



Gorsty Hill Road, Upper Tean

Phase 2 Environmental Ground Investigation and Remedial Strategy Report

For: Robert Coates Plant Sales Ltd.

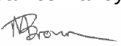
IGE Consulting
Suite Four
14-32 Hewitt Street
Manchester
M15 4GB

Tel 0161-237-9310
Email contact@igeconsulting.co.uk

Ref: 3465 - 01
Job: 3465
Rev: -
By: JH&MB

Date: Nov 2020

REVISIONS

Revision	Date	Prepared By	Authorised By	Remarks
First Issue	20 th November 2020	 James Harley  Molly Brown	 Andrew Edwards	



CONTENTS

1.0 INTRODUCTION

- 1.1 Brief
- 1.2 Third Parties

2.0 SCOPE OF INVESTIGATION WORK

- 2.1 REC Phase 1
- 2.2 IGE Investigation
- 2.3 Rotary Open Holes
- 2.4 Trial Pits
- 2.5 Site Testing and Sampling
- 2.6 Chemical Laboratory Testing

3.0 FINDINGS

- 3.1 Visual and Olfactory Contamination Findings and PID Results
- 3.2 Ground Conditions
- 3.3 Water Strikes
- 3.4 In-Situ Testing
- 3.5 Environmental Laboratory Test Results
- 3.6 Groundwater Depth Monitoring
- 3.7 Soil Infiltration Tests

4.0 ENVIRONMENTAL CONCLUSIONS

- 4.1 Assessment of Environmental Results
- 4.2 Conceptual Models

5.0 REMEDIAL STRATEGY

- 5.1 Brief Options Appraisal
- 5.2 Option 3 Remedial Strategy
- 5.3 Validation Strategy for Option 3 Remediation
- 5.4 Definition of Waste: Code of Practice

6.0 RECOMMENDATIONS

APPENDICES

APPENDIX 1	LIMITATIONS OF INVESTIGATION WORK AND REPORT
APPENDIX 2	FIGURES AND DRAWINGS - SI-01 Site Location Plan - SI-02 Exploratory Hole Location and Site Features Plan
APPENDIX 3	PROPOSED DEVELOPMENT PLAN
APPENDIX 4	TRIAL PIT LOGS AND PHOTOGRAPHS
APPENDIX 5	ROTARY OPEN HOLE LOGS
APPENDIX 6	CHEMICAL LABORATORY TEST RESULTS
APPENDIX 7	BRE 365 SOIL INFILTRATION TEST PIT RESULTS
APPENDIX 8	GROUNDWATER IN-SITU TESTING RESULTS
APPENDIX 9	ENVIRONMENTAL PERMIT
APPENDIX 10	DISCOVERY STRATEGY

1.0 INTRODUCTION

This Environmental Ground Investigation report has been prepared at the request of Robert Coates Plant Sales Ltd. Instructions to proceed were received in October 2020.

The c. 0.72 Ha rectangular site is located off Tenford Lane, Tean, approximately 2.9km south of Cheadle town centre at the approximate postcode ST10 4EL. The National Ordnance Survey (OS) grid reference for the centre of the site is 401758E, 340261N.

This report follows, and should be read in conjunction with, the following report:

- Resource & Environmental Consultants Ltd. (REC) *Phase 1 Geo-Environmental Site Assessment* (ref: 45244p1r0, dated: September 2013).

The site currently comprises an active scrap yard where vehicle breaking and dismantling takes place. The following was noted by REC: 'the plot is generally level across the southern and central sectors but the northern boundary and eastern-most sector of the site are marked by a steep slope which leads up to the adjacent agricultural land and residential property. There are three main structures at the site that comprise an office/workshop and ramp (centre) and vehicle storage shed (north). The surfacing to the majority of the site was observed to compact gravel with the only areas of hardstanding being concrete in the vehicle breaking area (west) and with the vehicle storage shed. Hydrocarbon staining was noted through the site. The majority of the external site area was observed to be used for the storage of scrap vehicles and salvaged parts'. IGE found the site to be in the same condition upon visiting in October 2020.

The site is bound to the south by Tenford Lane, a residential property to the east and open fields to the north and west. Access to the site is off Tenford Lane to the south of site. A Site Location Plan (SI-01) is contained in Appendix 2.

This Environmental Ground Investigation Report is to be used for submission to the Local Authority as part of a planning application (Ref: SMD/2017/0792) as it is the Client's intention to develop the site into 6 No. residential dwellings with associated

private gardens and areas of hard standing and soft landscaping. The report is to be used in support of discharge of Condition 21 which states:

No development approved by this planning permission shall take place until a detailed remediation scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, property (existing or proposed including buildings, crops, livestock, pets, woodland, service lines and pipes; buildings), adjoining land and ground and surface waters has been submitted to and approved in writing by the Local Planning Authority. The scheme must include:

- a) A site investigation scheme, based on the information already provided to support a detailed assessment of risks to all receptors that may be affected, including those off site.*
- b) The results of the site investigation and the detailed risk assessment referred to in (a) and, based on these, an options appraisal and A remediation strategy giving full details of remediation objectives and remediation criteria*
- c) A validation plan providing details of the data that will be collected in order to demonstrate that the all works set out in (a) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.*

Although addressing Condition 21 is the main aim of this report, soakaway tests have also been undertaken in support of Condition 4 as follows:

The development hereby approved shall not commence until drainage plans for the disposal of surface water and foul sewage have been submitted to and approved in writing by the Local Planning Authority. The drainage shall be implemented in exact accordance with the approved details before the development is first brought into use

A proposed development plan is contained in Appendix 3.

1.1 Brief

The brief was to carry out an intrusive environmental ground investigation for the site based upon the proposed development outlined in Section 1.0. The investigation was to include the following tasks:

- a) Undertake / install appropriate exploratory holes and collect representative soil and groundwater samples from exploratory holes and arrange appropriate chemical testing in accordance with the latest legal framework, record olfactory and / or visual evidence of contamination during intrusive works;
- b) Formulate conceptual models to accommodate the findings of the site investigation works in terms of the risk to human health, ground gas, controlled waters and the wider environment;
- c) Identify the risks and evaluate whether a Phase 3 numerical risk assessment and / or a Remedial Strategy, is required.

A report was to be provided to summarise the findings and recommendations.

Geotechnical investigation and assessment is outside of the scope of this report, including a slope stability assessment.

1.2 Third Parties

This report has been prepared for the sole use of Robert Coates Plant Sales Ltd. The report must not be copied or passed onto any third party or used for any purpose other than which it was prepared without the permission of the author. This report is copyright.

2.0 SCOPE OF INVESTIGATION WORK

This environmental ground investigation has been designed based on the Client's requirements in relation to the proposed development outlined in Section 1.0 and the findings of the REC Phase 1 Investigation Report, pertinent findings of which are summarised below:

2.1 REC Phase 1

REC noted the following hazardous materials at the site:

- 2 No. 1000 litre IBCs within a steel drip tray / bund, for the storage of waste oil. Numerous small oil containers also in the vicinity of the 1000L IBCs. REC noted staining to this area.
- 1 No. red diesel above-ground storage tank (AST) to the rear of the workshop/office building, on a block-work pedestal and 'appears to comprise an integrated bund with a lockable hatch for the storage of the dispensing nozzle'. REC noted only minor staining of the tank and block-work.

REC also noted the presence of 3 No. interceptor tanks located at the western site boundary, which anecdotally collect all contaminated surface water from the site. At the time REC visited the site the area was inaccessible so the interceptors were unable to be inspected. This was also the case during the IGE visit in October 2020, however, REC reported that the interceptor is (anecdotally) cleaned on a yearly basis by a licenced contractor.

2.2 IGE Investigation

Based on the findings of the REC Phase 1 investigation and planning Condition 21 given above, the ground investigation works were undertaken between 29th October and 2nd November 2020 and comprised 11 No. trial pits (including 2 No. BRE 365 soil infiltration test pits) and 2 No. rotary open holes. Two monitoring wells were installed within the rotary holes. Subsequent chemical laboratory testing was undertaken between 4th and 13th November 2020.

Drilling of rotary open holes and associated installation of monitoring wells was carried out by DP Drilling Ltd. Testing of soil samples for environmental purposes was carried out by i2 Analytical in accordance with the Environment Agency's MCERTS (Monitoring Certification) quality assurance accreditation scheme. These organisations were appointed directly by IGE Consulting to carry out these contracting works.

The locations of the exploratory holes were topographically surveyed (X-Y-Z axis) with an accuracy of 20mm.

The ground investigation was undertaken in general accordance with:

- BS 5930 (2015) Code of Practice for Ground Investigation;
- BS 1377 (1990) Methods of test for Soils for Civil Engineering Purposes;
- BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing.

The sampling strategy for the site has been completed in accordance with CLR4 and the design of the investigation was carried out in accordance with R&D Technical Report P 5-TR066, LCRM (2020) and BS:8485 (2015) + A1 (2019). Further details pertaining to the site investigation works are outlined in the following sections.

The limitations of the investigation work and report are included in Appendix 1.

2.3 Rotary Open Holes

In total 2 No. rotary open holes were constructed to a depth of 30.00m bgl (146.82m and 145.38m AOD). The rotary open holes were placed in targeted locations up and down gradient of the on-site tanks in order to achieve the following:

- Primarily to establish the depth to the aquifer groundwater and to allow for the installation of groundwater monitoring wells within this, but also to:

- Establish the thickness, extent and characteristics of any made ground, possible underlying natural superficial deposits, weathered bedrock and competent bedrock, and
- Obtain samples from these deposits for classification and laboratory testing.

The rotary open holes were installed with a standpipe to allow for monitoring and sampling of the underlying groundwater:

Exploratory Hole	Response Zone Stratum	Response Zone Depth m bgl (m AOD)	
		Top of Response Zone	Base of Response Zone
RO01	Red SANDSTONE with occasional pebble bands (driller's description)	22.00 (154.82)	30.00 (146.82)
RO02	Red SANDSTONE with occasional pebble bands (driller's description)	15.00 (160.38)	30.00 (145.38)

The monitoring wells are constructed of a 50mm diameter HDPE plain pipe to the depth of the response zone which is screened with slotted pipe and sealed in place with bentonite. The monitoring well is topped with a flush lockable cover.

The locations of the rotary open holes are shown on the exploratory hole location plan in Appendix 2 and the rotary open hole logs are contained in Appendix 5.

2.4 Trial Pits

11 No. trial pits were undertaken to depths of between 1.65m and 2.30m bgl (178.60m and 172.38m AOD), spatially across the site except the following:

- TP03, TP04 and TP05 were placed to target tanks (waste oil and diesel). *The location of these features are noted on the plans in Appendix 2.*

All trial pits were undertaken to achieve the following:

- to establish the thickness, extent and characteristics of the underlying made ground;
- to obtain samples for classification and laboratory testing;
- to establish the presence of any remaining significant obstructions;

- to establish the presence of any visual and / or olfactory contamination;
- to establish the excavatability of the shallow bedrock

Trial pit logs are contained in Appendix 4 and the locations of the trial pits are shown on the exploratory hole location plan in Appendix 2.

2.5 Site Testing and Sampling

The following site tests and sampling were undertaken:

- a) Retrieval of bulk disturbed samples from trial pits and rotary open holes from ground level to 30.00m bgl.
- b) Retrieval of groundwater samples by bailing (disturbed sampling) of the groundwater wells.
- c) 13 No. in-situ measurements of total volatile concentrations (>0.1ppm) using a Photo-ionisation Detector (PID) with a 10.6eV lamp between 0.10m bgl and 1.80m bgl.

2.6 Chemical Laboratory Testing

13 No. soil samples were sub-sampled from the samples obtained during exploratory hole construction and sent to i2 Analytical laboratories for chemical testing. These samples were placed into sterile sealed containers to facilitate MCERTS chemical laboratory testing of potential contaminants.

Based upon the REC Conceptual Site model contained in the above referenced REC Phase 1 report and summarised below in Section 4.2.1, the following contaminants of concern were identified and analysed:

Asbestos ID, sulphate, pH, nitrate, total and free cyanide, arsenic, barium, beryllium, boron, cadmium, chromium, chromium (hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, TPH-CWG, Speciated Polyaromatic Hydrocarbons, BTEX and MTBE, PCBs and phenol.

2 No. groundwater samples were also sent for laboratory chemical testing for the following determinands:

pH, Electrical Conductivity, Cyanide, Sulphate, Nitrate, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Hardness, Redox Potential, phenols, Speciated Polyaromatic Hydrocarbons (PAHs), Boron, Calcium, Magnesium, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, BTEX and MTBE, Speciated Total Petroleum Hydrocarbons (TPH-CWG) and Volatile Organic Compounds (VOCs).

3.0 FINDINGS

3.1 Visual and Olfactory Contamination Findings and PID Results

During the intrusive exploratory hole investigation works, the soils were examined carefully for both visual and olfactory evidence of contamination. The following table summarises the exploratory holes that were noted as having a hydrocarbon odour and / or sheen within the given made ground strata:

Location	Depth (m)	Hydrocarbon	Total Volatiles (ppm)
TP01	0.00 – 0.25	Slight odour and sheen	4.0
TP01	0.45 – 1.00	Odour	6.0
TP03	0.50 – 0.70	Odour and sheen	6.5
TP04	0.20 – 0.90	Odour	13.7
TP05	0.30 – 0.80	Odour and sheen	135.0
TP06	0.00 – 0.60	Slight odour	0.2
TP10	0.00 – 0.20	Slight odour	4.7

The natural strata below these samples was also tested, the results are shown in the table below.

Location	Depth (m)	Total Volatiles (ppm)
TP01	1.40	0.2
TP03	0.90	0.4
TP04	1.20	0.2
TP05	1.80	1.2
TP06	1.00	4.5
TP10	1.30	0.2

No visual or olfactory evidence of contamination was identified in the groundwater when struck during rotary borehole drilling.

3.2 Ground Conditions

The typical ground conditions encountered across the site are as follows:

- MADE GROUND comprising dark brown, sandy GRAVEL to a depth of between 0.15m – 0.70m bgl (178.45m – 173.98m AOD), underlain by;
- [IN PLACES] MADE GROUND comprising dark grey, sandy GRAVEL with occasional metal, timber, plastic and wire fragments to a depth of between 0.80m – 1.00m bgl (174.59m - 173.96m AOD), underlain by;
- WEATHERED HAWKSTONE FORMATION (SANDSTONE) comprising reddish brown, slightly gravelly, slightly clayey SAND to a depth of between 1.40m – 2.30m bgl (177.20m - 172.38m AOD), underlain by;
- HAWKSTONE FORMATION comprising red SANDSTONE with occasional pebble bands (driller's description) to a depth of at least 30.00m bgl (146.82m - 145.38m AOD) at termination.

Obstructions

The following obstructions were noted during excavation of the exploratory holes:

- Suspected concrete slab encountered in the southern end of TP01 from 0.60m to 0.80m bgl.

For more detailed descriptions, refer to the trial pit and rotary open hole logs contained in Appendices 4 and 5.

3.3 Water Strikes

Water strikes were recorded at the following locations and depths:

Strata	Exploratory Hole	Depth m bgl (m AOD)	Comments
MADE GROUND	TP03	0.70 (173.98)	Slight ingress at the boundary between the surface made ground and the natural weathered sandstone.
	TP04	0.45 (174.67)	Slight ingress from within suspected land drain
SANDSTONE	RH01	18.00 (158.82)	Water strike as recorded on Driller's log. Likely aquifer groundwater.
	RH02	15.00 (160.38)	

For further details pertaining to the water strikes please refer to the trial pit and rotary open hole logs in Appendices 4 and 5.

3.4 In-Situ Testing

Groundwater samples were taken from each of the 2 No. groundwater wells using a disposable bailer, bulk parameters (included in the below table) were measured until the readings became steady, indicating that standing water had been removed and aquifer groundwater was being detected. The water was then sampled and placed into appropriate containers for chemical laboratory testing. The results at the time of sampling have been summarised below:

Monitoring Well	Screen (mbgl)	NAPL (Y/N)	EC (uS/cm)	TDS (ppm)	ORP (mV)	Temp (°C)	Remarks (i.e. Odour, Sediment, Oil / Grease, Colour, Turbidity)
RH01	15.00-30.00	N	324	649	30	10.5	Water level at start 9.90m bgl. Slightly turbid. Orangish brown.
			224	449	75	10	Very turbid. Orangish brown.
			274	549	96	10	Very turbid. Orangish brown.
			276	556	104	10	Clear. Orangish brown. Sampled. Water level after bailing and sampling 9.98m bgl.
RH02	22.00-30.00	N	537	268	191	10	Water level at start 9.40m bgl. Turbid. Brown.
			516	258	192	10	Turbid. Brown.
			516	259	176	9.9	Turbid. Brown.
			520	260	155	9.9	Turbid. Brown.
			521	261	149	9.9	Becoming clearer.
			525	261	136	10.1	Water clearer. Sampled. Water level after bailing and sampling 9.40m bgl.

EC = Electrical Conductivity. TDS = Total Dissolved Solids. ORP = Oxidation Reduction Potential.

Detailed in-situ monitoring results are included within Appendix 8.

The samples were not fixed or filtered at the time of sampling to avoid affecting VOC and hydrocarbon concentrations as these were among the main contaminants of concern.

3.5 Environmental Laboratory Test Results

The findings of the chemical test results summarised below will be assessed against generic assessment criteria (GAC) for the purposes of screening allowable concentrations in comparison to the measured site concentrations. The GAC are defined based on the critical receptors identified at the site. Receptors are considered in relation to:

- Human health receptors (e.g. end-users, construction workers and the general public) via measured solid concentrations, and;
- Additional receptors may be relevant dependant on the site e.g. flora/fauna, water, buried concrete.

The GAC adopted for assessment of soils in relation to Human Health are based on published LQM/CIEH S4ULs (2015) for those compounds for which published criteria are available for varying scenarios (residential, commercial, allotment, public open space). In the absence of LQM/CIEH S4ULs (2015) the following GAC defining documents are adopted - CL:AIRE Soil GAC for Human Health Assessment (2010) and Category 4 Screening Levels (C4SLs) (2014).

The primary risk to human receptors from free cyanide in soils is an acute risk (i.e. a single dose could have a lethal affect as opposed to adverse effects from cumulative intake (chronic affect)). There is no current UK guidance available for calculating acute risks from free cyanide, therefore an in-house methodology has been used to derive an acute GAC of 60 mg/kg for all exposure scenarios. The value is given for Free or Easily Liberatable Cyanide but should be used to assess Total Cyanide in the absence of cyanide speciation. In cases where the Total Cyanide exceeds the GAC then analysis for Free or Easily Liberatable Cyanide should be completed.

GACs / Tier 1s for waters must be selected to assess potential risks to the identified environmental receptors. There are numerous UK and European guidelines for waters based on the site situation and different receptors. GACs utilised include - The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2009 (Part 7:Groundwater

Threshold Values), UK Drinking Water Standards (2000), Environmental Quality Standards, World Health Organisation concentrations, Environment Agency guidance concentrations and United States Environmental Protection Agency – Region 9 GACs.

3.5.1 Solid Samples

Summary tables indicating the results, assessed against their relevant GACs (**residential with home grown produce scenario**), are shown below:

MADE GROUND					
Solid Contamination Results					
Determinand	No. of Samples	Range of Results	Mean	GAC	Exceeded Allowable
Inorganics, Carbon and Asbestos					
Asbestos Quantification (%)	7	None detected - <0.001% Chrysotile		-	3
Water Soluble Sulphate as SO ₄ 2:1 Extract (mg/l)	7	17.9-1140	289	-	-
Soil Organic Matter (%)	7	2.5-11	6.4	-	-
pH	7	7.1-8.5	8.0	-	-
Cyanide, Total	7	<1	1	60 ²	0
Cyanide, Free	7	<1	1	60 ²	0
Nitrate as NO ₃ 2:1 water soluble (mg/l)	7	<5.0-6.7	5.2	-	-
Boron (hot water soluble)	7	0.6-8.5	2.4	290	0
Metals and Semi-Metals					
Arsenic	7	4.4-37	15	37	0
Barium	7	64-540	265	-	0
Beryllium	7	0.22-6.8	1.9	1.7	2
Cadmium	7	1.9-9.7	4.6	11	0
Chromium	7	10-64	34	910	0
Copper	7	56-820	332	2400	0
Mercury	7	<0.3-0.4	0.3	1.2	0
Nickel	7	11-90	41	130	0
Lead	7	140-550	270	200 ¹	4
Selenium	7	<1.0-1	1	250	0
Vanadium	7	8.8-76	31	410	0
Zinc	7	180-1200	560	3700	0
Chromium (Hexavalent)	7	<1.2	1.2	6	0
Total Petroleum Hydrocarbons Screen					
Petroleum Range Organics (C6-C10)	3	<0.1	0.1	-	-
TPH C10-C40	3	160-6300	3320	-	-
TPH C6-C10	3	<0.1	0.1	-	-
TPH C6-C40	3	160-6300	3320	-	-
TPH C10-C25	3	<10-1700	970	-	-
TPH C25-C40	3	150-4600	2350	-	-
Speciated Petroleum Hydrocarbons (TPH-CWG)					
TPH-CWG - Aliphatic >EC5 - EC6	4	<0.001	0.001	160	0
TPH-CWG - Aliphatic >EC6 - EC8	4	<0.001	0.001	530	0
TPH-CWG - Aliphatic >EC8 - EC10	4	<0.001-0.73	0.18	150	0
TPH-CWG - Aliphatic >EC10 - EC12	4	7.4-310	97	760	0
TPH-CWG - Aliphatic >EC12 - EC16	4	160-3700	1280	4300	0
TPH-CWG - Aliphatic >EC16 - EC21	4	360-3400	1480	110000	0
TPH-CWG - Aliphatic >EC21 - EC35	4	1000-6700	3300		

TPH-CWG - Aliphatic > EC35 - EC44	4	380-2700	1190	110000	0
TPH-CWG - Aliphatic (EC5 - EC35)	4	1600-11000	6250	-	-
TPH-CWG - Aliphatic (EC5 - EC44)	4	2000-11000	7200	-	-
TPH-CWG - Aromatic >EC5 - EC7	4	<0.001	0.001	300	0
TPH-CWG - Aromatic >EC7 - EC8	4	<0.001	0.001	660	0
TPH-CWG - Aromatic >EC8 - EC10	4	<0.001	0.001	190	0
TPH-CWG - Aromatic >EC10 - EC12	4	13-38	25	380	0
TPH-CWG - Aromatic >EC12 - EC16	4	130-1000	460	660	1
TPH-CWG - Aromatic >EC16 - EC21	4	440-2700	1210	930	2
TPH-CWG - Aromatic >EC21 - EC35	4	1100-2600	1775	1700	2
TPH-CWG - Aromatic > EC35 - EC44	4	110-800	425	1700	0
TPH-CWG - Aromatic (EC5 - EC35)	4	1800-6400	3500	-	-
TPH-CWG - Aromatic (EC5 - EC44)	4	2300-6600	3900	-	-
Polynuclear Aromatic Hydrocarbons (PAHs)					
Naphthalene	7	<0.05-6.9	1.4	13	0
Acenaphthylene	7	<0.05-1.8	0.48	920	0
Acenaphthene	7	<0.05-23	4.0	1100	0
Fluorene	7	<0.05-18	3.4	860	0
Phenanthrene	7	<0.05-52	11	440	0
Anthracene	7	<0.05-29	5.3	11000	0
Fluoranthene	7	0.25-89	18	890	0
Pyrene	7	0.25-78	16	2000	0
Benzo(a)anthracene	7	<0.05-30	6.7	13	1
Chrysene	7	<0.05-18	4.1	27	0
Benzo(b)fluoranthene	7	<0.05-24	6.3	3.7	3
Benzo(k)fluoranthene	7	<0.05-12	2.5	100	0
Benzo(a)pyrene	7	<0.05-20	4.9	3.0	3
Indeno(1,2,3-cd)pyrene	7	<0.05-9.6	2.5	41	0
Dibenz(a,h)anthracene	7	<0.05-1.9	0.53	0.3	3
Benzo(ghi)perylene	7	<0.05-10	2.7	350	0
Total PAH (Sum of USEPA 16)	7	<0.80-423	90	-	-
BTEX and MTBE (µg/kg)					
Benzene	4	<1.0	1	0.37	0
Toluene	4	<1.0	1	660	0
Ethylbenzene	4	<1.0	1	260	0
p&m-xylene	4	<1.0	1	310	0
o-xylene	4	<1.0	1	330	0
MTBE (Methyl Tertiary Butyl Ether)	4	<1.0	1	-	0
Polychlorinated Biphenyls (PCBs)					
PCB Congener 28	2	<0.001-0.073	0.037	-	-
PCB Congener 52	2	<0.001-0.007	0.004	-	-
PCB Congener 101	2	0.005-0.008	0.0065	-	-
PCB Congener 118	2	0.01-0.02	0.015	-	-
PCB Congener 138	2	0.002-0.013	0.0075	-	-
PCB Congener 153	2	0.005-0.01	0.0075	-	-
PCB Congener 180	2	<0.001-0.011	0.006	-	-
Total PCBs	2	0.051-0.11	0.0805	0.008 ⁽³⁾	2
Phenols – TP05 @ 0.50m bgl only					
Total Phenols (monohydric)	1	1	N/A	-	-
Volatile Organic Compounds (VOCs) – TP05 @ 0.50m bgl only					
One sample was tested for a wide range of VOCs. All concentrations were below their respective detection limits.					

Generic Assessment Criteria Used: LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015), unless stated:

- 1) Category 4 Screening Levels (C4SLs) (March 2014)
- 2) In-house screening value has been used as no GAC methodology currently exists
- 3) Soil Guideline Values (SGVs) (2009)

Note 1 – Units are in mg/kg unless stated.

Note 2 – Used 6% SOM (average organic matter %) used for GACs as a conservative measure.

Note 3 – Detection limit values used to calculate arithmetic mean

Note 4 – All GAC used relate to the 'residential with home grown produce' land use scenario.

NATURAL SOILS – WEATHERED SANDSTONE					
Solid Contamination Results					
Determinand	No. of Samples	Range of Results	Mean	GAC	Exceeded Allowable
Inorganics, Carbon and Asbestos					
Asbestos Quantification (%)	2	Not detected		-	-
Water Soluble Sulphate as SO ₄ 2:1 Extract (mg/l)	6	9.6-64.7	34.5	-	-
Soil Organic Matter (%)	6	0.5-1.7	1.1	-	-
pH	6	6.8-9.1	8.0	-	-
Cyanide, Total	6	<1	1	60 ²	0
Cyanide, Free	6	<1	1	60 ²	0
Nitrate as NO ₃ 2:1 water soluble (mg/l)	6	<5.0-13	6.7	-	-
Boron (hot water soluble)	6	<0.2-2.5	0.8	290	0
Metals and Semi-Metals					
Arsenic	6	2.4-5.8	4.1	37	0
Barium	6	15-120	59	-	0
Beryllium	6	0.27-0.57	0.36	1.7	0
Cadmium	6	<0.2-1.1	0.4	11	0
Chromium	6	6.7-14	10	910	0
Copper	6	12-57	25	2400	0
Mercury	6	<0.3-0.4	0.3	1.2	0
Nickel	6	5.4-13	8.2	130	0
Lead	6	5.6-79	29	200 ¹	0
Selenium	6	<1.0	1.0	250	0
Vanadium	6	11-19	16	410	0
Zinc	6	23-280	84	3700	0
Chromium (Hexavalent)	6	<1.2-1.3	1.2	6	0
Total Petroleum Hydrocarbons Screen					
Petroleum Range Organics (C6-C10)	6	<0.1	0.1	-	-
TPH C10-C40	6	<10-490	165	-	-
TPH C6-C10	6	<0.1	0.1	-	-
TPH C6-C40	6	<10-490	165	-	-
TPH (C10-C25)	6	<10-220	57	-	-
TPH (C25-C40)	6	<10-270	113	-	-
Polynuclear Aromatic Hydrocarbons (PAHs)					
Naphthalene	1	<0.05	0.05	2.3	0
Acenaphthylene	1	<0.05	0.05	170	0
Acenaphthene	1	<0.05	0.05	210	0
Fluorene	1	<0.05	0.05	170	0
Phenanthrene	1	<0.05-0.73	0.16	95	0
Anthracene	1	<0.05-0.36	0.10	2400	0
Fluoranthene	1	<0.05-1	0.34	280	0
Pyrene	1	<0.05-0.87	0.31	620	0
Benzo(a)anthracene	1	<0.05-0.63	0.18	7.2	0
Chrysene	1	<0.05-0.34	0.11	15	0
Benzo(b)fluoranthene	1	<0.05-0.52	0.16	2.6	0
Benzo(k)fluoranthene	1	<0.05-0.3	0.11	77	0
Benzo(a)pyrene	1	<0.05-0.47	0.14	2.2	0
Indeno(1,2,3-cd)pyrene	1	<0.05	0.05	27	0
Dibenz(a,h)anthracene	1	<0.05	0.05	0.24	0
Benzo(ghi)perylene	1	<0.05	0.05	320	0
Total PAH (Sum of USEPA 16)	1	<0.80-5.23	1.72	-	-
Polychlorinated Biphenyls (PCBs)					
A range of 7 PCBs were tested in 1 No. sample – TP02 @ 0.50m bgl. All concentrations were below their respective detection limits.					

Generic Assessment Criteria Used: LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015), unless stated:

- 1) Category 4 Screening Levels (March 2014)
- 2) In-house screening value has been used as no GAC methodology currently exists

Note 1 – Units are in mg/kg unless stated.

Note 2 – Used 1% SOM (average organic matter %) used for SOM-dependent GACs.

Note 3 – Detection limit values used to calculate arithmetic mean

Note 4 – All GAC used relate to the 'residential with home grown produce' land use scenario.

Full chemical test results are contained in Appendix 6.

In summary, the following unacceptable concentrations were noted within the made ground **only**:

Determinand	GAC (mg/kg)	Number of Exceedances	Exceedance Location	Exceedance Depth (mbgl)	Concentration in Sample (mg/kg)
Asbestos	N/A	3	TP01	0.55	<0.001% loose fibres of Chrysotile
			TP04	0.50	
			TP05	0.50	
Beryllium	1.7	2	TP04	0.50	6.8
			TP05	0.50	3.9
Lead	200	4	TP01	0.55	550
			TP04	0.50	270
			TP05	0.50	330
			TP07	0.10	260
Aromatic TPH C12-C16	660	1	TP05	0.50	1000
Aromatic TPH C16-C21	930	2	TP04	0.50	1000
			TP05	0.50	2700
Aromatic TPH C21-C35	1700	2	TP03	0.50	1800
			TP05	0.50	2600
Benzo(a)anthracene	13	1	TP05	0.50	30
Benzo(b)fluoranthene	3.7	3	TP01	0.55	8.2
			TP04	0.50	12
			TP05	0.50	24
Benzo(a)pyrene	3.0	3	TP01	0.55	6.0
			TP04	0.50	8.1
			TP05	0.50	20
Dibenz(a,h)anthracene	0.3	3	TP01	0.55	0.76
			TP04	0.50	0.84
			TP05	0.50	1.9
Total PCBs	0.008	2	TP03	0.50	0.051
			TP04	0.50	0.11

It is also worth noting the following:

- Although no GAC exists for this, elevated TPH in the range C10-C40 was detected in TP06 @ 0.20m bgl (3500mg/kg) and TP07 @ 0.10m bgl (6300mg/kg).

No asbestos was detected in any of the samples of natural weathered sandstone. No concentrations of any determinands were detected in exceedance of their respective GACs in any of the natural weathered sandstone samples.

3.5.2 Groundwater Samples

Groundwater samples were taken from each of the 2 No. wells. Summary tables indicating the results, assessed against their relevant GACs (**drinking water**), are shown below:

GROUNDWATER					
Aqueous Contamination Results					
Determinand	No. of Samples	RH1	RH2	GAC	Exceeded Allowable
General Inorganics					
pH (unitless)	2	7.6	7.5	6.5-10 ⁽²⁾	0
Electrical Conductivity (at 20°C) (µS/cm)	2	440	450	2500 ⁽²⁾	0
Free Cyanide	2	< 10	< 10	50 ⁽²⁾	0
Sulphate as SO ₄ (mg/l)	2	35.9	15.2	250 ⁽²⁾	0
Nitrate as N (mg/l)	2	9.29	7.12	50 ⁽²⁾	0
Chemical Oxygen Demand (COD) (mg/l)	2	66	33	-	-
Biochemical Oxygen Demand (BOD) (mg/l)	2	< 1.0	< 1.0	-	-
Hardness (mgCaCO ₃ /l)	2	259	307	-	-
Redox potential (mV)	2	203.9	205.9	-	-
Metals and Semi-Metals					
Boron (dissolved)	2	59	39	1000 ⁽¹⁾	0
Calcium (dissolved)	2	98	110	-	-
Magnesium (dissolved)	2	3.5	6.8	-	-
Arsenic (dissolved)	2	0.43	0.27	10 ⁽¹⁾	0
Barium (dissolved)	2	160	110	-	-
Beryllium (dissolved)	2	< 0.1	< 0.1	-	-
Cadmium (dissolved)	2	< 0.02	0.11	5 ⁽¹⁾	0
Chromium (dissolved)	2	2	2.6	50 ⁽¹⁾	0
Copper (dissolved)	2	1.3	2.2	2000 ⁽¹⁾	0
Lead (dissolved)	2	< 0.2	< 0.2	10 ⁽¹⁾	0
Mercury (dissolved)	2	0.22	< 0.05	1.0 ⁽¹⁾	0
Nickel (dissolved)	2	2.3	1.8	20 ⁽¹⁾	0
Selenium (dissolved)	2	< 0.6	< 0.6	10 ⁽²⁾	0
Vanadium (dissolved)	2	0.4	0.5	-	-
Zinc (dissolved)	2	1.1	8.1	5000 ⁽³⁾	0
Speciated Petroleum Hydrocarbons (TPH-CWG)					
TPH-CWG - Aliphatic >EC5 - EC6	2	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC6 - EC8	2	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC8 - EC10	2	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC10 - EC12	2	< 10	< 10	-	-
TPH-CWG - Aliphatic >EC12 - EC16	2	< 10	< 10	-	-
TPH-CWG - Aliphatic >EC16 - EC21	2	< 10	< 10	-	-
TPH-CWG - Aliphatic >EC21 - EC35	2	< 10	< 10	-	-
TPH-CWG - Aliphatic > EC35 - EC44	2	< 10	< 10	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	2	< 10	< 10	-	-
TPH-CWG - Aliphatic (EC5 - EC44)	2	< 10	< 10	-	-
TPH-CWG - Aromatic >EC5 - EC7	2	< 1.0	< 1.0	-	-

TPH-CWG - Aromatic >EC7 - EC8	2	< 1.0	< 1.0	-	-
TPH-CWG - Aromatic >EC8 - EC10	2	< 1.0	< 1.0	-	-
TPH-CWG - Aromatic >EC10 - EC12	2	< 10	< 10	-	-
TPH-CWG - Aromatic >EC12 - EC16	2	< 10	< 10	-	-
TPH-CWG - Aromatic >EC16 - EC21	2	< 10	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35	2	< 10	< 10	-	-
TPH-CWG - Aromatic > EC35 - EC44	2	< 10	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	2	< 10	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC44)	2	< 10	< 10	-	-
BTEX and MTBE					
Benzene	2	< 1.0	< 1.0	1.0 ⁽¹⁾	0
Toluene	2	< 1.0	< 1.0	-	-
Ethylbenzene	2	< 1.0	< 1.0	-	-
p & m-xylene	2	< 1.0	< 1.0	-	-
o-xylene	2	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	2	< 1.0	< 1.0	-	-
Polynuclear Aromatic Hydrocarbons (PAHs)					
Naphthalene	2	< 0.01	< 0.01	-	-
Acenaphthylene	2	< 0.01	< 0.01	-	-
Acenaphthene	2	< 0.01	< 0.01	-	-
Fluorene	2	< 0.01	< 0.01	-	-
Phenanthrene	2	< 0.01	< 0.01	-	-
Anthracene	2	< 0.01	< 0.01	-	-
Fluoranthene	2	< 0.01	< 0.01	-	-
Pyrene	2	< 0.01	< 0.01	-	-
Benzo(a)anthracene	2	< 0.01	< 0.01	-	-
Chrysene	2	< 0.01	< 0.01	-	-
Benzo(b)fluoranthene	2	< 0.01	< 0.01	-	-
Benzo(k)fluoranthene	2	< 0.01	< 0.01	-	-
Benzo(a)pyrene	2	< 0.01	< 0.01	0.010 ⁽¹⁾	0
Indeno(1,2,3-cd)pyrene	2	< 0.01	< 0.01	-	-
Dibenz(a,h)anthracene	2	< 0.01	< 0.01	-	-
Benzo(ghi)perylene	2	< 0.01	< 0.01	-	-
Total PAH (Sum of USEPA 16)	2	< 0.16	< 0.16	-	-
Volatile Organic Compounds (VOCs)					
Chloromethane	2	< 1.0	< 1.0	-	-
Chloroethane	2	< 1.0	< 1.0	-	-
Bromomethane	2	< 1.0	< 1.0	-	-
Vinyl Chloride	2	< 1.0	< 1.0	0.50 ⁽¹⁾	0
Trichlorofluoromethane	2	< 1.0	< 1.0	-	-
1,1-Dichloroethene	2	< 1.0	< 1.0	-	-
1,1,2-Trichloro-1,2,2-trifluoroethane	2	< 1.0	< 1.0	-	-
Cis-1,2-dichloroethene	2	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	2	< 1.0	< 1.0	-	-
1,1-Dichloroethane	2	< 1.0	< 1.0	-	-
2,2-Dichloropropane	2	< 1.0	< 1.0	-	-
Trichloromethane	2	< 1.0	< 1.0	-	-
1,1,1-Trichloroethane	2	< 1.0	< 1.0	-	-
1,2-Dichloroethane	2	< 1.0	< 1.0	-	-
1,1-Dichloropropene	2	< 1.0	< 1.0	-	-
Trans-1,2-dichloroethene	2	< 1.0	< 1.0	-	-
Benzene	2	< 1.0	< 1.0	1.0 ⁽¹⁾	0
Tetrachloromethane	2	< 1.0	< 1.0	-	-
1,2-Dichloropropane	2	< 1.0	< 1.0	-	-
Trichloroethene	2	< 1.0	< 1.0	-	-
Dibromomethane	2	< 1.0	< 1.0	-	-
Bromodichloromethane	2	< 1.0	< 1.0	-	-
Cis-1,3-dichloropropene	2	< 1.0	< 1.0	-	-
Trans-1,3-dichloropropene	2	< 1.0	< 1.0	-	-

Toluene	2	< 1.0	< 1.0	-	-
1,1,2-Trichloroethane	2	< 1.0	< 1.0	-	-
1,3-Dichloropropane	2	< 1.0	< 1.0	-	-
Dibromochloromethane	2	< 1.0	< 1.0	-	-
Tetrachloroethene	2	< 1.0	< 1.0	-	-
1,2-Dibromoethane	2	< 1.0	< 1.0	-	-
Chlorobenzene	2	< 1.0	< 1.0	-	-
1,1,1,2-Tetrachloroethane	2	< 1.0	< 1.0	-	-
Ethylbenzene	2	< 1.0	< 1.0	-	-
p & m-Xylene	2	< 1.0	< 1.0	-	-
Styrene	2	< 1.0	< 1.0	-	-
Tribromomethane	2	< 1.0	< 1.0	-	-
o-Xylene	2	< 1.0	< 1.0	-	-
1,1,2,2-Tetrachloroethane	2	< 1.0	< 1.0	-	-
Isopropylbenzene	2	< 1.0	< 1.0	-	-
Bromobenzene	2	< 1.0	< 1.0	-	-
n-Propylbenzene	2	< 1.0	< 1.0	-	-
2-Chlorotoluene	2	< 1.0	< 1.0	-	-
4-Chlorotoluene	2	< 1.0	< 1.0	-	-
1,3,5-Trimethylbenzene	2	< 1.0	< 1.0	-	-
tert-Butylbenzene	2	< 1.0	< 1.0	-	-
1,2,4-Trimethylbenzene	2	< 1.0	< 1.0	-	-
sec-Butylbenzene	2	< 1.0	< 1.0	-	-
1,3-Dichlorobenzene	2	< 1.0	< 1.0	-	-
p-Isopropyltoluene	2	< 1.0	< 1.0	-	-
1,2-Dichlorobenzene	2	< 1.0	< 1.0	-	-
1,4-Dichlorobenzene	2	< 1.0	< 1.0	-	-
Butylbenzene	2	< 1.0	< 1.0	-	-
1,2-Dibromo-3-chloropropane	2	< 1.0	< 1.0	-	-
1,2,4-Trichlorobenzene	2	< 1.0	< 1.0	-	-
Hexachlorobutadiene	2	< 1.0	< 1.0	-	-
1,2,3-Trichlorobenzene	2	< 1.0	< 1.0	-	-
Phenols					
Total Phenols (monohydric)	2	< 10	< 10	-	-

Generic Assessment Criteria Used:

(1) Water Supply (Water Quality) Regulations 2016

(2) P20 UK Drinking Water Standards

(3) Selected water Quality Standards, Appendix 8 to Environment Agency Environmental Quality Standards; Hydrogeological Risk Assessment for Landfills

Note 1 – Units are in µg/l unless stated.**Note 2** – All GAC used relate to drinking water.

No inorganics or metals were found to exceed the GACs for drinking water. No TPH, BTEX, MTBE, PAHs, VOCs or phenols were detected above detection limits. The water samples meet the chemical criteria for drinking water. None of the contaminants of concern were detected.

Full chemical test results are contained in Appendix 6.

3.6 Groundwater Depth Monitoring

During the groundwater sampling, the following groundwater depths were noted:

Monitoring Well	Water Depth Before Bailing mbgl (m AOD)	Water Depth After Bailing (mbgl)
RH01	9.90 (166.92)	9.98
RH02	9.40 (165.98)	9.40

It can be seen from the above depths that the recharge rate is fast and the water level within the monitoring wells is constant. Consequently, a continued period of groundwater level monitoring is not considered necessary.

3.7 Soil Infiltration Tests

During the site investigation works, 2 No. soil infiltration tests (soakaway) were undertaken in TP01 and TP02 in line with BRE 365 Soil Infiltration Test Pits guidance to determine the soil infiltration rates, which have been summarised below:

Exploratory Hole	Soil Infiltration Rate (m/s)		
	Run 1	Run 2	Run 3
TP01	1.91×10^{-5}	2.06×10^{-5}	1.78×10^{-5}
TP02	2.73×10^{-5}	2.80×10^{-5}	2.47×10^{-5}

Based on these results soakaway drainage is deemed feasible on this site, only in locations where contamination is not present.

Full soil infiltration test pit results are contained in Appendix 7.

4.0 ENVIRONMENTAL CONCLUSIONS

4.1 Assessment of Environmental Results

Soil sample analyses have assessed the presence of contaminants and visual and olfactory evidence of contamination from exploratory holes and the concentrations at which they occur on a spatial basis across the site.

The following contaminants were found in above human health allowable concentrations within the made ground: *asbestos, beryllium, lead, TPH, PAHs and PCBs*.

No contaminants were found in elevated concentrations within the natural weathered sandstone. No unacceptable concentrations of contaminants were found within the groundwater.

4.2 Conceptual Models

4.2.1 Previous Risk Assessment

The REC Phase 1 report identified the following:

Sources

- On-site vehicle breaker's yard (in operation >50 years) – metals hydrocarbons, PCBs and asbestos.

Pathways

- Migration of mobile contaminants on or off site via services, sewers and manmade conduits
- Direct contact, ingestion and inhalation of contaminants on site
- Migration of contaminated dusts during earthworks
- Migration of hazardous gases/vapours
- Uptake of toxins/phytotoxins by plants
- Consumption of contaminated potable waters

- Migration of mobile contaminants into groundwater, particularly in areas not benefiting from impermeable hardstanding.

Human Health Receptors

- Construction workers – risk assessed as low due to safe working practices and appropriate PPE will be in place
- Future residential users – risk assessed as moderate due to dermal contact and ingestion pathways
- Users of adjacent areas – risk assessed as moderate due to potential off-site migration of gases, vapours and contaminated dust

Controlled Waters Receptors

- Underlying Principal Aquifer and SPZ III – risk assessed as moderate due to absence of protection from drift deposits and presence of sources and pathways identified. However, RE state that lubrication oils and mentals are of low mobility so may be immobilised within shallow soil
- No nearby surface waters – risk assessed as negligible

Ground Gas Risk

REC state that no landfill sites have been identified within a 250m radius of the site, but that made ground or degrading hydrocarbon impact may give rise to localised pockets of ground gas. A risk level was not assigned.

4.2.2 Updated Human Health Risk Assessment

The made ground across site was found to contain unacceptable concentrations of asbestos, beryllium, lead, TPH in the range C10-C44 (but mostly aromatic TPH in the range C12-C35), a range of PAHs and PCBs.

Exceedances were found in multiple locations within the made ground. The main source of potential contamination is the >50-year operation of the site as a vehicle breaking and scrapping yard. This site use is spread across the site; therefore, the source is widespread and indiscriminate. This is concurred by the presence of contamination across the site within the made ground. Consequently, the made ground as a whole is considered unacceptable.

The natural soils have been tested across the site and no contamination has been found. Therefore, any unacceptable levels of contamination are considered to reside only within the made ground. This concurs with the type of contamination found – most of the above listed contaminants are of low mobility in soils.

TPH was elevated within the widespread made ground in the range Aliphatic and Aromatic C10-C44, but only Aliphatic TPH in the range C12-C35 was found to be exceeding GACs for a 'residential with plant uptake' end use. This is consistent with a petrol / diesel / motor oil source as anticipated. None of the samples tested contained Aliphatic and Aromatic TPH in the range C5-C10 above their respective detection limits.

Although asbestos was found at concentrations of just <0.001%, which is defined as 'trace' by the Control of Asbestos Regulations, this is still an unacceptable level for residential gardens. Therefore, the widespread made ground is not to be used within 600mm of ground level in areas of private gardens or within 300mm of ground level in areas of soft landscaping. However, trace asbestos levels are acceptable in general earthworks, consequently, the widespread made ground may be reworked and placed beneath hardstanding such as highways without additional precautions.

The widespread made ground has been determined as the contaminative source. A pathway is present where the end user (residents of the proposed houses) can come into contact with the site soils – private gardens and soft landscaping. Consequently, remedial measures are required to break the pollutant linkage – see Section 5.0.

4.2.3 Updated Ground Gas Risk Assessment

No landfills exist within influencing distance of the site as identified by REC. No other ground gas sources have been identified by IGE except the made ground on site. Made ground up to a maximum depth of 1.00m bgl was recorded on-site which could be a ground gas source, however, no significant putrescible or organic rich material was encountered within the made ground. The chemical test results concur with this – the soil organic matter result is skewed by the presence of TPH but where TPH is low (in TP08 @ 0.10m bgl), the soil organic matter content is just 2.5%, indicating

that the made ground is very low in organics. Consequently, the ground gas generation potential is anticipated to be low. Therefore, the made ground itself is discounted as a ground gas source and the ground gas risk is deemed very low, the **exception** being:

The presence of unidentified localised hotspots cannot be discounted, i.e. localised spillages or leaks, giving rise to a potential source for vapours and/or ground gases. On this basis, remediation is recommended – see Section 5.0 below for further details.

4.2.4 Updated Controlled Waters Risk Assessment

It has been determined above that the widespread made ground is the main contaminative source on site, containing elevated levels of metals, TPH in the range C12-C35, PAHs and PCBs. Most of these are of low mobility and recalcitrant, however, the shorter-range petroleum hydrocarbons have the potential to migrate through the granular soils underlying the site.

However, natural soils have been tested in multiple locations and found to contain no elevated concentrations of these contaminants. Also, both water samples contain no TPH, BTEX, MTBE, PAHs, VOCs or phenols, and the inorganics and metals were found to be below the allowable drinking water thresholds. Therefore, it is evident that migration is not occurring. The site has operated as a vehicle breaking and scrapping yard for >50 years, if migration has occurred, this is more than enough time for evidence to be apparent by the present day. On the basis that migration is not occurring the risk to controlled waters is deemed very low, **except**, the following:

The presence of unidentified localised hotspots cannot be discounted, i.e. localised spillages or leaks. On this basis, remediation is recommended – see Section 5.0 below.

It is possible that demolition and construction works may open pathways for migration to occur, however, the underlying ground conditions are granular, so there is no increase in risk from the present possibility of migration.

5.0 REMEDIAL STRATEGY

5.1 Brief Options Appraisal

The following 3 No. options for remediation have been considered for the site:

No.	Description	Environmental Impacts	Social Impacts	Economic Impacts	Comment
1	Removal of made ground – The made ground is the main source of contamination at the site and has been found to a maximum depth of 1.00m bgl.	Positive – Removing the made ground would be remediation by source removal, which would eradicate any risk to human health or controlled waters and would remove any residual ground gas / vapour risk Negative – The haulage of the site soils and landfilling would lead to the release of greenhouse gases, having adverse climate effects.	Positive – the remediation would negate all risk to the end users. Negative – The huge haulage requirement to remove would have an adverse social impact on local residents	Negative – Huge financial cost of haulage and landfill costs. Most costly option.	The huge financial cost of this option and sustainability issues relating to mass removal i.e. haulage related climate change issues and landfill disposal would <u>far outweigh the benefit</u> , as less costly methods of reducing the risk exist.
2	No remediation	Negative – The made ground is a contaminative source and pollutant (source-pathway-receptor) linkages exist at the site giving rise to unacceptable human health and controlled water risks, and potential ground gases / vapours	Negative – The adverse effects of contaminative linkages left unremediated would have adverse health effects on the end users.	Positive – Lowest cost option	This is the most fiscally acceptable option, however, the made ground is a contaminative source and pollutant linkages exist at the site giving rise to unacceptable human health and controlled water risks, and potential ground gases / vapours. It is <u>not feasible</u> to undertake no remediation.
3	Watching brief, potential hotspot removal, and	Positive – this option would break the pollutant linkages.	Positive – the remediation would negate risk to the end users.	Positive – Financial cost of earthworks is cheaper than removal of made ground.	This option, <u>outlined in much further detail below, is recommended</u> as it will achieve remedial

	cover system installation				objectives in the most effective and sustainable way.
--	------------------------------	--	--	--	---

5.2 Option 3 Remedial Strategy

5.2.1 Watching Brief and Hotspot Removal

Due to the residual risk of unidentified hotspots of contamination, described above, it is recommended that an IGE consulting qualified geo-engineer is in attendance during earthworks. The IGE engineer will act as a watching brief and identify any visual or olfactory evidence of contamination as the soils are turned during the earthworks.

The IGE engineer should cease works when any visual or olfactory evidence of contamination is identified and test the soils with a PID – as per the Discovery Strategy contained Appendix 10. Briefly, if the total volatile concentration is greater than 50ppm, excavate the identified soils and ‘*chase out*’ until all sides of the excavation have PID readings of less than 50ppm total volatiles. Works may then continue, repeating this as necessary if more hotspots are found. The excavated soils should be stockpiled on an impermeable surface and turned regularly to encourage volatilisation. The stockpile should be in an open-air area away from the influence of human health. After the stockpile has been aerated, it will be retested using a PID. If the readings are <50ppm, the soils may be used as fill under hardstanding, i.e. beneath proposed roads.

5.2.2 Interceptor and AST Removal

The interceptor and above ground storage tank (AST) remain as a potential contaminative source as they are likely to hold residual contamination. It is recommended to remove the interceptor and AST and any surrounding affected soils, following the below strategy in line with the ‘Blue Book’ method (APEA / EI ‘*Design, Construction, Modification, Maintenance and Decommissioning of Petrol Filling Stations*’ 4th ed. (April 2018)):

1. Arrangement should be made for a hazardous waste disposal contractor to remove any liquid or sludge contained in the interceptor chambers and AST and dispose of off-site at an appropriately licensed waste centre.
2. The interceptor and tank should be 'inerted' to prove no hazardous gas remains inside and should be issued with a 'gas safe' certificate by an appropriately qualified contractor.
3. All inlets to any associated redundant drainage / pipework system should be sealed off. The pipework could also be filled with hydrophobic foam if it is to be left in situ.
4. The outlet pipe from the redundant interceptor should be sealed and capped off at the site boundary or at the point where it connects to any remaining live drainage system within the site. Where the surface drainage is to remain operational the inlet and outlet pipes to the separator should be linked.
5. Excavate the interceptor and remove it and the AST from the site.

It is also recommended that an appropriately qualified contractor empties and removes the IBCs.

Then:

6. After the interceptor has been excavated and the AST has been removed, test the sides and base of the interceptor excavation, and the ground underneath the tank and IBCs with a PID. Excavate soils where visual evidence of contamination is noted e.g. hydrocarbon sheen or staining or where the PID reading >50ppm. Continue until PID readings on all sides and base of the excavation <50ppm. Stockpile the excavated materials with any other excavated soils from the hotspot works and undertake turning, volatilisation and testing as detailed above in Section 5.2.1.
7. Validate in line with the strategy outlined in Section 4.4 below. If validation proves that the remediation has been completed satisfactorily, backfill the excavation with a geotechnically suitable material to allow construction of the proposed development.

5.2.3 Ground Gas Protection Measures

On the basis of successful undertaking and validating of the above measures (removal of any hotspots by watching brief and removal of the interceptor, AST and IBCs) no ground gas or VOC protection measures will be necessary.

5.2.4 Controlled Waters

On the basis of successful undertaking and validating of the above measures (removal of any hotspots by watching brief and removal of the interceptor, AST and IBCs) the controlled waters risk will be very low and no further actions will be required.

5.2.5 Cover System Installation

Despite the above remedial measures (removal of any hotspots by watching brief and removal of the interceptor, AST and IBCs), other contaminants of concern will still be present within the made ground, i.e. asbestos, metals and PAHs. Therefore, the installation of a clean cover system is required in private gardens and areas of soft landscaping in order to break any contaminative linkages to end users. As finalised levels are unknown, options are given below based on excavation depths:

The following procedure is outlined for use in areas of private gardens where made ground is deeper than 600mm below finalised levels:

1. Excavate to 600mm bgl in garden area.
2. In accordance with BRE 465 (2004), a 600mm clean cover system is recommended to be added; this is to consist of:
 - No less than 150mm and no more than 300mm suitable topsoil, in accordance with BS:3882 (2015), underlain by;
 - Suitable subsoil to a total (topsoil + subsoil) depth 600mm, underlain by;
 - A 'no-dig, hi viz', permeable geotextile.
3. Validate in line with the below strategy.

The following procedure is outlined for use in areas of soft landscaping where made ground is deeper than 300mm below finalised levels:

1. Excavate to 300mm bgl in soft landscaping areas.
2. In accordance with BRE 465 (2004), a 300mm clean cover system is recommended to be added; this is to consist of:
 - No less than 150mm and no more than 300mm suitable topsoil, in accordance with BS:3882 (2015), underlain by;
 - Suitable subsoil to a total (topsoil + subsoil) depth 300mm, underlain by;

- A 'no-dig, hi viz', permeable geotextile.
3. Validate in line with the below strategy.

The following procedure is outlined for use in areas of private gardens where made ground is shallower than 600mm, and areas of soft landscaping where made ground is shallower than 300mm below finalised levels:

1. Excavate to natural soils.
2. Add a standard garden to standard Client specification, i.e. no cover system necessary as source has been removed.

5.2.6 Asbestos Management

Asbestos in the form of loose chrysotile fibres (<0.001%) was encountered within multiple samples of made ground – this is defined as 'trace' by the Control of Asbestos Regulations (CAR). Consequently, the granular made ground on-site is considered unsuitable for re-use within areas of proposed gardens or soft landscaping within the proposed developments. However, these soils can be handled during earthworks and placed outside of areas of soft landscaping (i.e. beneath hardstanding) without additional precautions, as CAR do not apply to 'trace' levels.

5.3 **Validation Strategy for Option 3 Remediation**

5.3.1 Interceptor Removal Validation

Following removal of the interceptor and excavation of the surrounding soils in line with the above strategy, and when all walls and base of the excavation exhibit PID readings of <50ppm, take 3 No. validation samples. Analyse the samples for TPH-CWG, BTEX and MTBE (as the contaminant of concern is petroleum range hydrocarbons). If the sample concentrations are sufficiently low, the removal will be validated and the excavation can be filled with engineered fill for development to proceed.

5.3.2 Cover System Validation

Once the clean cover system has been installed, validation requirements include:

- Details of the source of the cover material;
- Chemical test results to demonstrate that the soil is free from contamination and 'suitable for use' in-line with the below chemical testing suites and rates.

- Waste transfer notes to provide evidence of source;
- Confirmation of cover depth by either measurement tape or topographical survey with photographs at a frequency of one pit per three plots.

Imported topsoil and subsoil is required to be tested at source prior to import to confirm suitability. All topsoil and subsoil, whether site-won or imported is required to be tested at the following frequency:

Source	Material End Use	Sampling Frequency ¹	Testing Suites ³ (see below)
Greenfield Source:	Topsoil	1 per 200m ³	A, B, C, D, F, H
	Subsoil	1 per 200m ³	A, B, C, D, F
Brownfield Source:	Topsoil	1 per 50m ³	A, B, C, D, F, H
	Subsoil	1 per 100m ³	A, B, C, D, F
	General Fill ²	1 per 1000m ³	A, B, C, E, G

1) Minimum 3 samples regardless of volume.

2) 'General Fill' is material used primarily to raise levels, specifically not within areas of private gardens, public open space, or soft landscaping, e.g. 6F2.

3) In addition to the standard suites given, the laboratory testing suite should include any additional contaminants of concern based on the source of the samples.

Testing Suites:

- A.** Asbestos ID, Asbestos quantification.
- B.** pH, total and free cyanide, soluble sulphate, organic matter.
- C.** Arsenic, Beryllium, Boron, Cadmium, Chromium (III and VI) Copper, Lead, Inorganic Mercury, Nickel, Selenium, Vanadium, Zinc.
- D.** Speciated PAHs: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene.
- E.** Total (non-speciated) PAHs.
- F.** Speciated Total Petroleum Hydrocarbons (TPH): Aliphatic >EC5 - EC6, >EC6 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, and > EC35 - EC44, and Aromatic >EC5 - EC7, >EC7 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, > EC35 - EC44.
- G.** Total Petroleum Hydrocarbons (TPH): TPH EC6 – EC40.
- H.** BTEX: Benzene, Toluene, Ethylbenzene, p- & m-xylene, o-xylene. Methyl tertiary butyl ether (MTBE).

Once tested, the results are to be compared against the following Acceptability Criteria:

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>5 - <10 ⁽³⁾
	Total Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Free Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Soluble Sulphate (mg/l)	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200 ⁽¹⁾	630 ⁽¹⁾	1300	2330 ⁽¹⁾
	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
	Naphthalene	2.3	4900	1200	
D	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	
	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
	Benzo(ghi)perylene	320	640	1400	
E	Total PAHs				1000 ⁽⁴⁾
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	
	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21	65000	250000	450000	
	TPH-CWG - Aliphatic >EC21 - EC35				
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	
	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	

	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000 ⁽⁴⁾
H	Benzene	0.087	72	90	
	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000* ^{&***}	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD ⁽³⁾	LOD ⁽³⁾	LOD ⁽³⁾	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

- 1) Category 4 Screening Levels (March 2014)
- 2) CL:AIRE Soil GAC for Human Health Assessment (January 2010)
- 3) In-house screening criteria used as no GAC methodology currently exists
- 4) Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.

Assumed 1% SOM (most conservative) for those values dependent upon SOM.

ND = Not Detected

LOD = Limit of Detection

*Exceeds vapour saturation limit

**Exceeds solubility saturation limit

The above remedial measures should be reassessed following the receipt of a finalised external layout including levels. If finalised levels include a c. 1m cut, the made ground will be removed, removing the need for a cover system.

5.3.3 Material Management

Export of Materials

Any soils to be removed from site must be classified in accordance with WM3 under the definition of waste and chemically tested to determine their destination, i.e. reuse or landfill. Waste ticket records must also be retained as proof of the export of materials from site.

Stockpile Management

During the course of the development there will be areas of stockpiled soils intended for use within the proposed gardens. These will have been subjected to off-site testing and approved for use on site. It is imperative that the stockpiles are well managed to avoid inadvertent mixing or depositing of surplus or deleterious materials that would compromise the continued use. We would recommend that the site management reviews the proposed positions for placement of stockpiles and places either fencing or warning signs to ensure compliance.

5.4 Definition of Waste: Code of Practice

Due to the recommended handling and re-use of excavated site-won materials, it is possible to avoid complex waste legislation by utilising the Definition of Waste: Code of Practice (2011, DoW:CoP). This allows assessment of whether or not excavated materials are waste, and when excavated and treated waste can be classified as 'no longer waste'.

It is recommended that in line with DoW:CoP, a robust, site-specific material management plan (MMP) is emplaced, and that this is adhered to and verified in an appropriate verification report. This must be reviewed by a 'Qualified Person' who must provide a Declaration to the EA prior to works within the MMP being commenced.

6.0 RECOMMENDATIONS

- The conclusions of this report should be agreed with relevant regulatory authorities prior to the commencement of works.
- It is recommended that the following Remedial Strategy is undertaken:
 - Undertake a watching brief during earthworks to identify any visual and olfactory evidence of contamination as detailed above.
 - Have the interceptor and ASTs cleaned by an appropriately trained and qualified waste removal contractor, and a gas safe certificate issued before removal. Have the IBCs removed by an appropriate contractor. 'Chase out' any contamination in surrounding / underlying soils.
 - Install a clean cover system in private gardens (600mm) and soft landscaping (300mm).
 - No ground gas protection measures will be necessary following the above watching brief and removal recommendation.
 - Validate all remedial measures in line with the above requirements.
- It is recommended that in line with DoW:CoP, a robust, site-specific material management plan (MMP) is emplaced.
- Re-appraisal of the above conclusions may be necessary following finalised levels.
- It is recommended that a geotechnical assessment of the site including a slope stability inspection and assessment is undertaken for the proposed scheme once finalised levels are complete.
- It is recommended that a potable water supply risk assessment is undertaken for the site in order to assess the risk to water supply pipes from site soils – once completed design is established.
- An Environmental Protection Act 1990 Site License (environmental permit) exists on site for 'keeping and treating of controlled waste' – a copy of this permit is included in Appendix 9. Site ref: Coregreen Yard, Gorsty Hill Road, Tean, Staffordshire, ST10 4EL. Permit number: 40232. Environmental Permit (Waste Operations) number: WP3892FZ/A001 - Robert Coates Ltd. It is recommended that this permit is surrendered when operations cease on site.

APPENDIX 1
LIMITATIONS OF INVESTIGATION WORK AND REPORT

LIMITATIONS OF REPORT

This consultancy report was compiled and carried out by IGE Consulting Limited ('IGE') for the client, as defined in the main report (the 'client'), on the basis of a defined programme and scope of works and the terms of a contract between IGE and the client. IGE undertook this with all reasonable skill and care, taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between IGE and the client. IGE cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices. This report may not be relied upon, or transferred to, by any other party without the written agreement of its author. If a third party relies on this report, it does so wholly at its own and sole risk and IGE disclaims any liability to such parties.

It is IGE's understanding that this report is to be used for the purpose described in the 'Brief' section of this report. That purpose was a significant factor in determining the scope and the services to be provided. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without IGE's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of IGE.

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal

provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

The observations and conclusions described in this report are based solely upon the scope of works agreed between the client and IGE. IGE has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. IGE is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the agreed scope of works. For the avoidance of doubt, this report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species (e.g. Japanese Knotweed). It is recommended that the client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification of asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace full and proper surveys.

LIMITATIONS OF INVESTIGATION WORK

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations, the potential exists for ground conditions to be encountered which are different to those considered in this report. The explored extent of the site area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site.

In addition, chemical analysis was carried out for a limited number of parameters, based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Exploratory Holes

Where exploratory holes have been carried out as part of this investigation, the spacing has been determined to provide a reasonable indication of the general ground conditions across the site, but the number has ultimately been limited by commercial constraints. The findings of the exploratory holes relate specifically to the exploratory hole locations and are no absolute guarantee of the ground conditions between such locations. Due allowance should be made for the possibility of variation in conditions between exploratory hole locations.

Extent of Contamination Testing

The extent of contaminated land testing carried out on samples obtained from the site has been determined in accordance with the latest legal guidance issued by the government to provide, with reasonable certainty, the probable general levels of contamination present on site that could pose a significant hazard to human health or waters. The extent of site investigation works including chemical testing has also been limited by reasonable commercial constraints. Although extensive testing of samples has been carried out, the volume of samples taken for testing are a minute fraction of the total volume of soils and groundwater present on site. Therefore, there is a residual risk that undetected pockets of contamination may be present on site, situated between testing locations.

When investigating or developing potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and temporally. The absence of certain ground, ground gas, contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Extent of Geo-Environmental Studies

This report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species e.g. Japanese Knotweed. It is recommended that the Client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace a full and proper survey. If an Unexploded Ordnance (UXO) report has been obtained within the report, it has been so on the basis of Health and Safety concerns and no assessment has been made other than transcribing the recommendations of the sub-contractor contained within the report. In terms of a potential contaminative source, unless ordnance has been manufactured / stored on site, UXOs will only be determined as a contaminative source following a positive identification on site.

APPENDIX 2
FIGURES AND DRAWINGS



FOR GUIDANCE PURPOSES ONLY

Approximate Site Boundary

Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: Gorsty Hill, Tean			
For: Robert Coates Plant Sales Ltd.			
Drawing Title: Site Location Plan			
IGEconsulting Suite 4, 14 - 32 Hewitt Street, Manchester, M15 4GB Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 237 9310			
Scale: 1:2000 @A3		Date: Nov 2020	
Drawn: JH		Checked: AE	
Contract No. 3465		Drawing No. SI-01	P1