RDM

Environmental and Geotechnical Engineering Ltd

REMEDIATION SCHEME

for

A PROPOSED RESIDENTIAL DEVELOPMENT

at

WINDMILL HILL QUARRY

BRIERLEY ROAD

GRIMETHORPE

SOUTH YORKSHIRE

S72 7AW

for:

Mr Chris Gaddes
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Prepared by:	**Date**	**Revised**	**Revision**
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1. INTRODUCTION

1.1. General

RDM Environmental and Geotechnical Engineering Ltd (RDM) was commissioned by Mr C Geddes of Geddes Homes Ltd, Grimethorpe, South Yorkshire to provide further contamination testing for the development of a proposed residential site Brierley Road, Grimethorpe, hereafter known as “the Site”.

Phase I and II site investigations had already been undertaken by other parties for the proposed development on behalf of Mr Geddes, and the results of these investigations have been referred to in this report.

In the Phase II Report, undertaken by JWA Contract Consultants (Nov 8th 2021), it was concluded that remediation was necessary following determination of elevated levels of polyaromatic hydrocarbons (PAH) and one instance of Arsenic on the Site, all of which exceeded LQM/CIEH (2015) S4UL Human Health Assessment criteria.

A site visit was made by RDM Environmental and Geotechnical Engineering Ltd on 5th April 2022 after the Site was stripped following recommendations made in the Phase II Report. The RDM visit, intended to confirm absence of PAH contamination, undertook recovery of further samples from relevant areas and these were submitted to a laboratory for testing for PAH. However, elevated levels of PAH in the northern section of the site were again recorded from the sample results, indicating further remediation is necessary and a scheme should be provided to enable site to continue to be developed.

1.2. Objectives of the Remediation Scheme

The objectives of this Remediation Scheme are as follows:-

- To summarise the site investigation work and risk assessment undertaken to date.
- To present a remediation option appraisal with a conclusion
- To describe the requirements of the Remediation Scheme required to sever the contaminant linkages that have been identified.
- To act as a part of the contract documentation between the client and the remediation contractor.
- To designate roles and responsibilities of the various parties that will be involved in the remediation.
- To state how the remediation should be recorded and verified.

1.3. Site Description

The Site under development is a former quarry accessed from Brierley Road. Last used around the time of the First World War, the Site is a cutting into a sandstone outcrop occupying an area roughly of 0.21 hectares.

To the north, east and south, the Site is bordered by new residential developments and access ways, while Brierley Road abounds to the west with arable farmland with farm buildings beyond.

Geology

Geological maps published by the British Geological Survey (BGS) indicate that the Site is underlain by bedrock of the Brierley Rock (sandstone) Formation. This is a sedimentary formation that was deposited approximately 315 million years ago during the Carboniferous Period when the environment was dominated by swamps deltas and estuaries. There are no superficial deposits.

Existing Contamination

Contamination testing undertaken on November 8th 2021 by JWA has revealed elevated levels of polyaromatic hydrocarbons (PAH) together with an elevated level of Arsenic in the northern and eastern section of the Site in excess of LQM/CIEH criteria. Possible sources of the contamination are:

i.) minor (potentially hydraulic) oil spillage from plant machinery
ii.) remnants of burnt organic material (e.g. wood contained in imported fill)
iii.) imported fill with bituminous content used for areas of hardstanding.

1.4. Proposed Site Use

It is proposed that the Site be cleared and developed to include a series of 5 detached residential dwellings .

1.5. History of Site Investigations and Related Works

Previous works were undertaken by Rogers Geotechnical Services Ltd (May 2019). who provided a Phase One Desktop Study which recommended a Phase II Site-Investigation and a series of laboratory tests. The Phase II Investigation was undertaken on 6th November 2021 by JWA Contract Consultants Ltd in accordance with the Phase One Desktop Study and levels of PAH and Arsenic were detected in excess of LQM/CIEH S4UL Human Health Risk Assessment (2015).

On April 5th 2022, RDM Environmental and Geotechnical Engineering Ltd undertook a series of further testing in the vicinity of the locations where contamination had previously been detected by the JWA Investigation in the northern and eastern sections of the Site. The southern section of the Site had been shown to be clear of contamination by the JWA Investigation.

1.6. Identified Significant Potential Contaminant Linkages

The following is based on the land use of the proposed development being "residential", and the most vulnerable receptor being a female child of 0 to 6 years of age.

The previous land-use of the Site noted in the conceptual model of the Phase I Desktop Study Report (2019) indicated that contamination may be present as elevated levels of PAH, which the Phase II Investigation confirmed: also present was an elevated level of Arsenic. The source of both is likely to be previous industrial use (use of ash or waste materials for hard standing/site levelling), although minor spillage of fuels and/or oils from plant machinery may have contributed.

Tables 1 and 2 in Appendix 2 show the levels of contamination identified on the Site by the Phase II Investigation undertaken by JWA in November 2021. Table 1 includes results from shallower depths (0.1m bgl to 0.45m bgl), whereas Table 2 includes the results of deeper testing (0.45m bgl to 1.50m bgl). Tables 3 and 4 include testing undertaken by RDM Environmental Geotechnical using a similar approach to shallow and deeper soil horizon testing.

Summarising the results shown in tables 1 and 2, it is shown that upper soil contamination (<0.45m bgl), prior to site stripping, is generally higher in the northern section of the with a greater frequency of congeners exceeding LQM/CIEH criteria, particularly in TP1, TP3 (Arsenic only) and TP9 (see Appendix 3 – Site Map). However, comparison with lower soil results show that contamination was confined to the upper surface with no results exceeding criteria occurring in the lower soils (>0.45m bgl).

Test results from the RDM site assessment made on April 5th 2022 show an increase in PAH congeners that were shown to be in excess of LQM/CIEH criteria. The likely explanation for this is that testing at CTP1A (0.3m below new stripped surface) lies proximal to where site plant machinery is stored and where one minor instance of accidental spillage of oils is known to have taken place recently. Since the RDM investigation adopted the same multiple soil horizon testing approach used by JWA, further results are able to demonstrate that contamination was limited to the near surface soils and that at 0.6m below stripped surface in the northern section of the site soils were free from PAH contamination.

Therefore, the significant source-receptor linkages identified for the northern/eastern section of the Site where contamination was identified in excess of LQM/CIEH (2015) criteria following the RDM April 2022 investigation currently are:

- Potential inhalation of dust and ingestion of soils containing an elevated level of Arsenic(As) detected in TP3/1 in the JWA investigation of November 8th 2021.
- Dermal contact or ingestion of PAHs in the location of CTP1A (see Appendix 3 Site Map).

2. REMEDIATION OPTIONS

2.1. Objectives of Remediation Works

The main objectives of the remediation are to break the potential contamination linkages identified above to ensure that contaminated soils can no longer be considered likely to represent a significant risk of harm to human health.

To this end, it is desirable that remediation results in a high degree of certainty that the potential for contamination linkages have been removed permanently.

Remediation must be undertaken in a manner that is sustainable and proportionate to environmental and economic costs.

2.2. Breaking the Contaminant Linkages

In order to break the contamination linkages identified on the Site, remediation will include the encapsulation of near surface soils on the Site beneath designated hard surfaces (e.g. dwelling footprint, footpaths, driveways, terracing etc), and the removal of contaminated soils from soft landscaped areas, i.e. flower beds and lawned areas.

With reference to the attached site testing locations map in Appendix 3, these areas are the soft landscaping proximal to CTP1 and CTP3 and should include the rear/side gardens of plot 1 and 2.

Soils to be removed from the Site to landfill have been subject to a waste acceptance criteria test (WAC) undertaken on samples recovered during the RDM investigation. Results show that soils removed from the Site should be disposed of in landfill suitable for stable non-reactive hazardous waste. Soils stockpiled can then be manged on the Site according to the MMP.

3. SUMMARY OF CHOSEN REMEDIATION STRATEGIES

3.1. Management of Soil Contamination Pathways

In order to break contamination pathways, the following methodology should be adopted:

i.) Where hard-surfacing is intended, soils can remain and be encapsulated: This applies to soils within the footprint of the dwelling, below driveways/accessways/footpaths or below patios. This method is economical and environmentally preferrable as soils do not leave the Site. Once covered by hard surfacing, access to the soils is prevented and the source-receptor linkage is broken.

ii.) Where soft landscaping is intended for rear gardens of plots 1 and 2, soils will need to be removed to 0.6m below current ground level, severing the source-receptor linkage. Levels should be re-instated by importing soils or granular materials as preferred (for example 0.3m of granular material overtopped by 0.3m of topsoil), and it is important these should be certified as clean and be from a reputable supplier. A photographic record should be made of each stage of the remediation.

iii.) It is advised that the remedial measures included here are undertaken once the dwellings are constructed avoiding as far as possible any possibility of contaminating imported clean surface coverings and the necessity to re-test.

4. ENABLING WORKS

4.1. Access

Access to the Site from Brierley Road is unhindered from the adjacent roadway, but traffic flow will need to consider parking of vehicles attending the Site.

Vehicles, such as grab lorries, that may need to access the Site in order to remove soils, are advised to do so on a low-key basis so that limited space on the Site itself is not over-subscribed and vehicles are not forced to use the roadway whilst waiting for space. This approach would also be in keeping with maintaining a tolerable nuisance level for nearby properties who are affected by works on the Site.

The contractor should also maintain an adequate area for parking on the Site reserved for vehicles which are required on-site for the duration of the build.

4.2. Underground and Overhead Utilities

The contractor should identify all overhead and underground utilities that cross the Site, and either divert them or put in place adequate signage/fencing to prevent damage during the remediation.

5. HEALTH & SAFETY AND THE ENVIRONMENT

5.1. Principal Stakeholders in the Remediation

The principal stakeholders in the remediation will be as follows:

a.) The prospective or current site owners and future site residents

b.) A remediation supervisor who may be an independent advisor employed to supervise and verify the remediation program.

c.) A remediation contractor employed to achieve the remediation objectives.

5.2. CDM Regulations

It is understood that the time required to complete the remediation works will be below the threshold whereby such works would become a notifiable project under the Construction (Design and Management) Regulations (2015).

5.3. Contractor`s Qualifications and Experience

The remediation should only be undertaken by a contractor with appropriate qualifications and experience to undertake the work. As a minimum, the contractor should have been previously employed to undertake similar remediation, and be able to demonstrate satisfactory completion.

Only members of staff who are suitably qualified and experienced in their duties should be employed on the Site.

The contractor should provide a suitably qualified and experienced site supervisor to oversee the works on a full-time basis. The supervisor will be the contractor`s point of contact on-site and between other principal stake-holders.

5.4. Welfare Facilities

The contractor is to ensure that all necessary welfare facilities are available or their staff, bearing in mind access and spacing constraints of the Site.

5.5. Hygiene Facilities and Personal Protective Equipment (PPE)

Shallow or near surface soils are known to be contaminated by PAH and Arsenic levels in excess of LQM/CIEH S4UL criteria.

Arsenic enters the body via oral pathways, and dermal contact with Arsenic is not considered to be the critical pathway as only limited absorption occurs in this way. Arsenic causes severe gastrointestinal damage and haemorrhaging initially following exposure to acute concentrations but then other complications including bone marrow depletion, cardiovascular dysfunction and liver enlargement can occur. Arsenic is also carcinogenic as it can cause lung cancer following inhalation

Dermal contact with PAH, dependent upon the congener, result in skin irritations. Ingestion of the most toxic form Benzo[a]pyrene is widely studied and is known to be carcinogenic and mutagenic. It is environmentally persistent and can remain within the human body indefinitely, being passed down through successive generations.

Though dermal contact is likely to be limited for contractors, appropriate PPE should be provided for all staff employed on the Site, i.e. overalls and gloves and these should also be made available to site visitors. Hand washing facilities should be provided and be easily accessible.

5.6. Control of Dust

It is noted that the Site is proximal to private residences constituting a number of receptors who may be affected by the release of dust. To mitigate this, activities where excessive dust is generated should be kept to a minimum and the Site should be kept damp during periods of dry weather.

5.7. Noise and Vibration

Some noise and vibration may be generated during remediation, and this is unavoidable. Reasonable steps should be taken to minimise any activities where excessive levels are generated.

5.8. Traffic Management

The remediation contractor will ensure that an appropriate traffic management system is in place to control the flow of traffic removing and importing soils. All vehicles will be required to comply with system.

Speed limits should be set to 5 mph and parking should be allowed in locations that do not inconvenience local residents

5.9. Security

The contractor will ensure that the Site remains secure at all times and that all plant equipment is secured when not in use.

5.10. Protection of the Public Highway

The remediation contractor must ensure that dust, mud and silt etc are not deposited on the public highway as a result of the remediation works. Should this occur, then the highway should be cleaned immediately.

5.11. Protection of Surface Water Drains

Soil and water run-off from the remediation works should not be allowed to enter the surface water drainage system local to the Site, and the contractor should take measures to prevent this.

5.12. Fuelling of Plant and Machinery

Fuel to be used in machinery and plant involved with the remediation should not be stored on site. When fuelling is required during remediation, spillages should be avoided. However, if they do occur, affected soils should be excavated and removed from the Site.

6. UNFORSEEN CONTAMINATION

6.1. Unforeseen Contamination

Although the Site has been subject to investigation and sample coverage, unforeseen contamination being encountered during the remediation works is unlikely but not beyond possibility.

In this event, the remediation supervisor will log the nature of the contamination and agree any further works, over and above that described in this remediation scheme, with the remediation contractor.

7. EXCAVATED SOIL AND MATERIALS MANAGEMENT

7.1. General

The remediation contractor shall at all times comply with the relevant legislation and best practice guidelines in relation to waste management.

7.2. Green Waste

All grass and vegetation that is to be removed from the Site to enable remediation works to be undertaken is to be segregated from soils destined for landfill. All green waste should be disposed of correctly.

7.3. Burning of Wastes

Unlicenced burning of wastes including green waste arising from the remediation works is prohibited.

7.4. Re-Use of Excavated Soils

During the remediation works, it is envisaged some soils will be removed from the Site whilst others will be encapsulated. So, a Materials Management Plan (MMP) should be devised to include stock-piling of soils on the Site. Any stock-piling should be managed accordingly with consideration to items listed in section 5 of this remediation scheme. If necessary contaminated stock- piles should be stored on a geo-membrane and covered with tarpaulin to prevent rain-water ingress. Dust minimisation practices should be followed where appropriate and the location of the stock-pile should be specified in the MMP.

The period between re-use or disposal of soils should be minimised as afar as is practical.

7.5. Transportation of Wastes

Waste soils should be disposed of in landfill and the remediation contractor should ensure that the risk of materials being spilled or lost during transportation is minimised. Only licensed waste carriers should be employed to transport waste from the Site.

The remediation supervisor will keep a log of approximate volumes and types of soil waste that leave the Site during the remediation.

Accurate and comprehensive documentation showing the volume/tonnage of waste soils, the disposal location, date of disposal and details of any treatment applied should be maintained by the remediation contractor. These records should be legible and submitted to the remediation supervisor upon request.

Soils identified on the Site with elevated levels of PAH only exceed LQM/CIEH criteria for residential use and would not be considered a risk to human health in a commercial application. So, it may be possible to re-use soils in a less sensitive location instead of disposal to landfill, however the following will be applicable:

i.) The remediation contractor must provide documented evidence that the soil is suitable for re-use in this manner

ii.) A record should be kept of the location of re-use and independent confirmation of suitability should be sought.

The remediation supervisor will not advise the Local Authority that the remediation contractor has completed the remediation scheme satisfactorily until it can be demonstrated through maintained records that all waste soils have been transported and disposed of or re-used correctly.

8. SUPERVISION OF WORKS

8.1. General

In order to record the works undertaken during remediation, it is recommended that the remediation works are supervised and recorded by an independent environmental consultant.

9. DUTIES OF THE REMEDIATION SUPERVISOR

9.1. Duties of the remediation supervisor should include the following:

- Ensure that the remediation contractor undertakes the remediation in accordance with this remediation scheme, materials management plan (MMP) and any other applicable guidelines
- Act as liaison between the other principal stakeholders of the remediation
- Represent the interests of the Local Authority and, where appropriate, future residents
- Keep records that are sufficient to provide an accurate account of how the remediation works were undertaken and to produce a remediation verification report
- Production of a remedial verification report

10. VERIFICATION REPORT

10.1. Remedial Verification Report

Following satisfactory completion of the remediation, the remediation supervisor will provide a remediation verification report addressed to the Local Authority.

The report will contain all relevant information that is necessary to demonstrate that the remediation has been completed satisfactorily and that the objectives of the remediation have been met.

The report will include a revised site conceptual model showing that there are no longer any significant contaminant linkages, and contain a statement that the Site is suitable for its intended use.

10.2. Contents of Remediation Verification Report

The contents of the remediation verification will include the following information:

- References to this remediation scheme, previous site inspection reports and any other relevant documents
- Any agreed changes to this remediation scheme following issue
- Topographical survey drawing of the Site prior to remediation
- Details of any additional laboratory analysis undertaken on soils prior to or during the remediation
- Details of the remediation contractor and supervisor and their roles during the remediation
- Description of enabling works undertaken, e.g. removal of existing structures.
- Description of how contaminated soils were excavated and removed from the Site.
- Waste transfer notes detailing where waste soils were removed to and the details of the waste carriers
- Details of any treatment undertaken on the waste soils prior to disposal
- Details of any unexpected contamination encountered, and the steps taken to remove it.
- If applicable where soils were re-used and details of suitability
- Verification that works were undertaken in accordance with the MMP

- Confirmation that re-instatement was completed satisfactorily
- Photographic evidence with identifiable reference points to show stages of reinstatement works
- Confirmation that the remedial works were undertaken successfully
- Confirmation of achieved objectives
- Any necessary pre-cautions for contaminated soils remaining on-site
- A revised conceptual model

The verification report will remain in draft form until a signed declaration by a qualified person for the purposes of the Definition of Waste; Development Industry Code of Practice (CoP).

Richard Gray BSc (Hons) FGS
RDM Environmental and Geotechnical Engineering Ltd

APPENDIX I

SITE LOCATION PLAN

Site Location at Windmill Hill Quarry, Brierley Road, Grimethorpe

APPENDIX II

LQM/CIEH S4UL HUMAN HEALTH RISK ASSESSMENT (2015) OF RECOVERED SAMPLES

LQM/CIEH S4ULs Human Health Risk Assessment (2015)

Project: Brierley Road Grimethorpe JWG Assessment Nov 8th 2021

Upper Soils Horizon (0.1m bgl to 0.45m bgl)

Soil Sample	TP1/1	TP2	TP3/1	TP4	TP5/1	TP6	TP7/1	TP8/1	TP9/1		Mean	Max Concen:	SD	Resi pass/ fail	Com pass/ fail	US95	S4UL Residential	S4UL Commercial	N (no of samples)	Value t
Arsenic	13.00	12.00	59.00	17.00	8.70	14.00	18.00	17.00	30.00		20.97	59.00	26.89	fail	pass	**37.64**	37	635	9	1.86
Cadmium	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20		0.20	0.20	0.00	pass	pass	**0.20**	4.6	49.6	9	1.86
Chromium (total)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		0.40	0.40	0.00	pass	pass	**0.40**	910	8600	9	1.86
Copper	31.00	18.00	65.00	25.00	21.00	23.00	28.00	52.00	54.00		35.22	65.00	21.06	pass	pass	**48.28**	2400	6800	9	1.86
Lead (C4SL)	33.00	21.00	130.00	27.00	39.00	35.00	47.00	95.00	100.00		58.56	130.00	50.52	pass	pass	**89.88**	200	200	9	1.86
Mercury	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.40		0.31	0.40	0.06	pass	pass	**0.35**	15	320	9	1.86
Nickel	19.00	21.00	32.00	18.00	18.00	18.00	21.00	23.00	22.00		21.33	32.00	7.54	pass	pass	**26.01**	180	980	9	1.86
Selenium	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.00	pass	pass	**1.00**	250	12000	9	1.86
Zinc	120.00	40.00	180.00	68.00	47.00	74.00	110.00	170.00	180.00		109.89	180.00	49.58	pass	pass	**140.63**	3700	730000	9	1.86
Acenaphthene	0.62	0.05	0.05	0.05	0.05	0.05	0.05	1.30	4.60		0.76	4.60	2.72	pass	pass	**2.44**	200	1000000	9	1.86
Acenaphthylene	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.32		0.08	0.32	0.17	pass	pass	**0.19**	160	1000000	9	1.86
Anthracene	2.20	0.05	0.05	0.51	0.05	0.35	0.28	3.60	14.00		2.34	14.00	8.24	pass	pass	**7.45**	2200	540000	9	1.86
Benzo[a]anthracene	9.30	0.10	1.10	2.00	0.28	1.10	1.60	5.60	25.00		5.12	25.00	14.06	fail	pass	**13.84**	13	180	9	1.86
Benzo[a]pyrene	15.00	0.05	0.75	2.00	0.26	0.79	1.50	5.60	17.00		4.77	17.00	8.65	fail	pass	**14.94**	3.5	36	4	2.353
Benzo[b]fluoranthene	12.00	0.05	0.67	1.70	0.29	0.95	1.50	6.60	20.00		4.86	20.00	10.70	fail	pass	**11.50**	3.9	45	9	1.86
Benzo[g,h,i]perylene	9.20	0.05	0.44	1.00	0.05	0.55	0.85	2.90	8.30		2.59	9.20	4.67	pass	pass	**5.49**	640	4000	9	1.86
Benzo[k]fluoranthene	8.80	0.05	0.56	1.30	0.20	0.45	1.10	2.60	9.90		2.77	9.90	5.04	pass	pass	**5.90**	130	1200	9	1.86
Chrysene	7.30	0.05	0.72	1.90	0.27	0.83	1.50	5.00	16.00		3.73	16.00	8.68	pass	pass	**9.11**	19	350	9	1.86
Dibenzo[a,h]anthracene	2.10	0.05	0.05	0.05	0.05	0.05	0.21	0.73	2.30		0.62	2.30	1.19	fail	pass	**1.36**	0.43	3.6	9	1.86
Fluoranthene	17.00	0.05	1.40	4.40	0.50	2.10	3.30	15.00	58.00		11.31	58.00	33.02	pass	pass	**31.78**	290	23000	9	1.86
Fluorene	0.80	0.05	0.05	0.05	0.05	0.05	0.05	1.50	4.20		0.76	4.20	2.44	pass	pass	**2.27**	160	71000	9	1.86
Indeno[1,2,3,-cd]pyrene	8.20	0.05	0.41	0.98	0.05	0.55	0.77	2.50	8.90		2.49	8.90	4.53	pass	pass	**5.30**	39	510	9	1.86
Naphthalene	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1.60		0.22	1.60	0.97	pass	pass	**0.83**	24	1100	9	1.86
Phenanthrene	8.60	0.05	0.86	2.10	0.05	1.10	1.70	12.00	44.00		7.83	44.00	25.58	pass	pass	**23.69**	90	23000	9	1.86
Pyrene	15.00	0.05	1.20	3.70	0.45	1.70	2.80	12.00	47.00		9.32	47.00	26.64	pass	pass	**25.84**	620	54000	9	1.86

n	t
2	6.314
3	2.92
4	2.353
5	2.312
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

Higher instances of PAH/Arsenic contamination exceeding LQM/CIEH

Table 1 JWA Investigation November 8th 2021 Upper Horizon Soils (<0.45m bgl)

LQM/CIEH S4ULs Human Health Risk Assessment (2015)

Project: Brierley Road Grimethorpe JWG Assessment Nov 8th 2021

Lower Soils Horizon (0.45m bgl to 1.50m bgl)

Soil Sample	TP1/2	TP3/2	TP5/2	TP7/2	TP8/2	TP9/2					Mean	Max Concen:	SD	Resi pass/ fail	Com pass/ fail	US95	S4UL Residential	S4UL Commercial	N (no of samples)	Value t
Arsenic	6.90	11.00	9.30	17.00	8.10	7.70					10.00	17.00	4.95	pass	pass	**14.07**	37	635	6	2.015
Cadmium	0.20	0.20	0.20	0.20	0.20	0.20					0.20	0.20	0.00	pass	pass	**0.20**	4.6	49.6	6	2.015
Chromium (total)	4.00	4.00	4.00	4.00	4.00	4.00					4.00	4.00	0.00	pass	pass	**4.00**	910	8600	6	2.015
Copper	12.00	19.00	12.00	23.00	11.00	13.00					15.00	23.00	5.66	pass	pass	**19.65**	2400	6800	6	2.015
Lead (C4SL)	39.00	36.00	27.00	24.00	12.00	15.00					25.50	39.00	9.55	pass	pass	**33.35**	200	200	6	2.015
Mercury	0.30	0.30	0.30	0.30	0.30	0.30					0.30	0.30	0.00	pass	pass	**0.30**	15	320	6	2.015
Nickel	18.00	20.00	23.00	20.00	19.00	20.00					20.00	23.00	2.12	pass	pass	**21.75**	180	980	6	2.015
Selenium	1.00	1.00	1.00	1.00	1.00	1.00					1.00	1.00	0.00	pass	pass	**1.00**	250	12000	6	2.015
Zinc	38.00	54.00	47.00	70.00	35.00	38.00					47.00	70.00	16.26	pass	pass	**60.38**	3700	730000	6	2.015
Acenaphthene	0.05	0.05	0.05	0.05	0.05	0.05					0.05	0.05	0.00	pass	pass	**0.05**	200	1000000	6	2.015
Acenaphthylene	0.05	0.05	0.05	0.05	0.05	0.05					0.05	0.05	0.00	pass	pass	**0.05**	160	1000000	6	2.015
Anthracene	0.05	0.05	0.05	0.05	0.05	0.36					0.10	0.36	0.18	pass	pass	**0.25**	2200	540000	6	2.015
Benzo[a]anthracene	0.58	0.31	0.05	0.05	0.05	0.61					0.28	0.61	0.24	pass	pass	**0.47**	13	180	6	2.015
Benzo[a]pyrene	0.53	0.30	0.05	0.05	0.05	0.47					0.24	0.53	0.20	pass	pass	**0.48**	3.5	36	4	2.353
Benzo]b]fluoranthene	0.54	0.32	0.05	0.05	0.05	0.51					0.25	0.54	0.20	pass	pass	**0.42**	3.9	45	6	2.015
Benzo[g,h,i]perylene	0.38	0.05	0.05	0.05	0.05	0.28					0.14	0.38	0.17	pass	pass	**0.28**	640	4000	6	2.015
Benzo[k]fluoranthene	0.38	0.20	0.05	0.05	0.05	0.28					0.17	0.38	0.15	pass	pass	**0.29**	130	1200	6	2.015
Chrysene	0.52	0.32	0.05	0.05	0.05	0.43					0.24	0.52	0.20	pass	pass	**0.40**	19	350	6	2.015
Dibenzo[a,h]anthracene	0.05	0.05	0.05	0.05	0.05	0.05					0.05	0.05	0.00	pass	pass	**0.05**	0.43	3.6	6	2.015
Fluoranthene	1.10	0.60	0.05	0.05	0.05	1.60					0.58	1.60	0.72	pass	pass	**1.17**	290	23000	6	2.015
Fluorene	0.05	0.05	0.05	0.05	0.05	0.05					0.05	0.05	0.00	pass	pass	**0.05**	160	71000	6	2.015
Indeno[1,2,3,-cd]pyrene	0.31	0.05	0.05	0.05	0.05	0.26					0.13	0.31	0.13	pass	pass	**0.23**	39	510	6	2.015
Naphthalene	0.05	0.05	0.05	0.05	0.05	0.05					0.05	0.05	0.00	pass	pass	**0.05**	24	1100	6	2.015
Phenanthrene	0.62	0.38	0.05	0.05	0.05	1.10					0.38	1.10	0.51	pass	pass	**0.80**	90	23000	6	2.015
Pyrene	0.92	0.53	0.05	0.05	0.05	1.30					0.48	1.30	0.58	pass	pass	**0.96**	620	54000	6	2.015

n	t
2	6.314
3	2.92
4	2.353
5	2.312
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

Table 2 JWA Investigation 8th November 2021 Lower Horizon Soils (>0.45m bgl)

LQM/CIEH S4ULs Human Health Risk Assessment (2015)

Project: Brierley Road Grimethorpe Upper Soil Horizon (0.3m bgl) **Date: 05/04/2022**

Soil Sample		CTP1A		CTP2A		CTP3A		CTP4A				Mean	Max Concen:	SD	Resi pass/ fail	Com pass/ fail	US95	S4UL Residential	S4UL Commercial	N (no of samples)	Value t
Acenaphthene		0.10		0.10		0.10		0.10				0.10	0.10	0.00	pass	pass	**0.10**	200	1000000	4	2.353
Acenaphthylene		0.10		0.10		0.10		0.10				0.10	0.10	0.00	pass	pass	**0.10**	160	1000000	4	2.353
Anthracene		0.70		0.60		0.40		0.10				0.45	0.70	0.18	pass	pass	**0.66**	2200	540000	4	2.353
Benzo[a]anthracene		3.30		1.10		2.50		0.10				1.75	3.30	1.10	pass	pass	**3.04**	13	180	4	2.353
Benzo[a]pyrene		5.30		1.00		2.90		0.10				2.33	5.30	2.10	fail	pass	**4.80**	3.5	36	4	2.353
Benzo[b]fluoranthene		3.40		0.50		2.00		0.10				1.50	3.40	1.34	pass	pass	**3.08**	3.9	45	4	2.353
Benzo[g,h,i]perylene		3.50		0.60		1.90		0.10				1.53	3.50	1.40	pass	pass	**3.17**	640	4000	4	2.353
Benzo[k]fluoranthene		2.10		0.40		1.30		0.10				0.98	2.10	0.80	pass	pass	**1.91**	130	1200	4	2.353
Chrysene		3.20		1.00		2.60		0.10				1.73	3.20	1.04	pass	pass	**2.95**	19	350	4	2.353
Dibenzo[a,h]anthracene		0.60		0.10		0.20		0.10				0.25	0.60	0.25	fail	pass	**0.54**	0.43	3.6	4	2.353
Fluoranthene		6.40		3.20		4.20		0.10				3.48	6.40	2.07	pass	pass	**5.91**	290	23000	4	2.353
Fluorene		0.10		0.10		0.10		0.10				0.10	0.10	0.00	pass	pass	**0.10**	160	71000	4	2.353
Indeno[1,2,3,-cd]pyrene		4.40		0.60		2.10		0.10				1.80	4.40	1.84	pass	pass	**3.96**	39	510	4	2.353
Naphthalene		0.10		0.10		0.10		0.10				0.10	0.10	0.00	pass	pass	**0.10**	24	1100	4	2.353
Phenanthrene		2.50		1.90		1.10		0.10				1.40	2.50	0.78	pass	pass	**2.32**	90	23000	4	2.353
Pyrene		5.60		2.40		4.70		0.10				3.20	5.60	1.70	pass	pass	**5.20**	620	54000	4	2.353
Aliphatics	C5-C6	0.01		0.01		0.01		0.01				0.01	0.01	0.00	pass	pass	**0.01**	160	12000	4	2.353
	C6-C8	0.01		0.01		0.01		0.01				0.01	0.01	0.00	pass	pass	**0.01**	530	40000	4	2.353
	C8-C10	0.01		0.01		0.01		0.01				0.01	0.01	0.00	pass	pass	**0.01**	150	11000	4	2.353
	C10-C12	1.50		1.50		1.50		1.50				1.50	1.50	0.00	pass	pass	**1.50**	760	47000	4	2.353
	C12-C16	1.20		1.20		1.20		1.20				1.20	1.20	0.00	pass	pass	**1.20**	4300	90000	4	2.353
	C16-C21	1.50		1.50		1.50		1.50				1.50	1.50	0.00	pass	pass	**1.50**	110000	180000	4	2.353
	C21-C35	3.40		22.00		3.40		3.40				8.05	22.00	9.86	pass	pass	**19.66**	110000	180000	4	2.353
Aromatics	C5-C7	0.01		0.01		0.01		0.01				0.01	1.50	1.05	pass	pass	**1.25**	300	86000	4	2.353
	C7-C8	0.01		0.01		0.01		0.01				0.01	1.20	0.84	pass	pass	**1.00**	660	180000	4	2.353
	C8-C10	0.01		0.01		0.01		0.01				0.01	1.50	1.05	pass	pass	**1.25**	190	17000	4	2.353
	C10-C12	5.50		4.50		3.50		0.90				3.60	22.00	13.01	pass	pass	**18.91**	380	34000	4	2.353
	C12-C16	3.20		5.30		0.80		0.50				2.45	0.00	1.73	pass	pass	**4.49**	660	38000	4	2.353
	C16-C21	7.30		21.00		6.00		0.60				8.73	0.01	6.16	pass	pass	**15.98**	930	28000	4	2.353
	C21-C35	12.00		110.00		3.90		1.40				31.83	0.01	22.50	pass	pass	**58.29**	1700	28000	4	2.353
	C35-C44	28.00		140.00		14.00		10.00				48.00	0.01	33.93	pass	pass	**87.92**	1700	28000	4	2.353

n	t
2	6.314
3	2.92
4	2.353
5	2.312
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
13	1.782
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

PAH contamination confined to CTP1A (see site test locations map)

Table 3 RDM Investigation April 5th 2022 Upper Horizon soils (0.3m bgl) following site strip

LQM/CIEH S4UL Human Health Risk Assessment (2015)

Project: Brierley Road Grimethorpe Lower Soil Horizons (>0.6m bgl) **Date: 05/4/2022**

Soil Sample		CTP1B	CTP2B	CTP3B	CTP4B	Mean	Max Concen:	SD	Resi pass/ fail	Com pass/ fail	US95	S4UL Residential	S4UL Commercial	N (no of samples)	Value t
Acenaphthene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	200	1000000	4	2.353
Acenaphthylene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	160	1000000	4	2.353
Anthracene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	2200	540000	4	2.353
Benzo[a]anthracene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	13	180	4	2.353
Benzo[a]pyrene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	3.5	36	4	2.353
Benzo[b]fluoranthene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	3.9	45	4	2.353
Benzo[g,h,i]perylene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	640	4000	4	2.353
Benzo[k]fluoranthene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	130	1200	4	2.353
Chrysene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	19	350	4	2.353
Dibenzo[a,h]anthracene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	0.43	3.6	4	2.353
Fluoranthene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	290	23000	4	2.353
Fluorene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	160	71000	4	2.353
Indeno[1,2,3,-cd]pyrene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	39	510	4	2.353
Naphthalene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	24	1100	4	2.353
Phenanthrene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	90	23000	4	2.353
Pyrene		0.10	0.10	0.10	0.10	0.10	0.10	0.00	pass	pass	**0.10**	620	54000	4	2.353
Aliphatics	C5-C6	0.01	0.01	0.01	0.01	0.01	0.01	0.00	pass	pass	**0.01**	160	12000	4	2.353
	C6-C8	0.01	0.01	0.01	0.01	0.01	0.01	0.00	pass	pass	**0.01**	530	40000	4	2.353
	C8-C10	0.01	0.01	0.01	0.01	0.01	0.01	0.00	pass	pass	**0.01**	150	11000	4	2.353
	C10-C12	1.50	1.50	1.50	1.50	1.50	1.50	0.00	pass	pass	**1.50**	760	47000	4	2.353
	C12-C16	1.20	1.20	1.20	1.20	1.20	1.20	0.00	pass	pass	**1.20**	4300	90000	4	2.353
	C16-C21	1.50	1.50	1.50	1.50	1.50	1.50	0.00	pass	pass	**1.50**	110000	180000	4	2.353
	C21-C35	3.40	3.40	3.40	3.40	3.40	3.40	0.00	pass	pass	**3.40**	110000	180000	4	2.353
Aromatics	C5-C7	0.01	0.01	0.01	0.01	0.01	1.50	1.05	pass	pass	**1.25**	300	86000	4	2.353
	C7-C8	0.01	0.01	0.01	0.01	0.01	1.20	0.84	pass	pass	**1.00**	660	180000	4	2.353
	C8-C10	0.01	0.01	0.01	0.01	0.01	1.50	1.05	pass	pass	**1.25**	190	17000	4	2.353
	C10-C12	0.90	5.40	0.90	0.90	2.03	3.40	0.97	pass	pass	**3.17**	380	34000	4	2.353
	C12-C16	0.50	2.30	0.50	0.50	0.95	0.00	0.67	pass	pass	**1.74**	660	38000	4	2.353
	C16-C21	0.60	5.60	0.60	0.60	1.85	0.01	1.30	pass	pass	**3.38**	930	28000	4	2.353
	C21-C35	1.40	3.30	1.40	1.40	1.88	0.01	1.32	pass	pass	**3.43**	1700	28000	4	2.353
	C5-C35	10.00	17.00	10.00	10.00	11.75	0.01	8.30	pass	pass	**21.52**	1700	28000	4	2.353

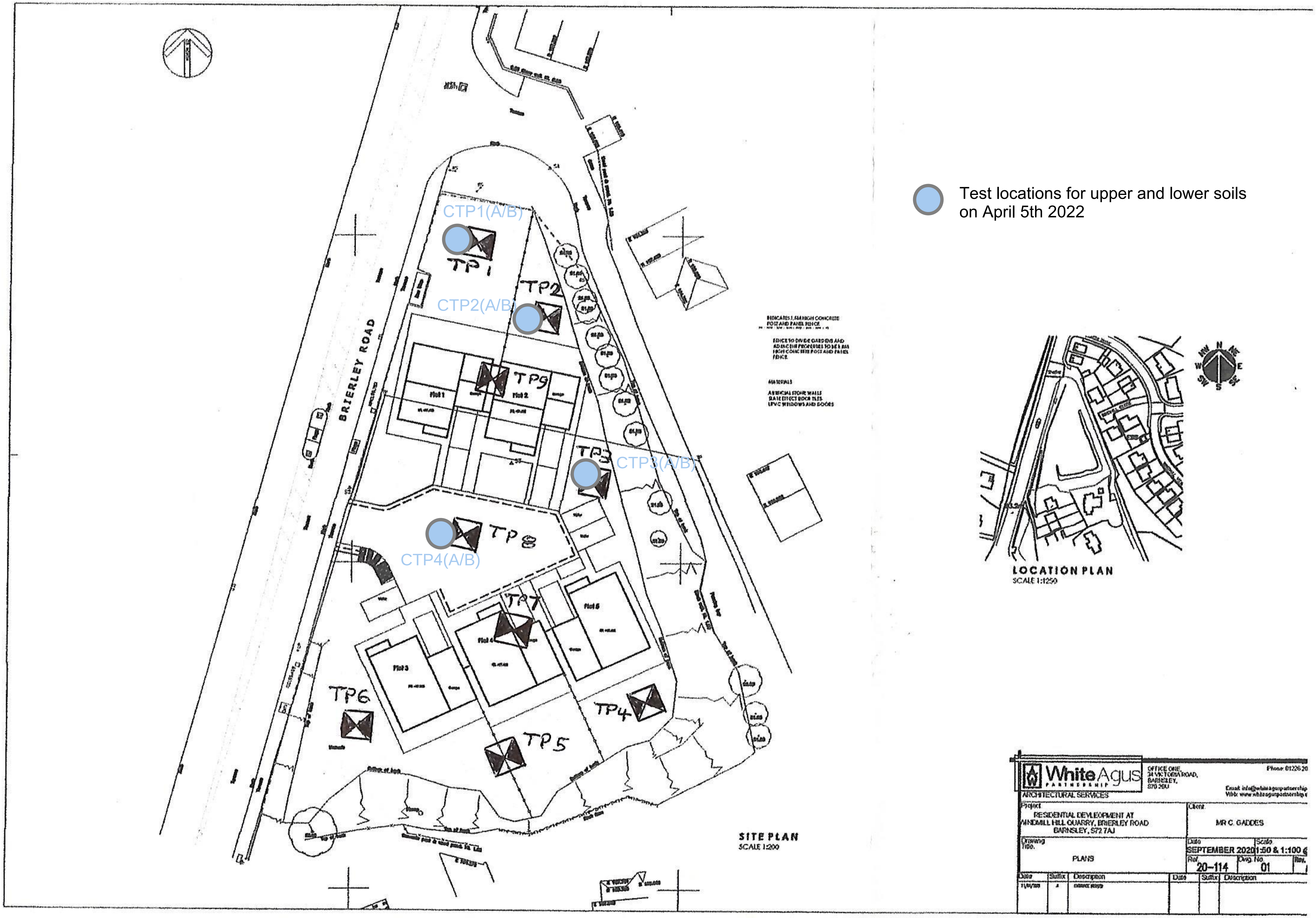
n	t
2	6.314
3	2.92
4	2.353
5	2.312
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
13	1.782
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

All Results below detectable threshold

Table 4 RDM Investigation April 5th 2022 Lower Horizon Soils (0.6m bgl)

APPENDIX III

SITE TEST LOCATION MAP



CTP1(A/B)
TP1
TP2
CTP2(A/B)
TP9
Plot 1
Plot 2
TP3
CTP3(A/B)
TP8
CTP4(A/B)
TP7
Plot 3
Plot 4
Plot 5
TP6
TP5
TP4
BRIERLEY ROAD
SITE PLAN
SCALE 1:200
Test locations for upper and lower soils
on April 5th 2022
LOCATION PLAN
SCALE 1:1250
N
S
E
W
NE
NW
SE
SW
White Agus
PARTNERSHIP
ARCHITECTURAL SERVICES
OFFICE ONE,
34 VICTORIA ROAD,
BARNSLEY,
S70 2BU
Project
RESIDENTIAL DEVLEOPMENT AT
WINDMILL HILL QUARRY, BRIERLEY ROAD
BARNSLEY, S72 7AJ
Client
MR C. GADDES
Drawing Title.
PLANS
Date
SEPTEMBER 2020
Scale
1:50 & 1:100
Ref.
20-114
Dwg. No.
01
Rev.
Date
Suffix
Description

APPENDIX IV

LABORATORY RESULTS

Certificate of Analysis

Certificate Number	22-06896	*Issued:*	14-Apr-22

Client Fosseway Environmental Limited
1 Browns Close
Sapcote
Leicesterdhire
Leicestershire
LE9 4FZ

Our Reference	22-06896
Client Reference	(not supplied)
Order No	fe2013
Contract Title	DETS Annual Rates 2021 - Grimethorpe
Description	9 Soil samples, 2 Leachate samples.
Date Received	08-Apr-22
Date Started	08-Apr-22
Date Completed	14-Apr-22
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 22-06896
Client Ref
Contract Title DETS Annual Rates 2021 - Grimethorpe

			Lab No	1994598	1994599	1994600	1994601	1994602	1994603
			.Sample ID	CTP-1A	CTP-1B	CTP-2A	CTP-2B	CTP-3A	CTP-3B
			Depth	0.40	0.80	0.40	0.80	0.40	0.80
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022
			Sampling Time	0915	0920	0940	0945	1000	1015
Test	**Method**	**LOD**	**Units**						
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	22	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	23	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	5.5	< 0.9	4.5	5.4	3.5	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	3.2	< 0.5	5.3	2.3	0.8	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	7.3	< 0.6	21	5.6	6.0	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	12	< 1.4	110	3.3	3.9	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	28	< 10	140	17	14	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	28	< 10	160	17	14	< 10
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	2.5	< 0.1	1.9	< 0.1	1.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.7	< 0.1	0.6	< 0.1	0.4	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	6.4	< 0.1	3.2	< 0.1	4.2	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	5.6	< 0.1	2.4	< 0.1	4.7	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	3.3	< 0.1	1.1	< 0.1	2.5	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	3.2	< 0.1	1.0	< 0.1	2.6	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	3.4	< 0.1	0.5	< 0.1	2.0	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	2.1	< 0.1	0.4	< 0.1	1.3	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	5.3	< 0.1	1.0	< 0.1	2.9	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	4.4	< 0.1	0.6	< 0.1	2.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.6	< 0.1	0.1	< 0.1	0.2	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	3.5	< 0.1	0.6	< 0.1	1.9	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	41	< 1.6	13	< 1.6	26	< 1.6

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo).

Summary of Chemical Analysis
Soil Samples

Our Ref 22-06896
Client Ref
Contract Title DETS Annual Rates 2021 - Grimethorpe

			Lab No	1994604	1994605
			.Sample ID	CTP-4A	CTP-4B
			Depth	0.40	0.80
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	05/04/2022	05/04/2022
			Sampling Time	1020	1025
Test	**Method**	**LOD**	**Units**		
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6

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WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 22-06896
Client Ref
Contract Title DETS Annual Rates 2021 - Grimethorpe
Sample Id WAC 0.30

Sample Numbers 1994606 1994607 1994608
Date Analysed 14/04/2022

Test Results On Waste

Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	4.0
DETSC 2003# Loss On Ignition	%	6.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	120.0
DETSC 3301 PAHs	mg/kg	6.3
DETSC 2008# pH	pH Units	8.2
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.89	1.7	< 0.002	0.016
DETSC 2306 Barium as Ba	8	12	< 0.02	0.11
DETSC 2306 Cadmium as Cd	0.27	0.27	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.3	0.27	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.4	1.4	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.68	0.87	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	0.2	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.5	2.5	0.007	0.027
DETSC 2055 Chloride as Cl	1600	1100	< 20	< 100
DETSC 2055* Fluoride as F	< 100	140	< 0.02	1.18
DETSC 2055 Sulphate as SO4	4600	5000	< 20	< 100
DETSC 2009* Total Dissolved Solids	29000	32000	58	315.3
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	7500	3100	15	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.9	6.9
DETSC 2009 Conductivity uS/cm	41.7	45.3
* Temperature*	16.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.113

Stage 1

Volume of Leachant L2*	0.199
Volume of Eluate VE1*	0.178

Stage 2

Volume of Leachant L8*	0.903
Volume of Eluate VE2*	0.852

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

V.2.06 ** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Information in Support of the Analytical Results

Our Ref 22-06896
Client Ref
Contract DETS Annual Rates 2021 - Grimethorpe

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1994598	CTP-1A 0.40 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994599	CTP-1B 0.80 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994600	CTP-2A 0.40 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994601	CTP-2B 0.80 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994602	CTP-3A 0.40 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994603	CTP-3B 0.80 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994604	CTP-4A 0.40 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994605	CTP-4B 0.80 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994606	WAC 0.30 SOIL	05/04/22	GJ 250ml, GJ 60ml		
1994607	WAC 0.30 LEACHATE	05/04/22	GJ 250ml, GJ 60ml		
1994608	WAC 0.30 LEACHATE	05/04/22	GJ 250ml, GJ 60ml		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX V

1. This report has been prepared and written specifically for the Client named in the introduction and is exclusively for his/her/their benefit. No reliance may be placed in the contents of this report by any third party except with the express agreement of the original Client and the written agreement of RDM. Such written agreement may require the payment of an additional fee.
2. The recommendations section of this report only provide an overview of the guidance and should not be specifically relied upon in their own right but should be considered in relation to the whole report and the development described in this report.
3. This report has been prepared and written in the context of the proposals for the development of the Site as stated by the Client and will not be valid in a differing context. Furthermore, new information, improved practices, or legislation may necessitate alterations to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of this report, it should be referred to us for re-assessment.
4. The assessment and interpretation of contamination and associated risks are based upon the scope of the work described in the fee proposal and agreed with the client, the report may not be sufficient to fully address the contamination or allow a detailed remediation scheme to proceed without further investigation or analysis.
5. Any assessments made in this report are based on the ground conditions and as revealed by the test pits and boreholes together with the results of any field or laboratory testing undertaken and where appropriate other relevant data which may have been obtained for the Site. The sources of such information are detailed in this report and while RDM use only such sources as are believed to be reliable, RDM will not be liable for the authenticity or reliability of information obtained from others.
6. Notwithstanding that factual reports from third parties concerning asbestos or mould of any kind may have been included for information purposes in this report, RDM will have no liability whatsoever for any claim or claims arising related to asbestos or mould of any kind.
7. There may also be special conditions appertaining to the Site which were not revealed by the investigation and which will not, therefore, have been taken into account in this report. Any assessments may be subject to amendment in the light of additional information becoming available.
8. Whilst an opinion may be expressed or implied in this report on possible configurations of strata between or beyond test pit or borehole locations, or on the possible presence of features based on either visual, verbal or published evidence, this is for guidance only and no liability can be accepted for the accuracy of such opinions.
9. Comments on groundwater conditions will have been based on observations made only at the time of the investigation unless otherwise stated. It should be noted, however, that groundwater levels vary due to seasonal and other effects.
10. This report is not a site categorisation, and hazards could occur which have not been detected.
11. Where data has been provided or is made available to RDM and this has been used in the report, it has been assumed that the information is correct. No responsibility can be accepted by RDM for inaccuracies within the data supplied.
12. The copyright in this report and other related plans and documents prepared by RDM is owned by them and no such report, plan or document may be reproduced, published or adapted without their written consent. Complete copies of the report may however be made and distributed by the Client as an expedient in dealing with matters related to its commission.
13. This report has been prepared solely for the client's purposes in obtaining planning permission and discharge of the planning conditions related to the proposed development indicated in the report. The discharge of these conditions does not constitute that the Site could be determined under Part IIA of the Environmental Protection Act 1990.