BROWNFIELD SOLUTIONS LTD

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

KELLEN HOMES & GREATER MANCHESTER YOUTH FEDERATION

Mount Road, Gorton

Remedial Strategy

NA/C5150/11739 Rev C

November 2023

EXECUTIVE SUMMARY OF REMEDIAL PROPOSALS	
Remedial Requirements	**Verification Requirements**
Side wide strip of existing topsoil with combination of: • Removal off site to suitable facility / suitable end use. • Stockpiling for later re-use / direct placement in suitable areas of the site (e.g. below the sports pitches). Placement to be carried out under declared MMP under the DoWCoP. Excavation, screening and engineering / re-use of remaining soils to an appropriate specification, as required.	Materials destined for re-use to meet chemical criteria as per Appendix A. Records of materials placement locations and depths (survey data, load tracking and photographic evidence).
Installation of clean cover system above any existing made ground which should comprise (top down): • 600mm "clean" validated topsoil/subsoil in private gardens. • Minimum 300mm "clean" validated topsoil/subsoil plus an engineered geotextile element at the base to prevent soils mixing in the area of the sports pitches. • 450mm "clean" validated topsoil/subsoil in all other areas of Public Open Space (POS) (reduction to 300mm if a geotextile is incorporated at the base). Elsewhere hardstanding will break the pathway to site end users/ human health. For areas of proposed trees, a tree pit will need to be excavated and additional subsoil provided above the hard dig layer / membrane. The above is subject to agreement with the local authority, and requirements should be confirmed at the earliest opportunity.	Imported topsoil and subsoil, and any materials re-used to require chemical testing as per Appendix A. Thickness of clean cover systems requires validation. First 10 plots to be inspected then falling to 1 in 4 plots if results are acceptable. In areas of soft landscaping/public open space (POS), validation pits should be excavated at a frequency of circa one pit per 25m x 25m area of POS. BSL suggest this is reduced to a total of 10 No. pits across the sports pitches to avoid damage – survey data could also be utilised (spot heights prior to placement and after placement of clean soils).
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 any remedial excavations (lateral extent and depth plotted on suitable plans). • 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). • Clean cover thickness validation records.

This executive summary should be read in conjunction with the full report, reference NA/C5150/11739 Rev C,and not as a standalone document.

PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Mount Road, Gorton		
Document Name:	Remedial Strategy		
Reference:	NA/C5150/11739 Rev C		
Status:	-	10/01/2023	Original.
	A	26/07/2023	Update after supplementary investigation.
	B	11/09/2023	Update to drawing numbers.
	C	23/11/2023	Updates to site layout and development description.

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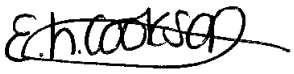
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DRAWINGS		
Drawing Number	**Rev**	**Title**
KH008-A-100	P8	CAD Site Layout
C5150/01	-	Site Location Plan
C5150/02	-	Site Features Plan
C5150/03A&B	-	Exploratory Hole Location Plan

APPENDICIES	
Appendix	**Title**
Appendix A	Chemical Specification for Soils
Appendix B	BSL Guidance -Re-use of Waste and Disposal

1.0 INTRODUCTION

1.1 Context

This Remedial Strategy has been produced by Brownfield Solutions Limited (BSL) for Kellen Homes Ltd & GMYF on a site off Mount Road, Gorton 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.
- NHBC Standards. Chapter 4.1: Land Quality - Managing Ground Conditions.

1.2 Background and Scope

This Remedial Strategy is to set out how the remediation of the site will be undertaken and how the works will be validated. The document explains how the works will be permitted under current regulatory regimes.

The scope of work for this document comprises a summary of the ground model, summaries of the of risk assessments carried out, 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.

1.3 Proposed Development

"Full planning application proposing the erection of a youth, sports and community hub (Use Class E(d)(g)), F2(b)), 2no football pitches, combined netball and basketball court, cricket strip (Use Class F2 (c)), a two storey apartment building comprising 36no apartments for young person's accommodation (Use Class C3) and 267no dwellinghouses (Use Class C3a), with associated landscaping, public realm, ecological mitigation, refuse storage, drainage, car parking and other associated works, with access from Wembley Road and Mount Road".

1.4 Available Information

This report should be read in conjunction with the BSL Phase I Geo-Environmental Assessment Report (LC/C5150/11494) issued in October 2022 and the BSL Phase II Geo-Environmental Assessment Report (MS/C5150/11591 Rev A) issued in January 2023.

A supplementary investigation was carried out to further characterise the topsoil in May 2023, report reference MB/C5150/12138.

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 for the purposes of this strategy.

1.5 Limitations

This report has been prepared for the sole use and reliance of the Client, Kellen Homes Ltd & GMYF. 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.

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 Description of Site

The site is located off Mount Road, Gorton, M18 7SU. It is centred on National Grid Reference 388289, 395020 as shown on the Site Location Plan, Drawing No. C5150/01.

The main site features and potential issues identified during the time of the intrusive investigation are detailed below and are shown on the Site Features Plan, Drawing No C5150/02.

Feature	Description
Site Area	9.07 hectares.
Site Access	Access to the site is gained off Mount Road to the west of the site. The entrance is located in the northwest corner of the site.
Current Land Use and Site Features	The site as existing is vacant, with no public access, having previously been used as playing pitches until 2019. The site is rectangular in shape with the majority formed of grass land aside from an area of hard standing where the former changing facilities once stood. The former vehicular access is from Mount Road.
Potential Sources of Gross Contamination	No potential sources of contamination were identified during the site walkover.
Vegetation	There are sporadic mature/semi-mature trees located along the site boundaries.
Topography	The site is generally flat.
Site Boundaries	The north boundary comprises wooden fence panelling and mesh fencing backing onto gardens and a new housing development. The east boundary currently comprises temporary heras fencing. The south boundary comprises steel palisade fencing. The east boundary is defined by metal mesh fencing.
Surrounding Area	The site is set within a mixed commercial and residential area. The northern boundary of the site sits adjacent to a residential development build by Sedona Homes comprising terraced and semi detached properties, with Mannering Street running in between, separated by fencing. To the east is Wembley Road, which hosts a number of semidetached dwellings. To the west is Mount Road, with Gorton Primary School, Manchester Boxing Centre and Nutsford Vale Park adjacent to the street. To the south lies a footway which connects Mount Road to Wembley Road. Further south is Cedar Mount Academy.

2.2 Environmental Setting

Site History
In summary, the historical map evidence indicates that the site has remained as sports fields / football pitches since 1922. Several small buildings have been present across the site. The surrounding area is predominantly residential, however historically multiple ponds existed in close proximity to the site which are presumed to be infilled. Additionally, a large clay pit was present to the west of the site (later in use as a landfill).

Published Geology and Hydrogeology
From the Phase 1 Assessment and published geology, it was anticipated that ground conditions would comprise the following sequence of strata (top down):

- Made Ground; over
- Diamicton Till; over

- Chester Pebble Beds Formation.

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

Stratum	Coverage	Aquifer Designation
Diamicton 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.
Chester Pebble Beds 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 historical groundwater abstraction for general cooling was located 246m south of the site, held by CBA Enterprises LTD. The nearest active abstraction is located approximately 1742m north and is held by Cemex UK Materials Limited. Review of the geology 2km away reveals this abstraction is from the Chester Pebble Beds Formation.

Hydrology
The nearest watercourse and surface water features is an unnamed and unmapped river crossing the east of the site. The closest major watercourse, the Gore Brook, is located 894m north of the site.

Potential Environmental Constraints
There is one BGS recorded landfill listed as being 305m west of the site at Matthews Lane. This site is also listed as an EA historical landfill extending to 97m west of the site and accepting inert, industrial, commercial, household, special and liquid sludge waste between 1969 and 1978. The Matthews Lane landfill site is located at the above-referenced clay pit. Information from Manchester City Council Environmental Protection Team indicates this is not gassing off-site.

Other historical landfill sites were recorded at Pink Bank Lane 244m northwest, accepting inert, commercial and household waste in 1981, and at Levenshulme Trading Estate 333m south accepting industrial and special waste, though does not specify dates of inputting.

There are two current waste management sites recorded within 250m of the site, both of which are 202m south of the site and relate to metal recycling.

There are three historical waste management sites recorded within 250m of the site, all of which relate to recycling facilities at an address 215m south of the site.

In addition, two ponds (potential gassing risks) were originally present onsite in the north on 1848 mapping, but no longer present from 1890. Multiple ponds are shown from the earliest mapping within 250m of the site. As the surrounding land became developed as part of Gorton, the ponds are no longer shown and are presumed to be infilled. Mapping from 1956 shows that all ponds were infilled.

Radon
Information from the environmental database report indicates the property is not in a radon affected area 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

In accordance with CIRIA Report C681, BSL have reviewed non-specialist UXO data for the site using the online Zetica Bomb Risk Mapping data. The map indicates the site to be in an area where the bomb risk is moderate.

Since the site is considered to be at moderate UXO risk, in order to determine if and what further action may be required to mitigate the risk, a Preliminary UXO Risk Assessment was commissioned from 1st Line Defence Limited, Report Ref PA16560-00, dated 23rd September 2022 in accordance with the recommended process set out in CIRIA Report C681.

The report indicates that during WWII the 48th Battalion Manchester Home Guard utilised the site, however given its location and proximity to housing, schools and roadways it is unlikely to have been used for extensive exercises or live weapons training. Additionally, no bombs were recorded within or adjacent to the site boundary.

The report concluded that UXO risks at the site are not considered to be higher than the 'background risk' of finding UXO in this part of the country, with the site assigned as low / minimal risk, and therefore no further action is recommended for the site.

2.3 Ground Conditions

Observed Geology and Groundwater

From the investigations carried out, the ground conditions can be summarised as below (top down):

- Made ground generally comprising sandy gravel from ground level to between 0.40m and 2.50mbgl.
- A layer of softer organic clay, assumed to be relict topsoil, was encountered between 0.70 and 2.60m across the site. This band was not found to be more than 0.50m thick, generally 0.30m or less thick.
- Natural superficial deposits generally comprising firm to stiff clay proven to depths between 2.20m and 4.45mbgl.
- Groundwater levels ranging between 2.30m and 3.00m bgl during site works.
- Post site works monitoring levels ranging between 0.52m and 4.01m bgl. The shallowest groundwater levels were in WS04 & WS07 which are the closest exploratory boreholes to the culverted river.

Observations

With the exception of ash and clinker observed as a minor constituent in the made ground soils, no other evidence of chemical contamination was observed at the site. It should also be noted that glass/sharps were observed in the topsoil and the made ground immediately underlying the topsoil.

3.0 SUMMARY OF RISK ASSESSMENTS

3.1 General

The site investigations and assessments have confirmed the presence of pervasive heavy metal and PAH contamination within the topsoil, made ground topsoil and general made ground, as detailed in the sections below.

3.2 Human Health Risks

As part of the initial phase II intrusive investigation, samples were tested for an assessment of the chemical contamination that may pose a risk to human health. The results were examined with reference the LQM/CIEH S4ULs and DEFRA C4SLs for a residential end use with homegrown produce. The apparent exceedance of the relevant screening value is taken as indicating further detailed assessment or remedial action is required.

Metals
The following elevated metals were detected:

Exploratory Hole	Depth (m)	Metal	Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Strata
WS03	0.10-0.20	Arsenic	53	37	Topsoil
WS04	0.30-0.50	Arsenic	120	37	Made Ground
WS05	0.30-0.60	Arsenic	190	37	Made Ground
WS06	0.30-0.60	Arsenic	180	37	Made Ground
WS07	0.40-0.60	Arsenic	130	37	Made Ground
WS08	0.30-0.60	Arsenic	160	37	Made Ground
WS09	0.30-0.60	Arsenic	140	37	Made Ground
WS11	0.20-0.40	Arsenic	140	37	Made Ground
WS12	0.30-0.60	Arsenic	160	37	Made Ground
TP06	0.10-0.20	Arsenic	39	37	Topsoil
TP07	0.30-0.60	Arsenic	140	37	Made Ground
TP08	0.30-0.40	Arsenic	210	37	Made Ground
TP10	0.30-0.60	Arsenic	170	37	Made Ground
TP11	0.10-0.20	Arsenic	67	37	Made Ground Topsoil
TP12	0.30-0.45	Arsenic	130	37	Made Ground
TP13	0.30-0.60	Arsenic	140	37	Made Ground
TP14	0.30-0.60	Arsenic	190	37	Made Ground
TP17	0.30-0.60	Arsenic	240	37	Made Ground
TP20	0.30-0.60	Arsenic	180	37	Made Ground
TP21	0.30-0.60	Arsenic	190	37	Made Ground
TP23	0.30-0.60	Arsenic	120	37	Made Ground
TP24	0.10-0.20	Arsenic	48	37	Made Ground Topsoil
TP25	0.30-0.60	Arsenic	190	37	Made Ground
TP27	0.30-0.60	Arsenic	150	37	Made Ground
TP28	0.30-0.60	Arsenic	190	37	Made Ground
TP29	0.30-0.60	Arsenic	180	37	Made Ground
TP30	0.10-0.20	Arsenic	45	37	Made Ground Topsoil
TP31	0.30-0.60	Arsenic	130	37	Made Ground
TP32	0.30-0.60	Arsenic	120	37	Made Ground
TP34	0.30-0.60	Arsenic	210	37	Made Ground
TP35	0.30-0.60	Arsenic	180	37	Made Ground
TP36	0.30-0.60	Arsenic	170	37	Made Ground

Exploratory Hole	Depth (m)	Metal	Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Strata
TP37	0.30-0.60	Arsenic	140	37	Made Ground
TP40	0.30-0.60	Arsenic	130	37	Made Ground
TP29	030-0.60	Copper	2700	2400	Made Ground
WS01	0.10	Lead	520	200	Made Ground Topsoil
WS03	0.10-0.20	Lead	390	200	Topsoil
WS04	0.30-0.50	Lead	3500	200	Made Ground
WS05	0.30-0.60	Lead	350	200	Made Ground
WS06	0.30-0.60	Lead	580	200	Made Ground
WS07	0.40-0.60	Lead	1700	200	Made Ground
WS08	0.30-0.60	Lead	640	200	Made Ground
WS09	0.30-0.60	Lead	1400	200	Made Ground
WS10	0.10-0.20	Lead	390	200	Made Ground Topsoil
WS11	0.20-0.40	Lead	980	200	Made Ground
WS12	0.30-0.60	Lead	700	200	Made Ground
TP05	0.10-0.20	Lead	220	200	Topsoil
TP06	0.10-0.20	Lead	370	200	Topsoil
TP07	0.30-0.60	Lead	990	200	Made Ground
TP08	0.30-0.40	Lead	1700	200	Made Ground
TP10	0.30-0.60	Lead	1700	200	Made Ground
TP11	0.10-0.20	Lead	1300	200	Made Ground Topsoil
TP12	0.30-0.45	Lead	980	200	Made Ground
TP13	0.30-0.60	Lead	1100	200	Made Ground
TP14	0.30-0.60	Lead	580	200	Made Ground
TP15	0.10-0.20	Lead	260	200	Topsoil
TP17	0.30-0.60	Lead	1600	200	Made Ground
TP20	0.30-0.60	Lead	610	200	Made Ground
TP21	0.30-0.60	Lead	640	200	Made Ground
TP23	0.30-0.60	Lead	840	200	Made Ground
TP24	0.10-0.20	Lead	960	200	Made Ground Topsoil
TP25	0.30-0.60	Lead	1200	200	Made Ground
TP27	0.30-0.60	Lead	660	200	Made Ground
TP28	0.30-0.60	Lead	800	200	Made Ground
TP29	0.30-0.60	Lead	760	200	Made Ground
TP30	0.10-0.20	Lead	500	200	Made Ground Topsoil
TP31	0.30-0.60	Lead	1600	200	Made Ground
TP32	0.30-0.60	Lead	910	200	Made Ground
TP34	0.30-0.60	Lead	1200	200	Made Ground
TP35	0.30-0.60	Lead	960	200	Made Ground
TP36	0.30-0.60	Lead	790	200	Made Ground
TP37	0.30-0.60	Lead	1300	200	Made Ground
TP40	0.30-0.60	Lead	1600	200	Made Ground
WS01	0.10	Mercury	1.4	1.2	Made Ground Topsoil
TP08	0.30-0.40	Mercury	4.8	1.2	Made Ground
TP11	0.10-0.20	Mercury	2.1	1.2	Made Ground Topsoil
TP12	0.30-0.45	Mercury	6.8	1.2	Made Ground
TP24	0.10-0.20	Mercury	4.1	1.2	Made Ground Topsoil
TP30	0.10-0.20	Mercury	2.0	1.2	Made Ground Topsoil
TP37	0.30-0.60	Mercury	8.9	1.2	Made Ground
WS08	0.30-0.60	Nickel	140	130	Made Ground
TP17	0.30-0.60	Nickel	140	130	Made Ground

Asbestos

No asbestos fibres have been detected in any of the 10 samples screened. Works were carried out by an engineer holding NLW CAT B asbestos training who reported that no visual evidence of asbestos was noted.

Poly Aromatic Hydrocarbons (PAHs)

Adopting the surrogate marker approach, elevated PAHs were recorded in numerous locations. The location(s) and elevated species of PAH's are shown in the table below:

Exploratory Hole	Depth (m)	Species	Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Strata
WS01	0.10	Benzo(a)pyrene	56.0	5.0	Made Ground Topsoil
WS02	0.25-0.35	Benzo(a)pyrene	8.1	5.0	Made Ground
WS03	0.10-0.20	Benzo(a)pyrene	7.1	5.0	Topsoil
WS04	0.30-0.50	Benzo(a)pyrene	14.0	5.0	Made Ground
WS06	0.30-0.60	Benzo(a)pyrene	20.0	5.0	Made Ground
WS07	0.40-0.60	Benzo(a)pyrene	18.0	5.0	Made Ground
WS08	0.30-0.60	Benzo(a)pyrene	21.0	5.0	Made Ground
WS09	0.30-0.60	Benzo(a)pyrene	66.0	5.0	Made Ground
WS10	0.10-0.20	Benzo(a)pyrene	87.0	5.0	Made Ground Topsoil
WS11	0.20-0.40	Benzo(a)pyrene	37.0	5.0	Made Ground
WS12	0.30-0.60	Benzo(a)pyrene	130.0	5.0	Made Ground
TP05	0.10-0.20	Benzo(a)pyrene	71.0	5.0	Topsoil
TP07	0.30-0.60	Benzo(a)pyrene	20.0	5.0	Made Ground
TP08	0.30-0.40	Benzo(a)pyrene	13.0	5.0	Made Ground
TP10	0.30-0.60	Benzo(a)pyrene	23.0	5.0	Made Ground
TP12	0.35-0.45	Benzo(a)pyrene	16.0	5.0	Made Ground
TP13	0.30-0.60	Benzo(a)pyrene	48.0	5.0	Made Ground
TP15	0.10-0.20	Benzo(a)pyrene	6.0	5.0	Topsoil
TP17	0.30-0.60	Benzo(a)pyrene	14.0	5.0	Made Ground
TP21	0.30-0.60	Benzo(a)pyrene	33.0	5.0	Made Ground
TP23	0.30-0.60	Benzo(a)pyrene	35.0	5.0	Made Ground
TP25	0.30-0.60	Benzo(a)pyrene	5.2	5.0	Made Ground
TP27	0.30-0.60	Benzo(a)pyrene	26.0	5.0	Made Ground
TP29	0.30-0.60	Benzo(a)pyrene	7.4	5.0	Made Ground
TP30	0.10-0.20	Benzo(a)pyrene	130.0	5.0	Made Ground Topsoil
TP32	0.30-0.60	Benzo(a)pyrene	30.0	5.0	Made Ground
TP36	0.30-0.60	Benzo(a)pyrene	120.0	5.0	Made Ground

* Based on Soil Organic Matter content

Total Petroleum Hydrocarbons (TPH CWG) and BTEX Compounds

No petroleum hydrocarbons have been identified above the adopted screening criteria and no BTEX or MTBE compounds have been identified above the adopted screening criteria.

Supplementary Investigation Testing

The aim of the supplementary investigation was to identify and further assess the levels of contamination associated with near surface soils, in particular the topsoil, to determine potential suitable re-use routes and assess waste classification for potential offsite disposal of soils.

A further 141 samples were analysed for a general broad suite of contaminants, including metals, asbestos, PAHs and TPH CWG.

Summary of Assessments and Outline Remedial Recommendations
It was considered unlikely that the site is being affected by offsite contamination sources as the site is underlain by clay strata and therefore contamination is unlikely migrate onto the site.

Based on the testing and assessment undertaken it would appear that there is pervasive contamination within the topsoil, made ground topsoil and made ground in the form of heavy metals and PAHs.

It should also be noted that there are still numerous exceedances in heavy metals and PAHs when the chemical testing results are compared against Public Open Space (POS) park screening values as would be applicable for the proposed sports pitches area in the west.

The initial phase II assessment stated that the above pose a risk to human health and requires further consideration. Outline remedial measures included either off site removal and / or re-use below a clean cover system.

Based on the supplementary assessment, it would appear that the majority of the topsoil would be unsuitable for the end use scenarios of commercial, POS and residential uses in their current state. However, with appropriate screening / sorting to remove glass this could negate ~50% of soils being removed off site to landfill with them being suitable for re-use on a commercial site or in POS areas (with relevant permits/exemptions etc in place from a waste regulation perspective).

To aid sustainability of the development and minimise the volume of soils to be removed from site, one remedial option for the impacted topsoil could be to place the material underneath the lower sensitivity proposed sports pitches, below a layer of clean cover to break the pathway to end users.

3.3 Permanent Ground Gases and Vapours

A summary of the ground gas monitoring carried out by BSL is presented below:

- BSL conducted 6 monitoring visits over 3 months.
- Methane was not recorded above the detection limit of the monitoring equipment (i.e. <0.1% v/v).
- Carbon dioxide concentrations were recorded up to 3.9% v/v.
- Oxygen concentrations ranged between 10.4% v/v and 22.2% v/v.
- The maximum steady state gas flow rate was 0.1 l/hr.

On the basis of the above and the assessment carried out, and liaison with Manchester City Council (MCC) Environmental Protection Team reading the frequency of visits, the site has been classified as Green in accordance with the NHBC Traffic Light Classification and therefore no mitigation measures are required.

3.4 Risk to Controlled Waters

Based on the investigation works undertaken to date and subject to agreement with the Environment Agency, the site is not considered to pose a significant risk to controlled water for the following reasons:

- There is no indication under present conditions of pollution of controlled waters and conditions following development of the site will not be any worse, indeed they may improve with increased hard cover and water retaining imported garden soils.
- No significant mobile contamination has been identified on site in soils based on the results obtained as a potential indicator of groundwater contamination.
- The site is underlain by very low permeability clays as proven by the infiltration testing which will inhibit lateral and vertical contaminant migration. There is believed to be over 30m of low permeability clay above the bedrock aquifer based on wider area BGS boreholes.
- The site does not lie within 500m of an SPZ.
- There are no groundwater abstractions within 1700m.
- There are no potable (sensitive) water abstractions within 2000m.

Based on the above, the site is not considered to pose an unacceptable risk to controlled waters. Therefore, no specific remedial requirements for controlled waters are necessary.

3.5 Waste Classification Summary

Test results were assessed through a waste classification database which allows users to code and classify waste as defined in the EWC (European Waste Catalogue) based on EC Regulation 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures (CLP) and latest Environment Agency guidance (WM3 “Guidance on the classification and assessment of waste -Technical Guidance”).

139 samples of topsoil were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3 using the HazWasteOnline tool.

Based on the waste classification database assessment, the majority of the topsoil has been classified as non-hazardous. The results of the waste assessment where hazardous properties have been flagged based on total concentrations are summarised in the table below:

Location	Depth (m)	Stratum	Waste Classification	Comments
TP103	0-0.20	MADE GROUND TOPSOIL	Hazardous	HP 10, HP 14
TP104	0-0.20	MADE GROUND TOPSOIL	Hazardous	HP 14
TP106	0-0.20	MADE GROUND TOPSOIL	Hazardous	HP 14
TP238	0-0.20	MADE GROUND TOPSOIL	Hazardous	HP 14
TP109	0-0.15	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
TP240	0-0.20	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
TP127	0-0.05	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
TP180	0-0.10	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
TP186	0-0.10	MADE GROUND TOPSOIL	Hazardous	HP 10, HP 14
TP209	0-0.10	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
TP219	0-0.10	MADE GROUND TOPSOIL	Hazardous	HP 7, HP 11
WS04	0.30-0.50	MADE GROUND	Hazardous	HP14
WS07	0.40-0.60	MADE GROUND	Hazardous	HP14
WS08	0.30-0.60	MADE GROUND	Hazardous	HP7, HP11

When segregating soils on site, a worst case should be assumed that the materials extend up to the exploratory positions classified as non-hazardous.

Note that further testing of the soils (WAC testing) may be required on the actual arisings in order to satisfactorily categorise the soil for its suitability if disposal to landfill is the only option.

3.6 Summary

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 mitigation is presented in the table below:

Source	Receptor
<- Poses an unacceptable risk to ->	
Elevated concentrations of heavy metals (arsenic, copper, lead, mercury, nickel) and PAHs (BaP via surrogate marker approach) are present within the topsoil and made ground, in addition to sharps/glass.	Human health / water pipelines / construction workers (Residential with homegrown produce / Public Open Space screening criteria adopted)

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

4.0 REMEDIAL OPTIONS APPRAISAL

4.1 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 – considered to be a suitable remediation option to mitigate the risk to human health.
Excavation and Disposal (may also require pre-treatment by screening & sorting).	Yes	£££	Weeks	This will effectively remove the source of the contamination (i.e. the existing topsoil), 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 – considered a suitable remediation option to mitigate the risk to human health in conjunction with other options.
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. Import of suitable clean topsoil and subsoil from suitable donor sites. 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.
New water supply pipelines – Barrier Pipe	Yes	£	Weeks	A pipeline risk assessment will be required to determine the most suitable pipe materials for potable water supply. Barrier pipe would prevent ingress of contaminants into the water supply, if needed.	Yes – in conjunction with other options, if a PRA determines this as a requirement.
Biological Methods					
Not considered to be relevant to the subject site.					
Chemical Methods					
Not considered to be relevant to the subject site.					
Physical Methods					
Not considered to be relevant to the subject site.					
Passive Methods					
Not considered to be relevant to the subject site.					

4.2 Selected Remedial Options

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

- Excavation and off-site removal/disposal of unsuitable and excess materials.
- Implement a clean cover system to break the pathway to end users.
- Carry out materials movements and import of clean cover system soils under a Materials Management Plan.
- Undertake a water supplier pipeline Risk Assessment/Utilise barrier pipe for water feed.

The current topsoil on site is not suitable for the intended residential and public open space end uses and will require removal, or dependant on requirements some materials could be retained on site in POS areas under a cover layer to mitigate the risk to end users e.g. below sports pitches or below landscaping/acoustic bunds if part of the design/layout. Re-use would need to be carried out under a suitable Material Management Plan.

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.

4.3 Site Remediation Requirements

The key requirements are summarised in the table below:

Source	Contaminants of Concern	Remediation Method	Further Details / Remedial Requirements
1 - Topsoil, Made Ground Topsoil	Arsenic, Lead, PAHs, glass/sharps	Excavation and off-site removal	Soils unsuitable for intended end use – to be removed from site; either to a suitably licenced facility, soils recycling plant or to an appropriate end use scenarios (e.g. a commercial end use site after screening/sorting and under appropriate permits).
2 - Made Ground	Arsenic, Lead, PAHs, glass/sharps	Clean cover system Materials Management	In private gardens and soft landscaping areas, a cover system comprising "clean" validated topsoil should be installed. Soils to be re-used under declared MMP where suitable.
2 - Made Topsoil	PAHs	Barrier Pipe	A water supplier Pipeline Risk Assessment will determine what potable water supply pipeline materials are required (PE or Barrier Pipe).

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

Detailed requirements are discussed in section 5.0 below.

5.0 DETAILED REMEDIAL REQUIREMENTS AND OTHER CONSTRAINTS

5.1 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.
2.	**Site Clearance** 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. Removal of relict hardstanding, floor slabs, drainage runs etc. Conduct site wide strip of made topsoil and stockpile for offsite removal or re-use in suitable areas at depth. A watching brief should be maintained during demolition and clearance/soils strip for any previously unidentified contamination.
3.	**Excavation and Re-use of Site Won Material and Importation of Soils (Earthworks)** Excavation, screening, treatment (if required) and engineering / re-use of soils where suitable, to an appropriate Earthworks Specification in accordance with SHW Series 600.
4.	**Installation of a Clean Cover System** Importation of "clean" cover system soil with suitable testing to prove suitability and provenance. Importation to be carried out under a declared MMP (unless from a manufactured source). Installation of "clean" validated cover system in soft landscaping areas, including private gardens and areas of POS, where required to provide growing medium. Imported soils to be used as part of the cover layer should meet the chemical criteria outlined in Appendix A.
5.	**Verification and Reporting of Remedial Work** The gardens and landscaped areas will require depth validation. 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 implemented.

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.

5.2 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.

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.

5.3 Cover Layer

A cover system comprising "clean" validated topsoil/subsoil should be placed in proposed private gardens and soft landscaped areas.

Imported soils to be used as part of the cover layer should meet the chemical criteria outlined in Appendix A.

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.

The installation of a clean cover system will break the pathway to human health from the identified contamination and act as a growing medium. The cover layer in private garden areas should comprise (top down):

- 200mm "clean" validated topsoil; over
- 400mm "clean" validated subsoil.

The cover layer in public open space areas should comprise (top down):

- 200mm "clean" validated topsoil; over
- 250mm "clean" validated subsoil.

Alternately, the cover layer in public open space areas, in particular the sports pitches, may comprise (top down):

- 200mm "clean" validated topsoil; over
- 100mm "clean" validated subsoil; over
- High visibility geotextile separation layer or 100mm hard dig granular layer (ideally 1st generation quarried stone).

The existing topsoil is very granular in nature and we anticipate drainage would not be significantly impacted if the existing topsoil is placed below additional clean imported/site won soils. We are aware that MCC has a policy of a 450mm cover system in POS areas, however, to assist with site levels we propose the above minimum of 300mm of clean imported soil/chemically suitable site won soil with the addition of an engineered element such as a Terram hi-visibility geotextile at the base to prevent soils mixing or a 100mm hard dig layer of chemically suitable aggregate. Beneath this engineered cover system, we consider the risk to end-users of being exposed to any potential contamination will be negligible. In reality, in certain areas there is likely to be clean cover thicker than this minimum suggested due to the cut/fill balance required.

Minor variances in the thickness of individual soils layers cover may be tolerated, provided the overall clean cover system is a minimum depth of 600mm (or 450mm in POS/300mm in POS with demarcation layer) to minimise soils mixing (e.g. min 100mm topsoil over 500mm subsoil). If the thickness is varied, the topsoil layer should be a minimum thickness of 100mm in accordance with warranty provider standards.

If a warning geotextile is utilised, this should be sufficiently durable and robust for the lifetime of the development. If a hard dig layer is opted for, first generation clean quarried stone is generally preferred.

Where made ground is absent and only natural strata present, only a nominal cover of clean topsoil will be required of 100mm, in line with minimum warranty provider requirements.

On the western part of the site, if the intention is to construct artificial sports pitches, then it is not considered that a specific cover layer will be required, as the build up typically includes a geotextile membrane, a clean subbase on top, a form of porous macadam/binding stone layer surface, a "shock pad" and then the artificial turf itself. This is considered to be more than adequate in breaking the pathways to the identified receptors.

Site drainage should be taken into consideration with the implementation of the clean cover layer. It is also essential to provide a structured, uncompacted and well-aerated soil profile for the successful establishment and subsequent growth of plants and grass. However, where heavy machinery and large volumes of soil are excavated and stored, soil structure can easily be destroyed by over-compaction, leading to poor drainage and failed garden planting. This can often be mitigated by careful site planning or rotavating the soils as required.

The above is subject to agreement with the Local Authority and the warranty provider; requirements should be confirmed at the earliest opportunity.

5.4 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.

5.5 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:

Stockpile sealed and cordoned off with warning sign	Sheeting of contaminated materials
	

5.6 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).

5.7 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.

5.8 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.

5.9 Unexpected Contamination

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

6.0 STAKEHOLDERS AND RESPONSIBILTIES

6.1 Key Stakeholders

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

Client / Developer	Consultant / Engineer	Contractor	CDM Stakeholders	Regulators
Kellen Homes Ltd & GMYF	Brownfield Solutions Ltd (BSL)	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) Warranty provider

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:

- 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 Clean Cover System

Soils used within the top 600mm in private gardens and 450mm in soft landscaping will comply with the chemical specification and testing frequencies provided within Appendix A.

Prior to importing any soils, test results for the proposed import will be provided to the clients representative, alongside the confirmation of the source (greenfield/brownfield/recycled etc).

Once installed by the groundworks contractor, there is a requirement to provide evidence of the chemical suitability and depths of the clean cover system, with inspections to be carried out by a suitably qualified Geo-environmental Engineer in a randomly selected area of plots. Confirmatory photographs will be taken for inclusion in the validation report. An example of good practice for depth validation is provided below:

Containing staff, datum bar and photo board, clearly showing spoil and pit depth	Plot Overview
	

The frequency of garden validations shall be specified as every plot for the first ten plots constructed, then falling to one depth validation inspection pit per every four plots ready at the time of inspection (1 in 4). Photos of all other plots with soils in place during the time of the inspection should also be provided.

In areas of soft landscaping/public open space (POS), validation pits should be excavated at a frequency of circa one pit per 25m x 25m area of POS. In the area of the sports pitches, we propose 10 No. locations should be validated to avoid damage to the pitches; survey data (before and after placement of soils) may also be utilised to demonstrate the clean cover thickness.

Minor variances in the thickness of individual soils layers cover may be tolerated, provided the overall clean cover systems are of the minimum specified depths to minimise soils mixing.

Where made ground has been completely removed from an entire plot, the cover system as such is not required, however a “clean” topsoil/subsoil layer comprising a minimum of 100mm “clean” topsoil is still required to act as a growing medium. Evidence of the removal of made ground soils down to natural strata will be required in such areas (visual inspection by an engineer with photos taken or survey data provided with photos from the contractor).

If the cover system is deemed to be insufficient, the groundworks contractor will be informed and advised on how much more material is needed for the cover system to be meet requirements, with an additional

verification pits will be re-excavated after rectification to confirm that a sufficient thickness of soil is present.

7.2 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™.

7.3 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:

- 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.

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DRAWINGS



Legend

- Indicates 1.8m high feature fence
- Indicates 1.8m high plot divisional screen fence.
- Indicates bin stores.
- Indicates principle entrance door to dwelling.
- Indicates secondary entrance door to dwelling.
- Indicates application site boundary.
- Indicates affordable units
- Indicates adaptable units
- Indicates footpath connection points
- Indicates proposed trees
- Indicates substation
- Indicates pumping station
- Indicates electric vehicle charging points.

All plots to be provided with a secure cycle point.

Accommodation Schedule
Mount Road, Gorton

KELLEN HOMES

House Type		Bed No.	Type	No.	Sqft	Total Sqft	Split
Private							
Hic	Hickory	2	Semi	73	767	55991	24.09%
Olive	Olive	2	Semi	8	770	6160	2.64%
Ced	Cedar	3	Semi	82	936	76752	27.06%
Aca	Acacia	3	Semi	26	940	24440	8.38%
Eme	Emerson	4	Semi	18	1064	19152	5.94%
				207		**182495**	**68.32%**
Affordables							
Adu835	adu835	2	Semi	2	835	1670	0.66%
Adu1009	adu1009	3	Semi	2	1009	2018	0.66%
Hic	Hickory	2	Semi	25	767	19175	8.25%
Ced	Cedar	3	Semi	19	936	17784	6.27%
Aca	Acacia	3	Semi	6	940	5640	1.98%
Oli	Olive	2	Semi	2	770	1540	0.66%
Eme	Emerson	4	Semi	4	1064	4256	1.32%
				60		**52083**	**19.80%**
			Total	**267**		**234578**	
YP Studio Apartments	Apts	1	Apartments	36	280	10080	11.88%
				36		**10080**	**11.88%**
							11.68%
			Total	**303**		**244658**	**100.00%**

Gross Site Area:	22.4	Acres	9.07	Hectares	
Nett Residential Site Area:	**15.645**	**Acres**	**6.33**	**Hectares**	
Gross Density:	13.53	Units/Acre	33.43	Units/Hectare	
Nett Density:	**19.37**	**Units/Acre**	**47.87**	**Units/Hectare**	
Gross Footage:	10922.23	SQFT/Acre	2507.37	SQM/Hectare	
Nett Footage:	**15643.09**	**SQFT/Acre**	**3591.13**	**SQM/Hectare**	

Revision	Date	Amendment	Initials
P8	07.11.23	Cricket pitch added to layout.	BOP
P7	03.10.23	EV Charging points added, Subs amended.	BOP
P6	02.10.23	Combined Netball & Basketball Court added.	BOP
P5	19.09.23	Hickory HT semi's roofs changed back to up and over and not hipped.	RGC
P4	11.09.23	Road 1 amended to allow for refuse to reach end. Drive to plot 74 amended and emergency access	KLW
P3	07.09.23	Cedar sqft updated 940 to 936.	KLW
P2	05.09.23	Affordable units increased to 60 plots. Mix updated accordingly	KLW
P1	25.08.23	Detailed site layout completed	BOP

Development
MOUNT_ROAD
Location
GORTON
Marketing Name
Drawing Title
CADSITELAYOUT
Job No.
KH008
Drawing No.
A-100
Revision
P8
Scale @ A0
1:500
Drawn By
BOP
Date
25.08.23
Checked by
RGC
Date Checked

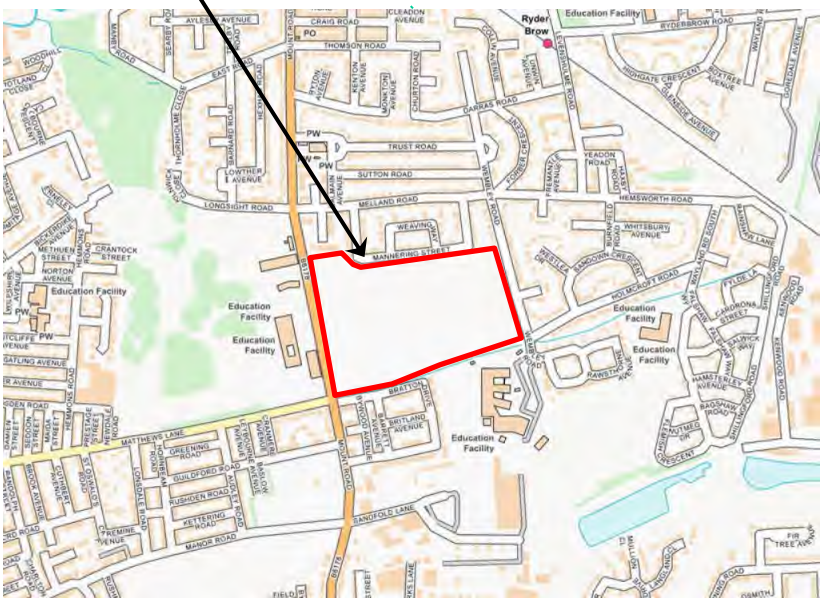
1st Floor, 103 Dalton Avenue, Birchwood Park, Warrington WA3 6YE
T: 01925 363108 W: www.kellenhomes.com
KELLEN HOMES



SITE LOCATION

NEAREST POSTCODE: M18 7SU

SITE ENTRANCE WHAT3WORDS: ///DASH.HAVING.TABLES



REV	DATE	DESCRIPTION	BY	CKD

BROWNFIELD SOLUTIONS LTD

CLIENT
KELLEN HOMES LTD

PROJECT TITLE
MOUNT ROAD, GORTON

DRAWING TITLE
SITE LOCATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C5150/01	-	NTS	20/09/22

DRAWN BY	CHECKED BY
SD	LC



KEY

APPROXIMATE SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	CKD

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

CLIENT
KELLEN HOMES LTD

PROJECT TITLE
MOUNT ROAD, GORTON

DRAWING TITLE
SITE FEATURES PLAN

DRAWING No.	REVISION	SCALE	DATE
C5150/02	-	NTS	19/10/22

DRAWN BY	CHECKED BY
MS	LC


KEY
APPROXIMATE SITE BOUNDARY
TPXX TRIAL PIT
WSXX WINDOW SAMPLE BOREHOLE
LWDXX LWD
SOAKAWAY INFILTRATION TEST
BOREHOLE INSTALLATION
MADE GROUND TOPSOIL SAMPLE IDENTIFIED AS HAZARDOUS FOR OFF SITE DISPOSAL PURPOSES
NB: SYMBOL FOR LOCATIONS HIGHLIGHTED AS HAZARDOUS DOES NOT INDICATE LATERAL EXTENT OF HAZARDOUS MATERIAL - THERE MAY BE NO VISUAL DIFFERENCE IN SUCH MATERIALS.
NOTES
1. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
3. DRAWING NOT FOR CONSTRUCTION PURPOSES.
REV | DATE | DESCRIPTION | BY | CKD
B | 05/06/23 | FINAL LOCATIONS BASED ON SURVEYED CO-ORDS. | MB | AJS
BROWNFIELD SOLUTIONS LTD
CLIENT
KELLEN HOMES
PROJECT TITLE
MOUNT ROAD, GORTON
DRAWING TITLE
EXPLORATORY HOLE PLAN
DRAWING No. C5150/03A&B
REVISION B
SCALE NTS
DATE 05/06/2023
DRAWN BY MB
CHECKED BY AJS

APPENDIX A

Chemical Specification for Soils

Quality Control Methodology for Imported and Re-used Soils

Prior to Importation and Re-use

Reliable testing results should be provided, or samples should be obtained at the source and tested prior to either importation to the subject site or re-use on site of origin as early as possible.

The frequency and scope of testing will vary depending on the source, the required testing for possible sources is provided below. These rates are based on professional judgement and acceptance of similar criteria used on similar sites to the satisfaction of the local regulatory authority. Results should be compared to the acceptance criteria also with this appendix.

Material Use	Testing Frequency*	Suite of Analysis					
		1	2	3	4	5	6
Topsoil							
Greenfield Source including Site Won (Top 600mm)	1 per 250m^3	■	■				
Brownfield/Recycled Source including Site Won (Top 600mm)	1 per 100m^3	■	■	■			
Subsoil							
Greenfield Source (Top 600mm)	1 per 250m^3	■	■				
Brownfield/Recycled Source (Top 600mm)	1 per 100m^3	■	■	■			
Site Won (Top 600mm)	1 per 250m^3	■	■	■			
First Generation (i.e. quarried sand)	No testing required. Certificate of material provenance is required.						
Physical Stone Break Layer							
First Generation (i.e. quarried stone)	No testing required. Certificate of material provenance is required.						
Site Generated / Imported 6F2	1 per 500m^3	■	■	■			
General Fill**							
Site Generated / Imported 6F2	1 per 1000m^3	■	■				
Site Won Made Ground	1 per 250m^3						■
	1 per 1000m^3	■	■	■			
Site Won Natural Arisings on Brownfield Site	1 per 1500m^3	■	■				■
Site Win Natural Arisings on Greenfield Site	1 per 2000m^3	■	■				
Other							
Hydrocarbon Hotspot Validation	1 sample per 10m of linear excavation to sidewall and 50m^2 base.			■	■		■

Notes

1 – BSL Default Suite - *arsenic, cadmium, chromium (total and hex), copper, nickel, mercury, lead, zinc, selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter, and pH.*
2 – Asbestos ID (and Quantification if detected).
3 – TPH Analysis - *Speciated Total Petroleum Hydrocarbons (TPH CWG) including BTEX and MTBE.*
4 – VOC Analysis - *Volatile Organic compounds (VOCs) by GC-MS (ex TIC).*
5 – SVOC Analysis - *Semi-Volatile Organic compounds (SVOCs) by GC-MS (ex TIC).*
6 – Visual Inspection & on-site screening for VOC using calibrated PID.
* - Minimum of 3 samples per source.
** To be used at depths >600mm bgl or below building/hardstanding.

The testing should be undertaken at a UKAS accredited laboratory and be MCERTS accredited and all results should be below existing residential guideline values which are presented in Appendix A.

Topsoil/Subsoil

The above specification is to determine if material is chemically clean, for suitability as a growing medium reference should be made to BS3882:2015 Specification for Topsoil and BS 8601:2013 Specification for Subsoil and Requirements for Use.

In addition to the above sampling frequencies and testing, all imported topsoil/subsoil should also confirm to the following criteria:

- Have a maximum stone size of 75mm.
- Be clean and free of foreign debris including building waste materials or contaminants e.g. brick, glass, asbestos and plasterboard, etc.

For imported soils, approval should be obtained from the Local Authority prior to importing to site.

Site Won Crushed Hardcore/Concrete (for use below building/hardstanding only)

In addition to the above sampling frequencies and testing; for re-use of hardcore/concrete (Grade 6) on the site of origin, BSL proposes the following inspection criteria:

- No visual contamination (oil staining etc).
- Limited deleterious material (organics, wood, etc).
- Limited metal.
- No visible asbestos containing material (ACM).
- Quantifiable Asbestos at or <0.001 w/w%.

Production of Grade 6 materials should be done under WRAP quality protocols or similar. Inspections and sampling would need to be carried out by a qualified geo-environmental engineer. For geotechnical performance, reference should be made to Series 600 Earthworks Guidance.

If the above criteria for asbestos are exceeded, then further consideration and assessment will be required. Works would need to be undertaken in compliance with the Control of Asbestos Regulations (CAR) 2012 and an Asbestos Plan of Works may be required.

Post Importation

The imported soils should be inspected on site to confirm it is the same material inspected at the source and it is suitable for use. Once imported to site, tests should also be undertaken to confirm the batch is suitable prior to use and has not been contaminated in transit.

A management plan should be in place on site for storage and transportation. The material should be stockpiled separately and well segregated on site to prevent cross contamination in accordance with good site practice.

Accurate records of the movement of soils should be kept in order to be incorporated in the final verification report.

Approval should be obtained from the Local Authority prior to use on site.

Validation and Verification Report

Site
A final verification report should be issued to the Local Authority/Warranty Provider (e.g. NHBC) detailing records of the re-use and importation of soils, alongside their use on the site.

Cover Layer
Once the chemical suitability of soils used for a cover system in soft landscaping and garden areas has been confirmed, the material can be placed in these areas.

The depth of the cover layer should be recorded, and photographs should be taken as evidence to be issued to the Local Authority/warranty provider in the verification report.

Approval for the placement of the cover layer should be obtained from the Local Authority/Warranty Provider.

APPENDIX B

BSL Guidance – Re-use and Disposal of Waste

Re-Use Of Waste - Guidance Note

Definition of Waste
The Environment Agency considers waste to be *"...any material that is discarded, or intended to be discarded..."* This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

CL:AIRE: Code of Practice
Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE DoWCoP), also commonly referred to as a "Materials Management Plan".

The developer/contractor is advised to complete all works under the DoWCoP.

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment.
- Material capable of being used in another place on the same site following ex-situ treatment on site.
- Material capable of being used in another development site without treatment (Direct Transfer).
- Material capable of being used in another development site following ex-situ treatment on another site eg Hub site.

The Code of Practice requires 4 No. Factors to be addressed:

1. Protection of human health and protection of the environment.
2. Suitability of use, without further treatment.
3. Certainty of use.
4. Quantity of material.

In order to satisfy these requirements the following are required:

i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
v) Volume calculations.
vi) Planning permission for the development.
vii) Contractual details to be clear, regarding who steps in is a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.
Soils which require treatment on site (eg bioremediation, stabilisation) will require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.
Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Alternatives include the EA U1 exemption (soils and stones <1000 tonnes and aggregates <5000 tonnes) and the Waste Framework Directive, which applies to naturally occurring soils used on site of origin only. Aggregates can also fall under the EA WRAP Quality Protocols.

Waste Classification For Soils

Introduction
Waste producers have a duty of care to classify the waste they are producing:

- before it is collected, disposed of or recovered.
- to identify the controls that apply to the movement of the waste.
- to complete waste documents and records.
- to identify suitably authorised waste management options.
- to prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

Background for Landfill Disposal
In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets his permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

Key Points

- Not all waste can be landfilled
- Landfills are classified according to whether they can accept **hazardous**, **non-hazardous** or **inert** wastes.
- Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
- Most wastes must be treated before you can send them to landfill.
- There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

Classification
Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e the hazard assessment. The most common EWC waste codes related to soil are:

17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

Soils may contain certain contaminants (eg asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

Waste Definitions

Inert	• Will not undergo any significant physical, chemical or biological transformations. • Will not dissolve. • Will not burn. • Will not physically or chemically react. • Will not biodegrade. • Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. • Has insignificant total leachability and pollutant content. • Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
Non-Hazardous	Is not inert (see above) Is not hazardous (see below)
Hazardous	Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance)
Stable Non-reactive hazardous waste#	Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).

This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) the **WAC is not relevant.** Furthermore the WAC limits **cannot be used to make an assessment of whether a waste is hazardous**. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

Classification based on Total Concentrations[1]	Non-Hazardous Waste		Hazardous Waste	
WAC testing	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	Above hazardous WAC limit values
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill[2]	HAZARDOUS landfill	PRE-TREATMENT[3]

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
2 Individual sites may have certain limit values pre-determined in their licence.
3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

Known Oils

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer's or supplier's REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Unknown Oils
Where hydrocarbons are contaminating soils it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

> For contaminated land specific consideration must be given to the following before proceeding;
>
> - The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
> - The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of **marker compounds** is optional; however it is recommended that where possible the marker compounds should be used. WM3 states:

> If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:
>
> - The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
> - This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
> - The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

TPH Concentration (mg/kg)	Petrol or Diesel	BaP (mg/kg)	Classification
10,000	No	0.9	Non- Hazardous
1,000	No	Not available	Hazardous
1,000	Yes	Not relevant	Hazardous

References

1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
7. 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 of the European Parliament
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

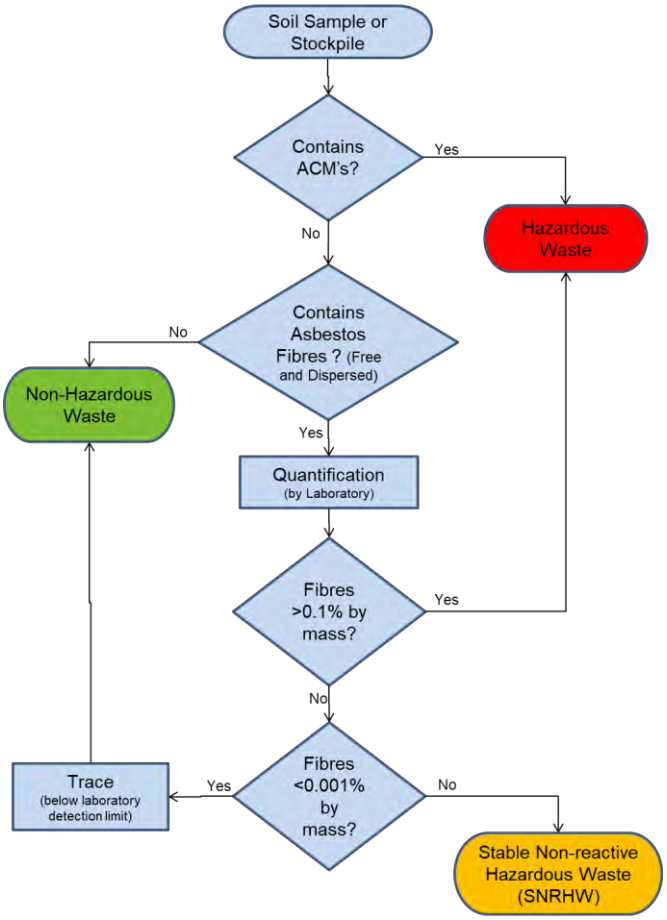
Additional Asbestos Guidance Notes

Disposal

The 1st Edition of WM3 "Guidance on the classification and assessment of waste", details the way in which Asbestos is assessed within soils.

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's)



Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site[1]. These levels are often termed "trace" by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)[1]. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

17 06	**Insulation materials and asbestos-containing construction materials**
17 06 01	Insulation materials containing asbestos
17 06 03	Other insulation materials consisting of or containing hazardous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05	Construction material containing asbestos

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and "*other suitable materials*" may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

Construction

Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether or not the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four hour period. The control limit is not a '*safe*' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 "the release of dispersed asbestos fibres from soil" 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m^3.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (eg by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation. There is currently a Joint Industry Working Group (JIWG) tasked with producing a Code of Practice for Asbestos in Soil, Made Ground and Construction & Demolition Material that will clarify in due course the position of the various government agencies.

Asbestos containing materials can remain in situ under a suitable cover system which may be hardsurfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Preliminary publications from JIWG (April 2015) provide guides for decision making in relation to construction. These are at a "Beta" test stage and further publications will be provided in due course.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk . There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required.

The re-use of soils containing asbestos at concentrations above hazardous waste levels is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

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