A Landmark Envirocheck Report for the Site, dated October 2020, including current and historical Ordnance Survey (OS) maps;
- ▲ British Geological Survey (BGS) and Environment Agency (EA) online data;
- ▲ Information provided by Reading Borough Council and third party reports available via the publicly available planning records.

1.4 Limitations

The standard limitations associated with this assessment are presented in Appendix A.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

² <https://www.gov.uk/guidance/land-affected-by-contamination>

2.0 Site Context & Data Review

2.1 Site information

Site Location		Site Layout	
 Contains OS data ©, Crown Copyright and Database Right (2020) Contains Data from, © 2020 Landmark Information Group Ltd		 Contains Data from, © 2020 Getmapping Plc Contains Data from, © 2020 Landmark Information Group Ltd	
Co-ordinates	Centred approximately at National Grid Reference 471420, 171210.	Elevation	46-49 m AOD
		Area	3.5 Ha
Site Location	The Site is located on the southern side of Rose Kiln Lane, approximately 150 m to the east of the A33 and approximately 2 km to the south of Reading town centre.		
Current Site Use	The Site is occupied by a retail park, comprising 13 retail units, arranged in an L-shaped layout across the western and southern parts of the Site, with a customer car parking located across the central, northern and eastern parts of the Site. The main entrance to the Site is located on Rose Kiln Lane, at the northern Site boundary. Service yards, accessed via an entrance on Gillette Road to the east of the Site, are located to the rear of the retail units, along the southern boundary and in the far western area of the Site. The external areas of the Site are predominantly covered by tarmac and concrete hardstanding and paving. Small areas of soft landscaping are present within the car park and along Site boundaries with an area of trees in the west. Electricity substations are understood to be present in the east and west of the Site, which are likely to be the responsibility of service providers. <i>No significant potential sources of contamination are considered to be associated with the current Site use or were observed during a Site visit.</i>		
Proposed Development Description	The proposed redevelopment for the Site comprises the demolition of the existing retail buildings and the construction of two new commercial / light industrial warehouse units with integral offices. External areas will comprise car parking, service yards and limited soft landscaped areas at the perimeter of the Site.		

Current Surrounding Area	North	Rose Kiln Lane, with a commercial/ industrial estate to the north, including car dealerships and vehicle repair garages.
	East	A Morrison's supermarket and petrol filling station, with residential area beyond.
	South	A large warehouse building (Tradetean).
	West	An area of trees, with the River Kennet, the A33 road and a water treatment works beyond.
	<i>The industrial estate and petrol filling station are considered to represent potential off-Site sources of contamination.</i>	

2.2 Environmental Setting

Published Geology	British Geological Survey (BGS) data indicates that the Site is directly underlain by clay, silt and sand of the Lambeth Group; no superficial deposits are indicated to overlie the bedrock beneath the Site, however Alluvial deposits are mapped immediately adjacent to the west of the Site, therefore, may be present on-Site. Made Ground is indicated to be present overlying the Lambeth Group bedrock across the majority of the Site. Extensive areas of Made Ground are present in the wider area associated with sand and gravel extraction and clay extraction.
Specific Ground Conditions	BGS data indicates that boreholes have previously been advanced on the Site, however, the borehole records are confidential and not available for review. The nearest available BGS borehole records (ref: SU77SW732-34, dated 1977) located approximately 25 m to the north of the Site identified the following geology: ▲ Made Ground (ash, wire concrete etc.) to depths of between 3.2 and 9.6 metres below ground level (m bgl); ▲ Clay to a maximum depth of 6.5 m bgl; over ▲ Sand proven to a depth of 12.0 m bgl.
Hydrogeology	The Environment Agency (EA) classifies the bedrock (Lambeth Group) as a Secondary A Aquifer, the Alluvium adjacent, and potentially on-Site is also classified as a Secondary A Aquifer. EA data indicates that the Site is not located within a designated groundwater Source Protection Zone. According to the Envirocheck® Report, there is one licensed abstraction from groundwater located on-Site. The abstraction is operated by Wyncote Developments Plc for general industrial purposes and the groundwater is indicated to be sourced from Chalk (present at depth beneath the Lambeth Group). Given the nature of the abstraction (used for development), this is unlikely to remain active. Several licensed groundwater abstractions, also from the chalk, are operated by Thames Water Utilities Limited for public potable water supply, located approximately 300 m from the Site at their closest point to the west of the Site (beyond the River Kennet). The historical BGS borehole information indicates that groundwater was present at a depth of approximately 9.3 m bgl in the vicinity of the Site.
Hydrology	The nearest surface water feature is a small stream or surface drain, located adjacent to the south-western boundary of the Site, which appears to flow into the River Kennet, which flows in a generally northerly direction, approximately 60 m to the west of the Site.

	According to the Envirocheck® Report, there are no licensed abstraction records from surface water located within an 500 m radius of the Site.
Coal Mining	The Site is not located within an area that is potentially affected by coal mining activity.
Radon Gas	The Site lies within an area where less than 1% of homes are above the National Radiological Protection Board (NRPB) recommended “action level” for radon. BRE211 (2007) indicates that no radon protective measures are necessary in the construction of new buildings at the Site.
Ecological Receptors	From information provided within the Envirocheck® Report, there are no statutory ecological receptors located within 1 km of the Site.
Heritage Interest	Based on current Historic England data, there are no areas of heritage interest recorded within a 1 km radius of the Site. Historical maps indicate that Roman remains were found at the southern boundary of the Site by, or prior to, the 1950s.
Environmental Sensitivity	<i>The Site is considered to have low to moderate environmental sensitivity given the presence of a Secondary A Aquifer beneath the Site, the presence of an adjacent surface watercourse, with consideration of the commercial/ industrial use of the surrounding area and extensive areas of Made Ground in the wider area..</i>

2.3 Historical Use of the Site & Surrounding Area

Approach	The historical development of the Site and surrounding area has been assessed through a review of available historical OS maps and Google Earth historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Copies of pertinent historical maps are included as Appendix B.
Historical Features On-Site	At the time of the earliest map edition of 1879, a works area with kilns used for the production of bricks and tiles (Rose Kilns) extended across the western part of the Site, with small buildings/ structures. A slope was indicated, extending from north to south across the Site, indicating that the ground in the western part of the Site had potentially been excavated/ lowered, likely associated with clay extraction. The eastern part of the Site appeared to be undeveloped, with two small buildings and field boundaries, indicating possible agricultural use. By the subsequent map of 1899, Rose Kilns were indicated to be disused and the eastern part of the Site is identified as part of a wider area of allotment gardens. By 1912, a tramway was present, leading onto the western part of the Site and the western area of the Site appeared to comprise rough grassland and a disused pit areas. By 1932, the tramway had been dismantled and the majority of the western part of the Site appeared to have been infilled/ raised in level, with the land sloping downwards at the western periphery. At some time between 1966 and 1980, the western part of the Site changed use to a scrap yard. The Site was redeveloped as the Brunel Retail Park in the mid-1990s, in a layout consistent with the existing Site, except for small extensions to the building in the eastern part of the Site circa 2005 and 2014.
Potentially Contaminative	Potential sources of contamination within 100 m of the Site include:

Historical Features Off-Site	▲ Kilns used for brick and tile production, located approximately 10 m to the west and north of the Site, from as early as 1879, identified as 'disused' by 1899; ▲ A tramway, present adjacent to the west of the Site, circa 1912; ▲ Sludge beds, associated with a sewage works, located adjacent to the south-west of the Site, from circa 1932 until circa 2006; ▲ A contractor's yard, located approximately 40 m to the north of the Site, circa 1958; ▲ A bus depot, with associated above-ground storage tanks, located approximately 80 m to the north-east of the Site, circa 1958; and ▲ Commercial/ industrial facilities, constructed in the area to the north and north-east of the Site, in the 1960s, including a printing works, a plastics factory, an electronics factory, a display factory, warehouses and a coach depot. A paint warehouse and an above-ground tank associated with an electronics factory were present approximately 50 m from the Site.
Implications for Land Contamination Risk	<i>The historical use of the Site for brick and tile production, with associated excavation and subsequent infilling of the land, and the historical presence of a scrapyard in the western part of the Site, are considered to represent potential sources of contamination. Potential historical sources of contamination have been identified within the surrounding area, including a wider area of Made Ground and kilns associated with the brick works, a sewage treatment works and commercial/ industrial facilities with associated above-ground storage tanks.</i>

2.4 Environmental Database Review

Approach	The Landmark Envirocheck® Report provides a database of environmental information held by various statutory bodies including the EA, Local Authority (LA), Health & Safety Executive (HSE) and the British Geological Survey (BGS) amongst others. A full copy of the Envirocheck® Report is provided in Appendix C and the most relevant information is summarised below.
Features On-Site	The following pertinent records are included within the Landmark Envirocheck® Report in relation to the Site: ▲ A BGS Recorded Mineral Site, relating to the historical opencast excavation of Lambeth Group clay and shale, associated with Rose Kilns; ▲ An Historical Landfill, identified as 'Rose Kiln Lane South' (EA reference: EAHLD13306). The landfill is indicated to have been in the north-western part of the Site (however, Local Authority Recorded Landfill information illustrates this in the east) and is indicated to have been licensed to accept commercial, household and liquid sludge wastes prior to 1994; ▲ A Pollution Incident to Controlled Waters. The incident occurred in January 1999, however, the pollutant involved was not recorded and was classified by the EA as a minor (Category 3) incident, therefore, it is not considered to represent a significant concern; and Three Contemporary Trade Directory Entries, which relate to the recent/ current commercial retail use.
Potentially Contaminative Features Off-Site	The following pertinent records within the Landmark Envirocheck® Report are located within 100 m of the Site: ▲ A Local Authority Pollution Prevention and Control permit (dated 1999) for a petrol filling station (Malthurst Reading Service Station), located approximately 30 m to the north of the Site;

	▲ Five Pollution Incidents to Controlled Waters; all the incidents were recorded by the EA as minor (Category 3) incidents involving sewage or oils and all occurred prior to 1994; ▲ Two Historical Landfills. One known as Gillette Warehouse, located adjacent to the south of the Site, that was licensed to accept commercial, household and liquid sludge wastes between 1930 and 1939. The other known as Island Road, located approximately 90 m to the west of the Site, licensed to accept inert waste between 1977 and 1985; ▲ Planning Hazardous Substance Consents, relating to the Gillette Industries Ltd facility, located approximately 70 m to the south of the Site. The permits relate to the use of liquefied flammable gas (including LPG) and natural gas; ▲ Contemporary Trade Directory Entries, including active and/ or inactive facilities for gas manufacture/ supply and vehicle repair; and ▲ A Fuel Station Entry, relating to the petrol filling station (which includes a car wash) at Morrison's supermarket, located approximately 40 m to the east of the Site.
Implications for Land Contamination Risk	<i>Historical landfills located beneath the Site, and adjacent to the Site, and commercial/ industrial facilities and petrol filling stations in the surrounding area, have been identified as potential sources of contamination from the regulatory database information.</i>

2.5 Planning Review/Regulatory Enquiries

On-line Planning Portal	Reading Borough Council	Date Accessed	18/10/2020
Findings	Applications pertinent to this assessment are summarised below: ▲ <u>94/00443/FD (940948)</u> – Erection of non-food retail warehouses (A1) with ancillary service areas and car parking for 510 cars. The application was granted consent in December 1994. The decision notice is not available for review on the planning portal, therefore, it is not known whether the planning consent was subject to any conditions in relation to the investigation of contaminated land or ground gas; and ▲ <u>131743</u> – Outline planning application for the erection of two new units for use within Class A1 and/ or A3, alterations to the wider site and car park layout and associated works. The application was granted consent in March 2014. Conditions 14, 15, and 16 of the planning consent ref: 131743 relates to contaminated land assessment and remediation requirements. Conditions 18 and 19 relate to ground gas investigation and remediation and Condition 21 relates to avoidance of risk to groundwater. Conditions 14, 15, 16 and 21 were discharged by the Council on 1st October 2014, following submission of a Phase I Desk Top Study, a Chemical Interpretive Report and Piling Information, and Conditions 18 and 19 were discharged by the Council on 6th November 2014, following submission of a Ground Gas Assessment Report. Details of the reports submitted to discharge the planning conditions are summarised in Section 2.6. Copies of the planning consent and discharge notices are reproduced as Appendix D.		
Part 2A of the Environmental Protection Act (EPA) 1990	During a previous assessment of the Site, Delta-Simons was informed by the local Contaminated Land Officer (CLO) that whilst the Site is on their list of prioritised sites under Part 2A (due to historical uses), the Site (given the current commercial use), is considered to be a low priority, and there is no schedule set to investigate the Site. They also stated that they have no records of previous intrusive investigation for the		

	Site (therefore, it suggests that their Part 2A information does not take into account the information provided in Sections 2.5 and 2.7 above and below).
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2.6 Previous Reports

List of Reports	Delta-Simons has reviewed the following reports (available on the public planning portal) relating to the Site: ▲ Planning Report for Planning Application ref: 131743 at the Site; ▲ Desk Top Study Report – Brunel Retail Park by Chelmer Consultancy Services, dated July 2014; ▲ Chemical Interpretive Report – Brunel Retail Park by Chelmer Consultancy Services, dated August 2014; ▲ Correspondence in relation to Piling at Brunel Retail Park from Mason Navarro Pledge, dated August 2014; and ▲ Ground Gas Assessment – Brunel Retail Park by Chelmer Consultancy Services, dated September 2014.
Planning Report for Site	A Planning Report by Reading Borough Council in relation to the planning application for the construction of two new units at the Site in 2014 includes information provided by the EA. According to EA records, the Site lies over an area of historical landfill; the landfill is indicated to thicken towards the west of the Site. When an extension to the retail park was constructed in 2005, WSP conducted an investigation (this report is not available to Delta-Simons for review) and two boreholes were drilled in the footprint of Unit 8 (whilst this Unit is now labelled to be in the west of the Site, a small extension was located in the east). The boreholes detected the presence of 1 to 2 metres of Made Ground. The EA stated that no infiltration drainage would be acceptable given the underlying landfill.
Desk Top Study Report - July 2014	Chelmer Consultancy Services (Chelmer) conducted a Phase I environmental risk assessment of the eastern part of the Site to support the planning application for construction of two new units at the retail park. The findings of the report are largely consistent with this Report. Chelmer recommended that an intrusive investigation was conducted to further assess the risks to site users of the proposed development on-Site.
Chemical Interpretive Report - August 2014	Chelmer conducted an intrusive investigation of the eastern part of the Site (the area of proposed new Units 12 and 13). The investigation comprised the advancement of one borehole to a depth of 10.0 m bgl, with collection of soil samples and installation with a monitoring well, and one trial pit to a depth of 0.7 m bgl. The ground conditions identified comprised a thin layer of tarmac over Made Ground to a depth of 1.8 m bgl. The Made Ground was underlain by clay to a depth of 7.0 m bgl, overlying sand, encountered from 7.0 to 10.0 m bgl. No groundwater was encountered during the investigation or on subsequent monitoring visits. All concentrations recorded were below relevant soil guidance values for commercial/industrial use. However, chrysotile asbestos was identified at a depth of 1.0 m bgl within the borehole. From ground gas monitoring, low methane and carbon dioxide concentrations were recorded with low flow rates, indicative of a Characteristic Situation 1. Further ground gas monitoring was recommended due to the historical landfill beneath the Site.
Correspondence regarding Piling	Mason Navarro Pledge provided information regarding piling for the construction at the Site to support the discharge of planning conditions for the construction of Units 12 and 13.

Information - August 2014	The letter confirms that piles installed for the foundations of the proposed development would be approximately 7 m in depth and founded in sand beneath the clay layer. As such, the piles would be above the reported groundwater level. Based on the investigation data that indicated low concentrations of potential contaminants and the shallow depths of the proposed foundations, the risk to controlled waters was considered to be low.
Ground Gas Assessment - September 2014	Chelmer conducted six further ground gas monitoring visits to the previously installed monitoring well. The maximum methane concentration recorded was 0.1% v/v. The maximum carbon dioxide concentration recorded was 5.4% v/v. The maximum flow rate recorded was 0.5 l/hr. Based on CIRIA guidance, the monitoring results were indicative of a Characteristic Situation 2, therefore, ground gas protection measures were recommended to be incorporated into the proposed development. It was proposed to incorporate a reinforced concrete floor slab with a 2000 gauge damp proof membrane.
Implications for Land Contamination Risk	<i>Significant contamination was not identified during a previous intrusive investigation of the eastern part of the Site in 2014. Whilst the verification reports have not been made available, it is understood that the construction of Units 12 and 13 incorporated ground gas protection measures.</i>

3.0 Conceptual Site Model

3.1 Introduction

A Conceptual Site Model (CSM) represents the relationships between contaminant sources, pathways and receptors, to support the identification and assessment of Possible Contaminant Linkages (PPL).

Where PPL are identified, a preliminary risk assessment is undertaken to assess the likelihood that each possible linkage exists and to determine whether these pose potentially unacceptable risks to identified receptors and require further assessment. Where this linkage is of a form that subsequently leads to the potential for land being identified as 'contaminated land' under the terms of Part 2A of the Environmental Protection Act 1990, the linkage is termed a significant pollutant linkage.

At the preliminary risk assessment stage, which is typically based upon desk study information and Site reconnaissance, the decision on whether a PPL poses a potentially unacceptable risk is based upon professional judgement. The significance of the PPL will also be determined dependant on the context of the land use and the purpose of the assessment.

Assessing risks from land contamination underpins the suitable for use approach adopted under Part 2A of the Environmental Protection Act 1990 and its associated regulatory regime.

3.2 Potential Contamination Sources

The Site is occupied by a retail park, first developed in the mid-1990s and extended circa 2005 and 2014. Prior to the 1930s, clay and shale in the western part of the Site was excavated and used for the production of bricks and tiles. This excavated area was subsequently used as a landfill (although a landfill is also recorded in the eastern part of the Site). At some time between 1966 and 1980, the western landfilled area of the Site was used as a scrapyard.

Potential sources of contamination identified in the surrounding area include kilns, a tramway, sludge beds, commercial/ industrial facilities with associated above-ground storage tanks, two petrol filling stations and an adjacent historical landfill and extensive areas of Made Ground associated with wider clay and sand and gravel extraction.

An intrusive investigation was undertaken prior to the recent extension of the building on-Site (two units in the eastern part of the Site), which did not identify any significant soil contamination to be present. Basic ground gas protection measures are understood to have been incorporated into the two eastern-most units of the development.

3.3 Potential Receptors

Relevant potential receptors are considered to include:

- ▲ Construction workers.
- ▲ Third parties during construction (adjacent Site users and residents).
- ▲ Future Site users (commercial site) and maintenance workers.
- ▲ The underlying bedrock is classified as a Secondary A Aquifer.
- ▲ The built environment (new buildings and infrastructure / utilities).

The Site is considered to be of low to moderate environmental sensitivity given the presence of a Secondary A Aquifer beneath the Site, the presence of an adjacent surface watercourse, and the commercial/ industrial use of the surrounding area.

3.4 Potential Pathways

The potential pathways are considered to be as follows:

- ▲ Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment.

- ▲ Inhalation of organic vapours associated with contamination.
- ▲ Migration of ground gas / vapours into on-site buildings causing asphyxiation or risk of explosion.
- ▲ Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- ▲ Direct contact between aggressive ground conditions and new infrastructure.

3.5 Contaminant Linkage Assessment

Based on the information reviewed within this Report, the following preliminary risk assessment table has been formulated, which identifies all PCL in the context of the Site's redevelopment for a commercial / industrial end use.

Pollutant Linkage Assessment				
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)
Potentially contaminated soils and/or groundwater located beneath the Site.	Direct contact/ ingestion and inhalation of dust and vapours.	Site users.	Low Risk	The potential for contamination to be present beneath the Site, associated with the historical presence of a landfill and a scrapyard in the west of the Site, cannot be discounted. However, given the proposed commercial / light industrial warehouse use of the Site, predominantly covered by the buildings and hardstanding, the risk to Site users is considered to be low. Further intrusive investigation is recommended to confirm the potential risks, including an assessment of potential vapour risks.
	Direct contact, ingestion and inhalation of dust and vapours.	Maintenance workers during any future sub-surface works at the Site.	Low to Moderate Risk	Site workers may become exposed to localised contaminated soils and shallow groundwater during intrusive groundworks undertaken at the Site. Use of safe working practices and implementation of appropriate Personal Protective Equipment (PPE) should reduce the risk to low.
	Leaching of contaminants and vertical migration.	Groundwater beneath the Site.	Low to Moderate Risk	Whilst the presence of contamination beneath the Site associated with historical use cannot be discounted, some clay is indicated to be present, underlying the Made Ground in the east of the Site. In addition, the proposed buildings and hardstanding present across the Site and in the surrounding area will limit the infiltration of rainfall and, therefore, reduce the potential for leaching and migration of any contamination. Overall, the risk is considered to be low to moderate.
	Permeation of hydrocarbons through plastic pipe work.	Water supply pipes.	Low to Moderate Risk	Hydrocarbons, especially aromatics and chlorinated solvents are known to permeate plastic pipes, particularly when encountered at high concentrations. Whilst it is considered unlikely that significant hydrocarbon contamination will be present, given the historical uses of the Site it is considered that upgraded water supply pipes within clean service corridors will be required.
	Lateral migration through any groundwater beneath the Site.	Off-Site receptors (neighbouring properties/ users and nearby surface water).	Low/ Low to Moderate Risk	Given the risk to groundwater is considered to be low to moderate, the risk to surface waters is also low to moderate, however, the risk to surrounding users is considered to be low.

Pollutant Linkage Assessment				
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)
Ground gas.	Vertical and lateral migration of ground gases.	Site users & the building on-Site.	Low Risk	Whilst ground gases could be present associated with the Made Ground and former landfill beneath the Site, gas monitoring undertaken in 2014 in the eastern area did not record significantly elevated concentrations of methane and carbon dioxide. Further investigation and ground gas monitoring will be required to confirm the risks and gas protection measures in accordance with current guidance.
Potentially contaminated soil and groundwater from off-Site sources.	Lateral migration and subsequent inhalation.	Groundwater beneath the Site and future Site users.	Low Risk	Whilst potential off-Site sources of contamination have been identified, including petrol filling stations and an adjacent landfill, the Site is in a built-up area with large amounts of hardstanding, resulting in restricted infiltration of rainwater and limited leaching of contaminants. Also, given the proposed current commercial use of the Site, the risk to Site users is considered to be low.

4.0 Development Considerations

4.1 Potential Remediation Requirements & Solutions

Soils	Given that the current and proposed commercial / light industrial uses comprise hardcover over the majority of the Site, the risk of the Site requiring remediation to protect end users is considered to be low. Localised mitigation measures, for example provision of a clean soil cover for proposed soft landscaping, will be required in areas where Made Ground is present. If contamination and / or asbestos-containing materials are identified, then this may have an impact on waste disposal costs.
Groundwater	Significant groundwater contamination is not anticipated, however, groundwater quality at the Site, and within the wider area is likely to be impacted due to the historical land uses, notably landfill on and off-Site.
Ground Gas	Given the current development at the Site and age of infill materials it is considered unlikely that a significant ground gas risk exists although it would be prudent to budget for ground gas protection measures until monitoring data is available to allow for classification of the Site.
Building Fabric & Services	Widespread contamination at the Site is considered unlikely. However, services are recommended to be placed in clean corridors with upgraded water supply pipework. The potential for aggressive ground chemistry to be present should be assessed though site investigation and implementation of appropriate design sulphate class for buried concrete should also be confirmed as part of the usual design process.

5.0 Conclusions & Recommendations

Risk Assessment Summary/ Conclusions	Delta-Simons has completed a land contamination risk assessment based upon available information. Significant potential sources of contamination have not been identified associated with the current land use, however, soil and groundwater contamination may be present associated with the historical use of the Site and the surrounding area. Whilst the presence of localised contamination cannot be completely ruled out, it is considered that the risk of significant possible pollutant linkages existing to users of the Site and in the surrounding area, in the context of a proposed redevelopment to a commercial / light industrial use is low. Intrusive investigation is required to fully characterise the Site.
Contamination Risks Associated with Ownership (Current Use)	There is considered to be a low risk of enforcement action by the regulatory authorities under Part 2A of the Environmental Protection Act, the Water Resources Act or the Environmental Damage Regulations, whilst the Site remains in its current commercial use. The potential for legal action by surrounding landowners / Third Parties based on the potential for contamination to migrate off-Site (ongoing or historically) is considered to be low.
Potential Contaminated Land Development Risks	Widespread contamination is considered unlikely and the preliminary risk assessment has identified a low to moderate risk of soil / groundwater contamination and hazardous ground gas at the Site. Asbestos may be present within the Made Ground and within the existing buildings.
Recommendations	Given that the proposed redevelopment requires the demolition of the existing on-Site buildings and the construction of new buildings, it is anticipated that an intrusive Site investigation would be required to support a traditional design process. It is anticipated that an environmental site investigation would be undertaken in conjunction with a geotechnical investigation. This will help to establish the Site-specific ground model and groundwater regime at the Site and enable an assessment of foundation and engineering solutions to be made. An intrusive Site investigation would determine the following: ▲ Presence, thickness and nature of the Made Ground; ▲ Presence, concentrations and leachability of substances of concern in shallow soils (including Made Ground) on-Site; ▲ Presence of substances of concern in any perched water/soil pore water or shallow groundwater beneath Site; ▲ Likelihood of significant ground gas and/or soil vapour intrusion into future on-Site and off-Site buildings; and ▲ Provide geotechnical information to inform the design of the foundations, pavements and any soakaways.

Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.