

whitby wood

Carmoor Road

P451205-WW-XX-XX-RP-G-0001

Remediation Strategy

Client: TIGER DEVELOPMENTS LIMITED

06/09/2024

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1 INTRODUCTION

The aims and objectives of this report are to outline the remediation strategy required for the development of the site known as Carmoor Road. The remediation is required to minimise or eliminate risk to the construction workers, site personnel, end users and off-site neighbours of the site of exposure to contamination.

A phase 1 desk study (ref: 2554-A2S-XX-XX-RP-Y-0001-00) has been conducted by A-squared to develop an understanding of the ground conditions and any potential geo-environmental risk associated with the site. The report outlines a conceptual site model (CSM) and a Preliminary Risk Assessment (PRA) as well as proposals for intrusive investigation. Based on this report, the following contaminants were of concern:

- Heavy metals, in particular Lead, Mercury and Beryllium.
- PAH, in particular Naphthalene, Benzo(a) anthracene, Chrysene, Benzo(b) fluoranthene, Benzo(a)pyrene and Di-benzo(a,h) anthracene.
- Vapours related to the presence of hydrocarbons in the soil.

A Factual report (ref: LS7347) of the findings of said intrusive investigation was released by Land Science the report was issued in April 2024 and covers encountered ground conditions, geo-environmental laboratory testing and gas, vapour and water monitoring results.

A generic quantitative risk assessment (GQRA) and a revised CSM, based on the ground investigation, was completed as part of a technical note by Whitby Wood in May 2024.

The evaluation of the above documents, including field results and data gathered by other parties, will lead directly to the conclusions made in this remediation strategy, therefore, no liability can be taken with the provided data.

2 SITE DESCRIPTION

2.1 Site Location

The development site is located at Carmoor Road, Manchester, M13 0FB. The site boundary and surrounding buildings is shown in Figures 1. The approximate National Grid reference for the site is 385519E, 395947N.



FIGURE 1 - PLAN IMAGE FROM GOOGLE MAPS

The development site falls within the central area of Manchester. It sits just outside of the defined city centre, just beyond the Corridor Manchester sub-area of the city centre. It is also just outside of and within easy walking distance of the defined Oxford Road Corridor Regeneration area. The site area is approximately 2100m². The site is bounded by Carmoor Road on the east, United Students – Brookhall student

accommodation on the west, the West Indian Community Centre on the north and retail terraces on the south. Access to the site is from Carmoor Road from east and Autumn Street on the west.

2.2 Current Site Use

Existing uses on the site include a garage workshop, an abandoned residential building, and a building used previously as a private day nursery which is now vacant. None of the buildings are of any architectural merit or are subject to statutory protection. The application site is not within a conservation area. It is situated 250 metres north of Victoria Park conservation area. It is understood that the existing buildings within site will be demolished to enable the new site development.

2.3 Proposed Development

The development consists of the demolition of existing buildings and construction of purpose-built student accommodation with 172 beds in a mix of studio and cluster units alongside ancillary facilities and shared amenity space, site access and other associated works. The development consists of three to six storeys.

The proposed buildings are anticipated to be reinforced concrete structures with reinforced concrete slabs and columns, and core walls to provide lateral stability to the structure. Surrounding the site, permeable paving to support surface water drainage is proposed. The extent of the proposed landscaping is shown on the drainage site plan in Appendix A.

3 REVIEW OF EXISTING INFORMATION

3.1 Phase 1 Desk Study

The phase 1 desk study provided by A2 in November 2022 (2554-A2S-XX-XX-RP-Y-0001-00) reviews the site setting based on a walkover survey and database searches. The walkover report provides insightful comments on modern day usage of the different areas of the site. The adjacent nursery is abandoned and one of the garage buildings is used for vehicle storage exclusively (no vehicle maintenance). A review of local planning records did not find any major works at the site location. Correspondence with Manchester City Council provided initial information on potential sources of contamination in the vicinity of the site. The only significant note provided related to a clinical waste transfer station and incinerator, located at Manchester Royal Infirmary.

A previous desk study had already been conducted for a wider site boundary including land to the North. It identified potential sources of contamination including Made Ground due to the historic and current use of the site as a garage, potential asbestos within the development, Made Ground associated with the infilling of former basements along the eastern boundary and contaminants in groundwater sourced from Made Ground. The contaminants identified consisted of heavy metals, PAHs and vapours associated to the presence of hydrocarbons.

The groundwater conditions on site were identified as comprising a potential perched water table above the impermeable Till deposits and a principal aquifer in the Collyhurst Sandstone Formation confined below the impermeable Till.

A review of geological hazards did not reveal any significant geotechnical risks associated with the information available on-site conditions. No historic mining activity was recorded at the site location and no evidence of such activity was found to be likely based on a Consultants Coal Mining Report.

Site history showed the site to be developed with terraced buildings as of 1891, some of which are present to date, a row of residential garages was built in 1950 and replaced in 1965 by modern garage facilities. The garages are listed to date as the only contemporary trade directory on site.

Finally, the report reviews the contamination sources, potential pathways and potential receptors before summarising the potential contamination linkages. The findings of this report corroborate the findings of the previous desk study and established the main contamination risks to be associated with Made Ground and current and historical site use as garages. The conceptual site model is presented in Table 3.

3.2 Technical Note on Generic Qualitative Risk Assessment (GQRA)

3.2.1 Summary

Based on the recommendations of the desk study and the findings of the site-specific ground investigation undertaken by Land Science in April 2024 (ref: LS7347), Whitby Wood carried out a GQRA on 1st May 2024. The following field works were carried out as part of the 2024 investigation:

- 5 no. dynamically sampler boreholes with follow-on rotary drilled boreholes with hand dug inspection pits.

- 4no. dynamic sampler boreholes with hand dug inspection pits.
- Groundwater monitoring standpipe installations within one borehole.
- Post-site work monitoring of groundwater levels, (3 no. monitoring visits)

The following laboratory testing was carried out based on the samples identified as potentially contaminated during field works. Table 1 presents the results for soil samples and Table 2 those for groundwater samples. It should be noted that groundwater was only encountered in one location, hence only one sample was tested as part of this investigation.

TABLE 1: GEOENVIRONMENTAL TESTING CARRIED OUT FOR SOIL SAMPLES

Test description	Number of tests
LS1-Soil (1)	9
TPH1	11
TPH7	9
Asbestos	9
LS2 (2)	15
(1) Screening suite: pH, fraction of organic carbon, Metals and Non Metals, water soluble Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.	
(2) Waste Acceptance Criteria: Total Organic Carbon, Loss on Ignition, BTEX, speciated PCB's, Mineral Oil (EC10 – EC40), pH, Acid Neutralisation Capacity, speciated PAH's, 10:1 leachable Metals and Non Metals.	

TABLE 2: GEOENVIRONMENTAL TESTING CARRIED OUT FOR WATER SAMPLES

Test description	Number of tests
LS1-Water (3)	1
(3) Screening suite: pH, Metals and Non Metals, total Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.	

Further details of the design investigation works are presented in the investigation report.

3.2.2 Quantitative Risk Assessment Methodology

The GQRA's objective was to measure the results obtained in the laboratory tests from the site investigation against the generic acceptance criteria (GAC).

3.2.3 Results from the Generic Quantitative Risk Assessment

Based on the assessment, the following results are identified:

Soil Samples

- Exceedance of heavy metal content is present in ten samples, between 0.4 and 2.3 m below ground level. The detected heavy metals are **Lead, Mercury and Beryllium**.
- Exceedance for speciated PAH limits is present in 23 samples, between 0.2 and 0.6 m below ground level. The detected PAH are **Naphthalene, Benzo(a) anthracene, Chrysene, Benzo(b) fluoranthene, Benzo(a)pyrene and Di-benzo(a,h) anthracene**.
- No **asbestos** was detected in the samples tested.

- No exceedance for any **Total Petroleum Hydrocarbon (TPH)** limit in all of the tested samples.
- No exceedance for any **MTBE** and **BTEX** limit in all the tested samples.
- Volatile organic Compound (**VOC**) were not measured directly on site but were correlated from laboratory results, these were identified in the form of volatile **PAH** in some locations.
- No exceedance for Semi-Volatile Organic Compound (**SVOC**) limits in all the tested samples.

Groundwater Samples

- Exceedance of copper content was found in one borehole (BH003).

Gas and Groundwater Monitoring

- Groundwater level was found to be 4.4m below ground level during the return visit undertaken to date, it was not encountered during the investigation works although water level measurements were made difficult due to the use of flush.

3.2.4 Revised Conceptual Site Model

The results from the ground investigation confirmed the results initially anticipated in the desk study. The following risks with rating low to moderate or higher associated with land contamination remain:

- Human health users of the proposed site via direct contact of on-site contamination
- Human health users off site via migration of on-site contamination
- Sulphate attack to proposed below ground structures due to on-site contamination
- Contamination of secondary aquifers via leaching of on-site contamination
- Human health users of the proposed site via migration from off-site contaminants

Risks to site workers and the environment (from potential land contamination) during the construction phase of the proposed development should be appropriately managed by successful implementation of construction phase risk assessments and method statements (RAMS). The associated construction phase risks from potential contamination are not considered further but should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and Construction Phase Plan (CPP).

As presented in Table 3, the impact of the contaminant sources listed above are most notably to the end users of the development, neighbours, proposed structure, and environment.

TABLE 3: REVISED CONCEPTUAL SITE MODEL

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
On-site Made Ground (Metals, PAHs)	Direct contact with soil, Inhalation of windblown soil, Ingestion of soil	Human health users of proposed site	Yes (However, only in areas of new proposed soft landscaping)	Low to moderate	Results from the ground investigation and monitoring indicated heavy metals and PAH contamination of Made Ground Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs)	Impact to water supply pipes followed by ingestion of contaminated water supply		Yes (New pipes may be laid in impacted soils)	Low to moderate	Results from the ground investigation and monitoring indicated heavy metals and PAH contamination of Made Ground Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Ground gas generation and inhalation		Yes (Made Ground and any contamination on site represent a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, VOCs associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Soil vapour generation and inhalation		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (Metals, PAHs)	Inhalation of windblown soil from the site	Off-site human health	Yes (Proposed site is predominantly sealed which prevent it acting as a viable source)	Very low	Yes (Site does not have a completely seal surface) Magnitude: Medium Likelihood: Unlikely	Very low
On-site Made Ground (ground gas & vapours)	Off-site migration and direct contact with impacted soil		Yes (Open ground areas associated with student accommodation and the community centre present in the vicinity)	Low to moderate	Yes (Open ground areas associated with student accommodation and the community centre present in the vicinity) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate
On-site Made Ground (ground gas & vapours)	Off-site migration and ingestion of impacted soil and dust			Low to moderate		Low to moderate
On-site						

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Made Ground (PAHs, Metals)	Impact to water supply pipes followed by ingestion of contaminated water supply	On-site below ground structures	Yes (Pipes may be laid in nearby soils impacted by potential contamination)	Low to moderate	(Pipes may be laid in nearby soils impacted by potential contamination) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate †
On-site Made Ground (ground gas & vapours)	Ground gas generation, off-site migration and inhalation		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, ground gas associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs, Metals)	Soil vapour generation, off-site migration and inhalation		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs, Metals)	Direct contact		Yes (Structures may be constructed in impacted soils)	Low to moderate	Yes (Structures may be constructed in shallow, impacted soils) Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Migration followed by ignition of ground gas		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, ground gas associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs, Metals)	Migration followed by ignition of soil vapour		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, ground gas associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
On-site Made Ground (PAHs, Metals)	Off-site migration followed by direct contact	Off-site below ground structures	Yes (Onsite contamination unlikely to migrate off site and cause damage to adjacent foundations)	Low	Yes (On site contamination unlikely to migrate off site and affect neighbouring below-ground structures) Magnitude: Medium Likelihood: Unlikely	Low
On-site Made Ground (ground gas & vapours)	Off-site migration followed by ignition of ground gas		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, VOCs associated to hydrocarbon contamination is present but are unlikely to migrate so the fine soils present at surface level Magnitude: Medium Likelihood: Low	Low
On-site Made Ground (ground gas & vapours)	Off-site migration followed by ignition of soil vapour		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present but are unlikely to migrate so the fine soils present at surface level Magnitude: Medium Likelihood: Low	Low
On-site Made Ground (PAHs, Metals)	Leaching and migration to groundwater via the unsaturated zone; Perched water percolation or lateral migration; Migration via advection and diffusion in the saturated zone; and Vertical and lateral migration of free-phase product in the unsaturated and saturated zones.		Yes (Limited shallow groundwater likely to be present within the Till and groundwater likely to be present at depth within the Collyhurst Sandstone Formation)	Low to moderate	Yes (No groundwater was encountered during drilling and the use of flush in impermeable soil made return readings less credible) Magnitude: Medium Likelihood: Low Likelihood	Low
On-site Made Ground (PAHs, Metals)	On-site ingestion / dermal contact / inhalation / root uptake	Flora and fauna in proposed soft-landscaped areas at the site	Yes (Very limited soft-landscaping is proposed and it is of low sensitivity)	Low	Yes (Very limited soft-landscaping is proposed and it is of low sensitivity) Magnitude: Low Likelihood: Low Likelihood	Low

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
On-site Made Ground (PAHs, Metals)	Off-site migration at shallow depth followed by ingestion / dermal contact / inhalation / root uptake	Off-site flora and fauna in soft-landscaped areas nearby and Nature Conservation Area immediately south	Yes (Very limited soft-landscaping is in the immediately surrounding area and it is of low sensitivity)	Low	Yes (Very limited soft-landscaping is in the immediately surrounding area and it is of low sensitivity) Magnitude: Medium Likelihood: Low Likelihood	Low
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site migration followed by direct contact or ingestion of soil		Yes (However, the site predominantly appears to have a completely sealed surface)	Very low	Yes (However, the site predominantly appears to have a completely sealed surface and the natural soil is impermeable) Magnitude: Medium Likelihood: Low Likelihood	Very low
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	Inhalation of windblown soil from off-site	Human health users of proposed site	No (Surrounding area predominantly sealed surfaces, therefore a viable source of contaminated windblown soil is not present)	Not applicable	No (Surrounding area predominantly sealed surfaces, therefore a viable source of contaminated windblown soil is not present)	Not applicable
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by impact to water supply pipes and ingestion of the water supply		Yes (Pipes may be laid in soils impacted by potential off-site sources)	Low to moderate	Yes (Pipes may be laid in soils impacted by potential off- site sources) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Off-site Laundry, garages (VOC, SVOC)	Ground gas generation, on-site migration and inhalation	On-site below ground structures	No (No sources of off-site ground gas have been identified)	Not applicable	No (No sources of off-site ground gas have been identified)	Not applicable
Off-site Laundry, garages (VOC, SVOC)	Soil vapour generation, on-site migration and inhalation		Yes (Potential sources of volatile contamination have been identified in the vicinity of the site)	Low to moderate	Yes (Potential sources of volatile contamination have been identified on the site) Magnitude: Medium Likelihood: Medium	Moderate
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site migration followed by direct contact		Yes (Unlikely that gross contamination with potential to damage structures is migrating onto site)	Low	Yes (Unlikely that gross contamination with potential to damage structures is migrating onto site) Magnitude: Medium Likelihood: Low	Low
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by ignition of ground gas		No (No sources of off-site ground gas have been identified)	Not applicable		Not applicable
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by ignition of soil vapour		Yes (Potential sources of volatile contamination have been identified)	Low to moderate	Yes (Sources of volatile contamination have been identified) Magnitude: Medium Likelihood: Medium	Moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site ingestion / dermal contact / inhalation / root uptake	Flora and fauna in proposed soft-landscaped areas at the site	Yes (very limited soft-landscaping is proposed and it is of low sensitivity)	Very low	Yes (very limited soft-landscaping is proposed and it is of low sensitivity) Magnitude: Mild Likelihood: Low Likelihood	Very low

4 REMEDIATION OBJECTIVES

4.1 General

The proposed remediation strategy aims to break or remove the potential pollutant linkages identified in the above conceptual model. The aim of the remediation of the site is to provide a site that is suitable for its end land use and does not pose a risk to future site users or the surrounding environment.

At the time of writing, the foundation solution most likely to be adopted is piled foundations. Therefore, a likely sequence of works for this scheme is:

- Demolition of the existing structures
- Removal of buried tanks where encountered
- Installation of piles
- Excavation to cutoff level
- Formation of pile caps
- Main structural works
- Landscaping

The remedial works shall be inspected and verified by a suitably qualified and experienced environmental consultant.

The Contractor shall submit a method statement to Whitby Wood for approval in advance of the works. The method statement shall demonstrate that potential contamination issues have been considered and appropriate procedures and contingency measures will be implemented to mitigate against the possible release or spread of ground, liquid or airborne contaminants.

4.2 Summary Mitigation Measures

The measures employed on site are dependant on the type of works being undertaken. Table 4 describes the methods to be used for the areas to be developed with structures and the areas to be landscaped.

TABLE 4 REMEDIAL OPTIONS FOR PERMANENT WORKS

No.	Proposed Remediation Measure	Linkage	Comments
Area of Proposed Structure			
1	Cover System / Capping	Pathway Interruption	Not a treatment but does contain the contaminant. Stops leaching and vertical movement. Concrete Structure acts as a capping layer for the existing ground on site
2	Excavation and Removal	Source Removal	Proposed works for the construction of the floor requires bulk excavation. Excavated soil should undergo proper testing prior to removal/reuse.

3	CFA Piles	Pathway Interruption	The proposed load bearing piles will penetrate through various strata and introduce a new pathway for contaminants present in the Made Ground to migrate to underlying strata and the existing groundwater. CFA piling minimises this risk as it is a method which causes minimal disturbance to the surrounding soil during installation.
4	Gas Vapour Membrane	Pathway Interruption	Not a treatment but contains the possibility of gasses to infiltrate closed spaces within the structure
5	Concrete Class Design as per BRE 465	Receptor Improvement	Concrete to be designed to the adequate Sulphate Class to ensure that it can withstand sulphate attacks
Area of Hard Landscaping			
1	Cover System / Capping	Pathway Interruption	Not a treatment but does contain the contaminant. Stops leaching and vertical movement. Pavement acts as a capping layer for the existing ground on site.
2	Excavation and Removal	Source Removal	The top 0.7m of Made Ground will be excavated and replaced with the cover system/capping layer in certain areas. Excavated soil should undergo proper testing prior to removal/reuse.
Buried tanks			
1	Removal and disposal	Source removal	The contractor shall ensure that all buried tanks have been completely removed in the demolition phase of the works.

4.3 Influence of Remediation Works to Receptors

4.3.1 On-site Human Health

Four moderate risks associated with the presence of Made Ground were identified on site in the revised conceptual site model. These are associated with ingestion or inhalation of contaminants which construction staff will be directly exposed to. All groundworkers shall be issued appropriate PPE to work in close contact with contaminated materials including but not limited to: protective clothing, footwear, and gloves.

End users will be at a lower risk of exposure to ingestion or inhalation of the contaminants in the soil, however some risk remains. Two options to mitigate this risk will be discussed here: removal and capping. The site is expected to feature hard cover over its entire surface area, therefore the contaminated deposits can either be confined below the new structures and surfaces or be entirely removed from site and replaced with appropriate fill. Both solutions offer advantages, while the solution of replacing the material present on site is a simple means to ensure that the source of contamination is removed, capping the material offers cost savings and ease of installation. In areas of landscaping, the soft landscaping is expected to consist of a 600mm cover layer as per BRE 465 and will therefore replace the majority of Made Ground.

In areas of structural development, no direct pathway will remain between the site users and the contamination in the ground, however, vapours can permeate the structure and present a risk to the users. Vapours can be contained by a gas membrane placed below foundations; this is not required in landscaping areas as the vapours cannot accumulate in open air conditions.

The second pathway of concern is ingestion via impact to the water supply pipes. There are two possible solutions to this issue. Firstly, contain water supply pipes within any drainage or bedding layers free of

contamination, which may be applicable if all Made Ground is removed from site. The other possibility is to alter the composition of the pipes to a material which would prevent contamination migration, cast iron for example, should they be laid in contaminated ground. In addition to the risk posed by the contaminated Made Ground, the contractor shall verify that no buried tanks remain at the time earthworks are carried out. If any are found and are considered to be leaking, they should be removed and all contaminated soil around it shall be removed from site. The plan below provides an indication of the highly contaminated zone identified to date and the approximate location of what is believed to be a buried tank.

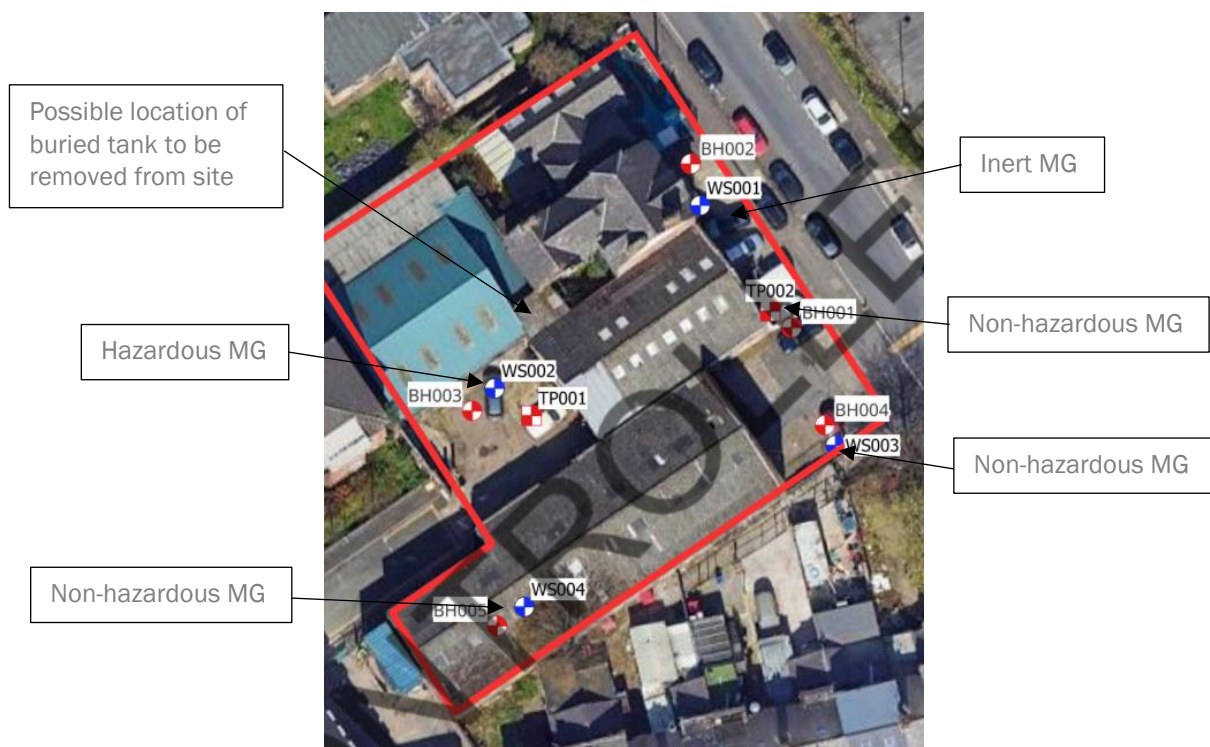


FIGURE 2 PLAN OF POTENTIAL CONTAMINATION

During earthworks, temporary stockpiles of excavated materials on site waiting for off-site removal shall be formed as discrete mounds and where possible, resting or hardstanding, or alternatively on impermeable membranes to prevent cross contamination of the site. A record shall be maintained of the location of temporary stockpiles, their chemical status, and from where the materials were originally excavated.

4.3.2 Off-site Human Health

Off-site human health could also be at risk via similar pathways to onsite human health explained above but will be addressed in a different manner. The significant difference between the two receptors is the migration of contamination sources required for the risk to be realised, a remediation strategy for this receptor will focus on this. The pathways of concern are again direct contact, ingestion of soil or dust and ingestion via water supply pipes, the latter are addressed in the same manner as in section 4.3.1. The direct contact with soil and ingestion of soil or dust are likely to be escalated by the measures required for section 4.3.1, specifically when concerning the removal or temporary storage of excavated contaminated material on or near site.

Temporary stockpiles shall be controlled as per section 4.3.1.

4.3.3 Off-Site Flora and Fauna

The same measures undertaken in section 4.3.1 should account for any potential issues to offsite flora and fauna. Any location chosen for offsite storage of any excavated material, temporary or otherwise, should be properly researched and approved.

4.3.4 Controlled Waters

As per the ground model discussed in section 3.1, the site is underlain by an impermeable stratum of Till which lies above a principle aquifer contained in the Collyhurst Sandstone Formation. The results of the site-specific site investigation, the Till extends from approximately 1m below ground level (bgl) to between 15 to 19.5m bgl.

The works likely to impact the principal aquifer on this site are the piling works which may open vertical flow paths, linking the contamination of the Made Ground to the aquifer. To avoid this, the Contractor should consider this risk when selecting an appropriate method of installation, methods such as CFA piling present minimal risk for cross contamination as it causes minimal disturbance during installation and seals the pathway with grout without leaving an open excavation.

4.3.5 Below Ground Structures

Buried structures may be exposed to aggressive soil or water conditions, the site-specific investigations collected samples to quantify the risk and determined from the results of the Sulphate and pH analyses that the appropriate concrete design class should be Class DS-1 and an ACEC class AC-1.

4.4 Classification of Excavated Materials

Due to the concentrations of total PAH and TPH found in the samples tested for WAC, the material on site cannot be classified as inert sitewide. From the site use and historical use, the area of the site to the northeast has been less exposed to contamination than the rest of the site and could be classified as inert. The site investigation confirmed this and indicated the area of the courtyard behind the garages to be the most contaminated with WAC testing classifying it as Stabilised Non-Reactive Hazardous Waste. Made Ground in other areas were not found to be hazardous but did not meet the criteria to be classified as inert, it should therefore be treated as Non-Hazardous.

When undertaking the excavation works, the Contractor should take care to identify visual and olfactory signs of contamination to avoid cross contamination between different material stockpiles on site.

4.5 Contractor's Method Statement and Inspection of Remediation Works

The Principal Contractor shall submit, in advance of the works, a method statement(s) to Whitby Wood for approval. The method statement(s) shall demonstrate that all relevant potential contamination issues have been considered and that appropriate procedures and contingency measures will be implemented to mitigate against the possible release of ground, liquid or airborne contaminants.

Responsibility for the correct implementation of the remediation strategy lies with the appointed Contractor. However, the remedial works shall be inspected and validated by a suitably qualified and experienced Environmental Consultant.

4.6 Inspection and Testing

The Environmental Consultant shall be present on the site during the proposed remediation works. Laboratory analyses shall be carried out at an MCERTS and UKAS-accredited laboratory.

It is possible that the groundworks/remediation will encounter different conditions from those revealed by the site investigation that may require special treatment or other alleviation measures. When the Contractor encounters unexpected ground conditions or potentially suspect materials, the Environmental Consultant shall be informed immediately to carry out an inspection as soon as is reasonably practical. The Environmental Consultant shall advise the Client and Contractor of any requirements of additional investigations or possible modifications to the remediation works.

5 WORKING PRACTICE AND WATCHING BRIEF

5.1 Staff Training/Brief

All site staff, site contractors and site visitors, shall be briefed on the site conditions, and should be aware of any potential contamination present on site, including any land, water or airborne contamination, any specific location on site that is most likely to be affected. If any contamination is encountered in site observations, it should be record as highlighted in section 5.2 and 5.3.

The following measures are suggested to provide a minimum level of protection:

- All ground workers on-site should be issued with protective clothing, dust masks, footwear and gloves.
- Care should be taken to minimise the amount of mud generated on-site

Reference should be made to the following Health and Safety Executive (HSE) document:

- CIRIA Report R 132 Guide for safe working on contaminated sites

5.2 Waste Disposal

Classification of any material to be disposed of to landfill shall be agreed in advance with the landfill operator(s), as appropriate. Any waste classified as “Hazardous” shall be disposed of in accordance with the Hazardous waste Regulations 2005.

All contaminated materials removed off-site shall be transported to an approved licensed landfill for final disposal. The Contractor shall provide a full documentary record of the operation. Copies of the documents should be provided to the Environmental Consultant for inclusion in the verification report.

5.3 Watching Brief

Watching brief is an action put into place to help minimise the infiltration of any contamination which was not present during the site investigation. The watching brief consists of:

- Any observation of contamination made during the development by any member of site staff, contractors or visitor.
- Photographic record of key stages of the development and key events, including new encounters with any contamination, formation levels of excavation, any reduced level dig/mass, and formation of landscape.

Areas with greater concern of contamination should be provided with a more specific watching brief to ensure risk is minimised on site. The brief should be prepared by a qualified site manager and/or by an environmental consultant.

During the development, the site manager is accountable and responsible for observing any works requiring the removal of the Made Ground during piling works to ensure any contamination encountered and method of contamination removal are recorded.

5.4 Discovery Strategy

The discovery strategy specifies the actions that should be taken in place if contamination is encountered during the works.

Examples of significant observations are identified below in Table 5 but are not only restricted to these items.

TABLE 5 EXAMPLES OF SIGNIFICANT OBSERVATIONS

Evidence	Description
Visual	Waste material (refuse, barrels, industrial wastes, ash, tar, etc) buried across the site. Fuel or oil like dark coloured substances present on soil surfaces mixed, smeared, or floating as well as presenting in the surface or ground water. Coloured marks across the site, for example colours such red, yellow, orange, green, light or dark blue, etc can be an indication of contamination. Large quantity of unexpected soil such as ash and clinker can suggest contamination
Odours	Hydrocarbon, Fuel, oil, and chemical type odours Unusual odours, such as sweet or fishy odours
Wellbeing	Nausea and light headache by staff or visitor during exaction works, when visual or olfactory evidence of contamination exists. Blistering, burning, or reddening of the skin due to contact with the soil. Difficulty in breathing for example burning of nasal passages, throat, lungs or skin.

6 VERIFICATION REPORTING

6.1 General

A Verification report is a requirement of the planning process to help verify remedial works are completed in accordance with approved methodologies and the risk associated with contamination is reduced ensuring the site is suitable for the end-users. The verification report is provided once all groundworks, including foundation works, are completed.

The following items are assessed in the verification report; therefore, information should be provided during the course of the works.

- Details of disposal of hazardous materials during demolition and site preparation
- Details of total disposal quantities and final disposal rates for waste soil
- Copies of relevant waste management/disposal licenses or PC Permits, as applicable.
- Copies of registered waste carrier certificates
- Records of any consents, permits, authorisation and/or licenses held or obtained by the Contractor (and subcontractors) relevant to the workers.
- Validation sample records

The following can also be included regarding backfill and import records, as necessary.

- Chemical and geotechnical data from site derived fill materials and topsoil
- Chemical and geotechnical data for imported fill materials and topsoil
- Imported fill summary records.
- Waste disposal records, including the following as applicable.
- Soils disposal summary and daily disposal records.
 - Liquid waste disposal summary.
 - Hazardous waste disposal summary
 - Waste consignment notes.
 - Tip tickets for each waste disposal facility use.
 - Liquid waste transfer notes

6.2 Verification of imported topsoil

Imported topsoil that is used for soil remediation works (capping) shall be sampled and analysed to demonstrate its chemical suitability. Analyses of the samples shall be carried out at an independent accredited laboratory (by UKAS and MCERTS) for an analytical suite which should include the following as a minimum:

- Particle size analysis and stone content

- PH and electrical conductivity values
- Heavy metals (As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn)
- Aromatic and aliphatic TPH
- Soil organic matter content
- Speciated PAHs

Sampling and analyses of the topsoil shall be carried out in accordance with guidelines and test methods provided in BS 3882:2015. Analytical results should be compared with Soil Guideline Values (SGV) published by the Environment Agency or relevant Generic Assessment Criteria (GAC).

The following frequency and quantity of topsoil samples are required:

- Natural source: 1 sample per 40m³, a minimum of 3 samples
- Recycled or Manufactured: 1 sample per 20m³, a minimum of 3 samples

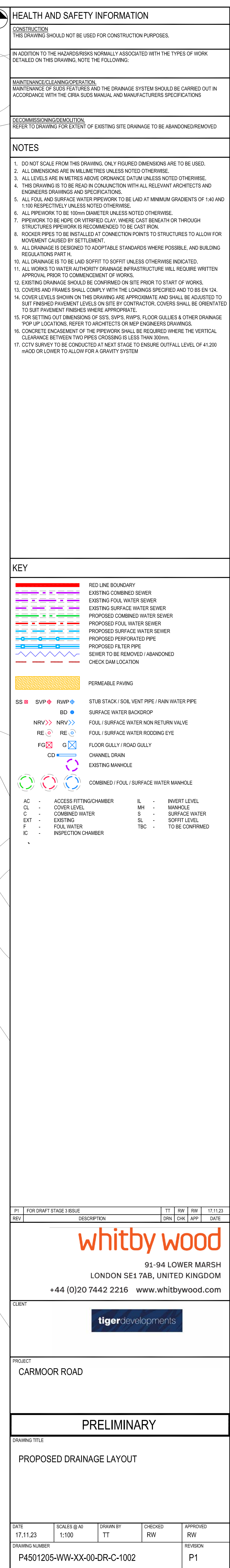
6.3 Verification of soil capping implementation

The following inspection shall be carried out by the Contractor on site to ensure that the proposed capping thickness is adopted on site:

- Inspection record at the proposed soil capping works
- A site plan confirming sample and depth check locations
- Confirmation of clean cover depth including photos (could be done by trial pit and use of photographs and/or logging of encountered soil)
- Confirmation of the presence of anti-dig layer

The inspection should be carried out with the minimum frequency of 1 at each plot.

Appendix A – Proposed Drainage Layout



Appendix B –GQRA

CARMOOR ROAD, MANCHESTER**Technical Note on Revised Conceptual Site Model for Land Contamination****REVISION:** P01 – 17th May 2024**APPENDICES:**

- **Appendix A:** Geo-Environmental Laboratory Test Results from extracted from Land Science Ground Investigation Report
- **Appendix B:** Carmoor Road Desk Study (2554-A2S-XX-XX-RP-Y-0001-00)
- **Appendix C:** Carmoor Road Investigation Report (LS7347)

EXECUTIVE SUMMARY

The aim of this technical note is to present the Revised Conceptual Site Model based on the findings from the design ground investigation works carried out by Land Science in January 2024.

A Generic Quantitative Risk Assessment was carried out by Land Science upon the completion of the ground investigation works and presented in the Ground Investigation Report (LS7347). A revised Conceptual Site Model is presented in this technical note, along with the findings of the review carried out and comments arising from the Ground Investigation Report. This document should be read in conjunction with the Phase 1 Desk Study Report (2554-A2S-XX-XX-RP-Y-0001-00) and the Ground Investigation Report (LS7347).

The results from the ground investigation indicate that the likelihood of land contamination on site is in accord with that initially anticipated during the desk study. The presence of contaminated Made Ground associated with historic and current site use was the main element identified in the investigation. The Made Ground was found to be contaminated with PAH and heavy metals and to be a potential source of ground gas and vapours. A remediation strategy will be required to mitigate the risks posed by the Made Ground. From the shallow nature of the deposits, it may be possible to remove the contaminants from the site entirely or alternatively, the structure will need to be separated from this source by means of a membrane or other structures (e.g. floor slab) which removes the pathway linkage to the development.

SITE LOCATION AND PROPOSED DEVELOPMENT

The site is situated at 90 Carmoor Road in Manchester, M13 0FB. The approximate National Grid reference for the site is 385520E, 395930N and the site footprint covers approximately 0.02 hectares. The southern area of the site currently includes three buildings, single-storey warehouse style commercial buildings which operate as Rafter's Garage. An associated forecourt and parking area is present at the front of the buildings on the western side of Carmoor Road. A three-storey brick-built residential property and a two-storey brick-built building which formerly operated as Catherine's Little Angels Day Nursery are present within the northern area of the site. A small garden area is present to the rear of the former nursery on site and contains both soft landscaping and hardstanding areas. A plan of the site is presented in Figure 1.



FIGURE 1 PLAN IMAGE FROM GOOGLE MAPS

The proposed development for Carmoor Road is to comprise demolition of the existing buildings and structures and redevelopment of the site in the form a 3 to 6 storey development intended as student accommodation offering 172 rooms.

SUMMARY OF GROUND INVESTIGATION WORKS

The following field works were carried out in January 2024:

- 5 no. dynamically sampler boreholes with follow-on rotary drilled boreholes with hand dug inspection pits.
- 4no. dynamic sampler boreholes with hand dug inspection pits.
- Groundwater monitoring standpipe installations within one borehole.
- Post-site work monitoring of groundwater levels, (minimum 3 no. monitoring visits)

The following laboratory testing was carried out based on the samples identified as potentially contaminated during field works. Table 1 presents the results for soil samples and Table 2 those for groundwater samples. It should be noted that groundwater was only encountered in one location, hence only one sample was tested as part of this investigation.

TABLE 1: GEOENVIRONMENTAL TESTING CARRIED OUT FOR SOIL SAMPLES

Test description	Number of tests
LS1-Soil (1)	9
TPH1	11
TPH7	9
Asbestos	9
LS2 (2)	15
(1) Screening suite: pH, fraction of organic carbon, Metals and Non Metals, water soluble Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.	
(2) Waste Acceptance Criteria: Total Organic Carbon, Loss on Ignition, BTEX, speciated PCB's, Mineral Oil (EC10 – EC40), pH, Acid Neutralisation Capacity, speciated PAH's, 10:1 leachable Metals and Non Metals.	

TABLE 2: GEOENVIRONMENTAL TESTING CARRIED OUT FOR WATER SAMPLES

Test description	Number of tests
LS1-Water (3)	1
(3) Screening suite: pH, Metals and Non Metals, total Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.	

Further details of the design investigation works are presented in the investigation report.

GENERIC QUANTITATIVE RISK ASSESSMENT METHODOLOGY

A review has been carried out on the generic quantitative risk assessment carried out by Land Science generic tier 1 screening assessment, Generic Assessment Criteria for residential development.

Based on the results of the generic quantitative risk assessment, a revised conceptual model was developed to identify potential mitigation measures.

RESULTS FROM THE GENERIC QUANTITATIVE RISK ASSESSMENT

Based on the assessment, the following results are identified:

Soil Samples

- Exceedance of heavy metal content is present in ten samples, between 0.4 and 2.3 m below ground level. The detected heavy metals are **Lead, Mercury and Beryllium**.
- Exceedance for speciated PAH limits is present in 23 samples, between 0.2 and 0.6 m below ground level. The detected PAH are **Naphthalene, Benzo(a) anthracene, Chrysene, Benzo(b) fluoranthene, Benzo(a)pyrene and Di-benzo(a,h) anthracene**.
- No **asbestos** was detected in the samples tested.
- No exceedance for any **Total Petroleum Hydrocarbon (TPH)** limit in all of the tested samples.
- No exceedance for any **MTBE** and **BTEX** limit in all the tested samples.
- Volatile organic Compound (**VOC**) were not measured directly on site but were correlated from laboratory results, these were identified in the form of volatile **PAH** in some locations.
- No exceedance for Semi-Volatile Organic Compound (**SVOC**) limits in all the tested samples.

Groundwater Samples

- Exceedance of **copper** content was found in one borehole (BH003).

Gas and Groundwater Monitoring

- Groundwater level was found to be 4.4m below ground level during the return visit undertaken to date, it was not encountered during the investigation works although water level measurements were made difficult due to the use of flush.

Results from the geo-environmental laboratory testing are presented in Appendix A.

REVISED CONCEPTUAL SITE MODEL

The Conceptual Site Model developed in the Desk Study based in the form of a preliminary risk assessment has been reviewed. A revised Conceptual Site Model taking into account the results from the Quantitative Generic Risk Assessment above is presented in Table 3.

The results from the ground investigation confirmed the results initially anticipated in the desk study. The following risks with rating low to moderate or higher associated with land contamination remain:

- Human health users of the proposed site via direct contact of on site contamination
- Human health users off site via migration of on site contamination
- Sulphate attack to proposed below ground structures due to on site contamination
- Contamination of secondary aquifers via leaching of on site contamination

Contamination Source: Off Site

- Human health users of the proposed site via migration from off site contaminants

Risks to site workers and the environment (from potential land contamination) during the construction phase of the proposed development should be appropriately managed by successful implementation of construction phase risk assessments and method statements (RAMS). The associated construction phase risks from potential contamination are not considered further but should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and Construction Phase Plan (CPP).

As presented in Table 3, the impact of the contaminant sources listed above are most notably to the end users of the development, neighbours, proposed structure, and environment.

An appropriate remediation strategy to either remove the source of contaminants, or breaking the pathway linkage between source and receptor shall be developed to mitigate potential contamination risks that are rated low to moderate or higher.

TABLE 3: REVISED CONCEPTUAL SITE MODEL

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
On-site Made Ground (Metals, PAHs)	Direct contact with soil, Inhalation of windblown soil, Ingestion of soil	Human health users of proposed site	Yes (However, only in areas of new proposed soft landscaping)	Low to moderate	Results from the ground investigation and monitoring indicated heavy metals and PAH contamination of Made Ground Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs)	Impact to water supply pipes followed by ingestion of contaminated water supply		Yes (New pipes may be laid in impacted soils)	Low to moderate	Results from the ground investigation and monitoring indicated heavy metals and PAH contamination of Made Ground Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Ground gas generation and inhalation		Yes (Made Ground and any contamination on site represent a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, VOCs associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Soil vapour generation and inhalation		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (Metals, PAHs)	Inhalation of windblown soil from the site	Off-site human health	Yes (Proposed site is predominantly sealed which prevent it acting as a viable source)	Very low	Yes (Site does not have a completely seal surface) Magnitude: Medium Likelihood: Unlikely	Very low
On-site Made Ground (ground gas & vapours)	Off-site migration and direct contact with impacted soil		Yes (Open ground areas associated with student accommodation and the community centre present in the vicinity)	Low to moderate	Yes (Open ground areas associated with student accommodation and the community centre present in the vicinity) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate
On-site Made Ground (ground gas & vapours)	Off-site migration and ingestion of impacted soil and dust			Low to moderate		Low to moderate
On-site						

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Made Ground (PAHs, Metals)	Impact to water supply pipes followed by ingestion of contaminated water supply	On-site below ground structures	Yes (Pipes may be laid in nearby soils impacted by potential contamination)	Low to moderate	(Pipes may be laid in nearby soils impacted by potential contamination) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate †
On-site Made Ground (ground gas & vapours)	Ground gas generation, off-site migration and inhalation		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, ground gas associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs, Metals)	Soil vapour generation, off-site migration and inhalation		Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (PAHs, Metals)	Direct contact		Yes (Structures may be constructed in impacted soils)	Low to moderate	Yes (Structures may be constructed in shallow, impacted soils) Magnitude: Medium Likelihood: Probable	Moderate
On-site Made Ground (ground gas & vapours)	Migration followed by ingestion of ground gas		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, ground gas associated to hydrocarbon contamination is present Magnitude: Medium Likelihood: Probable	Moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
On-site Made Ground (PAHs, Metals)	Migration followed by ignition of soil vapour		Yes (Volatile contaminants are potentially present)	Low to moderate		
On-site Made Ground (PAHs, Metals)	Off-site migration followed by direct contact		Yes (Onsite contamination unlikely to migrate off site and cause damage to adjacent foundations)	Low	Yes (On site contamination unlikely to migrate off site and affect neighbouring below-ground structures) Magnitude: Medium Likelihood: Unlikely	Low
On-site Made Ground (ground gas & vapours)	Off-site migration followed by ignition of ground gas		Yes (Made Ground and current site use represents a potential source of ground gas)	Low to moderate	Based on results from the ground investigation and monitoring, VOCs associated to hydrocarbon contamination is present but are unlikely to migrate so the fine soils present at surface level Magnitude: Medium Likelihood: Low	Low
On-site Made Ground (ground gas & vapours)	Off-site migration followed by ignition of soil vapour	Off-site below ground structures	Yes (Volatile contaminants are potentially present)	Low to moderate	Based on results from the ground investigation and monitoring, volatile contaminants are likely to be present but are unlikely to migrate so the fine soils present at surface level Magnitude: Medium Likelihood: Low	Low
On-site Made Ground (PAHs, Metals)	Leaching and migration to groundwater via the unsaturated zone; Perched water percolation or lateral migration; Migration via advection and diffusion in the saturated zone; and Vertical and lateral migration of free-phase product in the unsaturated and saturated zones.	Controlled waters - Underlying Secondary A Aquifer (River Terrace Deposits)	Yes (Limited shallow groundwater likely to be present within the Till and groundwater likely to be present at depth within the Collyhurst Sandstone Formation)	Low to moderate	Yes (No groundwater was encountered during drilling and the use of flush in impermeable soil made return readings less credible) Magnitude: Medium Likelihood: Low Likelihood	Low
On-site						

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Made Ground (PAHs, Metals)	On-site ingestion / dermal contact / inhalation / root uptake	Flora and fauna in proposed soft-landscaped areas at the site	Yes (Very limited soft-landscaping is proposed and it is of low sensitivity)	Low	Yes (Very limited soft-landscaping is proposed and it is of low sensitivity) Magnitude: Low Likelihood: Low Likelihood	Low
On-site Made Ground (PAHs, Metals)	Off-site migration at shallow depth followed by ingestion / dermal contact / inhalation / root uptake	Off-site flora and fauna in soft-landscaped areas nearby and Nature Conservation Area immediately south	Yes (Very limited soft-landscaping is in the immediately surrounding area and it is of low sensitivity)	Low	Yes (Very limited soft-landscaping is in the immediately surrounding area and it is of low sensitivity) Magnitude: Medium Likelihood: Low Likelihood	Low
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site migration followed by direct contact or ingestion of soil	Human health users of proposed site	Yes (However, the site predominantly appears to have a completely sealed surface)	Very low	Yes (However, the site predominantly appears to have a completely sealed surface and the natural soil is impermeable) Magnitude: Medium Likelihood: Low Likelihood	Very low
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	Inhalation of windblown soil from off-site		No (Surrounding area predominantly sealed surfaces, therefore a viable source of contaminated windblown soil is not present)	No pathway		
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by impact to water supply pipes and ingestion of the water supply		Yes (Pipes may be laid in soils impacted by potential off-site sources)	Low to moderate	Yes (Pipes may be laid in soils impacted by potential off- site sources) Magnitude: Medium Likelihood: Low Likelihood	Low to moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Off-site Laundry, garages (VOC, SVOC)	Ground gas generation, on-site migration and inhalation	On-site below ground structures	No (No sources of off-site ground gas have been identified)	No classification		
Off-site Laundry, garages (VOC, SVOC)	Soil vapour generation, on-site migration and inhalation		Yes (Potential sources of volatile contamination have been identified in the vicinity of the site)	Low to moderate	Yes (Potential sources of volatile contamination have been identified on the site) Magnitude: Medium Likelihood: Medium	Moderate
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site migration followed by direct contact		Yes (Unlikely that gross contamination with potential to damage structures is migrating onto site)	Low	Yes (Unlikely that gross contamination with potential to damage structures is migrating onto site) Magnitude: Medium Likelihood: Low	Low
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by ignition of ground gas		No (No sources of off-site ground gas have been identified)	No classification		
Off-site Laundry, garages (VOC, SVOC)	On-site migration followed by ignition of soil vapour		Yes (Potential sources of volatile contamination have been identified)	Low to moderate	Yes (Sources of volatile contamination have been identified) Magnitude: Medium Likelihood: Medium	Moderate

Potential Contaminant Source	Potential Pathway	Receptor	Potential Contaminant Linkage	Risk Level	Justification based on Results from Investigation Report	Revised Risk Level
Off-site Laundry, sub-station, garages (TPH, PAH, Metals)	On-site ingestion / dermal contact / inhalation / root uptake	Flora and fauna in proposed soft-landscaped areas at the site	Yes (very limited soft-landscaping is proposed and it is of low sensitivity)	Very low	Yes (very limited soft-landscaping is proposed and it is of low sensitivity) Magnitude: Mild Likelihood: Low Likelihood	Very low

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