

Land bound by John Dalton
Street, Ridgefield, Bow Street
and South King Street,
Manchester

Phase 1 Preliminary Risk Assessment

Curtins Ref: 070298-CUR-00-XX-RP-GE-001

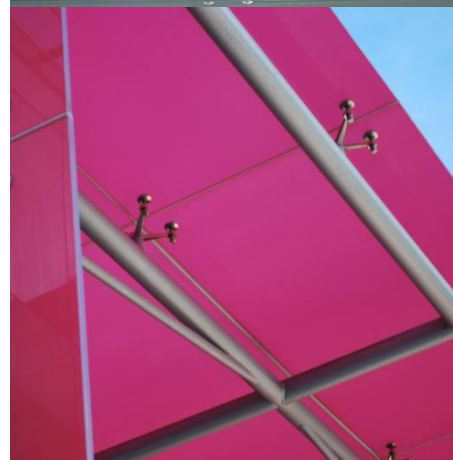
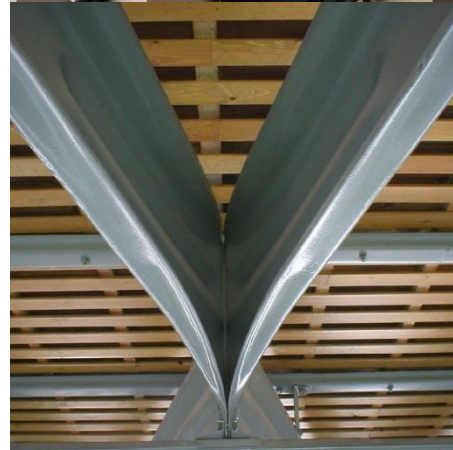
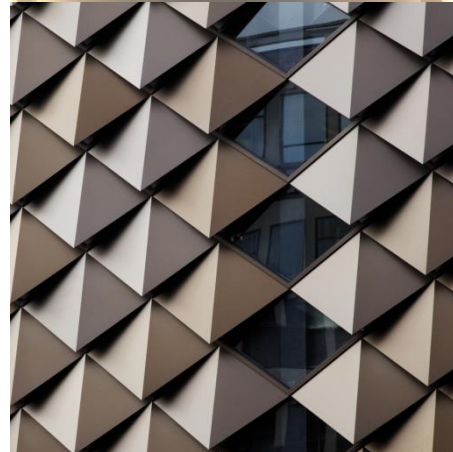
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Client Name: Island Site (General Partner) Ltd

Client Address: 26 Cross Street, Manchester M2 7AQ

Site Address: John Dalton St, Manchester, M2 6FW



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Executive Summary

Appointment	In November 2019, Curtins were instructed by The Island Site (General Partner) Limited to undertake a Phase 1 Preliminary Risk Assessment of the land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester. The site is centred on SJ 83714 98262 and covers an area of approximately 0.16 Ha.
Current Site Status	The site comprises the three buildings of Old Colony House, Ridgefield House and Grange House consisting of basements, ground floor retail accommodation and upper floor offices. The site is bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester
Site History	The earliest mapping (1848) shows the site and surrounding area partially developed with unspecified buildings. The River Irwell is located 250m north flowing south-westwards. By 1891, the site was fully developed. By 1917, the buildings were specified as being occupied by a tailor, a yarn warehouse and a bakehouse. Post war mapping (1948) indicates the buildings to the north of the site were demolished and redeveloped as Old Colony House. Ruins were recorded 15m north, 70m south west and 75m north. By 1966, the buildings to the south and east of the site were demolished and redeveloped at St James House with an electrical substation noted 35m south.
Geology	Made Ground is not indicated to be present on BGS mapping, however taking into account considerable historical development, its presence is expected. Surrounding BGS borehole records encountered Made Ground from ground level to between 1.10m and 2.50m bgl. Published mapping indicates the site is underlain by Glaciofluvial Sheet Deposits in the north and west of the site, which historic borehole logs suggest the deposit is encountered between 4.50m and 7.00m bgl. Glacial Till is mapped close to the eastern boundary and may underlie the site. The superficial deposits are underlain by the Chester Formation (sandstone). Local BGS records indicate bedrock to be generally 6-7m bgl. The site is situated in a coal mining reporting area; however, it is not within a development high risk area. No mine entries are located within 2km of the site boundary. Coal outcrops and possible shallow coal workings are mapped in excess of 2.3km northeast of the site.
Hydrogeology	The aquifer designated for the granular superficial deposits is a Secondary A Aquifer, while the bedrock is classified as a Principal Aquifer. The site is not located within a Source Protection Zone (SPZ). There are five groundwater abstraction points located within 500m of the site boundary. The nearest is located 364m west operated by Her Majesty's Court Service for non-evaporative cooling for commercial/public services.
Hydrology	The nearest surface water feature is the River Irwell located 255m north of the site running from east to west and flowing generally south-west. There are two pollution incidents to controlled waters within 250m of the site which affected the River Irwell, neither was associated with the site. There are no discharge consents within 250m of the site. There are no surface water abstractions recorded within 1km of the site boundary.
UXO	Risk mapping for UXOs has placed the site in a Moderate risk area. Two Luftwaffe targets are located within 1km of the site and one post-war UXO find is located 50m north of the site. Historical bomb damage mapping shows the site and surrounding area have been affected by fire bombs between 1940 – 1941. During this period damage to buildings were recorded 50m south east and 110m south west. Historic mapping from 1948 indicate ruins within a 100m radius of the site. Considering this, the risk of encountering a potential UXO is considered to be Moderate to High, therefore procurement of a Detailed UXO Risk Assessment Report should be obtained prior to any intrusive works taking place.

Initial Ground Contamination Assessment	The chronic health risk posed to site end users by onsite sources of contamination via direct contact, ingestion, inhalation is assessed as Moderate due to the historical residential and industrial use on site and throughout the surrounding area. The risk of pollution of groundwater and surface waters by onsite sources of contamination via vertical/horizontal migration through site soils is assessed as Moderate/Low and Very Low respectively, as it is considered likely that Made Ground soils will have been removed from across the site during the construction of the existing basements. The chronic health risk posed to site end users by on and offsite soils with the potential to generate ground gases via vertical and horizontal migration through the underlying deposits is assessed as Moderate/Low due to the historical activities on site of demolition and construction phases.
Recommendations	In summary the following recommendations are made; • Obtain a Detailed UXO Report prior to any intrusive works being undertaken at the site; • Undertake an intrusive ground investigation; • Undertake a GQRA as part of the ground investigation; and • Undertake Ground Gas monitoring.

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Appendices

Appendix A – Drawings

Appendix B – Envirocheck Report

Appendix C – Qualitative Risk Assessment Rationale

1.0 Introduction

1.1 Project Background

In November 2019 Curtins were instructed by The Island Site (General Partner) Limited to undertake a Phase 1 Preliminary Risk Assessment of the land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester

1.2 Scope of Services

The Phase 1 is intended to provide an overview of the geo-environmental and geotechnical setting of the site prior to the redevelopment of the site. The proposed works comprise the demolition of the existing buildings and structures and the erection of a 10-storey plus basement office building (Use Class E(g)), with flexible ground floor and basement uses (Use Class E) and a rooftop garden, works to facilitate the pedestrianisation of the southern part of Ridgefield and other associated works

Through this overview the Phase 1 aims to develop both a working conceptual and ground model for the site, as well as present an initial assessment of any risks that could be presented to the development including its intended end users and the wider environment.

Specifically, the Phase 1 provides an initial assessment of the site with regard to:

- a) Potential contamination of the site strata by historical and or current use;
- b) The potential impact on the wider environment by historical and or current use of the site of interest;
- c) The potential impact from surrounding land uses and other environmental factors;
- d) Potential problems associated with geological features such as faulting, mineral extraction, mining and land instability;
- e) The location of apparent sub-surface structures and obstructions that may affect the proposed redevelopment; and
- f) The location of above-surface features that may affect the proposed redevelopment.

Consideration of detailed flood risk, ecology and archaeological issues are outside of the scope of this report. These have been addressed in other documents which support this planning application.

2.0 Current Site and Surrounding Area Details

2.1 Site Location and Current Details

The current site details have been determined by a review of readily available online sources of information and the Envirocheck report (included in *Appendix B (1)*). The details are given in *Table 2.1*.

Table 2.1 – Site Details

Site Address	The Island, John Dalton Street, Manchester, M2 6FW
NGR	383710, 398260
Area of Site	Approximately 0.16 Ha
Current Site Use and Description	The site extends to approximately 0.13 hectares and is located at the heart of Manchester City Centre. The site comprises a rectangular block of buildings bound by John Dalton Street to the south, South King Street to the north, Bow Street to the east and Ridgefield to the west. Three existing buildings are located within the site boundary comprising: • Old Colony House (25,968 sq ft), a vacant 7 storey building comprising office accommodation with a vacant former restaurant at ground floor level. The building fronts onto South King Street; • 5 Ridgefield (11,748 sq ft), a 3 storey building comprising a former restaurant use at basement and ground floor level and vacant offices at first and second floors. The site fronts onto Ridgefield and Bow Street; and, • Grange House (17,309 sq ft), a 6 storey building comprising ground floor retail/restaurant/office use with vacant upper floors formerly in office use. The building fronts onto John Dalton Street.

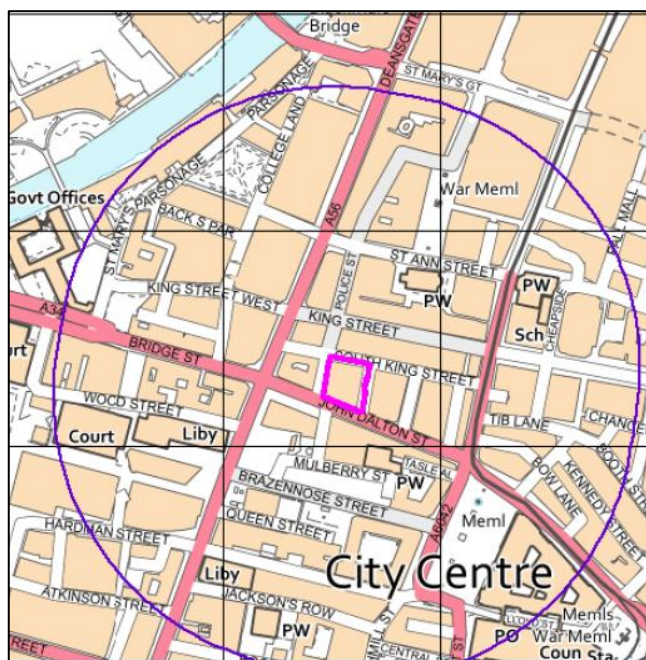


Figure 2.1 – Site Location Plan (site boundary shown in pink)
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2.2 Surrounding Area Details

The following details were determined using a variety of online sources of information and the Envirocheck Report (included in *Appendix B (1)*).

Table 2.2 – Surrounding Area

Surrounding Area	N	South King Street followed by commercial properties.
	E	Bow Street followed by commercial properties.
	S	John Dalton Street followed by commercial properties.
	W	Ridgefield followed by commercial properties.

3.0 Site History

A review of the available historical mapping, historical building plans and other information for the site, as presented within the Envirocheck report (1), has been undertaken and is presented in *Table 3.1* below.

Table 3.1 – Previous Site and Surrounding Area Uses and Potential Sources of Contamination (onsite uses are indicated in **bold**)

Date	Description	Potential Sources of Contamination
1851 - 1891	The site is partially developed, occupied by several unspecified buildings with courtyards. Generally unspecified buildings occupy the land within 100m of the site. A timber yard is located 70m south and St Anns Church and graveyard is located 85m north. The River Irwell is located 250m north west of the site.	• Uncontrolled deposition of Made Ground during construction onsite.
1891 - 1943	The site is fully developed with the configuration of the site changed. By 1917, the buildings are specified as being occupied as a tailor, a yarn warehouse and a bakehouse. The buildings vary in height from 3 to 4 storeys and basement are recorded. Generally unspecified buildings occupy the land within 100m of the site. A tramway is recorded 50m west. Printing works are located 85m south west and 140m south east	• Uncontrolled deposition of Made Ground during construction onsite. • Potential contamination associated with the yarn warehouse on site and any other unspecified industries.
1943 - 1966	The buildings in the north of the site have been demolished and redeveloped as Old Colony House which is 4 storeys, with two attics and a basement. The baker and tailor are no longer recorded. Ruins are recorded 15m north, 70m south west, 75m north and 135m west suggesting possible bombings in the area during WWII. The tramway is no longer recorded 50m west. A printing works is recorded 150m south west and 190m south west.	• Uncontrolled deposition of Made Ground during demolition and subsequent construction onsite. • Uncontrolled deposition of Made Ground during demolition and construction offsite. • Potential contamination associated with the Works within 250m of the site. • Potential unexploded ordnance (UXOs) on and surrounding site.
1966 - 2019	The buildings to the south of the site have been demolished and redeveloped. The buildings to the east of the site have been demolished and redeveloped as St James House. The surrounding area is occupied by commercial properties. The buildings 20m south west have been demolished and redeveloped as John Dalton House. An electrical substation is located 35m south.	• Uncontrolled deposition of Made Ground during demolition onsite. • Uncontrolled deposition of Made Ground during demolition and construction of St James House and other commercial properties offsite.

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Date	Description	Potential Sources of Contamination
	The printing works are no longer recorded.	

Potential sources of onsite contamination are further discussed in *Section 7.0*.

Potential sources of contamination above not considered likely to impact the site have been discounted from the Preliminary Conceptual Site Model.

4.0 Geology, Hydrogeology and Hydrology

4.1 Geology and Hydrogeology

A study of the Envirocheck records (1), BGS online borehole records (2) and British Geological Survey (BGS) 1:50,000 mapping records (Solid and Drift Editions) for Manchester (Sheet 085) (3) indicates the following geological and hydrogeological succession underlying the site:

Table 4.1a – Geological/Hydrogeological Succession

Geology	Associated Hydrogeological Classification
Made Ground is not indicated on BGS mapping. However, given the development of the site it is considered likely that Made Ground deposits will be present at the site.	N/A
Glaciofluvial Sheet Deposits (north and west) ¹	Secondary A Aquifer ³
Chester Formation ²	Principal Aquifer ⁴

1. These comprise sediments deposited by meltwater streams including mostly coarse grained sediments (sand and gravel) with finer layers (clay and silt)

2. Formation shows a progressive change northward, from a coarse-grained, typically well-cemented proximal facies to a fine-grained, less well-cemented distal facies. Formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite with quartz conglomerate and vein quartz.

3. This designation is assigned to drift deposits that are capable at supporting water supplies at a local rather than strategic scale.

4. These are layers of rock or drift deposits that have higher intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Glacial Till (clay) is recorded in close proximity to the eastern boundary and may underlie the site. The Glacial Till is recorded as a Secondary Undifferentiated Aquifer.

There are two faults recorded within 300m of the site. One fault is approximately 75m north trending north west and south east and one fault is trending 260m south running north west to south east.

There are seven BGS recorded boreholes within 50m of the site. The details of these are given in *Table 4.1b* on the following page.

Table 4.1b – Historical Borehole Record from Surrounding Area

Borehole Ref.	Location (NGR)	Details (depth to top of strata/lithology)	
SJ89NW3776	0m north (383710, 398280)	0.00m bgl 0.10m bgl 0.30m bgl 1.10m bgl 1.90m bgl	MADE GROUND bituminous surfacing (0.10m) MADE GROUND concrete (0.20m) MADE GROUND brick ashes (0.80m) Clayey SAND and GRAVEL (0.80m) Very dense very sand GRAVEL with cobbles (3.92m) 5.82m bgl borehole termination
SJ89NW1157	13m south (383730, 398220)	0.00m bgl 0.50m bgl 1.70m bgl 2.60m bgl 4.30m bgl 5.50m bgl 6.60m bgl	MADE GROUND tarmac, stone, sand and concrete (0.50m) MADE GROUND very loose topsoil, cinders, ashes and bricks (1.20m) Soft clayey brown SAND (0.90m) Medium dense slightly silty fine to coarse grained SAND and fine to coarse GRAVEL (1.70m) Very stiff brown silty sandy gravelly CLAY, grading to clayey fine to coarse SAND and fine to coarse GRAVEL (1.20m) Dense brown slightly clayey fine to coarse SAND (1.10m) Very weak moderately weathered dark red fine to medium grained sandstone 7.10m bgl borehole termination
SJ89NW3775	19m west (383680, 398280)	0.00m bgl 0.05m bgl 0.75m bgl 0.90m bgl 1.35m bgl 5.40m bgl	MADE GROUND bituminous surfacing (0.05m) MADE GROUND concrete (0.70m) MADE GROUND brick pieces and ashes (0.15m) MADE GROUND Soft brown silty and sandy CLAY with stone inclusions and brick (0.45m) Loose to dense SAND and GRAVEL (4.05m) Very dense orange SAND with clay lenses (0.60m) 6.00m bgl borehole termination
SJ89NW1158	26m south east (384338, 398210)	0.00m bgl 0.50m bgl 2.40m bgl 4.00m bgl 7.00m bgl 9.00m bgl	MADE GROUND tarmac, stone, sand and concrete (0.50m) MADE GROUND very loose topsoil, cinders, ashes and bricks (1.90m) Medium dense brown clayey silty fine to coarse grained SAND and fine to coarse GRAVEL (1.60m) Medium dense becoming dense brown slightly silty fine to coarse grained SAND and GRAVEL (3.00m) Very weak moderately weathered dark red with bands of green/grey, fine to medium grained SANDSTONE (2.00m) Moderately weak becoming moderately strong, moderate to slightly weathered dark grey fine to medium grained sandstone (3.00m) 12.00m bgl borehole termination
SJ89NW3777	36m east (383770, 398270)	0.00m bgl 0.02m bgl 0.15m bgl 1.60m bgl 2.40m bgl	MADE GROUND bituminous surfacing (0.02m) MADE GROUND cobble sets (0.13m) MADE GROUND clay, ashes, stones, bricks (1.45m) MADE GROUND brown silty and sandy clay with stone and coal inclusions and brick pieces (0.80m bgl) MADE GROUND house bricks (0.10m) 2.50m bgl borehole termination

Borehole Ref.	Location (NGR)	Details (depth to top of strata/lithology)	
SJ89NW3521	43m west (383650,398250)	0.00m bgl	MADE GROUND setts (0.20m)
		0.20m bgl	MADE GROUD concrete (0.25m)
		0.45m bgl	MADE GROUND dark brown sand, clay and gravel with bricks (0.75m)
		1.20m bgl	Medium dense brown slightly silty SAND and GRAVEL with cobbles and boulders (4.97m)
		6.17m bgl	Highly/moderately weathered inferior cemented red/brown SANDSTONE (8.83m)
		15.00m bgl borehole termination	
SJ89NW1160	49m south (383700,398190)	0.00m bgl	MADE GROUND setts (2.00m)
		2.00m bgl	Dense brown fine to coarse SAND and fine to coarse GRAVEL (2.60m)
		4.60m bgl	Very weak moderately weathered dark red fine to medium grained SANDSTONE (1.90m bgl)
		6.50m bgl	Moderately strong slightly weathered dark red fine to medium grained SANDSTONE (5.50m bgl)
		12.00m bgl borehole termination	

There are five groundwater abstraction points within 500m of the site boundary. The nearest entry is located 364m west and is operated by Her Majesty's Court Service for non-evaporative cooling for commercial/public services. There are no potable groundwater abstractions within 750m of the site.

The site is not located within a Source Protection Zone.

4.1.1 Mining

The Coal Authority's online interactive mapping (4) confirm the site is in a coal mining reporting area, however it is not within a development high risk area. The closest mine entries are approximately 2.0km east of the site. Coal outcrops and probable workings are mapped northwest to southeast, approximately 2.3km northeast of the site. As such, the risk to the development from coal mine workings is **Low** and has not been considered further.

The Envirocheck report (1) confirms that there are no BGS recorded mineral sites within 1km of the site boundary.

4.1.2 Other Ground Stability Issues

The Envirocheck report (1) confirms that there is no hazard to low risk from the following ground stability hazards on and around the site; running sands, collapsible and compressible ground, shrinking or swelling clay, landslides and ground dissolution.

4.1.3 Ground Gas

There are no BGS recorded land fills within 500m of the site. There are no historic landfill sites, registered landfill sites or waste transfer sites within 500m of the site.

There are no areas of potentially infilled land within 500m of the site.

The Envirocheck report (1) confirms the site is situated in a lower probability radon area where <1% of homes are above the radon action level. On this basis radon protection measures are not considered necessary in the construction of new dwellings or extensions.

Where the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

4.2 Hydrology

The nearest surface water feature is River Irwell 255m north flowing east to west (River Quality E).

There have been two pollution incidents to controlled waters within 250m of the site, and a further four within 500m of the site. None have been attributed to the site. The nearest incident, 240m north west, affected the River Irwell and was associated with an unknown pollutant. The second nearest incident, 296m north west, affected the River Irwell and was associated with unknown sewage.

There are no discharge consents within 250m of the site.

There are no active surface water abstraction points located within 1km of the site boundary.

5.0 Unexploded Ordnance (UXO) Risk Assessment

Military activities including those conducted as part of both the First and Second World Wars have resulted in a legacy of unexploded ordnance (UXO) being present within the shallow soils of the UK.

UXO result from various sources including both allied (military training) and German (bombing raids) with a guide figure of approximately 10% of all munitions failing to function as designed.

The likelihood of UXO being encountered on a development site is influenced by a number of factors including; the proximity to strategic targets, the nature of the development works being undertaken and evidence of local damage in the post-war periods amongst others. In order to determine the likelihood of UXO being present on a site, a step-wise risk assessment process is followed. This process is outlined within CIRIA C681 Unexploded Ordnance: A Guide for the Construction Industry (5).

Risk Mapping for UXO's (6) has placed the site in a Moderate Risk area. Moderate risk areas are those that show a bomb density of 11-50 bombs per 1000 acres and may contain WWII targets. Two Luftwaffe targets are located within 1km of the site; approximately 350m south and 750m north, and one post-war UXO find approximately 50m north of the site.

Analysis of historical bomb mapping from the University of Manchester (7) shows the site was hit by a fire bomb in 1940, with the surrounding area to the east and sustaining fire bombs spanning 1940-1941. During this period, buildings were damaged (red hatching) 50m south east and 110m south west.



Figure 6.1: Site boundary shown in red. Fire bombs red circles, damaged building in red hatching

Section 3.0 identified ruins on historical maps from 1948 which suggest possible bombings in the area during WWII.

Considering the above, the risk of encountering potential UXO as part of future intrusive works is considered **Moderate** to **High**. As such the procurement of a Detailed UXO Risk Assessment Report should be obtained.

6.0 Conceptual Site Model & Qualitative Risk Assessment

The conceptual site model (CSM) and Qualitative Risk Assessment (QRA) are presented in the table presented in this section. A diagrammatic CSM is contained within *Appendix A*.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified for the site. The QRA details the associated level of risk relating to these potential pollutant linkages.

The CSM and QRA concern risk to human health and water environment with additional, more specific risk assessment protocols contained within the main body of this reporting, as detailed in *Section 6.1* below.

The QRA follows the framework outlined within CIRIA C552 (8) which is summarised within *Appendix C*.

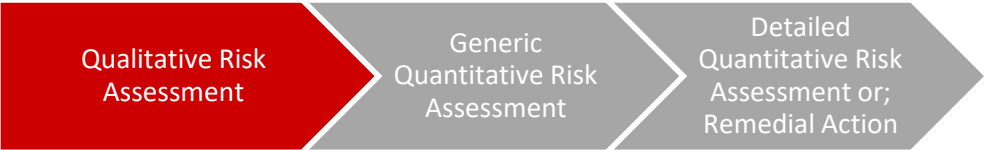
The 'risk rating' within the QRA refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

6.1 Additional Risk Assessments

The following risk assessments, listed below, are not included within the main CSM and QRA but none-the-less can be of critical importance to the onward development of the site.

- The risk posed by Unexploded Ordnance is discussed and assessed in *Section 5.0*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations (2015) (9) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works onsite will be undertaken in compliance with these requirements.



- The table below represents the first stage in the land quality risk assessment process: The Qualitative Risk Assessment.
- In order for a development site to be deemed 'suitable for use', the level of risk needs to be brought down to acceptable levels, i.e. low to negligible risk. The purpose of each stage of risk assessment is ultimately to establish, if there is a requirement for additional levels of assessment to be made in order to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.

Conceptual Site Model			Qualitative Risk Assessment			Recommended Actions
Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating	
Significant on-site sources of contamination: • Made Ground of unknown composition from uncontrolled deposition during construction and demolition of buildings on site. Potential contamination from historical industry on site including warehouses and tailors. • Localised contamination from PCBs arising from electrical substation in the basement of Grange House Significant off-site sources of contamination: • Made Ground of unknown composition from uncontrolled deposition of the construction and demolition of commercial buildings • Potential unexploded ordnance.	Direct contact, ingestion, inhalation (dust and vapours)	Site end users Site staff and visitors.	Medium Chronic health risk	Likely Given the historical industrial uses of the site, and the general historical use of the wider area it is considered likely that contamination is present within site soils, that could pose a risk to end users.	Moderate	Ground Investigation Including soil sampling GQRA as part of Ground Investigation
	Vertical migration through the weathered bedrock (soils) May occur due to processes including; capillary action, burrowing animals inducing soil mixing and downwards into the natural deposits through infiltration.	Controlled Waters Bedrock hosts Principal Aquifer Superficial deposits host Secondary A Aquifer in the north and west of the site	Medium Pollution of sensitive water resources	Low Likelihood Possible sources of contamination from historical site activities and construction activities on site, but taking into account that the site has not been occupied by significant heavy industrial land uses historically. It is likely that any Made Ground deposits were removed during excavation and construction of the existing basements. The eastern and southern areas are not indicated to be underlain by superficial deposits and the remainder of the site is underlain Glaciofluvial Sheet deposits, a Secondary A Aquifer. Shallow bedrock (6-7m bgl) hosts a Principal Aquifer. However, the site is not within a Source Protection Zone, with no potable groundwater abstractions points within 750m. There are five groundwater abstractions within 500m of the site for commercial / industrial uses.	Moderate / Low	Ground Investigation Including groundwater sampling GQRA as part of Ground Investigation
	Horizontal migration through preferential pathways in the underlying bedrock May occur due to the influence of perched or natural groundwater flow patterns and natural or man-made high permeability zones, e.g. fractures or drainage runs.	Controlled Waters Nearest surface water feature is the River Irwell located approximately 250m to the north of the site boundary flowing southwest.	Mild Pollution of non-sensitive water resources	Unlikely Migration of contaminants to the nearest surface water feature is considered unlikely given the distance to the receptor.	Very Low	No further action recommended.



Conceptual Site Model			Qualitative Risk Assessment			Recommended Actions
Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating	
Significant sources of ground gas: Potential ground gas generation from Made Ground or superficial deposits containing organic/putrescible content.	Vertical and horizontal migration through the superficial and bedrock deposits	Site end users Site staff and visitors.	Severe Human health risk	Low Likelihood Made Ground onsite and in the surrounding area is likely to consist of relatively inert demolition waste with a limited amount of putrescible material. Superficial deposits unlikely to contain significant volumes of putrescible material.	Moderate / Low	Ground Gas Monitoring as part of ground investigation Shallow gas monitoring to assess the risk.

7.0 Conclusion and Recommendations

The qualitative risk assessment (QRA) determined a varied level of level of risk associated with the proposed development from Low to Moderate.

The QRA concluded by recommending that generic quantitative risk assessments (GQRA) were conducted in order to confirm the assessment of risk ascribed to each of the respective potential pollutant linkages (PPLs). It is recommended that the GQRA is conducted as part of a ground investigation in support of the engineering design of the proposed development an outline scope for which is detailed in the section hereafter.

In summary, the following recommendations are made:

- Obtain a Detailed UXO Risk Assessment Report prior to any intrusive works being undertaken at the site;
- Undertake an intrusive ground investigation;
- Undertake a GQRA as part of the ground investigation; and
- Undertake Ground Gas Monitoring.

It is recommended that this work is completed prior to the commencement of any development works taking place and could be undertaken in conjunction with a geotechnical investigation. These works would also be required to sign off the expected planning conditions.

7.1 Contaminants of Concern

Potential contaminants of concern associated with the sources identified within the Conceptual Site Model in *Section 3.0* of this reporting include but are not limited to: broad range aliphatic and aromatic hydrocarbons present within any fuel oils; polycyclic aromatic hydrocarbons (PAHs); inorganic compounds including heavy metals; and asbestos present in discarded building materials.

It is understood an electrical sub-station may exist in the basement of the Grange House building; a potential localised source of polychlorinated biphenyls (PCBs).

Potential contaminants associated with the air-born dust/particulates include but are not limited to: polycyclic aromatic hydrocarbons and inorganic compounds including toxic metals that are also accounted for by potential onsite contaminants of concern.

7.2 Other Considerations

The requirement for additional surveys, e.g. arboricultural and ecological surveys, should be confirmed through advice from a suitably qualified and experienced professional

8.0 References

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