



Your Environment

PHASE 1: DESKTOP STUDY AND
PRELIMINARY RISK ASSESSMENT
REPORT AT
37 CREEK ROAD,
HAYLING ISLAND,
PO11 9QZ

For Chris Flint Associates

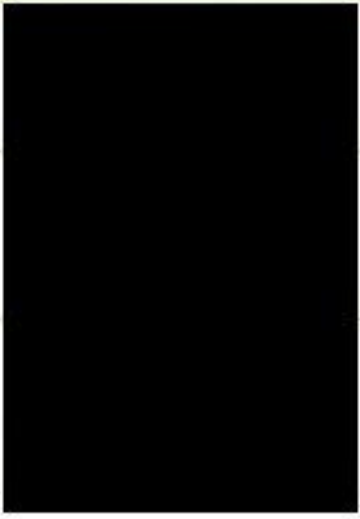
Your Environment

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Report Number: YE7136, June 2019

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Issue	Date	Description	Prepared	Reviewed	Approved
00	18.06.19	Final Report	TI	RG	CH

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1.0 Introduction

YourEnvironment (YE) was instructed by Chris Flint Associates to produce a Phase 1: Desktop Study and Preliminary Risk Assessment Report for a site located at 37 Creek road, Hayling Island, PO11 9QZ (grid ref: 473950, 0988323; area: 0.0059ha).

We understand current plans for the redevelopment of the site include;

- Conversion to form 1 bedroom flat with associated parking.

The purpose of this report is to accompany other documentation for the purpose of obtaining planning permission for the proposed construction through the local planning authority, namely Havant Borough Council, under reference APP/19/00211.

A proposed site plan provided to YE, at the time of issuing this report can be reviewed within [Appendix A](#).

Objectives

The objectives of this Phase 1 report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors;
- Review historical and recent uses to assess the potential for contamination to be present from past and current land-use;
- Assess by qualitative means the potential nature and extent of contamination from those uses and the environmental risk and liabilities which may affect the site redevelopment;
- Identify the prevalent source-pathway-receptor linkages present on site by means of a Tier 1 contamination risk assessment which incorporates the formulation of a Conceptual Site Model.

Information Sources

During the production of this report the following information sources have been utilised:

- A review of Historical Ordnance Survey Maps, Envirolnsight and Geolnsight information obtained from Groundsure (4C Group Ltd).

It should be noted that the information from these sources referenced in this report has been predominantly limited to that identified within 100m of the site, in order to focus on the most pertinent information. Information from outside this 100m radius will be referenced when deemed relevant (for example, landfills). The full information from these sources can be reviewed within [Appendices B & C](#).

2.0 Site Geology & Geological Hazards

Artificial/Made Ground

There are no records of artificial/Made Ground within 50m.

Superficial Ground and Drift Deposits

The superficial ground deposits underlying the study site are comprised of River Terrace Deposits (sand, silt and clay).

Bedrock Geology

Underlying the superficial drift deposits is bedrock composed of Wittering Formation (sand, silt and clay).

Radon

The study site is not located within a Radon Affected Area, as less than 1% of properties are above the Action Level. Therefore, no radon protective measures are necessary for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment.

3.0 Site Hydrogeology and Hydrology

Aquifer within Superficial Deposits

As a consequence of the superficial geology on site the stratum is classified as being a Secondary (A) Aquifer. These are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

Permeability of Superficial Geology

The minimum permeability is recorded as low with the maximum permeability recorded as being high.

Aquifer within Bedrock Geology

As a result of the bedrock geology on site, the aquifer is also designated as being Secondary (A).

Permeability of Bedrock Deposits

The minimum permeability is recorded as being low with the maximum permeability recorded as being high.

Groundwater and Surface Water Abstraction Licences

There is one active surface water abstraction licence within 2000m, which is 1862m northwest for a spray irrigation-storage.

Potable Water Abstraction Licences

There are no active potable abstraction licences within 2000m.

Groundwater Vulnerability and Soil Leaching Potential

The onsite soil vulnerability category is listed as being 'HU', this is defined as soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

Source Protection Zones

The study site is not located within a Source Protection Zone.

Ordnance Survey Water Network

There are two records within 250m of the study site, which are 153m south for an inland river not influenced by normal tidal action. The remaining results are over 165m from the study site.

Surface Water Features

There is one record within 250m of the study site which is 153m south.

4.0 Site Environmental and Industrial Setting

Environmental Permits, Incidents and Registers

Sites Determined as Contaminated Land under Part IIA EPA 1990

There are no records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 within 500m.

Landfill and Other Waste Sites

Potentially Infilled Land

There are twenty records of potentially infilled land within 500m, the closest five of which are 169-173m south for unspecified pits. The remaining records are over 175m from the study site.

Records of Landfill Sites

There are two entries within 500m, the closest of which is 436m northwest for a historic landfill site that was licensed to household waste. The following records are 485m north for a landfill site that was licenced to accept inert waste. The remaining entries are more than 500m away from the study area.

Historical/Current Land Uses

Records of Potentially Contaminative Uses

There are nineteen records of sites with a potentially contaminative past land use within 500m, the closest of which is 169m south for unspecified pit. The remaining entries are over 170m from the study area.

Historical Energy Features

There are thirty records of sites within 500m, the nearest of six of which are 77-80m south for electricity substations. The remaining entries are over 135m from the study area for electricity substations.

Historical Garage and Motor Vehicles Repairs

There are seven records of sites within 500m, the closest six are on site for garages, the following is 6m south for a garage.

Records of Potentially Contaminative Industrial Sites

There are four records of sites with a potentially contaminative industrial usage within 250m, the closest of which is 26m southwest for a vehicle repair & testing site. The following entry is located at 85m south for an electrical substation. The remaining entries are over 135m from the study area

Designated Environmentally Sensitive Sites

The study site is located within a Nitrate Vulnerable Zone.

Information on the environmental and geological setting of the site is presented in a Groundsure EnviroInsight and GeoInsight Report prepared for the site, a copy of this report is reproduced in **Appendix B**.

5.0 Historical Mapping Study

The object of this search was to report on the evidence of site history and redevelopment of the site and its environs from available County Series and Ordnance Survey Maps dating from the mid to late 19th Century to the present day as downloaded from Groundsure.

Maps only represent a “snap shot” of the site and its environs at the date of the survey. Changes that had occurred either to the site and/or the environs may well not have been recorded on the maps and could represent a hazard to the site.

The information reported might not represent all pertinent information that could be obtained. Any maps with no discernible changes will not be commented on in this report.

The interpretation of the maps and/or other data commented on in this report is subjective.

Year	On site	Off site
1866	➤ The site is a rectangular plot of land with no discernible features on site.	➤ Broad Lane immediately east. ➤ Marsh Lane 10m northeast. ➤ limekiln 100m south, ➤ East Stoke farm 100m northeast ➤ High water mark of ordinary tides located 100m south. ➤ Marsh located 100m south and 350m north.
1931	➤ No discernible changes.	➤ North Stoke Road located 10m north. ➤ Sewage works located 500m northwest, urban developments located ➤ 100m south and 10m-500m east.
1938	➤ No discernible changes.	➤ There is further urban development immediately west of site to 500m west. ➤ Street immediate east is now tagged Creek Road. ➤ Road northeast now tagged Sandy Point Road. ➤ There is west Haye Road 10m northwest of site.
1940	➤ No discernible changes.	➤ Residential developments immediately north and south of site.
1958	➤ There is a building on site.	➤ There is a garage 10m southwest ➤ Electric substation located 90m south of site. ➤ Further urban development towards the north, east, west and south of site.
2014	➤ No discernible changes.	➤ No relevant changes.

Table 1: *Historical Mapping Review*

The Historical Ordnance Survey Maps were obtained from Groundsure and are available for review within [Appendix C](#).

6.0 Walkover Survey

The site was visited by YE on June 10th, 2019. The weather was damp and overcast at the time.

Access

The site is accessible from Creek Road.

Topography

Both on and off site the ground is relatively flat, with a slight drop immediately to the south of the site.

Vegetation

The site is completely unvegetated.

Buildings and Structures / Floor Covering

There is one structure on site, which is a brick-built former takeaway food store, with a concrete base and pitched, tiled roofing. The site is connected to the hair and beauty salon immediately north.

Surface Permeability / Ground Covering

It is estimated that 100% of the site is impermeable tarmac and concrete.

Drainage Features

One manhole cover was noted on site and guttering was noted along the roof of the building on site.

Other Services

The site has access to all services.

Direction	Description of Site boundary
North	Boundary with hair and beauty salon immediately north
East	Soft boundary with pavement along Creek Road
South	Fenceline and oft boundary with access road to MOT garage
West	Rear of property

Table 3: Summary of site boundaries

Direction	Description of Surrounding Land Use
North	Hair and beauty salon
East	Creek Road, with commercial properties further east
South	Access road to MOT garage and vacant commercial property
West	Residential dwelling

Table 4: Summary of Surrounding Land Uses

Potentially Contaminative Land Uses

On site sources:

- None identified.

Offsite sources:

- MOT garage approximately 40m southwest;
- Previous underground storage tanks approximately 20m south.

7.0 Framework for Assessment of Contamination

Environmental risks are assessed within the risk management framework established in Part IIA of the Environmental Protection Act (EPA) 1990 introduced by Section 57 of the Environment Act 1995 which provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that:

- (a) *Significant harm is being caused or there is a significant possibility of such harm being caused;*
- or
- (b) *Pollution of controlled water is being or is likely to be caused.*

Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors which could be harmed or polluted.

The key aspect of the framework is the development of a Conceptual Site Model (CSM) which illustrates the spatial interaction between the potential sources and receptors on site.

The information presented in this report was collated and evaluated to develop an initial CSM to assess ground contamination issues at the site.

For a risk of pollution or environmental harm to occur as a result of ground contamination, **all** of the following elements must be present:

- A source, i.e., a substance that is capable of causing pollution or harm;
- A receptor, i.e., something which could be adversely affected by the contaminant;
- A pathway, i.e., a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

Potential sources, pathways and receptors are identified in the sections below and the risks associated with possible pollutant linkages outlined.

8.0 Contaminant Sources

On Site Sources

The following possible on site sources have been identified from the historical study:

- Possible Made Ground, from historical development.

The following on site sources have been identified from the site walkover:

- None identified.

The following possible on site sources have been identified from the EnviroInsight and GeoInsight:

- Garages.

The following contaminants are potentially associated with these sources:

- Heavy Metals;
- TPH and PAH;
- Ground gas - methane and carbon dioxide, from decomposition of organic carbon in Made Ground/infilled material associated historical development.

Off Site Sources

The following off site sources have been identified from the historical study:

- Garage (10m southwest);
- Electric substation (90m south).

The following off site sources have been identified from the site walkover:

- MOT garage approximately 40m southwest;
- Previous underground storage tanks approximately 20m south.

The following off site sources have been identified from the GeoInsight and EnviroInsight:

- Garages (6m south);
- Vehicle repair & testing site (26m southwest);
- Electricity substations (77-80m & 85m south).

The following contaminants are potentially associated with these sources.

- Heavy Metals;
- PAH and TPH;
- PCBs;
- VOCs and SVOCs;
- Ground gas - methane and carbon dioxide, from decomposition of organic carbon in Made Ground/infilled material associated historical development.

9.0 Source / Pathway / Receptor

Sources

The *main sources* of potential contamination that have been identified at the site or in the vicinity of the site are summarised above and below:

Source	Location	Description
Garages	On and Off site	Potential for localised contamination in the form of heavy metals, spilt fuels and oils.
Vehicle repair, testing and servicing site	Off site	Potential for localised contamination in the form of heavy metals, spilt fuels and oils, although the distance from the site reduces the risk.
Electricity substations	Off site	Potential contamination from PCBs, although the distance from the site reduces the risk.

Pathways

In order for contaminants to reach potential receptors, there has to be a viable **pathway** for the contaminant. Potential pathways that may affect the migration of contaminants are listed below:

Pathway	Medium	Properties
Direct Contact	Dust, solid and liquid phase	There may be direct contact with potentially impacted soil and Made Ground across the site. There is a possibility of dust fumes being produced during earthworks in the construction phase. Dermal contact and ingestion of potentially contaminated soils during construction or operational phase of the site.
Leaching through Made Ground	Unsaturated flow	Potential for leaching and migration of potential contaminants along preferential flow paths in the Made Ground due to its heterogeneity.
Foundations and Underground Infrastructure and Obstructions	Preferential flow	Depending on the foundation solution adopted, preferential flow paths for the vertical migration of potential contaminants to the underlying groundwater could be created.
Migration of Ground Gas	Gaseous flow	Made Ground is known to be highly variable in composition. Migration through granular material in Made Ground and alongside buried utility pipes / cables or along preferential flow paths.

Table 5: Pathways

Receptors

The site specific **receptors** that could be potentially affected by the contamination hazards identified during this preliminary appraisal are summarised below:

Category	Receptor	Properties
Humans	End users (such as residents and visitors)	Potential contact with contaminated soils in existing soft landscaping areas.
	Construction workers	Reworking of the contaminant impacted materials in Made Ground during construction works can expose workers to contamination.
Property	Materials and site structures	Foundations and site services may be damaged by potentially aggressive compounds present in soils.
Controlled Waters	Underlying superficial / bedrock Aquifer and surface water	The site is recorded as having a Secondary (A) Aquifer within the superficial deposits and a Secondary (A) Aquifer within the bedrock underlying the site. The nearest surface water abstraction licence is 1862m northwest for spray irrigation point. There are no portable or ground water abstraction licences within 2000m. In addition, the nearest surface water feature is water network is 153m south and the site is not within a source protection zone.
Plant (species and uptake) and Wildlife	Various	Attributes will be influenced by factors such as relative quality, scale, rarity and substitutability.

Table 6: Receptors

10.0 Qualitative Risk Assessment

Potential pollutant linkages are identified using the source-pathway-receptor framework detailed above. An assessment of the potential significance of each linkage is then made by consideration of the likely magnitude and mobility of the source, the sensitivity of the receptor and nature of the migration/exposure pathways.

This qualitative risk assessment has been undertaken in accordance with CIRIA C552: Contaminated Land Risk Assessment, A Guide to Good Practice (Rudland et al., 2001).

An assessment of the likelihood of the risk being realised and the magnitude of potential risk is presented below to give an estimation of the significance of each potential pollutant linkage identified.

The assessment is undertaken based on the current proposals for the site, at the time of issuing this report, which would be classed as been a generic end land use of 'residential without homegrown produce'.

11.0 Preliminary Conceptual Site Model

Contaminant Source	Pathways	Receptor	Potential Severity	Probability of Risk	Level of Risk	Justification
On Site: Made Ground soils on site possibly containing elevated metals, other inorganics such as TPH, PAH, phenols, VOC and SVOCs.	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Medium	Low Likelihood	Moderate/Low  	A moderate to low risk is assessed due to the garages on and off site. Direct contact is not likely between future residential occupiers/visitors and contaminants in the shallow soil as the proposed development does not contain any soft landscaping areas. There is possibly an appreciable risk from vapour intrusion.
		Construction Workers	Medium	Likely	Moderate/Low  	Construction workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk from contact with soils and shallow/perched groundwater.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Medium	Low Likelihood	Low/Moderate  	A low to moderate risk is assessed due to the potentially contaminative sources on and off site. The site is recorded as having a Secondary (A) Aquifer within the superficial deposits and a Secondary (A) Aquifer within the bedrock underlying the site. The nearest surface water abstraction licence is 1862m northwest for spray irrigation point. There are no portable or ground water abstraction licences within 2000m. In addition, the nearest surface water feature is water network is 153m south and the site is not within a source protection zone.
	Permeation of water pipes	Construction materials, future end users and site visitors	Medium	Likely	Moderate 	Hydrocarbons, especially aromatics are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary "barrier pipe" materials (eg polyethylene-aluminium-polyethylene) may be required by the water supply company.
On Site: Asbestos at/near ground surface in Made Ground soils.	Inhalation of fibres in airborne dust	Plant and Wildlife	Mild	Low Likelihood	Low 	A low risk is assessed as there are no indicated areas of soft landscaping on the proposed site plans.
		Future end users and site visitors	High	Low Likelihood	Low 	Likelihood is considered to be low as although the site walkover did not identify any potential asbestos containing materials (ACMs), the commercial history of the site creates potential for asbestos contamination.
		Construction Workers	High	Low Likelihood	Low 	Despite the lack of identified ACMs during the walkover, safe working practices should be implemented and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk from asbestos in soils.

On Site: Ground Gases (CH ₄ , CO ₂) from on site Made Ground.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	High	Low Likelihood	Moderate/ Low  	A moderate to low risk is given due to historical study showing presence of garages on and off site, possible risk for hydrocarbon volatilisation. Current guidance indicates that Made Ground is generally classified as low risk in terms of potential for gas generation.
Off Site: Historical land uses and activities, Made Ground/infilled material possibly containing elevated metals, other inorganics, TPH, PAH, PCBs, phenols, VOC and SVOCs.	Leaching through soils and migration via groundwater or soil pore moisture	Future end users and site visitors	Mild	Low Likelihood	Low /Moderate  	Given the variable permeability of the underlying geology and hydrogeology, there would be a moderate risk for the leaching of contaminants onsite. However, the walkover survey shows that the site estimated coverage is 100% impermeable tarmac and concrete which creates an extra capping layer resulting in a low to moderate risk.
	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Medium	Low Likelihood	Low /Moderate  	A low to moderate level of risk is assessed due to the potentially contaminative land uses/activities onsite and proximal to the site that could pose a potential risk to the site.
Off Site: Ground Gases (CH ₄ , CO ₂ , H ₂ S) from off site Made Ground historical land uses/activities.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	High	Low Likelihood	Low /Moderate  	The potentially contaminative land uses/activities proximal to the site create a potential for ground gas generation. Current guidance indicates that Made Ground is generally classified as low risk in terms of potential for gas generation.

Table 7: Preliminary Conceptual Site Model

12.0 Proposed Site Investigation

Based on the information obtained for formation of this report, we would recommend that an intrusive contaminated land investigation is undertaken to determine the actual pollution linkages and to quantify the risk to the receptors as outlined with the Preliminary Conceptual Site Model.

The intrusive investigation may reveal on-site sources of contamination that were not established by the Phase I Desk Study and Site Walkover and thus require modification of the conceptual site model.

12.1 Testing Regime

The testing regime has been devised in accordance with BS10175:2017 Guidelines for the Code of Practice for Contaminated Land and CLR Report No. 4 Sampling Strategies. The objective at this stage of the report is to attempt to delineate the extent of any possible contamination that may exist at the site by using intrusive soil sampling and testing techniques.

12.2 Sampling Strategy

A service search should be completed prior to any subsequent investigation to determine the service locations by lifting up any manhole/drain covers; therefore, locations may be subject to change depending upon these results.

The SI should incorporate the drilling of three (3no.) window sampler boreholes in order to gain a suitable spread of the site and enable adequate analysis of the soil conditions. This will be completed to a maximum depth of 3-4 metres below ground level (mbgl) or refusal or where groundwater is encountered.

All positions should be logged, and samples removed in accordance with current protocol. In addition, groundwater conditions, if encountered, shall be logged and visual/olfactory observations noted.

We would recommend that all three (3no.) of the windowless sample holes are installed with gas monitoring standpipes in order to quantify potential gas and groundwater risks.

We would recommend that the test locations be based on the findings contained with this report, to enable a broad coverage of the site.

12.3 Monitoring Regime

The installed positions should be monitored for ground gases and groundwater, monitoring will commence approximately 7-10 days after completion of the holes to enable equilibration of the underlying soils and groundwater. Monitoring will be completed on a fortnightly basis on three (3no.) occasions.

Gas monitoring should be completed in accordance with CIRIA C665 *Assessing Risks Posed by Hazardous Ground Gases to Buildings*, when atmospheric pressure is either falling and/or below 1005 millibars (mb).

A portable Gas Analyser (GA5000) should be used to monitor soil gases (Oxygen, Carbon Dioxide, Methane and Hydrogen Sulphide) within the positions. A Photo Ionisation Detector

(PID- MiniRae 2000 lamp 10.6eV) meter should also be used during monitoring rounds to analyse the presence of Volatile Organic Compounds (VOCs) as a matter of course.

Once gas monitoring has been completed, a dip meter will be used to test for groundwater depth. If groundwater is encountered the positions will be adequately purged and samples subsequently removed in accordance with BS 6068-6.18: 2001 *Water Quality Sampling: Part 18 - Guidance on Sampling of Groundwater at Contaminated Sites*.

12.4 Laboratory Analysis

An appropriate and consistent analytical suite of contaminants should be applied to any soil samples retrieved from the site.

Based on the findings contained within this report, we would recommend that a comprehensive range of testing should be undertaken to comprise of heavy metals, speciated Total Petroleum Hydrocarbons (TPH CWG Aromatic/aliphatic split) and speciated Polycyclic Aromatic Hydrocarbons (PAH) including the more carcinogenic benzo(a)pyrene (BaP) and naphthalene, soil organic matter (SOM) content, VOCs, SVOCs, pH and sulphates.

In addition, selected samples retrieved from the Made Ground, if encountered, will also be submitted for a screen to determine the presence, or otherwise, of asbestos.

Groundwater samples should be submitted for a similar suite of analysis to that of soils.

It should be noted that not all samples retrieved from the proposed investigative works will be laboratory analysed and a UKAS and MCERTS accredited laboratory testing organisation should carry out all analysis.

12.5 Guidance

The results from the proposed SI shall be compared against standards, such as the revised LQM/CIEH S4UL criteria¹ where available.

Results from gas monitoring shall be used to calculate a Gas Screening Value (GSV) in accordance with BS8485: 2015.

Groundwater analysis, if encountered, would be compared against the Drinking Water Standards (DWS) for the United Kingdom (UK).

13.0 Recommendations

13.1 Consultees

It is highly recommended that this report be forwarded to the relevant Local Authority Environmental Health and Planning Department prior to the proposed site investigation works commencing to seek their comments and subsequent approval, otherwise further works may be required.

¹ Nathanail et al. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3495

13.2 Groundworks Watching Brief

If during construction works any material is noted to show visual and/or olfactory signs of contamination an environmental consultant should be contacted to supervise/guide further works.

If any landscaping materials are to be imported on site, they should be tested to check that they are suitable for the intended use.

13.3 Flood Risk Assessment

This report does not replace a full hydrogeological survey and specialist studies may need to be undertaken to ascertain the risks posed from flooding. Further details on site flood information can be found within the appendices.

14.0 Limitations and Uncertainties

This report has been prepared by YE with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources, together with a site walkover inspection of the site.

The opinions given in this report have been dictated by the finite data on which are they based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site. This report is an environmental phase 1 report and does not consider the geotechnical implications for the site, its redevelopment and proposed future use. Further advice should be sought on geotechnical investigation requirements for the proposed development.