



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

INTRO DEVELOPMENTS LTD

Gould Street and Bilbrook Street, Manchester

Remedial Strategy for 2 No. Pressure Reduction Stations

LC/C5692/13238/Rev A

July 2024

EXECUTIVE SUMMARY OF REMEDIAL PROPOSALS

Remedial Requirements	Verification Requirements
Removal of all hardstanding, floor slabs basement structures, relic foundations etc across the site alongside removal of existing drainage runs.	Crush materials destined for re-use to meet chemical criteria as per Appendix A.
Excavation of made ground soils with subsequent importation of fill material.	Imported materials to be meet chemical criteria as per Appendix A.
On completion of the above follow final verification reporting requirements.	Final verification and reporting to include (but not limited to): • The size and extent of the remedial excavations (lateral extent and depth plotted on suitable plans). • Any treatment undertaken. • All sampling locations and test results. • All the material imported to the site (including volume, source and chemical composition). • All the material exported from the site (including volume, destination and chemical composition). • Discharge of any groundwater.

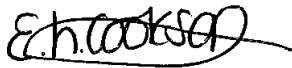
This executive summary should be read in conjunction with the full report, reference LC/C5692/13238/Rev A, and not as a standalone document. Document Version 2.3.

PROJECT QUALITY CONTROL DATA SHEET

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DRAWINGS

Drawing Number	Rev	Title
C5292/01	-	Site Location Plan
C5292/04	-	Remedial Land Exploratory Hole Location Plan
2277-PLA-XX-XX-DR-L-1000	P09	Proposed Site Layout - Hardworks
21353-HYD-XX-XX-DR-GE-1002	P1	Site Features Plan (Hydrock 2022)
B023707/02	-	Site Layout Plan (WYG 2020)
B023707/05	-	Previous Exploratory Hole Locations (WYG 2020)

APPENDICES

Appendix	Title
Appendix A	Chemical Specification for Soils
Appendix B	BSL Guidance -Re-use of Waste and Disposal
Appendix C	UXO Risk Assessment Report
Appendix D	Exploratory Hole Logs

1.0 INTRODUCTION

1.1 Context

This Remedial Strategy has been produced by Brownfield Solutions Limited (BSL) for Intro Developments Ltd on a former gas works site off Gould Street and Bilbrook Street, Manchester and has been completed in general accordance with the following guidance:

- Environment Agency guidance - Land Contamination: Risk Management (LCRM).
- BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.

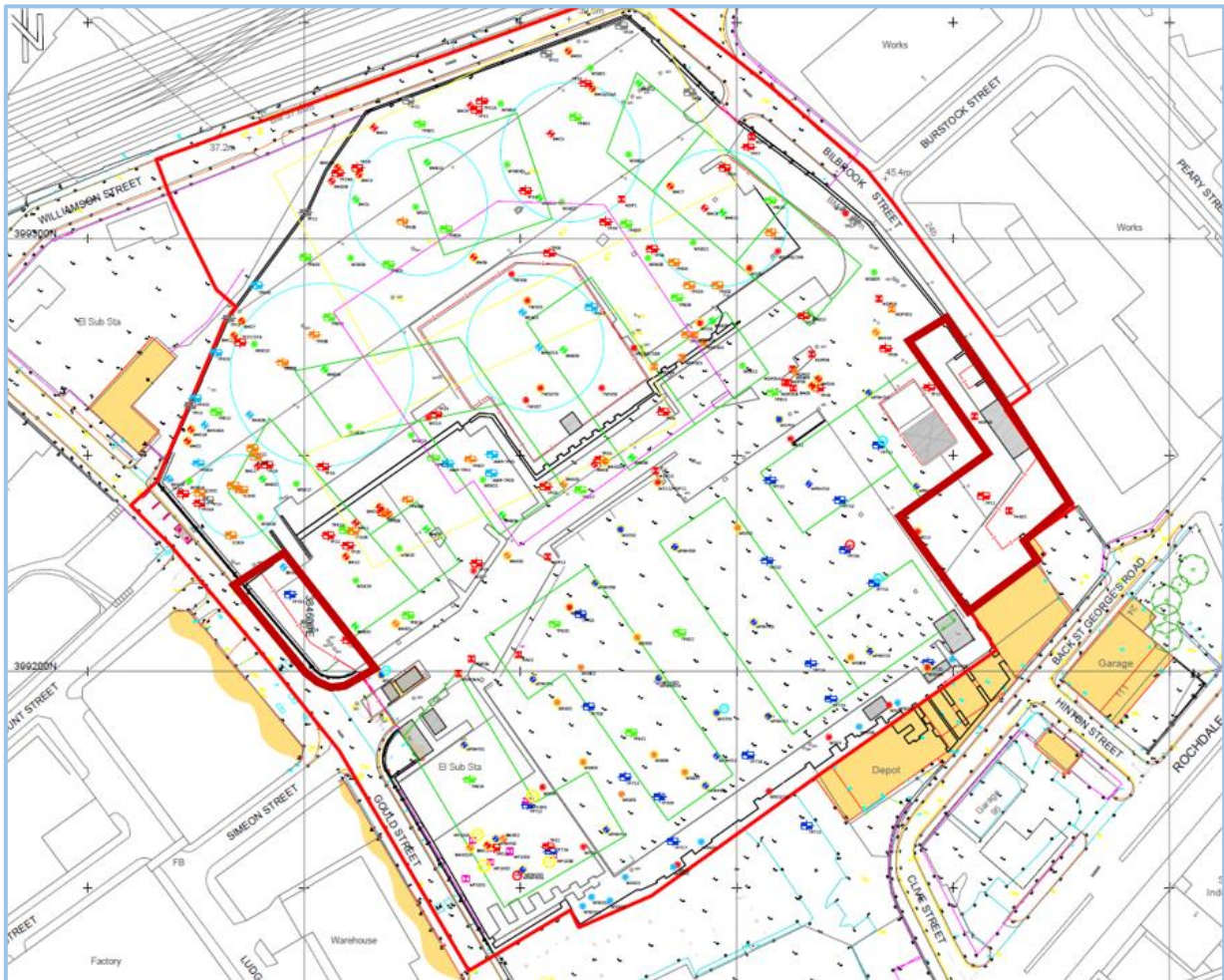
1.2 Background and Scope

The wider Gould Street site was a former gasworks with holders, tar tanks and associated historic process buildings present. The majority of these were demolished and remediated approximately 20 years ago. However, it is known that Tar Tank 1 was not remediated and that Centrica/Cadent still have some network infrastructure present on the site which is due to be diverted as part of the future development of the site. In addition, a large telecommunications tower is present in the northeast of the site present within a small compound.

The site is to be developed in a phased approach; Phase 1 to 4 inclusive. Phase 1 and 2 in the southwest of the site were investigated as part of the proposed development, recently by Hydrock in 2022 and a remediation strategy was produced. Phases 3 and 4 of the development have not been investigated by the client as part of the proposed development works, although several phases of historic investigation, remedial design and remediation have been carried out across the site. The site is being developed under two separate planning applications which cover Phases 1 and 2 and then 3 and 4.

This Remedial Strategy pertains to two parcels of land within the Phase 1 and Phase 2 areas where the network infrastructure detailed above is to be diverted, as shown on WYG drawing No. B023707/05.

The positions of the land parcels within the context of the wider Gould Street site are shown in dark red below:



The Remedial Strategy is to set out how the remediation of these areas will be undertaken and how the works will be validated. The document explains how the works will be permitted under current regulatory regimes and has been produced to address condition 6 of Manchester City Council Planning Permissions reference 128431/FO/2020, granted on 16th November 2022 at the land bound by Gould Street, Williamson Street, Bromley Street and Binbrook Street, Manchester, M4 4DD (the wider Site area).

The planning condition states:

'Condition 6 (Pre-Commencement Conditions)

Prior to the commencement of the development hereby approved, details of a remediation strategy to deal with the risks associated with contamination of the site in respect of the development hereby approved shall be submitted for approval in writing by the City Council, as Local Planning Authority. This strategy will include the following components:

1. *A preliminary risk assessment which has identified:*
 - *all previous uses*
 - *potential contaminants associated with those uses*
 - *a conceptual model of the site indicating sources, pathways and receptors*
 - *potentially unacceptable risks arising from contamination at the site*
2. *A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off-site*

3. *The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.*
4. *A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action*

Reason - There is evidence of site contamination at the application site which requires further consideration and examination. In particular, details of outstanding gas monitoring is required to be submitted for consideration and an appropriate remediation strategy prepared. This is pursuant to policy EN18 of the Manchester Core Strategy (2012).'

The following table sets out how each element of planning condition 6 will be addressed:

Condition	Sections	Comments
6.1 – Preliminary Risk Assessment	1.4, 2.0	Desk Study containing PRA referenced in Section 1.4 – Available Information Desk Study / PRA summarised in Section 2.0 – Ground Model Summary
6.2 – Site Investigation Scheme	1.4, 2.4	Phase II Geo-Environmental Assessment Reports containing previous SI works are referenced in Section 1.4 – Available Information Previous SI works are summarised in Section 2.4 – Ground Conditions Additional SI / testing following removal of the made ground is detailed in Section 4.3 – Site Remediation Requirements
6.3 – Results of SI, Risk Assessment and Remedial Strategy	2.4, 4.2, 5.0	Results of the previous SI works and associated risk assessments are summarised in Section 2.4 – Ground Conditions Remedial strategy works are presented in Section 4.2 – Selected Remedial Options and also in Section 5.0 – Detailed Remedial Requirements and Other Constraints
6.4 – Verification Plan	7.0	The verification process is detailed in 7.0

The scope of work for this document comprises a summary of the ground model, summaries of the risk assessments carried out (LCRM Stage 1), a remedial options appraisal (LCRM Stage 2), Remedial Strategy (LCRM stage 3) implementation details and any validation requirements.

Note that geotechnical aspects are not specifically addressed within this document as it seeks to meet the requirements set out within LCRM. Geotechnical aspects should be considered within a Geotechnical Design Report in accordance with Eurocode 7 or a suitable site specific Earthworks Strategy.

It should also be noted that the wider Gould Street site will not be bound by the methodology presented within this report and will be subject to it's own separate remedial options appraisal and remedial strategy report at a future date following the conclusion of further intrusive investigation works.

1.3 Proposed Development

The proposed development is for new pipework and infrastructure associated with the installation of two Pressure Reduction Stations (PRS) within the areas shown on WYG drawing No. B023707/05.

The proposed development is shown on the proposed development plan, drawing No. 2277-PLA-XX-XX-DR-L-1000 provided to BSL by the client.

1.4 Available Information

The following reports have been produced for the wider site and contain intrusive investigation information pertaining specifically to the land parcels for which this Remedial Strategy is being produced. The reports should be read in conjunction with this assessment (in date order):

-
- Entec UK Limited, Site Investigation Report Factual (Mentor No. 3624), dated February 2003.
 - Entec UK Limited, Hydrogeological Risk Assessment, no ref number, dated March 2010.
 - Amec, Final Verification Report, reference S05760rr577i3, dated October 2011.
 - WYG, Environmental Assessment Ground Investigation Factual Report, reference A074754-55-1, dated June 2015.
 - WYG, Land Condition Summary Statement, reference 784-B024707, dated December 2020.
 - Hydrock Consultants Ltd, Ground Investigation Report, reference 21353-HYD-XX-XX-RP-GE-0003, dated February 2022.
-

It is assumed that the Local Planning Authority will have provided the above reports to the appropriate statutory consultees and the recommendations therein have been accepted.

1.5 Limitations

This report has been prepared for the sole use and reliance of the Client, Intro Developments Ltd. This report shall not be relied upon or transferred to any other parties without the express written authorisation of BSL. If an unauthorised third party comes into possession of this report they rely on it at their risk and the authors owe them no duty of care or skill.

Current UK guidance and legislation has been used in the environmental assessment of the site, BSL is not liable for any subsequent changes in the guidance and legislation.

BSL have used reasonable skill, care and diligence in the production of this report. The findings and opinions conveyed via this report are based on information obtained from a number of sources as detailed within this report, BSL have assumed this information is correct and reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon. This report may not be relied upon by the client or submitted to a third party for their reliance for the purposes of valuation, mortgage, insurance and regulatory approval, until all invoices have been settled in full.

The recommendations within this report are based upon the proposed site end use provided to BSL at the time of writing. If the end use or development layout changes from the proposal, then the recommendations may change or become invalid.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities prior to implementation to ensure compliance.

2.0 GROUND MODEL SUMMARY

2.1 Context

The ground model summary presented in this section summarises the works completed at the site to date, including the preliminary risk assessment, previous site investigation schemes and the results of the site investigations which are applicable to the land parcels in question. This addresses conditions 6.1, 6.2 and 6.3 of planning condition 6.

2.2 Description of Site

The wider site is located off Gould Street, Manchester (nearest postcode M4 4DD). It is situated approximately 750m north-east of Manchester City Centre, centred on National Grid Reference 384672 399254 as shown on the Site Location Plan, Drawing No. C5692/01.

Information presented below is specific to the two land parcels to which this report pertains:

Feature	Description
Site Area	Western Land Parcel: approximately 0.04 hectares. Eastern Land Parcel: approximately 0.12 hectares.
Site Access	Access to both land parcels are from within the wider site boundary, accessed off Gould Street to the west.
Current Land Use and Site Features	Western Land Parcel: This land comprises a vegetated verge area in the west, with the eastern part forming part of the wider tarmac car park. The two areas are segregated by palisade fencing. Eastern Land Parcel: The land is predominantly tarmac and concrete hardstanding, with an area in the southeast which comprises a rough gravel surface. A small structure / container is also present.
Potential Sources of Gross Contamination	None present at the time of the walkover, however the eastern land parcel has an area in the southeast which is labelled on the WYG drawing as a 'pigging compound' which is utilised for maintenance of pipework. It is unclear whether the land is still actively used for this.
Vegetation / Ecology	The western land parcel comprises vegetation across much of the land.
Topography	Both parcels of land are generally flat.
Site Boundaries	Western Land Parcel: The boundary between the land and Gould Street is defined by a low brick / stone wall which forms a small retaining feature for the vegetated verge as Gould Street slopes downwards to the north adjacent to the site. The northern boundary comprises a brick retaining wall as the carparking to the north is at a lower elevation. The southern and eastern boundaries are not defined as the landforms part of a wider car park. Eastern Land Parcel: The northeast boundary comprises a high brick wall. The southeast of the site is defined by the walls and buildings for the land bordering the site. The rest of the parcel is undefined and forms part of the wider site car park.
Surrounding Area	The land parcels are set within the wider Gould Street site which comprises a former gas works site now used as car parking with retained energy infrastructure (telecommunications tower / pipework pressure reduction systems etc). Beyond the wider site boundary, the land is located northeast of Manchester City Centre in what has historically been a predominantly industrial area, although re-development of land in recent years has introduced multistorey apartment buildings directly west of Gould Street and on land to the north. Railway tracks elevated from the surrounding land are present to the north beyond William Street and Bromley Street.

2.3 Environmental Setting

Site History

The wider site area in which the land parcels are situated was previously used for the production and storage of gas, with an operational gas works present on site since 1824. The works started in the northwestern area of the site and then expanded south and east to cover the full site area. At its full extent, the retorts were present in the south of the site, with the holders and tar wells in the north. The purifiers, washers and condensers were present in the central area.

More recently the land has been used as a call centre (in the south) and associated car parking, though the call centre building has now been demolished.

It is known that the former holders, tar tanks and associated historic process buildings were majority demolished and remediated approximately 20 years ago. However, it is known that Tar Tank 1 was not remediated and that Centrica/Cadent still have some network infrastructure present on the site which is due to be diverted as part of the future development of the site. In addition, a large telecommunications tower is present in the northeast of the site present within a small compound.

Specific to the land parcels, the 2020 WYG Land Condition Summary Statement report provides the following site history:

Eastern land parcel: *The earliest historical map dated 1848 shows the site is part of a larger gas works site (Rochdale Road Gas Works). The land parcel is occupied by retorts and garages from 1893 until 1938. Gas works related structures on the site prior to 1893 are not labelled on historical plans. A meter house occupies the site until 1948-1952 when a storage hopper for coal and conveyor belts are constructed. It is understood at this time the area was used for coal storage. The hopper and conveyor belt were removed from the site by 1968 and the site is shown as vacant. The south eastern corner of the site is shown as a separate area on the 1983-1989 map and is assumed to be the pigging compound. An unidentified structure is present on the eastern boundary of the area. Aerial photography from 2000 shows the western half of this area to comprise of an area of heavily vegetated land and car parking.*

Western land parcel: *The earliest historical map dated 1848 shows the site is part of a larger gas works site, the western land parcel was occupied by an office building in the southern half and a larger building in the northern half identified as a process building and later housing purifiers (1908). The building in the southern half is shown on historical site drawings as stores and a canteen in 1958. The buildings onsite were demolished between 1983 and 1988 where the site is shown as vacant. The western half of the site is occupied by dense vegetation while the eastern half is used for car parking.*

Published Geology

The 2003 Entec report and online BGS mapping indicate that the published geology should comprise the following sequence of strata (top down):

- Glacial Till (clay, sand and gravel); over
- Chester Formation (sandstone).

Made Ground is also considered likely to be present based on the site history.

Hydrogeology

Based on the inferred geology, a summary of the Environment Agency aquifer designations is presented in the table below:

Stratum	Coverage	Aquifer Designation
Glacial Till	Full Site	Secondary Aquifer (Undifferentiated). The classification is assigned where it is not possible to attribute either category A or B to the aquifer.

Stratum	Coverage	Aquifer Designation
Chester Formation	Full Site	Principal Aquifer. This is Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

The site does not lie within 500m of a Source Protection Zone.

A full Hydrogeological Risk Assessment has been published by Entec in 2010 which details in greater depth the hydrogeology of the site.

Hydrology

The River Irk is located approximately 250m to the northwest of the site, at an elevation which is approximately 15m below the ground level of the site.

Radon

Information from the UK Radon Mapping indicates the property is in an area where less than 1% of homes are at or above the Action Level and therefore no radon protective measures are necessary in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2015 Edition.

UXO Risk

The site is known to lie within a moderate UXO risk zone. In order to support further investigation works, a detailed UXO risk assessment by a specialist was commissioned (EOD Contracts reference EOD/24/24210/DTS/REV1/Gould Street, Manchester, M4 4BH dated 12 June 2024). The report was able to demine moderate risk areas of the site where supervision by a UXO engineer and scanning of intrusive position with a magnetometer would be required as below:



Whilst the western and eastern remedial land parcels are not within areas of moderate risk for UXO, UXO awareness safety briefings should be provided to all site personnel.

A copy of the UXO report is provided in Appendix C.

2.4 Ground Conditions

Observed Geology and Groundwater

A significant amount of intrusive investigation and remedial works have been undertaken across the wider site. The following exploratory hole locations are within the land parcel boundaries:

-
- Parkman investigation, 1992: TP16.
 - Entec investigation, 2003: WS13, TP11, TP39, THA01, HDP03.
 - Entec investigation, 2010: BH507.
 - Amec investigation, 2011: WS13S1, WS13S2.
 - Hydrock investigation, 2022: TP701.
-

Ground conditions encountered within the eastern and western remedial land parcels is presented below, taken from the 2020 WYG Land Condition Summary Statement report:

Made Ground: *The Made Ground in the western land parcel was described in TP39 located in the south as clayey gravel with brick, concrete, ash and linoleum tiles to a depth of 2.0mbgl (42.83m AOD). BH507 located in the northern half of the western land parcel encountered Made Ground as sandy gravel of concrete, brick and spent coal/clinker. The depth of the Made Ground was proven in this location to 3.2m bgl.*

The Made Ground in the eastern land parcel comprises of sand and gravel of ash and clinker with occasional cobbles of brick. The Made Ground in WS13 was encountered to a depth of 2.0m bgl (43.64m AOD), base unproven. A concrete base was encountered in TP11 at a depth of 1.9m bgl (44.01m AOD), overlying this was Made Ground comprising of burnt brick assumed to have originated from the former retorts.

Superficial Deposits: *Geological mapping shows the site to be underlain by Devensian Glacial Till Deposits comprising of gravels, sands, silts and clays. Superficial deposits have only been encountered in BH507 in the western land parcel and described as firm to stiff sandy clay to a depth of 13.25m bgl. Sand lenses and bands or slightly sandy slightly gravelly clay are present from 8.4m bgl.*

Bedrock: *Geological mapping shows that the bedrock underlying the site comprises of the Chester Sandstone Formation. According to the British Geological Survey (BGS) the thickness of this unit varies between 50m and 220m. Weathered sandstone was encountered in BH507 as red brown fine to medium sand at a depth of 13.25m bgl.*

Based on the above and additional locations encountered which were not reviewed as part of the WYG report, the ground conditions can be summarised as below (top down):

-
- Made ground from ground level to a maximum proven depth of 3.30m bgl.
 - Natural superficial deposits comprising firm to stiff clay with sand and silt bands proven to 13.25m bgl.
 - Solid geology comprising weathered sandstone bedrock proven to 15.00m bgl.
-

Copies of the relevant exploratory hole logs are provided in Appendix D and locations of the relevant exploratory holes are shown on BSL drawing No. C5692/04 'Remedial Land Exploratory Hole Plan'.

Observations

Made Ground associated with a reported strong naphthalene odour in WS13 during the Entec 2003 site investigation was subsequently removed as part of the remediation works. Validation results from the excavations did not identify any significant residual contamination.

In the eastern land parcel, burnt brick and gravels of spent coal/coke was also identified in Made Ground between 0.10m bgl and 3.30m.

3.0 SUMMARY OF RISK ASSESSMENTS

3.1 Context

The summary of risk assessments presented in this section details risk assessments which are applicable to the land parcels in question. This addresses condition 6.3 of planning condition 6.

3.2 General

Several phases of site investigation has been undertaken across the wider site to date, some of which included exploratory holes within the two land parcels. The reports pertaining to these works are listed in Section 1.4 and the ground conditions encountered are detailed in Section 2.4. A plan showing exploratory hole locations which fall within the two land parcels is presented as BSL drawing C5692_04 'Remedial Land Exploratory Hole Plan'.

Chemical testing of soils within the land parcels is limited, however the previous site investigations have confirmed the following:

-
- Gross contamination is not anticipated within the made ground soils at the site as remedial works to remove contamination was undertaken across the wider site area previously, including within the two discreet land parcels, as reported within the WYG 2020 Land Condition Summary Statement. However;
 - Hydrock have undertaken additional intrusive investigation works within Phases 1 and 2 which did highlight pervasive arsenic and PAH contamination within made ground soils in close proximity to the land parcels. However; testing of TP701 which falls within the western land parcel did not reveal exceedances of contaminants comparative to commercial GACs.
 - There remains a small residual risk that previously unidentified contamination is present within areas between exploratory hole locations and remediation excavations.
 - Asbestos testing was not undertaken as part of early intrusive investigation works, however was undertaken as part of the Hydrock 2022 investigation, whereby asbestos contamination was identified in several locations within made ground soils, though was not identified in TP701 in the western land parcel where soils were screened. Therefore, risks associated with asbestos contamination are unknown.
 - There is anticipated to be some degree of contamination impacting the groundwater underlying the two site areas as a result of migration from the wider gas works area.
-

Chemical testing results for previous intrusive investigation works are presented in the reports listed in Section 1.4.

3.3 Human Health Risks

Made ground underlies both land parcels which has not been shown to be grossly contaminated, however there remains a small residual risk of unidentified contamination present. Additionally, soils were not screened for the presence of asbestos as part of the original works.

3.4 Permanent Ground Gases and Vapours

Risks from permanent ground gases are considered to be low for the following reasons:

-
- Ground gas monitoring has been undertaken as part of the previous intrusive investigations, however it has been found that the dataset is incomplete and a full, adequate assessment has not been completed for the wider site (Hydrock 2022). However;
-

-
- Proposed buildings / structures which form part of the Pressure Reduction Stations (PRS) on the land parcels will be fully vented to national grid standards, and therefore hazardous gases will not be able to build up in such quantities as to affect future site users.
-

Remedial measures in regards to hazardous ground gases are therefore not required at the sites and are not considered further within this report.

It should be noted that this assessment is limited to the two land parcels to which this report pertains, and is not applicable to the wider Gould Street site.

3.5 Risk to Controlled Waters

Risks to controlled waters, particularly the underlying principal bedrock aquifer, exist within the wider site area which could be impacting groundwater beneath the site. However; any attempt to treat groundwater beneath the two land parcels would be disproportionately expensive given the size of the wider site comparative to the land parcels in question.

It is therefore considered appropriate that risks to controlled waters are not subject to remedial measures at this time, particularly in the interest of moving forward with the proposed development, but that a full controlled waters risk assessment will be undertaken as part of the upcoming intrusive investigation works for the wider site which will include:

-
- Undertake a site wide detailed gap analysis to inform the DQRA.
 - Produce a site wide PRA to summarise all existing data in one report.
 - Confirm the design of the supplementary site investigation targeting the areas not previously investigated – Phases 3 and 4.
 - Carry out some confirmatory investigation in areas previously investigated and remediated (Phase 1).
 - Carry out supplementary trial pitting along route of new gas pipeline filling in data gaps in this area.
 - Carry out a detailed drainage risk assessment of the deep sewer that crosses the northern part of the site, to identify if it is part of the wider Water Authority drainage or a standalone localised historic feature.
 - Refine the existing site conceptual model based on the supplementary site investigation.
 - Carry out subsequent rounds of groundwater sampling and analysis (min 2 No. rounds), enabling detailed comparisons to be made with the groundwater monitoring undertaken prior to the remedial works undertaken in the north of the site.
 - Refinement of the hydrogeological model.
 - Produce a DQRA for controlled waters, encompassing the latest groundwater and soil data. This would be based on the original model, but with updated parameters and soil concentrations where required.
 - Design the remedial strategy and RTCs driven by the DQRA target levels. This would likely encompass a site over dig and extensive on-site testing and validation ensuring any areas not identified during the site investigation are picked up.
 - Produce a Piling Risk Assessment to demonstrate piling/penetrative works would not pose a risk to identified receptors.
 - Conduct on going regulatory liaison in aid of transparency and to ensure LPA/EA queries are resolved in a timely manner.
 - Installation of sentinel monitoring wells for longer term compliance and re-assurance, if required.
-

3.6 Summary of Updated CSM

A summary of the findings of the previous investigations and assessments where a risk is present (i.e. an unacceptable source-pathway-receptor linkage) which requires immediate mitigation in order to proceed with development of the identified land parcels is presented in the table below.

Source	Receptor
<- Poses an unacceptable risk to ->	
Elevated concentrations of contamination and asbestos fibres / ACMs within the made ground	Human health / construction workers (Commercial screening criteria adopted)

Based on the above, it has been recommended that a Remedial Strategy was prepared that identifies the specific remediation requirements for the site.

4.0 REMEDIAL OPTIONS APPRAISAL

4.1 Context

The remedial options appraisal presented in this section details remedial options which are applicable to the land parcels in question. This addresses condition 6.3 of planning condition 6.

4.2 Remediation Options

This section has been produced in general accordance with the requirements of LCRM: Stage 2 Options Appraisal.

The Investigations and risk assessment have concluded that the site will require remediation is the action required to prevent, minimise, remedy or mitigate the effects of the identified unacceptable risks listed in the section above.

The remediation of the site will need to ensure that upon completion of the development, the ground conditions at the site can be shown to be appropriate for the intended use and that they will not pose unacceptable contamination risks to the identified receptors.

For the options appraisal, there are 3 steps to follow:

-
- 1) Identify feasible remediation options.
 - 2) Do a detailed evaluation of options.
 - 3) Select the final remediation option.
-

The objectives of the remediation will be to sever one or more of the linkages within the source-pathway-receptor (S-P-R) model. There are three broad approaches which can be adopted:

-
- Remove or treat the source of pollutants.
 - Remove or modify the migration pathway.
 - Remove or modify the behaviour of the receptor.
-

The options appraisal process considers the available remedial techniques to achieve the above based on following key criteria:

-
- Effectiveness.
 - Practicality.
 - Durability.
 - Relative Cost.
 - Relative Operational Time (in terms of installation or the activity).
 - Sustainability.
-

The feasibility of each of the listed remedial option is assessed in terms of effectiveness at treating the contamination, which is broken down into; effective (Yes), partially effective (Partially) or not effective (No).

The listed techniques are also assessed in terms of relative cost ranging from negligible cost (£) through moderately expensive (££) to prohibitively expensive (£££).

Timescales over which the remediation technique is operational has been relatively assessed as weeks, months, years and decades. If a given technique is only effective over a period in the order of years to decades, then its overall feasibility is diminished.

A sustainable approach can help to ensure that the benefit of doing the remediation is greater than its impact.

The table below summarises the possible remedial options and assesses each against the six key criteria listed above:

Remedial Activity	Effective	Relative Cost	Operational Time	Comments (Practicality / Sustainability / Durability)	Feasible
Civil Engineering Methods					
Cover System	Yes	£	Weeks	Will prevent contact between site end users and shallow contaminated soils, breaking the S-P-R linkage.	Yes - however; it is unlikely that soft landscaping will be included within the final design.
Excavation and Disposal (may also require pre-treatment by screening & sorting).	Yes	£££	Weeks	This will effectively remove the source of the contamination, but is much less sustainable compared to other feasible options (excessive cost, take up of landfill space, transport issues, need to replace with clean material)	Yes – removal of made ground soils, including grubbing out of any relic foundations.
Materials Management (Excavation and Re-Use of Suitable Materials)	Yes	££	Weeks	Excavation and re-use of any suitable materials and potential re-use of treated materials at a suitable depth. Would need to be undertaken in association with a Materials Management Plan (MMP) prepared in accordance with the CLAIRE Definition of Waste Code of Practice and signed off by a Qualified Person.	Yes – in conjunction with other options.
Stabilisation and Solidification	N	££	Weeks to months	Mixing of cement/lime into soils to effectively bind contamination to minimise migration from soil to vapour and dissolved phases and reduce the mobility of contaminants in soils. Bench trials would be required to determine the most suitable binder formulation and to prove that solidification/stabilisation will be effective in reducing leachate concentrations. Option would still require a cover system to mitigate human health risks.	Yes, but discounted as it is considered there is no need for such an aggressive remediation technique, particularly in respect to the likely contamination present.

4.3 Selected Remedial Options

Based on the above remedial options appraisal, the most appropriate approaches to the residual risks are listed below:

- Turnover of all made ground soils within the land parcels to allow for grubbing out of relic foundations.
- Removal of all made ground soils to expose natural soils, undertaken under a watching brief.
- Chemical testing of natural soils beneath the made ground to confirm that potentially contaminated materials have been removed.
- Import of clean, suitable soils to the site, potentially under CL:AIRE CoP, to provide fill for excavated soils.

The options selected have been chosen because they are considered to be effective, can be carried out practically within the available time periods and are commercially viable. By removing all made ground soils, any contamination which may be present will be removed, breaking the pollutant linkage.

The chemical testing is deemed to satisfy the planning requirement for a site investigation scheme.

4.4 Site Remediation Requirements

The key requirements are summarised in the table below:

Source	Contaminants of Concern	Remediation Method	Further Details / Remedial Requirements
1 – Made Ground	Unknown	Source Removal – Excavation of made ground	Once turnover of soils and grubbing out of relic foundations has been achieved, made ground soils will be removed from within the land parcels and stockpiled ahead of chemical and geotechnical testing to confirm suitability for re-use either within the land parcels or on the wider site area. Materials which are deemed not to be chemically suitable for re-use will be taken for off site disposal at a suitable facility. Once removed, chemical testing will be undertaken to confirm that “clean” faces have been encountered. The number of tests are detailed in Appendix A. The results of testing should be initially compared against GACs for a human health – commercial setting, with further risk assessment undertaking if required. Clean, imported soils will be used to backfill the excavation and allow for development.

In addition to the specific remedial requirements listed above which are intended to mitigate the risks from known sources, it was recommended that a watching brief be maintained during the groundworks and construction for any evidence of contamination and BSL consulted for advice.

Detailed requirements are discussed in section 5.0 below. Note where the word “clean” is used from here on, the definition of this shall mean chemically suitable for the intended use.

5.0 DETAILED REMEDIAL REQUIREMENTS AND OTHER CONSTRAINTS

5.1 Context

The detailed remedial requirements presented in this section details the selected remedial options and methodology which are applicable to the land parcels in question. This addresses condition 6.3 of planning condition 6.

5.2 General

This section is intended to fulfil the requirements of LCRM Stage 3: Remediation and Verification.

All remedial works are to be overseen by suitably experienced and qualified site staff and a site watching brief will be in place alongside regular visits by a suitably qualified person to undertake the necessary verification works described.

The table below provides a summary of requirements in terms of the approximate order of works. It should be noted that the precise sequencing has not yet been confirmed by an appointed Contractor. This Remedial Strategy may also be subject to revision, dependant on the requirements of the regulators.

Task	Description
1.	Pre-Commencement - Approval of this Remedial Strategy with the Local Authority, Warranty Provider (e.g. NHBC) and Environment Agency (EA) prior to site works commencing. - Appointment of contractor for the works, who is to obtain appropriate permits, licences and approvals. Other appointments as per CDM requirements. - Production and declaration of a Materials Management Plan (MMP) under the DoWCoP prior to any works commencing or confirmation of waste exceptions (U1) to be in place (if required).
2.	Site Clearance, including Demolition Works (if required) Subject to all necessary ecological and arboricultural surveys being undertaken and appropriate mitigation measures in place, the site should be cleared and any vegetation below areas of proposed development should be stripped in accordance with Series 200 of the Specification for Highway Works. Demolition of buildings, removal of hardstanding, floor slabs, drainage runs, redundant pipework etc. A watching brief should be maintained during demolition and clearance/soils strip for any previously unidentified contamination.
3.	Excavation of Made Ground Material and Importation of Soils (Earthworks) Excavation, screening and either re-use (if chemically and geotechnically suitable) or off-site disposal of made ground soils. Validation testing of underlying natural soils to verify that potential contamination has been removed. The number of tests are detailed in Appendix A. The results of testing should be initially compared against GACs for a human health – commercial setting, with further risk assessment undertaking if required. Importation of clean, suitable materials to backfill the excavation and achieve proposed ground levels. Placement of materials will be undertaken to an appropriate Earthworks Specification in accordance with SHW Series 600.
4.	Verification and Reporting of Remedial Work Collation of information relating to site clearance, chemical testing, any remedial works, remedial verification, material movements and waste transfer documentation where appropriate. A closure Verification Report will be required to close out the declared Materials Management Plan and submitted to CL:AIRE (if required).

Task	Description
	Complete remedial validation report(s) in line with regulatory guidance and warranty provider requirements. The report(s) should be submitted to the Local Authority and warranty provider for approval following completion.

5.3 Demolition Works

Issues surrounding demolition of above ground buildings is outside the scope of this report, it is assumed that all existing above ground buildings and structures will be removed to ground level prior to remedial works commencing, following completion of any enabling works such as asbestos removal where present.

The excavation of all hardstanding areas, slabs, basement structures, relict foundations and similar below ground obstructions, will be undertaken with materials stockpiled and tested to determine their fate (on-site re-use or off-site disposal) in accordance with a Materials Tracking System.

All excavations should be suitably benched or otherwise supported for the duration of the works in accordance with relevant industry guidance.

Redundant drainage associated with the previous development will require chasing out. Existing connections to be located and capped to prevent contaminated groundwater entering the off-site drainage. The contractor should locate and record connection points and maintain off site connection pipework to allow for future connection if required.

5.4 Earthworks

General Considerations

Work procedures should be designed to minimise the risk of dust becoming airborne by suitable means, such as keeping the exposed soils damp or covered at all times. It is important that the control measures in place are sufficiently robust to prevent release of contaminated dust into the surrounding environment.

Geotechnical Considerations

Whilst geotechnical aspects are not specifically considered within this Remedial Strategy, all earthworks should be undertaken in accordance with an appropriate Earthworks' Specification.

Final site levels have not been provided and therefore the extent of any cut/fill earthworks requirements are unknown, however there will be a requirement to backfill excavations associated with made ground removal within the land parcels. Materials classification for earthworks has not been undertaken.

If present, unsuitable materials (e.g. timber, metals and plastics) removed during screening should be segregated and stored in a suitable location prior to off-site disposal to a suitable licence facility. Where practicable materials should be re-used or recycled.

The contractor should be responsible for controlling groundwater entry into excavations.

Materials Management

Any works involving the movement of soils within the site boundary shall be done in accordance with a Materials Management Plan (MMP) under the CL:AIRE Definition of Waste Code of Practice (CoP) or shall be done in accordance with an appropriate exception (U1). Further guidance is presented in Appendix B.

To implement the DoWCoP, there is a requirement to notify the Environment Agency and Local Authority of the intention to use the code of practice in principal, after which there is a 21-day notice period for their response.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

- The aims and objectives of the project meet the requirements of the Waste Framework Directive.
- The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
- There is certainty of use (i.e. materials tacking which should be in place as part of good site practice in any case).
- Quantity (the quantity of materials used should be known).

Information on existing site levels, proposed levels, volumes generated (e.g. foundation / drainage excavation arisings) would need to be known in order to complete the MMP.

If the DoWCoP is the chosen route, it is an absolute that the MMP should be in place and declared by a Qualified Persons (QP) before works commence, otherwise excavated soils could constitute an illegal deposit of waste and enforcement action could be taken by the EA and HMRC.

In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion. So long as the project can prove the four criteria (listed above) then permits or the DoWCoP are not required. However, many projects still use the DoWCoP to ensure compliance.

Re-use of soils containing asbestos should comply with the CL:AIRE publication ‘Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials’ (CAR-SOILTM) and CAR 2012.

In terms of the re-use of brick/concrete crush materials, the DoWCoP does cover aggregates, but only on the site of origin and the EA WRAP aggregate Quality Protocol might best apply to ensure quality standards.

Imported Materials and Materials for Re-use

Any soils or materials imported or to be re-used as part of the works should be tested for chemical compliance and suitability in line with the guidance stipulated in Appendix A and the proposed end use.

Any imported material should be approved by BSL and the Local Authority prior to being imported onto site.

Where feasible, imported topsoil should conform to the requirements of BS 3882:2015 (Specification for Topsoil and requirements for use), or as agreed with the client. Imported subsoil should also conform to the requirements of BS 38601:2013 (Specification for subsoil and requirements for use), or as agreed with the client.

In addition, all materials must be free from aggressive / invasive weeds (such as Japanese Knotweed and Giant Hogweed) and bulk vegetative growth.

Hydrocarbon and VOC Impacted Soils

Whilst no significant petroleum hydrocarbon or VOC contamination has been identified in respect to human health in soils a watching brief should be in place during works to observe for potential contamination.

Should significant contamination be encountered, it is wholly possible that by virtue of excavation and sorting, the VOCs within soils will volatilise. However, an allowance should be made for volumes of soil

that may not be readily treatable (e.g. grossly impacted soils) and may require off-site disposal to a suitably licensed waste facility. Further guidance is presented in Appendix B for off site disposal of soils.

An allowance should be made for measures to temporarily store potentially hydrocarbon impacted groundwater encountered during excavations until testing has been undertaken and a suitable disposal route defined. Any groundwater disposal is the responsibility of the remediation contractor and this must be done under suitable discharge consent.

Asbestos Impacted Soils

Asbestos screening was not undertaken as part of the previous investigation works and therefore ACMs may be present which have not previously been identified.

During the excavation, sorting and screening of soils, any easily identifiable asbestos containing material (e.g. asbestos cement sheeting tile etc) shall be removed by hand picking and disposed off-site to a suitably licensed waste facility by a suitably qualified and licensed contractor.

The reuse of excavated soils contaminated by asbestos should also be carried out in accordance with "Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance (shortened name CAR-SOILS™)" with work requirements assessed by a competent person in line with the Joint Industry Working Group (JIWG) Decision Support Tool for CAR 2012 Work Categories (i.e. are the works notifiable or not and are they non-licensed or licensed).

Re-use of Asbestos Impacted Soils

In terms of materials placement (i.e. re-use), if implemented, the following criteria will deliver a site that is suitable for use in terms of asbestos risk (applicable to the built environment only):

-
- Soils between finished ground level to 0.60m depth must be characterised by nil asbestos.
 - Soils below 0.60m depth or directly beneath building plots (i.e. below hardstanding, floor slabs, driveways etc) and adopted highways/pavements must be characterised by asbestos at or <0.001% w/w asbestos.
 - For soils >1.00m below finished ground levels, asbestos in soils should be <0.1% w/w and providing that asbestos contaminated soils are placed below this depth, then it is considered that there is no risk to human health. Efforts should be made to remove any visible ACM, providing it is practical to do so and does not generate any increased level of risk.
-

Provision will need to be made for hand picking of identifiable asbestos containing materials where observed and these materials will need to be placed in a locked skip prior to disposal to an appropriate waste facility.

These criteria have been used on similar sites to the satisfaction of the local regulatory authority.

Records of all activities undertaken, especially where soils containing 0.1% w/w to 0.001% w/w are placed below 1.00m, should be kept in a Health & Safety file for future reference, noting that this primarily applies to persons engaged in excavation works below 1.00m depth. CAT B training is likely to be required for operatives excavating below these depths, although the contractor should undertake their own risk assessments to confirm requirements.

Well Decommissioning

Existing monitoring wells which fall within the boundaries of the land parcels are required to be decommissioned to remove potential pathways. Covers and pipe shall be removed, and the resultant annulus filled with bentonite grout or concrete in accordance with EA guidance.

UXO

The UXO desk study indicates that much of the wider site is Medium Risk, however the eastern and western land parcels are within low risk areas.

As a minimum precaution, all personnel working on the land should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

5.5 Importation of Fill Material

Soils will likely be required to be imported to site to act as fill following the removal of made ground soils.

Imported materials to be used should meet the chemical criteria outlined in Appendix A.

Note that all obstructions will need to be grubbed out to at least 2000mm below finished levels, final depth to be agreed with the BDP engineer and Centrica.

It should be noted that the screening criteria and scenarios adopted within Appendix A are conservative, thus an exceedance of a contaminant will not necessarily deem the material to be unsuitable. Any exceedances detected and overall material suitability will be assessed on a case by case basis, with the results included and discussed in the Validation Report.

5.6 Records

Accurate records and as-built drawings will need to be kept, updated and provided for all aspects of the remedial works as they progress.

The construction works should be devised in a way to allow the maximum re-use of site won materials adhering to current waste regulations. To allow this and demonstrate compliance with Waste Management Licensing Regulations the Contractor should maintain an accurate Materials Management Plan (MMP). These shall show the source, description, classification and placement location of all fill used on the site. The plans shall be revised regularly with archive versions maintained for future reporting purposes. The MMP should show the extent of any excavations undertaken on site.

5.7 Stockpile Management

Segregation of materials and stockpiles should be maintained, and accurate records kept to avoid the potential for cross contamination. Good site practice for stockpile management includes, but is not limited to:

-
- Damping down of the site surface, excavations and stockpiles to prevent the generation of dust (wind blown asbestos fibres can contaminate “clean” topsoil stockpiles potentially resulting in expensive disposal costs).
 - Stockpiles sizes should be kept to a minimum to reduce ‘wind whip’ causing potentially hazardous material to be blown from the pile.
 - Once at the intended size, stockpiles should be “sealed” to ensure no excess materials are placed and mixed into the stockpiled to prevent cross contamination.
 - Clean, validated material proposed for re-use as part of the cover system should ideally be placed on a suitable polythene membrane or clean concrete hardstanding to prevent any cross contamination.
 - Appropriate loading of plant to prevent spillages.
-

- Appropriate signage should be displayed so that site workers/visitors are aware of the intended use and are alerted to the potential hazards associated with the material to be stored on site.

Examples of good site practice for stockpile management are presented below:



5.8 Testing

Prior to commencing any works the Contractor will submit to the Clients Representative (Suitably qualified Geo-environmental Engineers) details for the testing laboratories to be used together with their UKAS and MCERTS accreditations (as appropriate). The Clients Representative will approve the laboratories subject to them holding the relevant certifications. Alternatively, providing the Client's Representative is a suitably qualified Engineer, then they may attend site to obtain samples for appropriate testing.

Tests carried out by a laboratory without the approval of the Client's Representative will be rejected.

All samples will be taken in accordance with relevant guidance (e.g. BS 10175:2011+A2:2017).

The contractor is responsible for the testing of the physical properties of any imported or processed material to be used in the engineering works. This applies to both site won and any imported materials.

Site won material shall be tested to confirm its chemical suitability. Contaminated material for disposal should be tested to define the most economical disposal route. In addition, any material to be imported to the site shall be tested and its suitability demonstrated prior to it being brought to the site.

The geotechnical suitability of site-won materials will be confirmed before reuse, by appropriate earthworks testing, in accordance with an Earthworks Specification (preparation of which is outside the scope of this remedial strategy).

5.9 Permits

The appointed contractor will need to hold or obtain relevant waste permits or exemptions (where applicable) in accordance with the Environmental Permitting Regulations 2016 to carry out waste recovery, treatment and re-use activities on site. Alternatively, waste recovery and re-use operations shall be in accordance with the CL:AIRE Definition of Waste Code of Practice (DoWCoP), 2011 and an approved Materials Management Plan (MMP) declared under the DoWCoP by a Qualified Person (QP).

A crusher/screener will also require a waste permit or exemption. Aggregates should be processed in accordance with relevant WRAP Quality Protocol to produce a non-waste product.

It is the contractor's duty of care to ensure that any waste to be treated or disposed off-site is transported by a licenced waste carrier and that the waste facility is licenced, permitted or holds an appropriate exemption.

Evidence of the above should be maintained and provided on request along with any waste transfer or consignment notes for materials removed off-site.

5.10 Surface Water Runoff

The contractor should provide and maintain means to intercept surface run off in accordance with good site practice. Run-off from the site shall not be allowed to enter adjacent waterways or drainage gullies without the permission of the Drainage and Highway Authorities.

Surface waters from the site shall be discharged to the mains sewer under consent from the local Water Authority.

It should be noted that groundwater impacted by hydrocarbons may require some form of treatment prior to discharge, alternatively if only small amounts of water are encountered, this could be stored and removed to a suitable waste disposal facility.

5.11 Unexpected Contamination

If any unexpected contaminated materials are encountered by the contractor, then works should cease in that area and the contractor should consult BSL for advice prior to any irrevocable action at the site.

6.0 STAKEHOLDERS AND RESPONSIBILITIES

6.1 Key Stakeholders

A summary of the key project stakeholders is presented below (not exhaustive):

Client / Developer	Consultant / Engineer	Contractor	CDM Stakeholders	Regulators
Intro Developments Ltd	Brownfield Solutions Ltd (BSL) BDP Civil and Structural Consulting Engineers	Demolition, Remediation and Groundworks Contractors (TBC)	Principal Contractor (TBC) Principal Designer (TBC) Health and Safety Executive (HSE)	Manchester City Council (regulator - Human Health risk and planning consent) Environment Agency (EA) (regulator - controlled waters and waste)

6.2 Client

The remediation works will come under the umbrella of CDM 2015 Regulations. The Client is responsible for formally appointing a Principal Designer and Principal Contractor, otherwise the Client assumes the role of Principal Designer. All pre-construction information will need to be made available to the appointed duty holders and sufficient time and resources allowed.

6.3 Consultant/Engineer (Client's Representative)

A suitably qualified Geo-Environmental Engineer/consultant should be appointed as the client's representative to oversee the works, who will have a visiting role throughout and provide advice when required.

They should be responsible for:

- Providing appropriate supervision of the remedial works (either part time or full time).
- Monitoring the works to ensure compliance with this strategy and specification.
- Audit testing of materials. (However, it is the responsibility of the contractors to demonstrate the suitability/acceptability and the compliance of the material with the specification).
- Approval of test results.
- Validation of the works.

They will maintain records of the works to include the following:

- Record sheets to include a summary of the activities.
- Aspects relating to Environmental Control or non-compliance with this strategy.
- Test Results.

Liaison will be carried out with relevant regulators prior to commencing on site. The design of the Remedial Strategy can be adapted to avoid unnecessary delays at a later date.

Validation information will be supplied to the Local Authority for approval in a Verification Report. The report will include relevant site records and stand as certification that the remedial works have been carried out in accordance with this strategy.

6.4 Contractor

The contractor appointed to oversee the development construction works should comply with the following regulations, guidance and legislation relating to the works:

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- Environmental Protection Act 1990.
 - Health and Safety Executive “Protection of Workers and the General Public during the Redevelopment of Contaminated Land”, HS(G)66, HMSO 1991.
 - Duty of Care Regulations 1991.
 - Water Resources Act 1991.
 - Water Industry Act 1991.
 - Environment Act 1995.
 - The Control of Substances Hazardous to Health Regulations 2002.
 - Hazardous Waste Regulations.
 - Control of Asbestos Regulations (CAR) 2012.
 - Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance (shortened name CAR-SOIL™).
 - The Construction, Design and Management Regulations 2015.
-

The contractor should provide adequate supervision for all the site works. This shall include a suitably experienced Remediation Engineer or Site Manager who will validate the work and maintain records allowing preparation of a validation report for the works.

The appointed contractors will be responsible for maintaining all records in connection with the works.

Records shall include details of:

-
- All the material imported to the site (including volume, source and chemical composition).
 - All the material exported from the site (including volume, destination and chemical composition).
 - The size and extent of the remedial excavations (lateral extent and depth plotted on suitable plans).
 - Any treatment undertaken.
 - Details of the contractor’s waste exemptions, if applicable.
 - Discharge of any groundwater.
-

6.5 CDM Stakeholders - Health & Safety

The appointed Principal Contractor (PC) will need to produce a Construction Phase Plan for the work, prepare risk assessments and method statements. The PC will be responsible for the coordination of welfare and H&S matters on-site including sub-contractors.

The Principal Designer/Client will review the Construction Phase Plan and notify the local office of the Health and Safety Executive (HSE) of the works prior to commencing (via form F10). Unless otherwise agreed with the client, the table below provides a broad outline of the overall project team.

All works should be carried out in a manner that will safeguard all site employees. This should include but not be limited to; site induction for all staff and visitors, training/safety awareness training, issue of Personal Protective Equipment (PPE) and the provision of suitable welfare facilities. Further advice is

provided within HSE publication 'HSG 66 Protection of Workers and the General Public during Redevelopment of Contaminated Land'.

The works should be carried out in a manner to protect against damage to property or nuisance to property or persons on the site or within its immediate vicinity. Noise and dust issues should be considered. Members of the public should be excluded from the works areas and the contractor should maintain suitable security to ensure unauthorised persons cannot access the works.

Appropriate temporary protection and warning signs should be erected to warn of hazards that may result as a consequence of the works.

6.6 Regulators

Implement the regulations and environmental standards set by government. The contents of this report will need to be agreed in advance of works with the regulators.

7.0 VERIFICATION PLAN

7.1 Context

The verification plan presented in this section details how the selected remedial works will be recorded and verified. This addresses condition 6.4 of planning condition 6.

7.2 Remedial Excavations

All made ground soils and relic foundations / obstructions will be removed during remedial excavations under a watching brief by a suitably experienced and qualified Geo-Environmental Engineer.

Impacted soils surplus to requirements and which do not meet the chemical and geotechnical criteria for re-use either within the land parcels or within the wider Gould Street site will be disposed off site to a suitably licensed facility.

Material being re-used should comply with the testing and chemical requirements set out within Appendix A.

Following removal, chemical testing will be undertaken to confirm that “clean” faces have been encountered. The number of tests are detailed in Appendix A. The results of testing should be initially compared against GACs for a human health – commercial setting, with further risk assessment undertaking if required.

7.3 Imported Soils

Imported materials / soils will likely be required to backfill the remedial excavations.

Imported material should comply with the testing and chemical requirements set out within Appendix A.

7.4 Well Decommissioning

Wells located within the land parcels should be decommissioned in accordance with EA guidance and backfilled with a low permeability material (i.e. concrete or bentonite). For decommissioned wells, photographic evidence should be provided of their removal and infilling.

7.5 Contingency Planning

Should significantly contaminated material be encountered during the development (e.g. gross hydrocarbon impaction) then a suitably qualified geo-environmental engineer should be consulted for advice. Measures may include the excavation of the material which should stockpiled on 2000-gauge polythene sheeting, sampled and tested for an appropriate range of contaminants.

Once the laboratory analysis of the material is available, an assessment will be undertaken to determine whether it will need to be disposed off-site to a suitable facility or if the materials could be retained on site re-used with or without some form of treatment within regulatory requirements.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

Should gross asbestos contamination be identified, then all works should cease until an Asbestos Management Plan is put into place (if not done so already) and remedial requirements are confirmed by a suitably qualified geo-environmental engineer. Note remedial works under such instances may be

classified as either licenced or non-licenced and may be notifiable to the Health and Safety Executive (HSE). Works would need to comply with CAR 2012 and CARSOILS™.

7.6 Reporting

On receipt of all information, the appointed Geo-Environmental Engineer will compile a Verification Report(s). The report will be a concise document that provides records and collected evidence of the remediation carried out at the site. The final report should contain:

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- Introduction, including description of the project and background to the works.
 - Summary references to site investigation data, risk assessments and the Remedial Strategy.
 - A description of the works undertaken and any treatment records.
 - Details of chemical validation testing.
 - Reference to the MMP (if utilised), records of where material was moved from/imported from/to and final destinations, including volumes, suitable for use criteria, QP declaration references etc.
 - Details of how any out of specification materials were dealt with and final destination, including waste transfer notes.
 - Appropriate site plans and photographic record.
 - Conclusions, detailing any additional works that may be required.
 - Details of any long term monitoring requirements, if any.
-

This should then be submitted to the regulators and warranty providers for approval, which should close out the requirements of this Remedial Strategy.

8.0 REFERENCES

- Association of Ground Investigation Specialists. 'Guidelines for Good Practice in Site Investigation'. Issue 2, March 2006.
- BS 3882: 'Specification for topsoil'. 2015.
- BS 5930+A1:2020: 'Code of Practice for Site Investigations'. 2020.
- BS 6031: 'Code of practice for earthworks'. 2009.
- BS 8485+A1: 'Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings'. 2019.
- BS 8576 'Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)'. 2013.
- BS 10175:2011+A2 'Investigation of Potentially Contaminated sites - code of practice'. 2017.
- BRE Report BR211, Scivyer, C. 'Radon – Guidance on protective measures for new buildings' 2015 Edition.
- BRE Report 414. 'Protective measures for housing on gas contaminated land. Building Research Establishment Report'. 2011.
- BRE Report 465 'Cover Systems for Land Regeneration'. 2004.
- CIRIA Special Publications 101-112, 'Remedial Treatment for Contaminated Land'. 1998.
- CIRIA Special Publication 124, 'Barriers, liners and cover systems for containment and control of land contamination'. 1996.
- CIRIA 149 'Protecting Development from Methane'. 1995.
- CIRIA 150 'Methane Investigation Strategies'. 1995.
- CIRIA 151 'Interpreting Measurements of Gas in the Ground'. 1995.
- CIRIA 152 'Risk assessment for Methane and Other Gases from the Ground'. 1995.
- CIRIA 552 'Contaminated Land Risk Assessment – A guide to good practice'. 2001.
- CIRIA C659 'Assessing risks posed by hazardous ground gases to buildings.' 2006.
- CIRIA C665 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'. 2007.
- CIRIA C681 'Unexploded Ordnance (UXO) A guide for the construction industry'. 2009.
- CIRIA C716 'Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination'. 2012.
- CIRIA C733 'Asbestos In Soil And Made Ground: A Guide To Understanding And Managing Risks'. 2014.
- CIRIA C735 'Good Practice on The Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases'. 2014.
- CIRIA C748 'Guidance on the Use of Plastic Membranes as VOC Vapour Barriers'. 2014.
- CL:AIRE and CIEH. 'Guidance on Comparing Soil Contamination Data with a Critical Concentration'. May 2008.
- CL:AIRE 'The Definition of Waste: Development Industry Code of Practice'. Version 2. March 2011.
- CL:AIRE RB17 'A Pragmatic Approach to Ground Gas Risk Assessment'. 2012.

CL:AIRE SP1010 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'. Rev 2 2014.

CL:AIRE 'Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials – CAR-SOIL™'. 2016.

CL:AIRE 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies' Version 1. March 2017.

DEFRA and the Environment Agency, CLR10 'Soil Guideline Value Reports for Individual Soil Contaminants'. 2002-2004.

DEFRA and the Environment Agency, CLR Report No 11 'Model Procedures for the Management of Contaminated Land'. 2004.

Department of the Environment, CLR Report No 1 'A framework for assessing the impact of contaminated land on groundwater and surface water'. 1994.

Department of the Environment, CLR Report No 2 'Guidance on Preliminary Site Inspection of Contaminated Land'. 1994.

Department of the Environment, CLR Report No 3 'Documentary research on Industrial Sites'. 1994.

Department of the Environment, CLR Report No 4 'Sampling Strategies for Contaminated Land'. 1994.

Department of the Environment Waste Management Paper No. 27. 'Landfill Gas: A Technical Memorandum Providing Guidance on the Monitoring and Control of Landfill Gas'. 1992.

Department of the Environment. 'Industry Profiles' - 48 separate publications available from The Stationery Office, London. 1995.

DETR. Circular: Contaminated Land. 2006.

EC Regulation 1272/2008 'The Classification, labelling and packaging of substances and mixtures (CLP)' 2008.

Environment Agency 'Using Soil Guideline Values'. 2009.

Environment Agency, 'Updated Technical Background to the CLEA model'. 2009.

Environment Agency, 'Human health toxicological assessment of contaminants in soil'. 2009.

Environment Agency Hazardous Waste: 'Guidance on the classification and assessment of waste' WM3 ver 1.1 May 2018.

Environment Agency. 'Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination'. 2006.

Environment Agency & NHBC. R&D Publication 66. 'Guidance for the Safe Development of Housing on Land Affected by Contamination'. 2008.

Environment Agency. R&D Publication 20. 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources'. 1999.

Environment Agency Technical Guidance Note 01. Hydrogeological Risk Assessment for Landfills. [Withdrawn Feb 2016. Replaced with below].

Environment Agency and DEFRA 'Landfill developments: groundwater risk assessment for leachate'. 2016.

Environment Agency Petroleum Hydrocarbons in Groundwater 'Supplementary Guidance for Hydrogeological Risk Assessment'. 2009.

Environment Agency 'Groundwater protection: Principles and practice (GP3)'. 2013. [Superseded 2017 by www.gov.uk online guidance].

Environment Agency guidance - Land Contamination: Risk Management (LCRM). 2021.

Environmental Permitting Guidance: version 3.1 'The Landfill Directive for the Environmental Permitting (England and Wales) Regulations'. 2010.

Environmental Quality Standards. 2008.

European Parliament Directive 2008/98/EC of the Council of 19 November 2008 on waste and repealing certain Directives. 2008.

European Parliament. Directive 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC.

Ground Engineering. Wilson & Card 'Proposed method classifying gassing sites' /1999.

Hazardous Waste (England and Wales) Regulations. 2005.

Health & Safety Executive (HSE). 'Protection of Workers & the General Public during the Development of Contaminated Land'. 1991.

Health and Safety Executive (HSE). Control of Asbestos Regulations (CAR). 2012.

Landfill Directive 'Directive 1999/31/EC on the landfilling of waste'. 1999.

Manual of Contract Documents for Highway Works, Specification for Highway Works: Volume 1, Amendment August 2014. [Withdrawn 30th May 2017].

Manual of Contract Documents for Highway Works, Specification for Highways Works – Series 600 Earthworks November 2006. [Withdrawn 30th May 2017, Replacement unknown].

NHBC Standards. Chapter 4.1: Land Quality - Managing Ground Conditions.

UK Drinking Water Standards: Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) and Water Supply (Water Quality) Regulations 2000 (SI 2000/3184).

UKWIR Report 10/WM/03/21 2010 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' 2010.

DRAWINGS



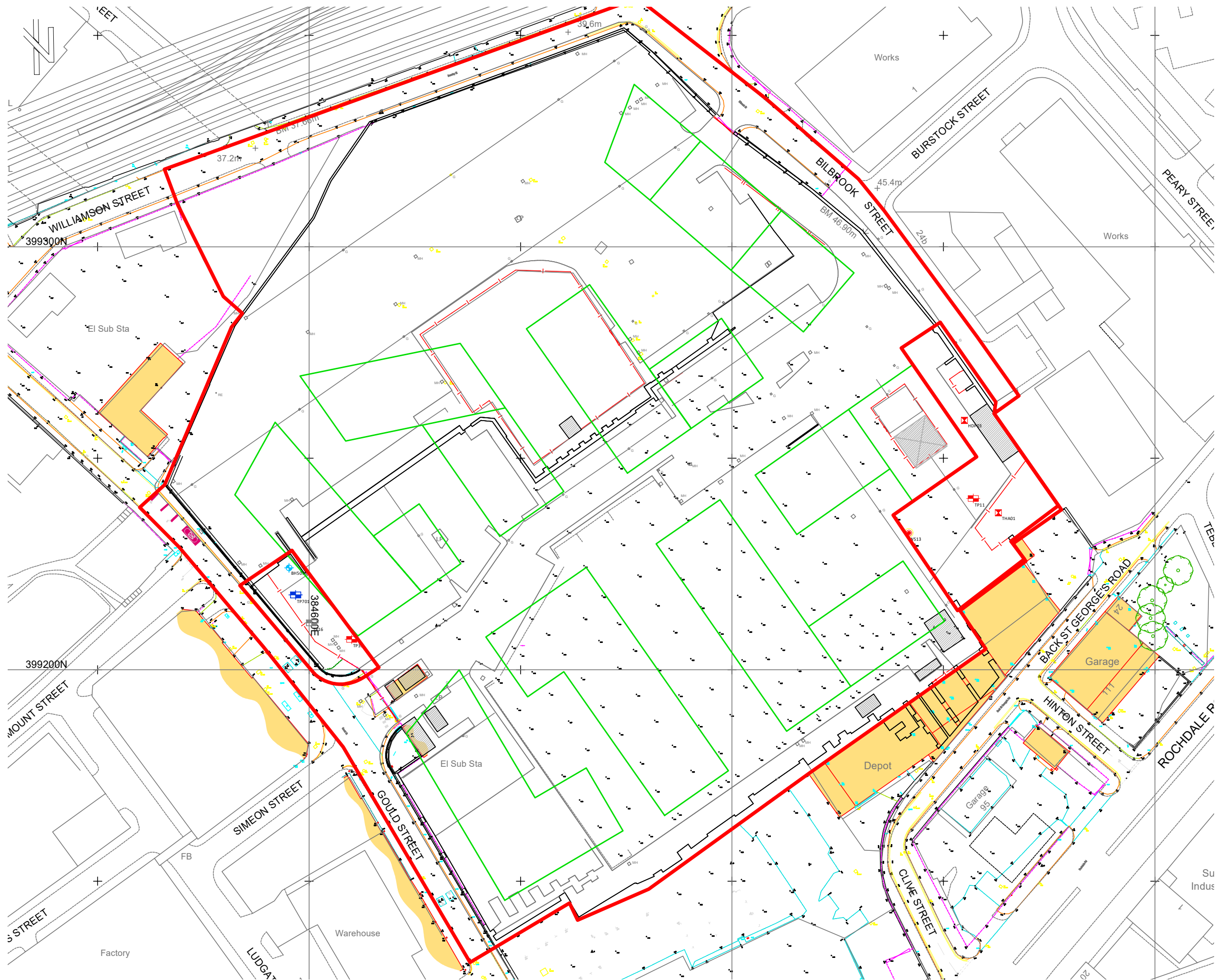
SITE LOCATION

NEAREST POSTCODE: M4 4HY

SITE ENTRANCE WHAT3WORDS:
///CARE.BANANA.PILE



REV	DATE	DESCRIPTION	BY	CKD
 BROWNFIELD SOLUTIONS LTD CEO ENVIRONMENTAL ENGINEERING EXCELLENCE				
CLIENT				
SOUTH VALLEY ESTATES				
PROJECT TITLE				
GOULD STREET, MANCHESTER				
DRAWING TITLE				
SITE LOCATION PLAN				
DRAWING No. C5692/01	REVISION -	SCALE NTS	DATE 06/06/24	
DRAWN BY SD		CHECKED BY AJS		



KEY	
1	APPROXIMATE SITE BOUNDARY
2	TRIAL PIT
3	WINDOW SAMPLE BOREHOLE
4	CABLE PERCUSSIVE BOREHOLE
5	W/ ROTARY CORE FOLLOW ON
A	B
1	ASBESTOS RISK
2	ASBESTOS IDENTIFICATION >0.001%
3	ASBESTOS IDENTIFICATION Not Quantified
4	ASBESTOS IDENTIFICATION
A	B
1	HYDROCK (2021)
2	TRIAL PIT
3	WINDOW SAMPLE BOREHOLE
4	ROTARY CORED BOREHOLE
A	B
1	WYG (2014)
A	B
1	AMEC (2011)
2	TRIAL PIT
3	WINDOW SAMPLE BOREHOLE
A	B
1	ENTEC (2009)
2	HAND EXCAVATED TRIAL PIT
3	TRIAL PIT
4	TRIAL TRENCH
5	INSPECTION CHAMBER TRIAL PIT
6	WINDOW SAMPLE BOREHOLE
7	CABLE PERCUSSIVE BOREHOLE W/ ROTARY CORE FOLLOW ON
A	B
1	ENTEC (2002)
2	HAND EXCAVATED TRIAL PIT
3	TRIAL PIT
4	WINDOW SAMPLE BOREHOLE
5	CABLE PERCUSSIVE BOREHOLE
A	B
1	PARKMAN (2002)
2	TRIAL PIT

NOTES

- ALL INFORMATION CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT/ENGINEER FOR INFORMATION. HOLDINGS/COMBOS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
- THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
- DRAWING NOT FOR CONSTRUCTION PURPOSES.

REV	DATE	DESCRIPTION	BY	CKD



CLIENT			
SOUTH VALLEY ESTATES			
PROJECT TITLE			
GOULD STREET, MANCHESTER			
DRAWING TITLE			
REMEDIAL LAND EXPLORATORY HOLE PLAN			
DRAWING No.	REVISION	SCALE	DATE
C5692/04	-	NTS	20/06/24
DRAWN BY		CHECKED BY	
AH		xxx	



- NOTES:
1. Do not scale from this drawing.
 2. Always work to noted dimensions.
 3. All dimensions are in millimetres unless otherwise stated.
 4. All setting out, levels and dimensions to be agreed on site.
 5. The dimensions of all materials must be checked on site before being laid out.
 6. This drawing must be read with the relevant specification clauses and detail drawings.
 7. Order of construction and setting out to be agreed on site.

BOUNDARY

Site Boundary

LANDSCAPE

H1 Yorkshire Flag Paving
To courtyard and access areas
Subcolour: TBC, TBC, TBC, TBC

H2 Large Format Granite Paving
To the Lane and Burstock Street / Park edge
Colour: Grey to be complemented architectural material palette subject to further detailed design

H3 Clay Paving
To play areas throughout the site
See small format units
Colour: Terracotta to complement architectural material palette

H4 Reeds Bound Gravel
To courtyard areas
Subcolour: Buff colour

H5 50/50 Permeable Paving
To the Lane
Subcolour: Paving units to match adjacent Clay Paving

H6 Self Bound Gravel
To play areas along central street
Subcolour: Buff colour

H7 Timber Deck Surfacing
To provide carriages

H8 Natural stone stepping stones
To paths through planting
Subcolour: TBC

H9 Natural stone steps
To have Natural stepping paving to top and bottom of steps
Colour: Grey

H10 Exposed Aggregate Concrete Surfacing
To vehicle access routes off Gould St / Burstock St

H11 Tarmac Surfacing
To vehicle access routes adjacent to gas compounds

LANDSCAPE

F1 Bicycle Stands
Wood finish, see goings

F2 Telescopic Barriers
Automatic system with CCTV

F3 Feature Seating Elements
To the Lane and Burstock Street
Timber with Cast Iron Steel Frame

F4 Feature Seating Elements
To Courtyards
Timber with Cast Iron Steel Frame

F5 Seating Edge
To Courtyards
Timber with edge of planting areas

F6 Seating Edge
To Public Realm generally
Natural stone with timber legs

F7 Informal Play Features
To the Lane, Simeon and Courtyards
Play features and other informal play features

F8 Green Structure
To the Lane
Steel frame reflecting greenery with planting

F9 Original Pedestrian from Gas Works Office
To corner of Gould St
Recreated from site, use subject to assessment of condition

F10 Perforated Cast Iron Balustrade
To the Lane of Burstock St
Opportunity for graphic artwork incorporation

F11 Metal Gate to access ramp
To the Public Realm access
To have access control for residents and National Grid

S2-P09	06-05-21	Material update, gate added to P2 ramp	TF	MS
S2-P08	25-10-20	Planning Issue	TF	MS
S2-P07	24-09-20	Planning Issue	TF	MS
S2-P06	18-09-20	Planning Issue	TF	MS
S2-P05	11-09-20	Planning Issue	TF	MS
S3-P04	04-09-20	Draft Planning Issue	TF	MS
S3-P03	08-07-20	Design Development	TF	MS
S3-P02	09-06-20	Design Development	TF	MS

Revision	Date	Description	Drawn	Appr.
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LIVERPOOL
No. 8 Princes Parade, Princes Dock, Liverpool, L3 1DL
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Client MCR Property Group

Project The Gasworks, New Town

Drg Title Hardworks

Created on 04.05.20 Created by MS Approved by KR

Scale 1:500 Size A1 Workstage Stage 2

Drg No. 2277-PLA-XX-XX-DR-L-1000 Suitability S2 Revision P09