

**Carley
Daines and
Partners Limited**
Consulting Civil and Structural Engineers

**36-40 DRAKE STREET
ROCHDALE
For
ROCHDALE BOROUGHWIDE HOUSING**

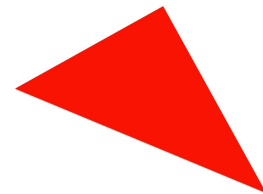


PHASE 2 GEO-ENVIRONMENTAL INVESTIGATION AND ASSESSMENT
UNDERTAKEN FOR
ROCHDALE BOROUGH HOUSING

Ref: 18-B-12366/Drake Street

9th August 2019

Principal: **D.J. Middleton BEng(Hons) CEng MStructE**
Company Number: **11006567** Address **6 Brunswick Street, Carlisle, CA1 1PN**
VAT Number: **285 0439 91**



Report Title:	Drake Street, Rochdale, OL16 1RX
Report Reference:	19-B-12366
Client:	Rochdale Borough Housing
Issue Date:	9th August 2019
Drafted By:	D.J. Middleton
Authorised By:	C. Carley

This document has been prepared for the titled project (or named part thereof) and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authorisation being obtained from Carley Daines & Partners. Carley Daines & Partners accepts no responsibility or liability for the consequences of the use of this document, wholly or in part, for any other purpose than for which it was commissioned. Any persons so using or relying upon this document for such other purpose do so at their own risk.

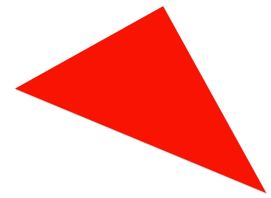
This report was prepared for the sole use of the Client and shall not be relied upon or transferred to any other party without the express written authorisation of Carley Daines & partners. It may contain material subject to license; unauthorised copying of this report will be in breach of copyright/license.

The findings and opinions provided in this document are given in good faith and are subject to the limitations imposed by employing site assessment methods and techniques, appropriate to the time of investigation and within the limitations and constraints defined within this document. The findings and opinions are relevant to the dates when the assessment was undertaken but should not be necessarily relied upon to represent conditions at a substantially later date.

The findings and opinions in this report are based on information obtained from a variety of sources as detailed and which Carley Daines & Partners assumes to be reliable but has not been independently confirmed. Therefore, Carley Daines & Partners cannot and does not guarantee the authenticity of reliability of third-party information it has relied upon.

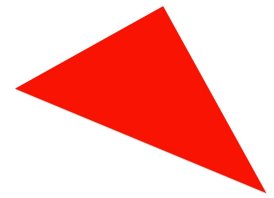
Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by Carley Daines & Partners for the effects of any future changes to such guidelines and legislation.

The limitations of liability of Carley Daines & Partners for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

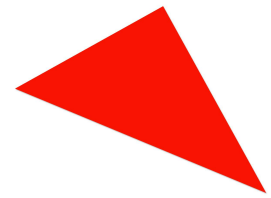


EXECUTIVE SUMMARY

Site Location	The site is located in the centre of Rochdale Town centre and at approximate OS Grid Reference 389825, 413316.
Development Proposals	Preliminary plans that have been made available to us indicate that the site is to be redeveloped with a new office facility, built over four floors, with associated drainage and parking infrastructure.
Site History	Historical maps show that the site, since 1853, being developed with potentially residential and/or commercial/retail properties on site until between 2009 and 2015 when the buildings closest to Nelson Street were demolished.
Foundations & Floor Slabs	A development of this nature should be supported on piled foundations, designed using skin friction and end bearing in the competent sand strata, linked to the superstructure with a series of reinforced concrete ground beams. A suitable alternative of ground improvement may also be considered. Ground floors should be suspended.
Pavements	New pavements should be designed on a CBR value for formation soils of 2.5% for made ground, and 3.5% for glacial till. Any buried structures in proposed pavement areas will need to be broken down to a depth of at least 0.6m below formation level to prevent unacceptable surface differential settlement. It is recommended that CBR testing should be undertaken in accordance with established procedure at formation level
Concrete Classification	On the basis of the chemical test results, the typical Design Sulphate (DS) Class, and "Aggressive Chemical Environment for Concrete" (ACEC) class for the site are DS-2 and AC-1s.
Soakaways	In view of the nature of the drift geology and its level, soakaways are considered to be a viable drainage solution, due to the depth of made ground and the underlying permeable sand.

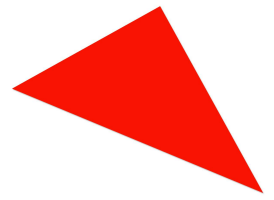


Ground Gas	Ground gas protection measures are not required
Contamination Assessment	Chemical testing has been undertaken on soil samples, which revealed a LOW level of on-site contamination. However, delineation of nominal exceedances around TP2 is required. The requirement for specific materials and measures to protect the incoming water supply from ground contamination is not envisaged.
Waste Disposal	On the basis of the current information, it is likely that the surplus topsoil/made ground will be classified as non-hazardous with natural deposits classified as inert for landfill disposal.
Further Site Investigation	Post demolition of the existing buildings on site further site investigation to ascertain geotechnical and geo-environmental properties of the ground is recommended.



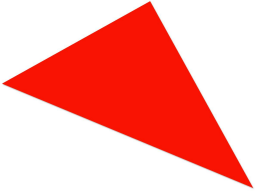
CONTENTS

- 1.0 INTRODUCTION**
 - Appointment
 - Proposed Development
 - Objective
 - Scope
- 2.0 SITE LOCATION & DESCRIPTION**
 - Site Location
 - Site Description
- 3.0 SUMMARY OF ENVIRONMENTAL AND HISTORICAL SETTING**
- 4.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT**
- 5.0 SITE INVESTIGATION**
 - Rationale
 - Intrusive Works
 - Monitoring Standpipe
 - Geotechnical & Chemical Testing
- 6.0 GROUND CONDITIONS**
 - Stratigraphy
 - Made Ground
 - Glacial Till
 - Visual/Olfactory Evidence of Contamination
 - Existing Foundations
 - Groundwater
- 7.0 GEOTECHNICAL APPRAISAL**
 - Site Preparation and Earthworks
 - Foundations
 - Floor Slabs
 - Excavations & Groundwater
 - Pavement Design
 - Concrete Design
 - Drainage & Soakaways
- 8.0 GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)**
 - General
 - Human Health
 - Soil Test Results
 - Conclusions
- 9.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS**
 - Waste Soils Characterisation
 - Water Supplies
- 10.0 GROUND GAS ASSESSMENT**



APPENDICES

Appendix 01 -	Site Plan
Appendix 02 -	Geotechnical Logs
Appendix 03 -	Chemical Test Results
Appendix 04 -	Tier 1 Assessment Criteria for Soil Contamination



1.0 INTRODUCTION

Appointment

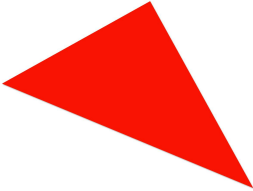
- 1.1 Carley Daines and Partners Limited has been commissioned by Rochdale Borough Housing to undertake a Phase 2 Geo-Environmental investigation and assessment on the proposed development of a plot of land known as 36-40 Drake Street, Rochdale, Manchester.

Proposed Development

- 1.2 Preliminary plans that have been made available to us indicate that the site is to be redeveloped with a new office facility, built over four floors, with associated drainage and parking infrastructure.
- 1.3 Preliminary development plans have been made available to us, prepared by Michael Hyde Architects.

Objectives

- 1.4 The objective of the Ground Investigation and Assessment is to provide geotechnical recommendations for construction design purposes, together with a geo-environmental risk assessment in terms of potential ground contamination.
- 1.5 To achieve the objective, the following tasks were undertaken:
- Confirm, through undertaking a review of the existing desk study information, the Geological, Hydro-Geological and Environmental Setting of the site, so as to identify any potential ground constraints to development through a site specific conceptual model and to design an appropriate Ground Investigation in accordance with the Environment Agency (2004) Model Procedures for the Management of Land Contamination, CLR11.
 - Characterise the ground conditions in terms of geology, soil geotechnical parameters, and ground contamination from information provided by an appropriate ground investigation.

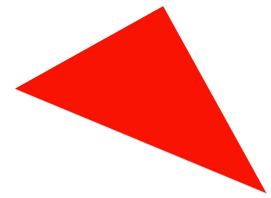
- 
- Provide recommendations regarding suitable foundations, floor slabs and new pavement construction, together with any geotechnical considerations that could affect possible future development.
 - Determine a ground conceptual model for the site so as to undertake an appropriate Phase 2 Generic Quantitative Risk Assessment (GQRA).
 - Advise on adverse ground and gas contamination on site, and advise on appropriate remedial measures.

Scope

- 1.6 A Phase 1 PRA has not been undertaken and therefore a review of historical and environmental information is included in this report.
- 1.7 The investigation comprised the sinking of four small diameter boreholes & excavation of two trial pits, it should be noted, however, that access to the full site footprint was not possible due to the presence of existing buildings, further testing will be carried out.

The location of the intrusive works undertaken took into consideration the proposed development and possible existing services.

- 1.8 The Ground Investigation has been undertaken in general accordance with BS5930:1999 *Code of Practice for Ground Investigation* and BS10175:2011 and A1:2013 *Investigation of Potentially Contaminated Sites - Code of Practice* except where superseded by EN ISO 22475-1 "*Geotechnical Investigation and Assessment - Sampling by Drilling and Excavation and Groundwater Measurements*"
- 1.9 Geotechnical soil testing has been undertaken in accordance with guidelines provided in BS1377:1990 - Parts 1-9 "*Method of Test for Soils for Civil Engineering Purposes*". Samples for chemical analysis were obtained and handled generally in accordance with the current guidelines (BS10175:2011 and A1:2013) relating to the anticipated nature of possible contamination and the intended end use.



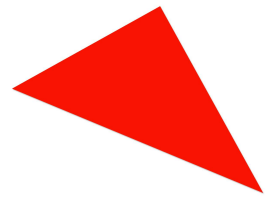
2.0 SITE LOCATION AND DESCRIPTION

Site Location

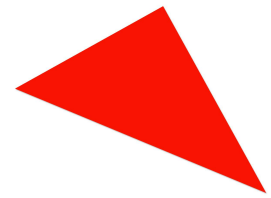
- 2.1 The site is located in the centre of Rochdale Town centre and at approximate OS Grid Reference 389825, 413316.
- 2.2 The surrounding area is predominantly retail and commercial.
- 2.3 A Location Plan is presented in Appendix 01.

Site Description

- 2.4 The site is an irregular shaped plot and surrounded on two sides by Drake Street and Nelson Street. The site comprises a vacant, grass covered plot as well as two existing buildings with associated rear space. The boundary of the site is coincident with the back of pavement to the Drake Street and Nelson Street elevations.
- 2.5 Drake Street is an arterial road through Rochdale, the site being located in the centre of Rochdale itself.
- 2.6 The first available historical map, from 1853, shows the entire site being occupied by terrace properties, presumably either residential or retail in type, with associated rear outbuildings. It also appears that there were three smaller properties fronting onto Nelson street, to the rear of the corner property on Drake Street.
- 2.7 From 1930, the building to the corner of Drake Street and Nelson Street and the smaller properties appear to have been combined to a single building. Photographic evidence shows this building on Drake Street and Nelson Street being a mixture of three and four storeys.
- 2.8 The latest historical maps available, dated 2000, showed all the buildings still in-situ, as does photographic evidence from 2009.

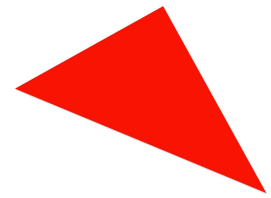


- 2.9 Between 2009 and 2015 the buildings on the Nelson Street elevation have been demolished and a grassed area now exists.
- 2.10 There is an approximate two metre fall across site, the lower side being the back of the Drake Street pavement and there are no watercourses on site.



3.0 SUMMARY OF ENVIRONMENTAL AND HISTORICAL SETTING

- 3.1 The following paragraphs summarise the most relevant findings based on a review of historical, geological & environmental data.
- 3.2 It was anticipated that made ground may exist, overlying natural ground measures.
- 3.3 Solid geology is indicated as Pennine Lower Coal Measures Formation and South Wales Lower Coal Measures Formation (Undifferentiated).
- 3.4 A coal mining report has identified that the site is not within a surface area that could be affected by any past recorded coal mining.
- 3.5 There are no faults within influencing distance of the site.
- 3.6 There are no surface watercourses on the site, the nearest watercourse is the River Roch, 120m to the east.
- 3.7 In terms of hydrogeology the site is indicated as being above a secondary aquifer A.
- 3.8 The site is not within a currently designated Environment Agency Source Protection Zone.
- 3.9 The site is not within a known brine compensation area.
- 3.10 The site is in a low probability radon area.
- 3.11 There are no hazardous installations within 500m of the site.
- 3.12 There are no landfill sites within influencing distance of the site, therefore gas testing was not proposed.



4.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

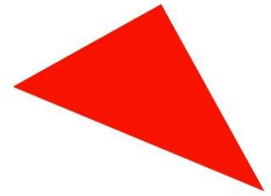
4.1 Based on the above findings, the following summarises Preliminary Conceptual Model and Risk Assessment for development of the site for new residential structures with landscaped garden areas.

Table 5 – Summary of Environmental Information			
Potential Source	Pathways	Potential Receptor	Risk
In-ground Contaminants on Site (Metals, PAH, Hydrocarbons, asbestos)	Ingestion Dermal Contact Inhalation of dust Inhalation of vapours	Human health – future site uses	Low
	Infiltration and migration through permeable strata	Groundwater	Low
	Direct contact	Construction materials Drinking water pipes	Low
		Future buildings on site	Low
Ground Gas (CO₂ and methane)	Migration through permeable strata	Human health – future site occupants	Negligible

4.2 Under the proposed development scenario, several pollutant linkages are considered possible, although the overall preliminary risk is assessed as being generally low.

4.3 The approach is, however, precautionary, until such time as uncertainties in the conceptual model can be verified by appropriate site investigation.

4.4 It is not known if there is any significant historical contamination on site, though a review of historical plans suggests that this is considered highly unlikely.



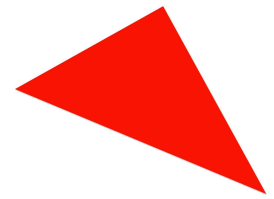
5.0 SITE INVESTIGATION

Rationale

- 5.1 Intrusive investigations were undertaken primarily to provide geotechnical parameters for structural design purposes, and also to verify the preliminary site conceptual model and confirm the anticipated relatively low environmental risk.
- 5.2 Four small diameter boreholes were sunk to provide geotechnical information on near surface deposits and to provide samples for chemical and geotechnical analysis.
- 5.3 Two hand excavated trial pits were formed, both under the footprint of the proposed southern side of the proposed building.
- 5.4 A general suite of contaminant testing was undertaken on selected samples of soil to confirm the contamination risk, and where applicable to establish the chemical suitability of soils for possible re-use within the development.

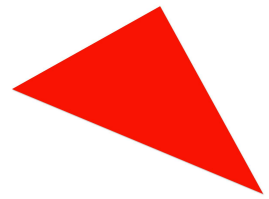
Intrusive Works

- 5.5 Ground investigation work was undertaken by Mini Soil Surveys, acting under our direct control and supervision. The work comprised the sinking of four small diameter boreholes to a maximum depth of 7.0m, and the hand excavation of four trial pits to a depth of 1m. Work was undertaken on 26th June 2019.
- 5.6 The borehole and trial pit records are presented in Appendix 02 of this report.



Geotechnical and Chemical Testing

- 5.7 In-situ geotechnical testing was undertaken at regular intervals during the formation of the boreholes in the form of SPT tests, and also shear vane tests. Results of this testing are presented on the Descriptive Logs in Appendix 02.
- 5.8 The results of the chemical testing of the borehole logs are presented in Appendix 03.
- 5.9 Chemical analysis was undertaken on selected soil samples for the following contaminants of concern:
- Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc).
 - PAH (USEPA16)
 - TPH
 - Asbestos screening and identification
 - pH and Sulphate concentration



6.0 GROUND CONDITIONS

Stratigraphy

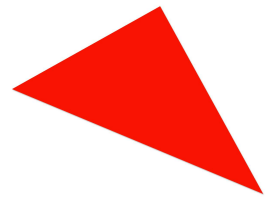
- 6.1 Ground conditions encountered during the intrusive investigation generally confirmed those identified in the published geological plans and in summary comprise made ground overlying medium/dense sand.

Made Ground

- 6.2 Made Ground was encountered in the boreholes from ground level to depths ranging from 1.80m - 3.90m. The made ground generally comprises of topsoil, brick and concrete rubble, cinder, sandstone fragments and some roof slate fragments. The findings of boreholes 01 and 03 are consistent with infilled basements, these were formed on the Nelson Street elevation of the site.
- 6.3 The made ground was generally found to be weak and poorly compacted.
- 6.4 The horizon between made ground and sand is clearly defined.
- 6.5 The made ground has not been subject to geotechnical testing, as it is considered to be unsuitable for use as a foundation bearing strata.

Pennine Coal Measures

- 6.6 The Made Ground is underlain by loose becoming medium dense fine to medium sand.
- 6.7 SPT N values in the sand and sandstone range from N=9 to N=30. The SPT N values generally confirm a significant increase in bearing capacity over the depth of the borehole.
- 6.8 Further ground investigation works are proposed post demolition of the remaining units, at which point a more holistic view of the depth of the competent material can be established. In the meantime it would be fair to assume competent material is unlikely to be any shallower than what has been established to date, ie. approximately 2.10m.



Visual/Olfactory Evidence of Contamination

- 6.9 No visual or olfactory evidence of significant ground contamination was identified during the investigation.

Existing Foundations

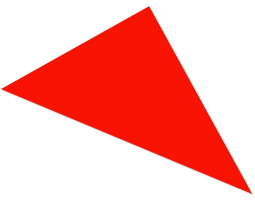
- 6.10 The findings of the hand excavated trial pits exposed a potential existing basement floor in borehole 2, to the rear of the site.

Groundwater

- 6.11 Groundwater was encountered in all boreholes.. This is considered to be perched groundwater.
- 6.12 Variations could still potentially occur in the long-term water regime due to seasonal and temperature differences.

General

- 6.13 It should be appreciated that ground conditions could vary between and away from the exploratory borehole positions, and due allowance should be made in this respect at this time but further exploratory work and testing is proposed to ascertain more site wide information.



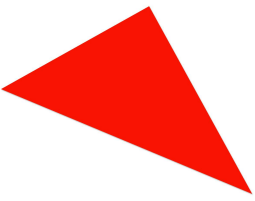
7.0 GEOTECHNICAL APPRAISAL

Site Preparation and Earthworks

- 7.1 At commencement, appropriate soil stripping and stock piling should be undertaken. A further visual check should be carried out for any evidence of significant contamination away from areas previously examined and tested.
- 7.2 Even given the site history, a small possibility of foundations and from previous development remains. Such buried structures, if encountered, would need to be removed to facilitate excavations for new foundations and drainage. It is assumed that as part of the initial demolition works the existing structures will be removed in their entirety.
- 7.3 Any such hardstandings encountered below existing ground level could be appropriately crushed and may be suitable for re-use as infill beneath hard cover areas.
- 7.4 Appropriate sorting and segregating of such excavated materials will ensure that selected material is suitable for use as bulk fill in remaining areas.
- 7.5 It is not anticipated that significant earthworks are envisaged.
- 7.6 Any existing trees that are to remain will need to be protected from the effects of site preparation and construction activities. In particular, tree roots may need to be protected during excavations for foundations and drainage, and specialist advice, if required, should be sought in this respect.

Foundations

- 7.7 Made ground and underlying incompetent natural strata should be considered unsuitable for the direct support of structural loads, as it may be loose and soft, which could result in unacceptable and differential settlements.



7.8 Given the depth of the made ground and the level of the more competent material, a conventional solution of pad foundations and strip footings is not viable. Therefore it is our opinion therefore that a development of this nature should be supported on piled foundations, designed using skin friction and end bearing in the competent sand strata, linked to the superstructure with a series of reinforced concrete ground beams. A suitable alternative of ground improvement may also be considered.

7.9 Generally, attention is drawn to the high levels of perched ground water encountered throughout the site. Any future development should allow for temporary de-watering operations to foundations and service trenches. Lateral support of the vertical sides of all excavations deeper than 1.5m is likely to be required.

Floor Slabs

7.10 It is recommended that floor slabs should be suspended, either precast beam and block or suspended cast in-situ.

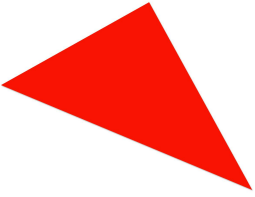
Excavations and Ground Water

7.11 The presence of significant volumes of groundwater inflow into excavations is not anticipated. Conventional 'sump and pump' dewatering measures will be adequate to keep excavations dry.

7.12 Excavations will be possible with the use of conventional hydraulic plant and will need to be appropriately supported for safe man entry, and in the event that they occur in proximity to existing site boundaries and the highway.

Pavement Design

7.13 In consideration of the ground conditions encountered in relation to the proposed development at the site, it is likely that Made Ground and sand/sandstone will be exposed at formation level beneath areas of hardstanding.

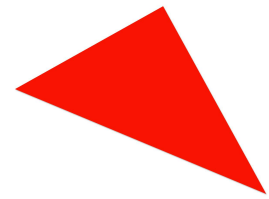
- 
- 7.14 It is recommended that new pavement design should be based on a CBR value of no more than 2.5% for the Made Ground, and 3.5% for the sand/sandstone, with any soft, loose, or otherwise incompetent material being removed and replaced with a suitable thickness of capping, comprising well compacted granular fill.
- 7.15 The design CBR's should be confirmed by in-situ testing at formation levels prior to construction. In addition, where the formation is left exposed for any appreciable time, particularly during inclement weather, the CBR should be checked by further testing and, where required, adjusted to take account of any softening effects resulting from moisture change.
- 7.16 If buried structures are to remain beneath proposed pavement areas, they should be broken down to a depth of at least 0.6m beneath the proposed formation to prevent the possibility of 'hard spots' leading to unacceptable differential settlement at the surface.

Concrete Design

- 7.17 Design/mix of concrete should be undertaken in accordance with the "Aggressive Chemical Environment for Concrete" (ACEC) classification, of BRE Special Digest 1:2005 (Concrete in Aggressive Ground). With reference to the site history, it is deemed necessary to classify the site as "Brownfield", with respect to the BRE Special Digest.
- 7.19 The results of 2:1 soluble sulphate extract analysis are between 0.1 and 1.5g/l. Values of pH range from 7.7 to 10.0.
- 7.20 On the basis of the chemical test results, the design sulphate (DS) and "Aggressive Chemical for Concrete" (ACEC) class for the site are DS-2 and AC-1s respectively.

Drainage and Soakaways

- 7.21 Consideration has been given to the feasibility of on-site soakaways for surface water drainage. Due to the depth of made ground, and the permeable nature of the underlying natural soils, soakaways are considered to be viable for the new development.



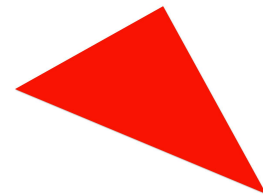
8.0 GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

General

- 8.1 A review of the environmental information has concluded that due to the absence of historic contaminative land use, the potential for a significant pollution linkage is most likely low.
- 8.2 Further to this, no visual or olefactory evidence of significant ground contamination was recorded during the ground investigation. We would conclude therefore that the risk to the site development from ground contamination is low.
- 8.3 However, it has been considered prudent to adopt a precautionary principle and undertake chemical analysis on the sub-surface soils to confirm the anticipated low human health risk status of the site.

Human Health

- 8.4 Selected samples have been analysed for a general suite of contaminants of concern and compared against Generic Assessment Criteria (GAC) for human health to determine the significance of the measured concentrations in relation to the site conceptual model. Thus, a Generic Quantitative Risk Assessment has been undertaken in line with guidelines provided in CLR11, Model Procedures for the Management of Land Contamination.2004. GQRA.
- 8.5 The GAC used in the assessment primarily comprised published Soil Guideline Values (SGV) and values that have been derived using Contaminated Land Exposure Assessment (CLEA) guidance as provided by CEFRA and the EA. In the latter case, values derived by Land Quality Management Ltd (LQM) on behalf of the Chartered Institute of Environmental Health (CIEH) and presented in their publication 'Generic Assessment Criteria for Human Health Risk Assessment' (2nd Edition) have been used. Where contaminants are not covered by the above guidelines, GAC have been sourced from previously withdrawn SGV's.
- 8.6 A conservative approach has been adopted in the first instance by assuming a worst case "Commercial" land-use scenario as defined by the guidance.



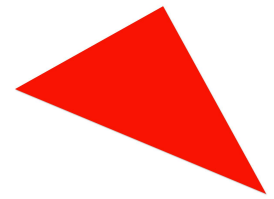
Soil Test Results

- 8.7 A total of six soil samples were analysed for a suite of Metals, Semi-Metals, PAH and TPH. Most of the concentrations passed the defined GAC.
- 8.8 No asbestos fibres were detected in any of the samples analysed.
- 8.9 However, one exceedance was encountered in respect of PAH, and this is set out in the table below.

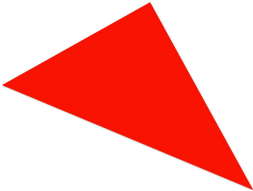
Contaminant	Number of Exceedances	SGV (mg/kg)	Maximum Recorded Concentrations (mg/kg)	Sample
Benzo(a)Pyrene	1	0.83	1.0	TP2

Conclusions

- 8.10 The elevated level of contamination is to be localised in the area Trial Pit 2, due to the nature of the Made Ground. Due to this, further investigation in this area prior to development commencement would be prudent, to identify the extent of this exceedance. Localised excavation and removal of contaminated material may be required.
- 8.11 Where the site is to be covered by hard surfacing & buildings, there will be no mechanism for a direct contact pollutant linkage. Therefore, the risk to end-users of the site will be negligible in these areas. This is the case for the majority of the site.
- 8.12 In small areas, where Made Ground is exposed within soft landscaped areas, a possible direct contact linkage can be envisaged.
- 8.13 Therefore, to these areas it is recommended that a clean capping layer is provided of inert material 600mm thick.



- 8.14 The potential for higher or differing levels of contamination exists on site away from sample positions and therefore a watching brief should be maintained to record any unexpected or obviously elevated levels of additional contamination. Further testing will be done as part of the addendum intrusive works post full site demolition.
- 8.15 If any material is imported to site for soft landscaping and gardens, then appropriate testing to verify cleanliness and suitability would need to be undertaken.
- 8.16 The nature of the ground conditions encountered are such that they are not considered to be volatile and therefore are not considered to be a potential risk to human health through inhalation of indoor or outdoor air. No special requirements are therefore considered in this respect.



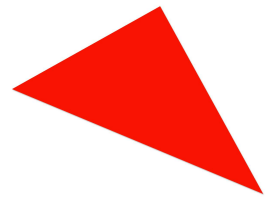
9.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

Waste Soil Characterisation

- 9.1 Excavation works undertaken during the development will produce waste soils for which appropriate waste management will be required. In line with current principals, any waste soils should be considered for re-use where possible by incorporation into the development.
- 9.2 Site-won granular Made Ground may be re-used as bulk fill, subject to engineering suitability, under proposed hardstanding and capped off using compacted granular fill.
- 9.3 Waste arisings comprising uncontaminated natural soil would be suitable, subject to confirmation of suitability for re-use as sub-soil with any planned landscaped areas.
- 9.4 On the basis of current information, it is likely that the Made Ground would be classified as non-hazardous, or even inert, with natural deposits classified as inert for landfill disposal.
- 9.5 No evidence has been encountered within the Made Ground of any significant levels of asbestos.
- 9.6 For inert waste disposal (and in the unlikely event of hazardous waste disposal), allowance will need to be made for adequate Waste Acceptance Criteria (WAC) testing with appropriate consideration of the additional time and costs associated with this.
- 9.7 Although not anticipated, any imported fill such as topsoil, will be subject to specific quality requirements. Allowance should be made for testing imported fill materials prior to emplacement to ensure suitability.

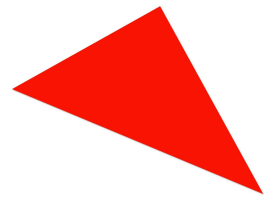
Water Supply Pipes

- 9.8 United Utilities will need to be consulted with regard to the selection of suitable water supply pipe materials for the development. However, in light of the ground conditions encountered, the requirement for specific materials and measures to protect the water supply from ground contamination are not envisaged.



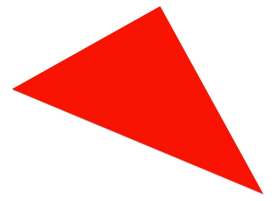
10.0 GROUND GAS ASSESSMENT

- 10.1 Gas levels were not monitored post site investigation works due to the fact historical landfill sites were not identified within 500m of the site.



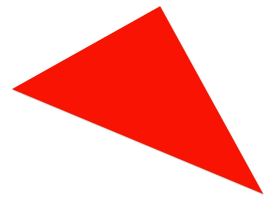
APPENDIX 01

SITE LOCATION PLAN



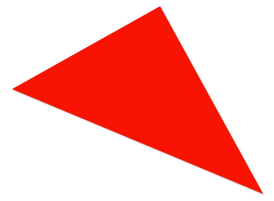
APPENDIX 02

GEOTECHNICAL LOGS



APPENDIX 03

CHEMICAL TEST RESULTS



A P P E N D I X 04

TIER 1 ASSESSMENT CRITERIA FOR SOIL CONTAMINATION