

STAGE 2 ENVIRONMENTAL REPORT

AT

HOUGH LANE

WOMBWELL

ON BEHALF OF

HOOBER HOMES LTD

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1.0 EXECUTIVE SUMMARY

The pertinent conclusions of the report are tabulated below. However, the information below is not exhaustive, and it is recommended the report is read in its entirety.

Proposed Development	Residential dwellings with private gardens.
Existing Site Description	Occupied by a large warehouse and numerous other factory buildings, surrounded by concrete and bitmac hardstanding and some areas of rough ground. Large telecoms mast on site. Large mature trees around boundaries. Slope forms south/western boundary.
Site History	A garage and unknown small buildings before a warehouse and other factory buildings used for steel and fibreglass tank/container manufacture, including a spray paint workshop. Fuel/chemical storage associated with the factory.
Geology	Pennine Middle Coal Measures of mudstone, siltstone and sandstones. No superficial deposits identified. No faults
Coal Mining	Site is considered at low/very low risk from historical coal mining activities but an intrusive site investigation is required to confirm this situation and determine any need for treatment.
Hydrogeology	Secondary A Aquifer. No active abstractions within 1km.
Hydrology	Nearest watercourse is a river 140m to south. No active abstractions within 1km. Not at risk of river flooding.
Radon	No protection measures, but intermediate potential radon area.
Landfill Gas	Gas monitoring is ongoing and will be reported separately. Based on monitoring visits to date, CS2 mitigation measures.
Ground Conditions	Typically 1m but up to 2.8m of made ground, overlying firm to stiff clay over relatively shallow bedrock at typical depths of 2.5m.
Contamination	Localised elevated lead, PAH and TPH in made ground. All in the west of the site. Asbestos in existing building and small stockpile of asbestos sheets to rear of large warehouse building.

Remediation Strategy	0.6m cohesive cover to soft areas in the west of the site. Topsoil required to a minimum of 0.3m in all gardens on the rest of site. Gas mitigation measures to be confirmed upon completion of monitoring. Removal of asbestos stockpile and from buildings.
Foundations	Strip/trenchfill foundations for majority of site. Possible alternative foundation solution in the southwest where made ground up to 2.8m has been encountered. A tree survey is required.
Excavations	Likely to be stable for majority of the site. Potentially unstable in southwest where deep made ground is present.
Soakaways	Soakaways not considered suitable for the site.
Road Pavement	Depth of made ground is variable across the site. A design CBR value of 2% - 3% is considered applicable on the natural clay below the made ground with an increase in this value for the weathered mudstone bedrock and sandstone bedrock below. The area of deeper made ground in the southwest of the site will require further consideration.

2.0 TERMS OF REFERENCE

2.1 Hoober Homes Ltd is considering developing the site at Hough Lane with a residential development including associated new roads, public open space and private gardens. It was considered appropriate to provide information to aid viability assessment and design of any subsequent development. In October 2017, Fairhurst issued a Stage 1 Desk Study Report for the site (Reference 117436/DS02 dated 12/10/2017). This involved an assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. In addition to comments and conclusions on range of issues, the report also recommended intrusive investigation and assessment.

2.2 In May 2020, ARP Geotechnical Ltd was appointed by Hoober Homes Ltd to undertake an intrusive investigation, comprising trial pits and windowless sample boreholes to assess the ground conditions.

2.3 The investigation was implemented generally in accordance with BS 5930:2015 +A1:2020 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality - managing ground conditions", Environment Agency CLR 11 "Model Procedures for the Management of Land Contamination" and BS10175 : 2011 + A2 : 2017 "Investigation of potentially contaminated sites - Code of practice". This report is limited to the data obtained as part of this investigation. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions, including groundwater levels, after the preparation of this report.

2.4 The findings or contents of the Stage 1 Desk Study Report are not reproduced here in full, and it is recommended that this report is read in conjunction with the third party Stage 1 Report.

2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist to undertake a more detailed survey, including for any invasive/harmful weeds.

2.6 The assessment of any topsoil is carried out in terms of potential chemical effects on human health only, and no account is taken of aesthetic or horticultural properties. Such considerations should be referred to a horticulturist or landscape architect.

2.7 The report has been prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Geotechnical Ltd. For the avoidance of any doubt, where ARP Geotechnical Ltd enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Geotechnical Ltd.'s consent.

2.8 Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular the duties and obligation of the Client.

3.0 THE SITE

Site Location

3.1 The site, which is centred on Ordnance Survey Grid Reference 439070, 402460, is located off Hough Lane in Wombwell, Barnsley.

3.2 A site location plan, aerial photograph and proposed site layout, are presented in Appendix A.

Site Description

3.3 The site is currently a securely locked/fenced, disused, former Balmoral Tanks factory site. The site is occupied by a large (approximate 130m long and 15m wide) warehouse type building just south of the centre of the site, and numerous other factory buildings that are located closer to the access to the site, off Hough Lane. A large telephone mast with associated small substation is located in the southwest of the site. The site is covered in a combination of concrete hardstanding (forming the access into the site and the yard to the large warehouse building), bituminous hardstanding (to the rear of one of the other main factory buildings) and rough open ground (which is present at the extremities of the site and to the rear of the large warehouse building). Asbestos cement sheets were observed to have been present on the ground to the rear of the large warehouse building.

3.4 The main area of the site is relatively flat (at around 80m A.O.D) but there is a slope downwards from the access off Hough Lane (at around 86m A.O.D) into the main site area. The southern and southwestern boundary of the site is higher than the surrounding land. It is estimated that the site is approximately 3m higher than the adjacent land, with the difference in level accommodated by a steep slope.

3.5 The site is bounded by housing, Hough Lane and then a cricket ground to the north, by housing and open fields to the east and south, and by a housing estate to the west.

Site History

3.6 Ordnance Survey archive maps show the site was woodland until the 1930s, at which point some small buildings were constructed in the north of the site (adjacent to Hough Lane) and a track was cut through the woodland. As time progressed, the buildings in the north were added to and expanded. A garage is identified in the north of the site and a works in the northwest of the site. By 1999, a building is identified in the south of the site (in its current location) and this building is extended in 2006 (as the building is seen on the site currently). The site is known to have been used by Galglass Ltd from 1989 until 2014, with Balmoral Tanks occupying the site from 2014. The site was mainly used for the manufacture of galvanised steel and fibreglass tanks and containers. It is known that associated engineering work, fuel and lubricant oil storage also will have been undertaken on site.

3.7 Hough Lane and an area of common ground were present to the north of the site in the 1890s. A reservoir and an old quarry were also present to the north. Wombwell colliery is also shown at this time, but at a significant distance to the north. The most significant surrounding land use is considered to be the foundry which was present adjacent to the west of the site, from the 1930s until the 1960s, at which point it is referred to as a works. This works building has been present until fairly recently and has now been replaced by a housing estate.

4.0 ENVIRONMENTAL SETTING

4.1 The environmental setting for the site was established by the Stage 1 Desk Study Report undertaken by Fairhurst under reference 117436/DS02 and dated 12/10/2017. The findings of the Desk Study Report, updated and amended where deemed appropriate, are summarised below.

Geology

4.2 The geological maps show the site to be underlain by the Pennine Middle Coal Measures Formation comprising interbedded pale grey sandstone, siltstone, grey mudstone and coal seams. There are no faults shown to affect the site. The Swinton Pottery Coal is identified to outcrop approximately 55m to the northeast of the site and the Newhill Coal seam is identified to outcrop 45m to the southwest of the site. The strata are progressively younger towards the northeast, and of the two outcrops, only the Newhill Coal will underlie the site.

Coal Mining

4.3 The Coal Mining Report indicates that the site is within the surface area of underground coal mine workings of 9 seams of coal at significant depth. It indicates that the site is recorded to be situated within 20 metres of a known coal seam outcrop and that due to this the site is located within a "High Development Risk Zone", as defined by the Coal Authority. The report does not identify any mine shafts or adits to exist on or adjacent to the site.

4.4 A Coal Mining Risk Assessment (dated 2nd July 2020) has been produced by ARP Geotechnical Ltd and reviews the Coal Mining Report and all of the available geological information in detail. It is recommended that the CMRA is read in entirety, but it is concluded that the Swinton Pottery Coal does not underlie the site, and there is a low to very low risk that workings are present within the Newhill Coal seam that could affect some of the site. An intrusive investigation is recommended to be undertaken to confirm the low/very low risk presented by the Newhill Coal.

Hydrogeology

4.5 The Landmark Envirocheck Report indicates the Bedrock Aquifer Designation to be "Secondary A Aquifer". There are no superficial deposits.

4.6 There are no groundwater abstractions within 1km of the site.

4.7 The site is not within a groundwater Source Protection Zone.

Hydrology

4.8 The nearest surface water feature downslope is a river, located 140m to the south of the site. Any surface water run-off, which is not intercepted by drainage, could in theory eventually reach the river. A culverted stream is shown located in the centre of the adjacent site to the west, although it is understood that the culvert was diverted as part of the residential development. The site is not in an area at risk from river flooding.

4.9 There are no surface water abstractions within 1km of the site.

Other Relevant Environmental Data

4.10 There is an historical landfill possibly located as close to 25m to the south of the site. This was associated with the adjacent foundry and the landfill is recorded to have accepted foundry waste including clinker, slag, asbestos sheets, detergent/oily waste, and sand. The landfill was recorded as accepting waste in 1977.

4. 11 No radon protective measures are stated to be necessary for new dwellings on the site, but the site is within an “intermediate probability radon area”. It is stated in the third party desk study to be within a “low probability radon area” but this is incorrect.

4.12 The site is not within an area at risk from river flooding.

4.13 BGS data indicates the general area has the "potential for groundwater flooding of property situated below ground level" (i.e. basements or similar).

Potential Contamination Sources

4.14 The following potential sources of contamination have been identified

4.14.1 Possible made ground – metals, inorganics, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH), phenol, asbestos.

4.14.2 Additional possible contamination due to the presence of specific historical uses of the site including above ground diesel tank, spray paint workshop, waste storage areas– TPH and PAH.

4.14.3 Landfill gas and potentially also mine gas associated with worked coal seams.

4.14.4 Asbestos within existing buildings.

4.14.5 Asbestos cement sheets placed/tipped to the rear of the large warehouse building.

5.0 SITE INVESTIGATION

5.1 A site investigation was undertaken by ARP Geotechnical Ltd on 2nd and 3rd June 2020. The purpose of the investigation was to produce an assessment of the site in accordance with BS10175 : 2011 + A2 : 2017 "Investigation of potentially contaminated sites - Code of practice", and to provide geotechnical information to aid design of the development.

5.2 The site was gridded on a maximum 25m spacing and trial pits and windowless sample boreholes were completed and sampled on the grid, to satisfy the requirements of the British Standard, along with any targeted locations. Twelve trial pits (TP1 to TP12) were excavated, to depths of between 1.6m and 4.0m and 11 window sample boreholes were completed, to depths of between 1.81m and 4.45m. The trial pits and window sample boreholes were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. Justifications for the locations are given below.

LOCATION	REASON
TP1 to TP6	Part of grid. TP2 and TP3 in external storage area. TP4, 5 and 6 in external storage area to rear of the main warehouse building.
TP7	Above ground diesel tank
TP8 to TP12	Part of grid. TP10 and TP11 in external storage area to the rear of the main warehouse building and where significant made ground was anticipated. TP12 in-between factory buildings in the north of the site.
WS1	Part of grid and in waste storage area.
WS2 to WS6	Part of grid. WS4 and WS5 in external storage area to the rear of the main warehouse building
WS7 and WS8	Part of grid and in the location of the existing welding and fabrication workshop.
WS9 and WS10	Part of grid and in the location of the existing spray paint workshop.
WS11	Part of grid.

5.3 Four gas monitoring wells were installed in BH2, BH4, BH7 and BH11, and subsequently monitored by ARP Geotechnical Ltd. The wells were installed to 3m depth, with the bottom 2m comprising slotted pipe with gravel surround, and the upper 1m comprising plain pipe with bentonite seal and lockable flush cover.

5.4 The trial pit and borehole location plan and logs are included in Appendix B. It should be noted that the co-ordinates on the logs have not been surveyed in, but are automatically determined by the logging software (which incorporates mapping) following positioning of each location by the Engineer. However, each position has been located using smartphone GPS, with an indicated accuracy of 2m to 3m at the time of the investigation.

5.5 Chemical analysis of 22 No. soil samples for metals, inorganics, speciated PAH, TPH, phenols, and asbestos was undertaken by the UKAS accredited Chemtech Environmental Laboratory based in Stanley, County Durham. Elevated determinands were tested further for speciated TPH and leachability to determine the potential mobility of the contaminants. The test certificates are included in Appendix C.

5.6 Analysis for Atterberg Limits and moisture content was undertaken by the UKAS accredited Professional Soils Laboratory (PSL) in Doncaster. Geochemical testing comprising pH and water soluble sulphate was undertaken by DETS. The test certificates are included in Appendix C.

6.0 SUMMARY OF GROUND CONDITIONS

Strata and Groundwater

6.1 The ground surface across the site comprises concrete slabs, bitmac hardstanding, or rough ground typically present as gravel of mixed lithologies. Of the buildings on site that were entered and investigated, all had concrete slabs.

6.2 For the majority of the site, the made ground was present as a mixture of granular and cohesive made ground to depths of between 0.2m and 1.7m, with a typical depth of approximately 1m. Deeper made ground, typically as clay with gravel of mixed lithologies, was identified in the southwest of the site behind the large warehouse building. Made ground in this area was up to 2.8m deep. This depth was identified in TP 11 and the made ground composition in this pit was highly variable and contained an array of man-made debris including fence posts and scrap metal.

6.3 Below the made ground was typically a firm to stiff clay (residual Pennine Middle Coal Measures Formation (PMCMF)) which was either buff or grey coloured or sometimes a combination of the two, and slowly graded into a weathered mudstone bedrock or weathered sandstone bedrock (weathered PMCMF). Occasionally a weathered siltstone was identified. The sandstone bedrock is visually more obvious, as there in a distinct change in hardness/difficulty of excavation when the sandstone is encountered (i.e. it is very difficult to excavate through). The mudstone bedrock is seen with more of a gradual change, from the residual clay soil above, to a weathered rock displaying signs of bedding and recovered as mudstone gravel pieces. The weathered bedrock is encountered at depths of between 1.3m (TP4) and 3.9m (WS5) but is typically encountered across the site at depths of between 2m and 3m.

6.4 Groundwater was rarely encountered during the site investigation - it was encountered in three locations in total, which were TP5 and TP6 at a depth of 3.4m and 3.75m respectively (which was close to the final excavation depth of each pit), and in WS7 at 3.0m. During the

recent monitoring visits, groundwater was identified at 1.76m below ground level in WS2, 2.8m in WS4, 1.03m in WS7 and no groundwater was encountered in WS11.

6.5 The excavations generally remained stable for the short period of exposure and the pits were backfilled with the arisings on completion. Where deep made ground was encountered, specifically in TP11, major instability was noted. TP8 and TP12 also recorded instability within the made ground. Rapid or significant inflows of groundwater were not identified, but the investigation did reveal that perched water may be trapped on top of the mudstone and residual clay soils, especially at depth and where granular made ground is present above.

6.6 Hydrocarbon odours were noted in TP9 from 0.8m to 1.2m depth and in TP11 from 0.5m to 1.5m depth.

Gas Assessment

6.7 The ground gas investigation is currently ongoing and is being undertaken in accordance with BS 8576: 2013 "Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)". The ground gas risk assessment is to be carried out in accordance with BS 8485: 2015 + A1: 2019 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings".

6.8 So far the monitoring has showed no methane (CH_4) to be present, a maximum carbon dioxide (CO_2) concentration of 9.6 v/v, and zero flow rate. However, a number of visits, over more than a four week period, are still to be carried out, and the full results will be reported by separate letter. At present, Characteristic Situation 2 has been identified, which requires gas mitigation measures to be incorporated into new dwellings on the site.

7.0 CONTAMINATION ANALYSIS

Screening Values - Soils

7.1 There is presently conflicting opinion with regard to the appropriate generic assessment criteria, or screening values, for soils which should be used in contamination assessment for proposed development. In March 2014, DEFRA published Category 4 Screening Levels (C4SLs) for six contaminants: arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead. The values are based on the toxicological benchmark of a "low level of toxicological concern" (LLTC) rather than the previous regulatory approach of "minimal or tolerable level of risk". As the C4SLs are less protective of health than the previous approach, the Chartered Institute of Environmental Health (CIEH) has advocated an alternative approach based on minimal risk, but with some adjustment of exposure parameters to more realistic scenarios than those previously used. To this end, the CIEH has collaborated with Land Quality Management to publish "Suitable 4 Use Levels" (S4ULs) "The LQM/CIEH S4ULs for Human Health Risk Assessment", November 2014 (LQM/CIEH). However, DEFRA has reiterated its intention that the C4SLs should be used in generic risk assessment for proposed development, and there is indication that other parties will collaborate, in the near future, to extend the range of C4SL determinands beyond the six published so far.

7.2 In the absence of a final resolution to the debate, soil contamination test results in this report have been compared first against the more conservative S4UL, and where a C4SL exists for the same determinand, consideration given to the use of the C4SL for any exceedences of the S4UL, within the site specific context. Where no S4UL exists for a determinand, for example lead, the C4SL has been used. The LQM/CIEH screening values have been calculated for soil organic matter contents of 1% and 2.5%, as well as 6%, and the appropriate screening value is used for the organic matter content of the soil. All the C4SL values published are for a soil organic matter content of 6%.

7.3 A table showing the screening values utilised is included in Appendix C.

Screening Values - Leachability and Groundwater

7.4 In order of preference, the Environmental Quality Standards (EQS) annual averages for freshwater have been used as generic screening values for these results. Where no EQS is available, the stringent UK Drinking Water Standards (DWS) have been used, and other sources in the absence of EQS and DWS, as indicated on the groundwater screening values table in Appendix C.

Soils Analysis

7.5 Twenty two soil samples were issued to Chemtech laboratory for the suite of testing (As, Cd, Cr (VI), Cr(III), Cu, Hg, Ni, Pb, Se, Zn, Total Sulphate, Water Soluble Sulphate, pH, Phenol-monohydric, Speciated PAH, Total TPH, Asbestos, and Organic Matter). The testing comprised:

Twenty samples of Made Ground - one sample from the majority of each of the locations
Two samples of natural clay from locations TP1 and TP5
Further aliphatic/aromatic split on two samples of made ground with elevated TPH concentrations (TP9, TP12 and WS8)
VOCs and SVOC testing on samples of made ground from TP11 (external storage area with hydrocarbon odour) and WS9 (paint shop)
PAH Leachability testing on two samples with elevated PAH (TP12 and WS8)

7.6 Due to the highly variable ground conditions on site, in terms of material and depths encountered, and the spatial distribution of the elevated determinands encountered, statistical analysis of the results was not considered appropriate for this site.

Made Ground

7.7 A results summary table for determinands within the made ground found to be above screening values is given on the following page. The table shows only those samples with elevated determinands. All other samples not shown in the table had no exceedances. The screening values used are for 2.5% organic matter, as the average for the site is 4.6% and the next category below this has been used, to give a conservative assessment.

Sample reference	Depth (m)	Pb	BaA	Ch	BbF	BaP	I123P	DahA	TPH
TP9	0.80-1.20	336	3.81	3.81	6.66	6.62	6.60	1.19	7500
TP10	0.70-1.00	121	2.91	3.30	5.74	4.75	3.88	0.68	126
TP11	0.80-1.20	134	2.64	3.38	3.39	5.27	4.04	0.67	767
TP12	0.80-1.00	73	37.49	35.22	25.12	82.58	53.16	10.52	1182
WS3	0.30-0.70	23	11.38	11.55	20.02	36.71	46.04	4.89	198
WS5	0.70-1.00	24	124.11	103.09	105.99	183.69	125.18	29.60	2827
WS6	0.50-0.80	163	1.41	1.54	3.46	2.95	2.89	0.64	212
Screening Value at 2.5% SOM*		200	11.00	22.00	3.30	5.00	36.00	0.28	500

Pb = Lead, BaA = Benzo(a)anthracene, Ch = Chrysene, BbF = Benzo(b)fluoranthene, BaP = Benzo(a)pyrene, I123P = Indeno (123)pyrene
DahA = Dibenzo(a)anthracene, TPH = Total Petroleum Hydrocarbons
* Residential with home grown produce screening value
All units in mg/kg
Exceedance

7.8 In total, seven locations identified made ground with determinands above the assessment criteria. It is notable that these exceedances are confined to the western area of the site. It can be seen from the table that, apart from lead in TP9, all exceedances are of either individual PAH or TPH. These results are considered further in the risk assessment section of this report. None of the locations corresponded with a location of particular potential for contamination, for example the paint shop area or above ground diesel tank. Two of the locations (TP9 and TP11) did correspond with locations in which hydrocarbon odours were noted below depths of between 0.5m and 0.8m.

7.9 Further aliphatic/aromatic split carbon weighted speciation was carried out on three samples, two with elevated TPH values. Two determinands were found to be slightly elevated in the sample from TP9. These were C10 to C12 aliphatic, with a value of 402mg/kg obtained (the

screening value for 2.5% organic matter is 330mg/kg) and C12 to C16 aliphatic, with a value of 2,427mg/kg (the screening value is 2,400mg/kg). To put these values into context, they are several orders lower than the screening value for public open space (13,000mg/kg and 250,000m/kg respectively). However, they will need to be considered in the risk assessment.

Natural Ground

7.10 Two samples of natural ground were tested, as testing of natural ground is sometimes requested by regulators. Natural ground was tested at locations TP1 at 1.0 to 1.3m depth and TP5 at 1.2 to 1.4m depth. As would be anticipated, no elevated contamination was identified. A relatively low pH was identified in TP5 and this is discussed later in the report.

Water/Leachability Analysis

7.11 Leachability testing was carried out on the samples from TP12 and WS8 showing elevated/raised levels of PAH contamination. The laboratory test certificates are presented in Appendix C. The results show the individual PAHs to have a degree of leachability and the test results are elevated when compared to screening values. However, it should be noted that the screening values are equivalent to the stringent UK Drinking Water Standards, for concentrations permissible as tested at the tap, and for very stringent Environmental Quality Standards (EQS). The slight leachability does not necessarily prevent retention of material on site, but the additional risks presented must be taken into consideration.

Updated Risk Assessment and Conceptual Model

7.12 The categorisations of risk adopted in this report are adapted from CIRIA Report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001). This approach assesses the potential severity of any pollution event and the probability of the event occurring, to arrive at a risk category, for the various potential source - pathway - receptor linkages. The relevant tables used, with the definitions, are presented in Appendix D.

7.13 The updated source – pathway – receptor matrix is presented below, taking into account the findings of the investigation. Any pathways in italics are deemed not to be viable and the reason given.

Viable Source - Pathway - Receptor Matrix (Finished Development)

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Made ground on west of site: - elevated TPH and PAH	• Inhalation, ingestion and dermal contact with soil and dust • Fruit and vegetable intake, with soil • Vapour inhalation outdoor • Vapour inhalation indoor	**Humans:-** • Future occupants • Maintenance workers • Adjacent residents and general public	**Medium**	**Low Likelihood**	**Moderate/ Low**
	• Migration in surface water	• Surface water (nearest downslope is 140m to south). There are no abstractions within 1km.	**Medium**	**Unlikely**	**Very Low**
	• Migration in groundwater	• Groundwater (Secondary A Aquifer, no abstractions within 1km)	**Medium**	**Unlikely**	**Very Low**
	• Root uptake	**Vegetation:-** • Landscape areas • Private gardens	**Medium**	**Low Likelihood**	**Moderate/ Low**
	• Migration	**Services/Utilities:-** • Potable water supply	**Medium**	**Low Likelihood**	**Moderate/ Low**
Ground Gas: methane and carbon dioxide	• Asphyxiation • Explosive risk	• Construction/de-molition workers • Future occupants • Buildings	**Severe**	**Low Likelihood**	**Moderate**
Possible asbestos within existing buildings and sheeting on the ground to rear of large warehouse building.	• Inhalation	• Future occupants • Maintenance workers • Adjacent residents and general public	**Severe**	**Low Likelihood**	**Moderate**

7.14 It can be seen from the above matrix that several pathways to receptors are operative, and this may affect users of the finished development, with up to a moderate risk applicable. Some form of remedial action is, therefore, considered necessary to allow residential development without excess risk.

Risk Based Assessment of Remedial Options

Asbestos Within Existing Buildings and Sheeting on the Ground Surface

7.15 Provided an asbestos survey is carried out prior to any demolition or work on the existing buildings on the site, and any identified asbestos (including the cement sheets on the ground to the rear of the large warehouse building) is removed and disposed to a licenced facility, then the risk to receptors is low. The work should be carried out by appropriately qualified Contractors and records of the removal should be kept, including any method statements for the work, as the Local Authority may request this to prove that soils have not been subsequently impacted by asbestos contamination.

Landfill and Mine Gases

7.16 To address the potential risk from landfill, and the low risk of mine, gases, monitoring of borehole wells is in progress. This will determine whether or not protection measures are likely to be necessary. Currently, CS2 mitigation measures have been identified as necessary. This will be confirmed by separate letter report on completion of the monitoring.

Made Ground - Ingestion, Dust Inhalation, Dermal Contact, Root Uptake, and Fruit and Vegetable Intake, With Soil

7.17 This pathway is automatically blocked where buildings or hardstanding are present above the material. However, in garden areas, provision of a cover blanket of a minimum 0.6m thickness will be required in the western area of the site ,where required, due to elevated contamination, to reduce the risk to future users of the site to acceptable levels from these pathways. This assumes a worst case double dig scenario (i.e. 2 x spade depths). Although the contamination was identified to be present on the west of the site, made ground was extensive across the site and, for aesthetic reasons, it is likely that a minimum of 0.3m of topsoil will be required for all gardens. This will need to be agreed with the Local Authority.

As made ground is very variable, the presence of contaminated material on areas of the site other than the west cannot be ruled out, and in the event of such unexpected or suspected contamination on the wider site, then a cover blanket 0.6m should be provided in gardens and landscaping.

Made Ground - Surface Water and Groundwater Pathways

7.18 Risks to groundwater and surface water are considered minimal, but can be reduced further by ensuring that where the cover blanket, required in the west of the site, includes at least 0.45m thickness of material with at least 35% silt/clay content (at least 35% passing a 63 micron sieve), for example clay, sandy clay, or gravelly clay. If cohesive cover blankets are used, external levels and surface water drainage will need to be carefully designed to avoid localised surface water ponding.

Migration to Utilities

7.19 Localised hydrocarbon contamination has been identified on this site and, therefore, it is considered likely that water supply pipework will need to be protected from migration. The local water company should be consulted.

Risks During Construction Period

7.20 It is also necessary to consider the effects of the contamination present on the site in relation to the risks to adjacent residents, construction workers and the general public during construction. This is assessed in the following matrix.

Source	Pathway	Potential risk	Risk after employing suitable Health and Safety plan.
Existing made ground	Inhalation	Moderate	Damping down of the site during dry periods and timely placement of the existing made ground below barriers should block this pathway and reduce the risk to negligible.
Existing made ground	Ingestion	Moderate	Site fencing will exclude access to members of the public. Existing made ground will be contained within the site boundary, and placed below barriers as soon as possible. Washing facilities and a clean mess room from which work boots and overalls are excluded should be provided. These measures should block this pathway and reduce the risk to negligible.
Existing made ground	Contact	Moderate	Education of workers to use adequate hygiene and PPE should block this pathway and reduce the risk to negligible.
Existing made ground	Surface water	Moderate	Preventing surface water run off by minimising open exposure times of the existing made ground, and using bunds or cut off trenches as necessary should block this pathway and reduce the risk to negligible.
Asbestos in existing buildings and on surface of site	Inhalation	High	Provided an asbestos survey is carried out, and any identified asbestos is removed from site prior to any other works commencing, the pathway is blocked and the risk is negligible.

7.21 Provision of all the above measures will ensure that all the identified pathways for the contamination will be blocked.

Summary of Contamination Identified and Remedial Options

7.22 The site is underlain by up to 2.8m thickness of made ground, overlying residual clay and then weathered mudstone or weathered sandstone bedrock. Monitoring of ground gases, by means of borehole well installations, is in progress. This will determine whether or not protection measures are likely to be necessary. This will be confirmed by separate letter report on completion of the monitoring.

7.23 The made ground was found to contain localised elevated concentrations of lead, PAH and TPH in the west of the site only.

7.24 The contamination risk assessment, and assessment of remedial options, has indicated that, provided that the following remedial measures are adopted, then the risks to the identified receptors are deemed acceptable for the proposed development of residential properties with private gardens.

7.24.1 An asbestos survey should be carried out prior to any demolition or work on the existing buildings on the site, and any identified asbestos should be removed and disposed to a licenced facility. A small stockpile of asbestos sheeting was noted on the ground to the rear of the large warehouse building on site. This should be removed from site also. The work should be carried out by appropriately qualified Contractors and records of the removal should be kept, including any method statements for the work, as the Local Authority may request this to prove that soils have not been subsequently impacted by asbestos contamination.

7.24.2 Where any garden or landscape areas overlie the existing made ground that has been identified to be contaminated in the west of the site, a minimum 0.6m thickness of uncontaminated soils (topsoil and subsoil) should be provided. Due to the extent of made ground across the site, it is recommended that all gardens have at least a 0.3m covering of clean topsoil. This is subject to the agreement of the local authority. In areas of hardstanding or building footprints, the cover blanket is not required. If any contamination is found or suspected on the wider site where only 0.3m soils are being provided, then a cover blanket should be placed similar to that specified for the west of the site.

7.24.3 Where a cover blanket is required on site in garden areas, i.e. in the west of the site, it should include at least 0.45m thickness of material with a minimum 35% silt/clay content (at least 35% passing a 63 micron sieve), for example clay, sandy clay, or gravelly clay, to minimise leaching of contamination. If cohesive cover blankets are used, external levels and surface water drainage will need to be carefully designed to avoid localised surface water ponding.

7.24.4 Any imported soils used within the cover blanket will need to be verified as suitable by inspection and testing, in accordance with guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): "Guidance on the Verification Requirements for Cover Systems".

7.25 Protected surface water supply pipes may be required. The local water company should be consulted.

7.26 A Contamination Remediation Statement is included in Appendix E.

8.0 GEOTECHNICAL TESTING

8.1 Selected samples of the natural strata were delivered to PSL in Doncaster for testing with regard to plasticity indices and moisture content. Test certificates are presented in Appendix C and a summary of the results, including Modified Plasticity Indices, is given below.

Location	Depth (m)	MC	LL	PL	PI	<425µm	I'p
TP3	1.8-2.0	18	46	21	25	100	25
TP11	2.8-3.0	15	41	20	21	100	21
TP12	2.0-2.2	12	Designated as non-plastic material				
WS3	1.8-2.0	19	61	26	35	100	35
WS4	2.7-3.0	10	38	19	19	88	17
	No. of results	5	4	4	4	4	4
	Min.	10	38	19	19	88	17
	Max.	19	61	26	35	100	35

I'p	VCP
>40%	High
20% - <40%	Medium
10% - <20%	Low

MC= Moisture Content (%) LL= Liquid Limit (%) PL= Plastic Limit (%)
PI= Plasticity Index (%) I'p= Modified PI (%) VCP= NHBC Standard Chapter 4.2 Volume Change Potential

8.2 The plasticity test data shows the clay strata to be of intermediate to high plasticity, in accordance with BS 5930:2015 +A1:2020 "Code of Practice for Site Investigations". When the percentage retained on the 425 micron BS sieve is considered, the Modified Plasticity Index, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees" is a maximum of 35. In accordance with the Standard, this equates to Medium Volume Change Potential.

8.3 Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by DETS (as a subcontracted lab to PSL) and Chemtech, comprising seven samples of natural strata and 20 samples of made ground. In accordance with the BRE Special Digest 1

"Concrete in aggressive ground", the characteristic values for the two materials are given below:

Characteristic Values

Material	pH	SO_4
Made Ground	6.8	134
Natural Strata	4.8	133

SO_4 = Sulphate content in mg/l on a 2:1 water : soil extract pH = Acidity

8.4 The geochemical analyses show the natural strata to have low water soluble sulphate content but a relatively low pH. The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1 for the natural ground and AC-2z. for the natural soils. Therefore, the use of FND2z designated concrete will be necessary for unreinforced buried concrete, in accordance with BS 8500. For any reinforced buried concrete, other design-specific mixes will apply.

9.0 COMMENTS AND CONCLUSIONS

Site Description

9.1 The site comprises the disused, former Balmoral Tanks factory site. The site is occupied by a large (approximate 130m long and 15m wide) warehouse type building just south of the centre of the site, and numerous other factory buildings that are located closer to the access to the site off Hough Lane. A large telephone mast with associated small substation is located in the southwest of the site. The site is covered in a combination of concrete and bituminous hardstanding, and rough open ground.

9.2 The main area of the site is relatively flat, but the access from Hough Lane into the main site area slopes downwards from the road. The southern and southwestern boundary of the site is higher than the surrounding land. There are some large mature trees around the boundaries.

9.3 The site is bounded by housing, Hough Lane, and then a cricket ground to the north, by housing and open fields to the east and south, and by a housing estate to the west.

Site History

9.4 Ordnance Survey archive maps show no development on the site prior to the 1930s. Development on the site was progressive after this time. A garage has been present in the north of the site and a works in the northwest. The wider buildings have been used for the manufacture of galvanised steel and fibreglass tanks and containers. It is known that associated engineering work, fuel and lubricant oil storage also will have been undertaken on site. A reservoir and an old quarry were also present to the north. A foundry was adjacent to the west, recently replaced by a housing estate.

Geology

9.5 The geological maps show the site to be underlain by the Pennine Middle Coal Measures Formation comprising interbedded pale grey sandstone, siltstone, grey mudstone and coal seams. There are no faults shown to affect the site. The Swinton Pottery Coal is identified to outcrop approximately 55m to the northeast of the site and the Newhill Coal seam is identified to outcrop 45m to the southwest of the site. The strata are progressively younger towards the northeast, and of the two outcrops, only the Newhill Coal will underlie the site.

Coal Mining and Coal Recovery

9.6 The Coal Mining Report indicates that the site is situated within 20 metres of a known coal seam outcrop and that, due to this, the site is located within a "High Development Risk Zone", as defined by the Coal Authority. The report does not identify any mine shafts or adits to exist on or adjacent to the site.

9.7 A Coal Mining Risk Assessment (dated 2nd July 2020) has been produced by ARP Geotechnical and reviews the Coal Mining Report and all of the available geological information in detail. It is recommended that the CMRA is read in entirety but it is concluded that the Swinton Pottery Coal does not underlie the site, and there is a low to very low risk that workings are present within the Newhill Coal seam that could affect some of the site. An intrusive investigation is recommended to be undertaken to confirm the low/very low risk presented by the Newhill Coal.

Environmental Data

9.8 The bedrock strata beneath the site are classified as a Secondary A Aquifer (there are no superficial deposits). There are no groundwater abstractions within 1km of the site.

9.9 The nearest surface water feature downslope is a river located 140m (taken from the Envirocheck Report data) to the south of the site. However, there are no surface water abstractions within 1km of the site.

9.10 No radon protective measures are stated to be necessary for new dwellings or extensions on the site but the site is within an "intermediate probability radon area". In these circumstances of apparent conflict, it may be prudent to assume basic radon protection is required, to prevent conveyancing difficulties. However, ground gas protection is required in any event, as discussed below.

9.11 There is a landfill located adjacent (identified possibly to be as close as 25m) to the south of the site. Gas monitoring to date has identified maximum carbon dioxide and methane concentrations of 0% and 9.6% respectively. Risk assessment indicates that gas protection of properties, against carbon dioxide, is required, as CS2 conditions are indicated. However, this will be confirmed by separate letter report on completion of the monitoring.

9.12 The specific design of the protection measures, and the verification required, is dependent on the detailed foundation design, the selection of products/suppliers, the gas regime, and who installs the protection. Once more of these factors are known, as a minimum following foundation design and design of the protection measures, a Statement on Gas Protection should be prepared. The document should provide information for the Client and other interested parties, such as the regulatory authorities, outlining how gas protection measures for properties on the site will be implemented and the installation verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

9.13 The site is not at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available. BGS data indicates the general area has the

"potential for groundwater flooding of property situated below ground level" (i.e. basements or similar).

Ground Conditions Encountered

9.14 The ground investigation revealed the made ground over the majority of the site was present as a mixture of granular and cohesive made ground to depths of between 0.2m and 1.7m, with a typical depth of approximately 1m. Deeper made ground, typically as clay with gravel of mixed lithologies, was identified in the southwest of the site, behind the large warehouse building. Made ground in this area was up to 2.8m deep. Hydrocarbon odours were noted in TP9 from 0.8m to 1.2m depth and in TP11 from 0.5m to 1.5m depth.

9.15 Below the made ground was typically a firm to stiff clay (residual Pennine Middle Coal Measures Formation (PMCMF)), which slowly graded into a weathered mudstone bedrock or weathered sandstone bedrock (weathered PMCMF). Occasionally, a weathered siltstone was identified. The weathered bedrock was encountered at depths of between 1.3m (TP4) and 3.9m (WS5) but is typically encountered across the site at depths of between 2m and 3m. Groundwater was rarely encountered during the site investigation. Recent monitoring visits showed groundwater at depths of between 1.03m an 2.8m below existing ground level.

Contamination Assessment

9.16 The contamination assessment identified the made ground to contain localised elevated concentrations of lead, PAH and TPH in the west of the site only.

9.17 The contamination risk assessment confirmed that, provided remedial measures are implemented, comprising clean cover soils to soft areas in the west of the site, the materials present on the site are compatible with the proposed residential with private garden usage. A cover of 0.3m thickness of clean soils is proposed on the rest of the site, for aesthetic purposes. A Contamination Remediation Statement, which includes further detail on the remediation measures for the site, is presented in Appendix E.

9.18 Protection of water supply pipes from hydrocarbons are likely to be required. The local water company should be contacted for advice.

Foundations

9.19 The existing made ground present across the site is considered unsuitable for support of foundation loads. The depth of made ground across the site is typically around 1m (but locally up to 2.8m). Residual soils (residual PMCMF) are present beneath, comprising firm to stiff clay. Weathered bedrock is then encountered below, of either weathered mudstone or sandstone (occasionally weathered siltstone is present) at depths of around 2.5 to 3.0m. As such, strip/trench fill foundations will be suitable for the vast majority of the site. An allowable bearing pressure of 100kN/m^2 is considered applicable for the firm to stiff clay encountered on site. Increasing allowable bearing pressures are likely to be available with depth, of 150kN/m^2 where the clay improves to a granular material, and 300kN/m^2 on bed rock. A geotechnical engineer should be contacted for advice on the appropriate depth, if more than 100kN/m^2 is required.

9.20 In the southwest corner of the site, made ground has been identified up to 2.8m thick. Exploratory hole positions WS5, TP10 and TP11 identified made ground to depths of 2.2m, 2.4m and 2.8m respectively. Excavation faces within the made ground in this area of the site were unstable to varying degrees. If houses are to be located in this area then the proposed foundations will need to be considered carefully. Based on the proposed plan for the site, most of this area where deep made ground has been identified will comprise Public Open Space (POS). However, If foundations are required in this area, then the option of piling should be considered along with the possibility of deep trench fill foundations or a temporary reduced level excavation in the area to reduce the depth of the required foundation excavations.

9.21 The southern boundary of the site is formed by a slope which slopes downwards to the adjacent land. The position and proximity of any plots, and roads or any other structures, to

this slope should be considered so that additional loading is not applied to the slope and its stability is maintained.

9.22 The clays were shown to be of Medium Volume Change Potential. Therefore, in accordance with NHBC Standard Chapter 4.2 "Building Near trees", in the absence of trees, a minimum foundation depth of 0.9m below existing or proposed ground level is applicable, whichever is the lower. However, in the presence of any proposed, existing or removed trees, the foundation may need to be deepened, depending on the type of tree and its distance from the face of the foundation. If not already available, a tree survey may be required to enable a foundation schedule to be prepared. The tree survey will also need to consider trees on third party properties.

9.23 The foundation should be taken below the depth of any existing foundations or obstructions, onto natural ground. The whole plan area of the foundation should be placed on similar natural material. If plots are located partly on weathered mudstone (as a stiff to hard clay) and partly on more competent sandstone then Foundations should be reinforced to accommodate this transition.

9.24 If bedrock is encountered on part of a foundation excavation, the rest of the plot should be deepened to ensure founding on similar material. However, if rock is not encountered by 2.5m depth on the remainder of the plot, then the Engineer should be contacted for further advice.

9.25 The above foundation advice is subject to confirmation that shallow underground mine workings are not present beneath the site. The risk of this is very low to low, but needs to be confirmed by rotary drilling investigation. The presence of any such workings is not a bar to development, and there are tried and tested techniques for rendering development over such ground safe, for example injection of grout. Such treatment is commonplace and it if required, is usually covered by an appropriate planning condition. Following such treatment, the only change to the foundation design is usually the incorporation of mesh reinforcement.

Excavations

9.26 It is likely that excavations into the natural strata will remain stable in the short term, requiring minimal trench support, in accordance with the prevailing statutory guidance. However, instability can be anticipated within the made ground present on the site.

9.27 Slight groundwater seepages were recorded in TP5 and TP6, at 3.4m and 3.75m respectively. Water was also encountered at 3.0m within WS7. Any such encounters of groundwater should be controllable by pumping from an artificial sump.

9.28 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock or buried foundations and structures are likely to require a hydraulic breaker.

Chemical Precautions

9.29 The Aggressive Chemical Environment for Concrete (ACEC) class is AC-2Z. Therefore, the use of FND2z designated concrete will be necessary for unreinforced buried concrete, in accordance with BS 8500. For any reinforced buried concrete, other design-specific mixes will apply.

Road Pavement Construction

9.30 Due to the history of the site, the depth and nature of the made ground can vary significantly over relatively short distances. For the main area of the site (anywhere in front of the large warehouse building) made ground is typically around 1m deep (but was identified up to 1.7m deep). Formation of roads on the existing made ground are unlikely to be acceptable (especially for any adoptable roads). For any areas of road pavement, including parking areas, the formation will therefore need to be the natural strata, comprising either firm to stiff clay, the more competent weathered mudstone bedrock or, locally, sandstone bedrock, which are all present beneath the made ground. Typically, the formation would be expected

to be the firm to stiff clay. Based on the observed characteristics of the material, and the results of the plasticity testing a design California Bearing Ratio (CBR) value of around 2-3% is considered applicable for the firm to stiff clay, below any obvious soft spots, and at equilibrium moisture content. The CBR value will be significantly higher for the more competent weathered mudstone and especially the sandstone bedrock. If considered necessary, this should be confirmed by testing at proposed subgrade level before construction.

9.31 Deep made ground (up to 2.8m) is present in the southwest of the site. A formation for any adoptable road pavement on natural strata at this depth will present problems. There are several potential solutions for this situation, including complete excavation of the made ground to natural strata, and placement of engineered fill to a controlled specification, partial excavation and replacement, with or without layers of geogrid, or the use of vibro stone columns overlaid by a geogrid reinforced stone blanket. The proposed measures will need to be agreed with the adopting authority and, therefore, consultations with the relevant authority should be undertaken at the earliest stage.

Soakaways

9.32 The majority of the site is underlain by clay and mudstone, which is not considered to be sufficiently permeable for the use of soakaways. There is a localised band of sandstone present across the site, but with clay/mudstone present to either side The general topography of the site, surrounding area and, presumably, the groundwater flow direction, is downwards to the south and west. There is a slope with lower ground level off the site to the south and west and, therefore, soakaway drainage could represent a risk of flooding off site. The disposal of surface water using soakaways is, therefore, unlikely to be practical on the site.

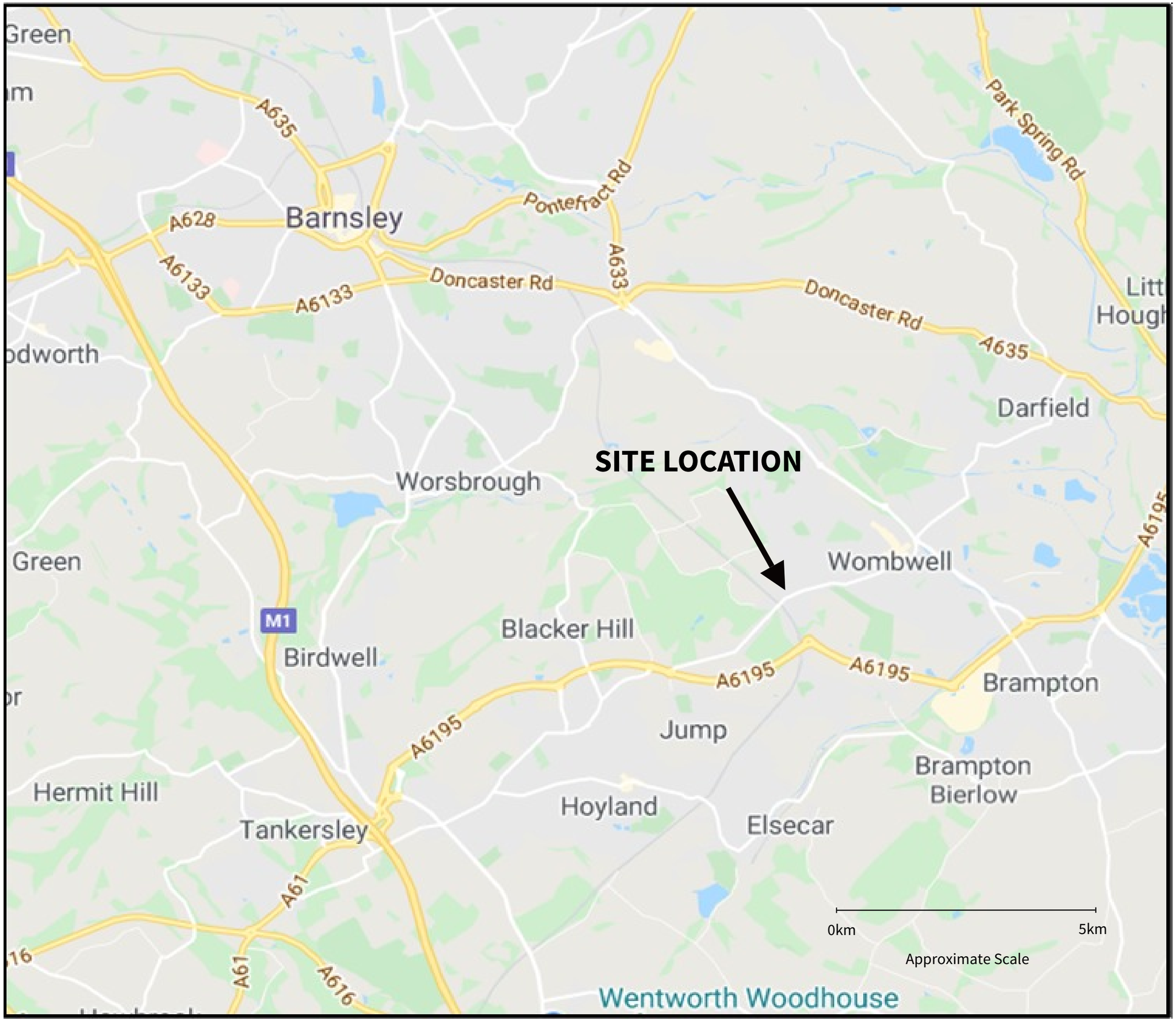
Suggested Further Work

9.33 A rotary borehole investigation should be carried out to confirm the situation with regard to shallow underground coal workings beyond doubt.

9.34 Once the gas regime has been established, and following detailed foundation design, and decisions from the client in relation to selection of products/suppliers for gas protection, and who installs the protection, a Statement on Gas Protection should be prepared, outlining how gas protection measures will be implemented and the installation verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities.

A P P E N D I X A

SITE LOCATION PLAN, AERIAL PHOTOGRAPH AND PROPOSED LAYOUT



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Project
HOUGH LANE BARNSLEY

Client
HOOBER HOMES LTD

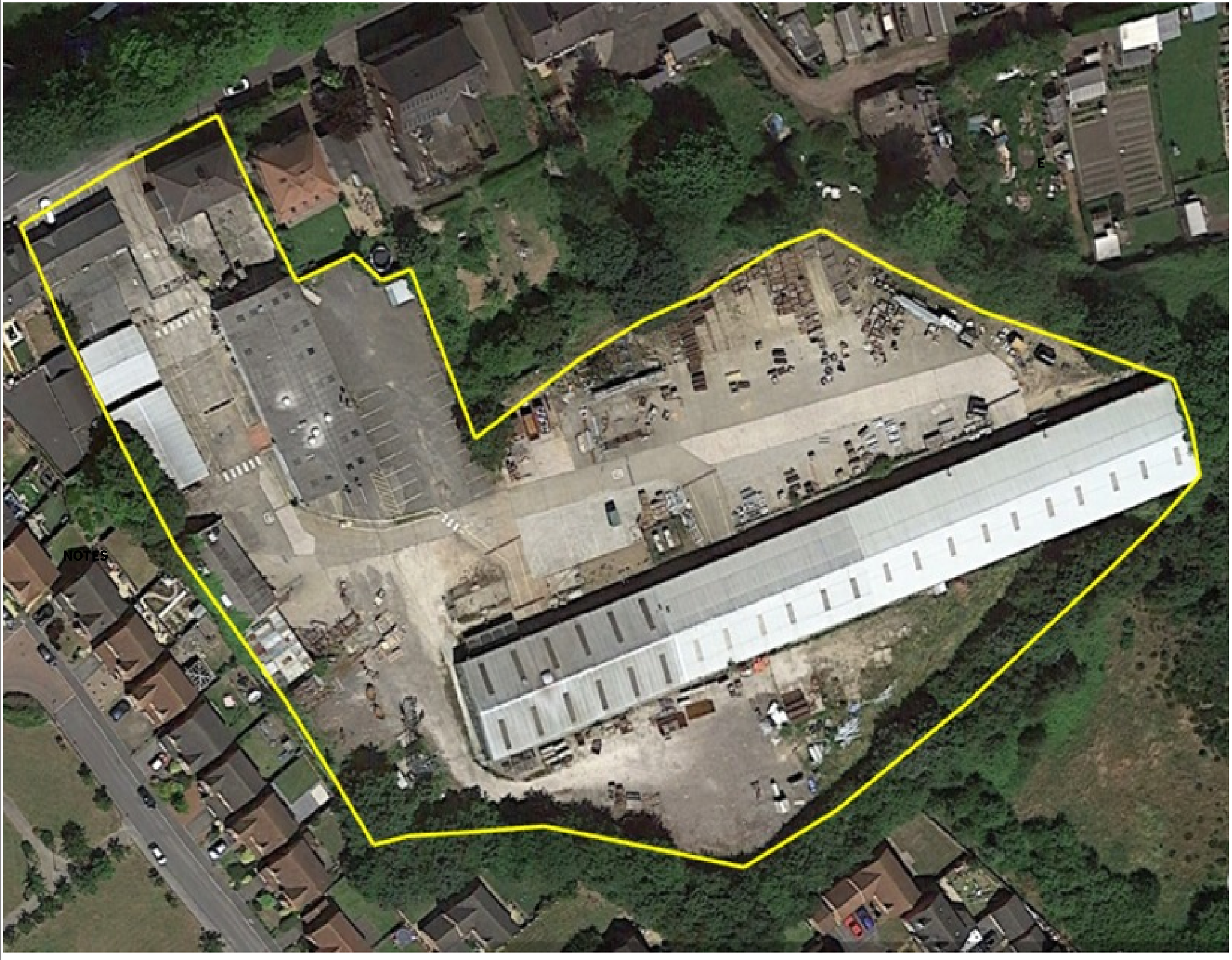
Title
SITE PLAN

Date
JULY 2020

Drawn
V1 @A3

Scale
AS SHOWN

Job No.
HOO/01



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Project
Hough Lane
Wombwell

Client
Hoober Homes Ltd

Title
Aerial Photograph Plan

Date
July 2020

Drawn	Scale
AMJ	NTS

Job No.
HOO/01

NORTH

0m 10m 30m 60m

SCALE 1:500

VISIBILITY SPLAY BASED ON DRG. NO.117436/SK1001 REV A

VISIBILITY FROM DEVELOPMENT TO BE CHECKED DUE TO EXISTING BUILDINGS

HOUGH LANE

70000 43000 43000 70000

2400

RE-CONSTRUCT EXISTING BOUNDARY WALL TO ACHIEVE REQUIRED VISIBILITY SPLAY

RED LINE TAKEN FROM TITLE PLAN SYK265383 - DISCREPANCIES MAY OCCUR DUE TO LIMITATIONS WITH OVERLAY PROCESS

EXISTING HOUSES TO BE RETAINED. NEW REAR ACCESS AND PARKING REQUIRED

ALLOTMENT GARDENS

SUB STATION MAY BE REQUIRED - ITEM TO BE CONFIRMED BY CLIENT

HEDGE

STEEL FENCE

EXISTING BUILDINGS ON SITE TO BE DEMOLISHED

BOUNDARY ALONG THIS BOUNDARY NOT SURVEYED - INDICATED AS SHOWN ON TITLE PLAN PENDING UPDATED TOPOGRAPHICAL SURVEY

Shared Access

EXISTING LANDSCAPING SHOWN INDICATIVELY AT PRESENT

AREA INACCESSIBLE (DENSE SHRUBS)

PHONE MASTER

POS

BUND TO BE REMOVED ALONG SOUTHERN BOUNDARY

ASSUMED OFFSET TO PHONE MAST CAN BE REDUCED - TBC

ASSUMED DRAINAGE OUTFALL. REQUISITION MAY BE REQUIRED DUE TO THIRD PARTY LAND

3.91 ACRES (GROSS)
0.39 ACRES (GROSS)

Legend

Boundary Treatments:

- 1.8m high screen wall
- 1.8m high feathered edge fence
- 1.5m high close boarded fence with 300mm trellis

Refer to boundary treatment layout and details for further information

- Front entrance door
- Secondary entrance door
- Lockable personnel gate (circa. 101no.)
- V Visitor Parking
- Shared private driveway - Tarmacadam

Refuse and recycling:
LA Waste Provision
LA bins to be placed onto permanent paved area. 900X1800mm flag base to bin storage area

- Bin Collection Point with flag based to size indicated on drawing

Paved Patio Area
To consist of 2no. row of 600x600 slabs positioned central to door. Paths to be 900mm wide to front entrance. All other paths to be 600mm to side and rear of dwellings with 150mm margin adjacent dwelling. Shared paths to rear and side to be increased to 900mm wide.

- Garage
- Planning Boundary Line

Trees and Hedgerows:

- Existing trees to be retained and protected within the development
- Root protection zone of existing tree to be retained
- Indicative landscaping
- Tree/Shrubs to be removed

BARNSLEY MBC PLANNING POLCIES AND HOUSING REQUIREMENTS:

- POLICY H7 REQUIREMENT FOR 10% AFFORDABLE HOUSING
- POS REQUIREMENT OF 15% OF THE GROSS SITE AREA REQUIRED
- REAR GARDENS TO BE SIZED AS FOLLOWS:

A. UP TO 2 BEDROOMS - MIN. 50M²
B. 3 BEDROOMS AND ABOVE - MIN. 60M²

- ALL PLOTS TO HAVE ELECTRIC CHARGING PROVISION
- ALL PLOTS TO HAVE CYCLE STORAGE FOR MIN. 1NO. CYCLE
- MINIMUM SPACE STANDARDS APPLY TO HOUSING

House Type	Occupancy	Type	GIA m²	GIA ft²	No.	%
2B4P	2 Bed 4 Persons	2 Storey	65.00	700	18	30.5%
3B5P (A)	3 Bed 5 Persons	2 Storey	77.20	831	16	27.1%
3B5P (B)	3 Bed 5 Persons	2 Storey	77.20	831	17	28.8%
3B5P(1)	3 Bed 5 Persons	2 Storey	79.64	857	3	5.1%
3B5P (2)	3 Bed 5 Persons	2 Storey	79.64	857	1	1.7%
4B6P	3 Bed 6 Persons	2 Storey	95.45	1027	4	6.8%
OVERALL TOTAL			3106	33428	59	100.0%

	Acres	Hectares			
SITE AREA (GROSS)	3.91	1.58			
SITE AREA (NET)	2.99	1.21			
UNIT DENSITY	20	Units/Acre	AREA DENSITY	11180	ft² / acre
	49	Units/Hectare		27626	m² / hectare

NOTE : THE RED LINE INDICATES THE PROPOSED PLANNING APPLICATION BOUNDARY AND IS SUBJECT TO CONFIRMATION. ALL LEGAL BOUNDARIES SHALL BE CONFIRMED BY THE CLIENT. THIS DRAWING IS BASED ON A TOPOGRAPHICAL SURVEY PROVIDED BY A THIRD PARTY. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL THIRD PARTY ENGINEERING PROPOSALS. THE TREES INDICATED ON THIS DRAWING REPRESENT A MIXTURE OF APPROXIMATE POSITIONS AND THOSE CONTAINED WITHIN THE TOPO SURVEY PROVIDED. FOR PROPOSED TREES AND LANDSCAPING PROPOSALS, PLEASE REFER TO SEPARATE LANDSCAPE ARCHITECTS' PROPOSALS.

IMPORTANT NOTE:
This layout is based on an Ordnance Survey Plan to the Western boundary and therefore actual boundaries and layout may vary following results of Site Topographical Survey

Rev	Details	Date	By	Chk

DATE	26.03.2020	DRAWN	H51
SCALE	1:500@A1	CHK	H51

Hough Lane, Wombwell

Site Appraisal

Dwg No	H51-HLW-001	Rev
		--

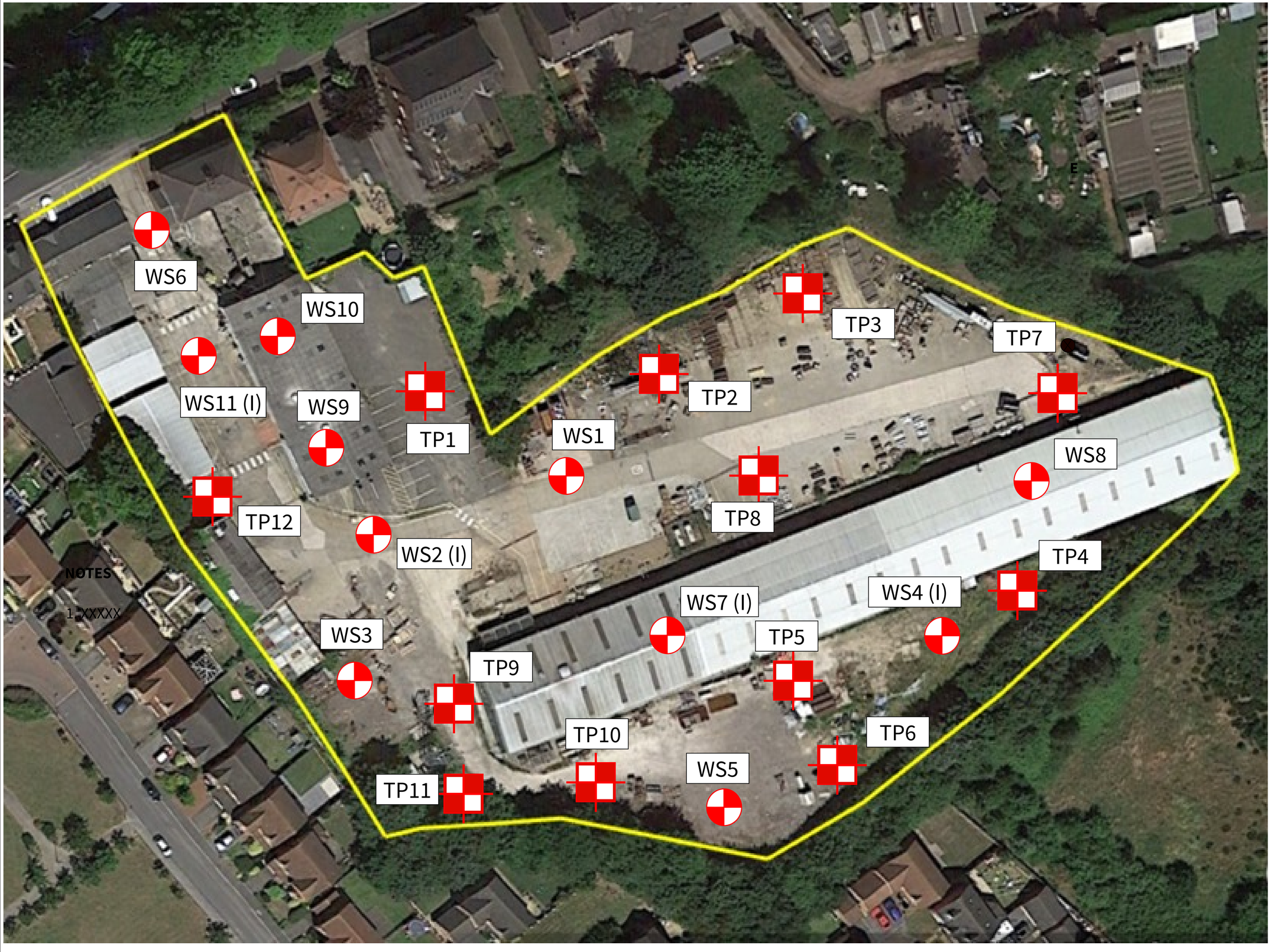
HOOBER homes®

HIVE 31

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A P P E N D I X B

BOREHOLE AND TRIAL PIT LOCATION PLAN AND LOGS



Trial Pit

Window Sample

(I) = Monitoring Installation

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Project
Hough Lane
Wombwell

Client
Hoober Homes Ltd

Title
Exploratory Hole Location Plan

Date
July 2020

Drawn
AMJ

Scale
NTS

Job No.
HOO/01

HOUGH LANE

43000

70000

43000

2400

HEDGE

STEEL FENCE

STEEL FENCE

STEEL FENCE

STEEL FENCE

Shared Access

Shared Access

Shared Access

Shared Access

PHONE MAST

AREA INACCESSIBLE (SHRUBS)

WS1

WS2 (I)

WS3

WS4 (I)

WS5

WS6

WS7 (I)

WS8

WS9

WS10

WS11 (I)

TP1

TP2

TP3

TP4

TP5

TP6

TP7

TP8

TP9

TP10

TP11

TP12

Trial Pit

Window Sample

(I) = Monitoring Installation

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Client
Hoober Homes Ltd

Title
Exploratory Hole Location Plan - Proposed Layout

Date
July 2020

Drawn
AMJ

Scale
NTS

Job No.
HOO/01

ARP Geotechnical Limited

Trial Pit Log

TrialPit No **TP01** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439039.86 - 402488.79 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 2.20 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.05			Bitmac Hardstanding. MADE GROUND: Sandstone flags/blocks.
0.50 - 0.90	ES		0.50			MADE GROUND: Dark brown slightly sandy gravelly silty CLAY. Gravel is fine to coarse angular to rounded of mixed lithologies (but mostly sandstone).
1.00 - 1.30 1.10	D	HSV=62	0.90			Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
			1.50			Very weak to weak buff SANDSTONE recovered as angular gravel and cobbles (WEATHERED PMCMF).
			2.20			End of Pit at 2.200m Sandstone bedrock encountered, unable to excavate further

1 2 3 4 5

Groundwater: None recorded

Backfill: Backfilled with arisings upon completion

Stability: Stable throughout

Remarks: None

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Trial Pit Log

TrialPit No **TP02** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439075.39 - 402494.23 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 2.60 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
0.40 - 0.70	ES		0.70			MADE GROUND: Dark brown slightly gravelly sandy silty CLAY. Gravel pieces are of slag, porcelain, brick and sandstone.
1.30		HSV=95	2.50			Firm to stiff (high strength) buff sandy silty CLAY with low cobble content. Cobbles are angular of sandstone (RESIDUAL PMCMF).
			2.60			Very weak to weak buff SANDSTONE recovered as angular gravel and cobbles (WEATHERED PMCMF). End of Pit at 2.600m Sandstone bedrock encountered, unable to excavate further.

1 2 3 4 5

Groundwater: None

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks: None

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Trial Pit Log

TrialPit No **TP03** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439105.51 - 402508.49 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 3.70 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
0.00 - 0.15	ES		0.15			MADE GROUND: Foundry slag.
0.30 - 0.60	ES					MADE GROUND: slightly gravelly sandy silty CLAY with whole bricks and large cobbles of sandstone.
			1.20			Firm to stiff buff sandy silty CLAY with low cobble content. Cobbles are angular of sandstone (RESIDUAL PMCMF).
1.40		HSV=90	1.40			Firm to stiff (high strength) dull grey slightly sandy silty CLAY (RESIDUAL PMCMF).
1.80 - 2.00	D					
			2.50			Extremely weak to very weak dull grey MUDSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.70			End of Pit at 3.700m Mudstone bedrock encountered, very difficult to excavate further.

1 2 3 4 5

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks: None

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Trial Pit Log

TrialPit No **TP04** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439140.38 - 402463.36 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 1.60 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
0.00 - 0.20	ES					MADE GROUND: Cobbles of sandstone and rags, plastic and rope.
			0.20			Light brown slightly sandy silty CLAY recovered as hard angular cobble sized pieces (Desiccated CLAY). (Residual PMCMF).
			1.30			Very weak to weak buff SANDSTONE recovered as angular gravel and cobbles (WEATHERED PMCMF).
			1.60			End of Pit at 1.600m Sandstone bedrock encountered, unable to excavate further.

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks: None

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Trial Pit Log

TrialPit No **TP05** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439099.60 - 402448.47 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 3.40 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.15			MADE GROUND: Gravel of mixed lithologies over geotextile.
0.30 - 0.60	ES					MADE GROUND: Dark brown slightly gravelly slightly sandy CLAY. Gravel is of brick and sandstone.
			1.00			Firm to stiff dull grey slightly sandy silty CLAY (RESIDUAL PMCMF).
1.20 - 1.40	D					
			2.50			Extremely weak to very weak dull grey MUDSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.40			End of Pit at 3.400m Mudstone bedrock encountered, very difficult to excavate further.

1 2 3 4 5

Groundwater: Groundwater at 3.4m

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks:

ARP Geotechnical Limited	Trial Pit Log	TrialPit No **TP06** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439109.32 - 402434.71 Level:	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley	Pit Dimensions (m) Length: m Width: m Depth: 3.80 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd			Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.15			MADE GROUND: Gravel of mixed lithologies over geotextile.
						MADE GROUND: Dark brown slightly gravelly slightly sandy CLAY. Gravel is of brick and sandstone. Occasional pieces of wire and rags.
1.20 - 1.60	ES					
			1.80			Firm to stiff (high strength) dull grey and buff slightly sandy silty CLAY (RESIDUAL PMCMF).
2.00		HSV=80				
			3.00			Extremely weak to very weak dull grey MUDSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.80			End of Pit at 3.800m Mudstone bedrock encountered, very difficult to excavate further.

1 2 3 4 5

Groundwater: Groundwater at 3.75m

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks: None

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Trial Pit Log

TrialPit No **TP07** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439148.31 - 402493.59 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 3.10 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.15			MADE GROUND: Limestone gravel.
0.50 - 0.70	ES					MADE GROUND: Angular cobbles of sandstone and siltstone in sandy clay matrix.
			1.50			
1.70		HSV=77				Firm to stiff (high strength) buff sandy silty CLAY with low cobble content. Cobbles are angular of sandstone (RESIDUAL PMCMF).
			3.00			
			3.10			Very weak to weak buff SANDSTONE recovered as angular gravel and cobbles (WEATHERED PMCMF).
						End of Pit at 3.100m Sandstone bedrock encountered, unable to excavate further.

1 2 3 4 5

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks: Next to removed diesel tank

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Trial Pit Log

TrialPit No **TP08** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439097.19 - 402482.16 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 1.80 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
						Concrete slab including reinforcement mesh.
			0.20			MADE GROUND: Sandstone cobbles
0.40 - 0.80	ES					
			1.40			Very weak to weak buff SANDSTONE recovered as angular gravel and cobbles (WEATHERED PMCMF).
			1.80			End of Pit at 1.800m Sandstone bedrock encountered, unable to excavate further.

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: major instability in made ground.

Remarks: None

ARP Geotechnical Limited	Trial Pit Log	TrialPit No **TP09** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439042.72 - 402443.74 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley	Pit Dimensions (m) Length: m Width: m Depth: 3.80 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd			Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.05			MADE GROUND: Weathered/broken down bituminous surface.
			0.15			MADE GROUND: Gravel of limestone (sub-base/type 1 material).
						MADE GROUND: whole bricks and gravel of mixed lithologies. Reinforcement mesh, rope and rags
0.80 - 1.20	ES		0.80			MADE GROUND: black ashy sand with gravel of mixed lithologies. Hydrocarbon odour noted.
			1.20			MADE GROUND: Sandstone flags (possible old road).
1.30		HSV=65	1.30			Firm to stiff (medium strength) dull grey and buff mottled slightly sandy silty CLAY (RESIDUAL PMCMF).
			3.50			Extremely weak to very weak dull grey MUDSTONE and SILTSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.80			End of Pit at 3.800m Mudstone/siltstone bedrock encountered, very difficult to excavate further.

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Stable throughout.

Remarks:

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Trial Pit Log

TrialPit No **TP10** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439062.04 - 402430.77 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 4.00 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
			0.20			MADE GROUND: Gravel of mixed lithologies over geotextile.
0.70 - 1.00	ES					MADE GROUND: Slightly gravelly slightly sandy silty CLAY. Gravel is of mixed lithologies. Occasional piece of rope and rag.
2.50		HSV=73	2.40			Firm to stiff (medium strength) dull grey slightly sandy silty CLAY (RESIDUAL PMCMF).
			3.60			Extremely weak to very weak dull grey MUDSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			4.00			End of Pit at 4.000m Full depth of pit completed (using smooth bucket)

1 2 3 4 5

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Some instability in made ground.

Remarks: None

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Trial Pit Log

TrialPit No **TP11** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439045.36 - 402426.02 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 3.80 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
0.80 - 1.20	ES					MADE GROUND: Dark brown sandy CLAY with fence post, reinforcement mesh, rags, plastic sheet, metal pole and pottery. Hydrocarbon odour from 0.5m to 1.5m.
2.80 - 3.00	D	HSV=63	2.80			Firm to stiff (medium strength) dull grey slightly sandy silty CLAY (RESIDUAL PMCMF).
2.80			3.50			Extremely weak to very weak dull grey MUDSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.80			End of Pit at 3.800m Full depth of pit completed (using smooth bucket)

1 2 3 4 5

Groundwater: None encountered.

Backfill: Backfilled with arisings upon completion.

Stability: Major instability in made ground.

Remarks: None

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Trial Pit Log

TrialPit No **TP12** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439001.93 - 402473.22 Level:	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Pit Dimensions (m) Length: m Width: m Depth: 3.20 m	Machine Type: JCB 3CX	Scale 1:25
Client: Hoober Homes Ltd				Logged: AMJ

Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
						Concrete slab including reinforcement mesh.
			0.20			MADE GROUND: dark brown sandy clay with whole bricks.
			0.40			MADE GROUND: Sandstone flags and cobbles.
			0.60			MADE GROUND: Gravel of mixed lithologies with whole bricks and boulder sized sandstone blocks.
0.80 - 1.00	ES					
1.70 - 2.00	D		1.70			Firm to stiff (medium strength) buff very sandy silty CLAY with low cobble content. Cobbles are angular of sandstone and siltstone (RESIDUAL PMCMF).
						Buff very clayey SAND layers within clay.
			3.00			Extremely weak to very weak dull grey MUDSTONE and SILTSTONE recovered as angular gravel and cobbles. (WEATHERED PMCMF).
			3.20			End of Pit at 3.200m Mudstone bedrock encountered, very difficult to excavate further.

1 2 3 4 5

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion.

Stability: Major instability in made ground.

Remarks: None

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Windowless Sample Log

Borehole No. **WS01**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439059.16 - 402478.30	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15 - 0.50	ES		0.12			Concrete slab including reinforcement mesh.
								MADE GROUND: Brown slightly sandy silty CLAY.
					0.50			Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		1.00	SPT	N=14 (4,4/3,3,4,4)				
		1.70	SPT	50 (25 for 60mm/50 for 50mm)	1.70			Very weak to weak buff SANDSTONE (WEATHERED PMCMF).
					1.81			End of Borehole at 1.810m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

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Windowless Sample Log

Borehole No. **WS02** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439027.58 - 402468.46	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.60	ES		0.30			MADE GROUND: Gravel of mixed lithologies
					0.60			MADE GROUND: Dark brown sandy gravel of mixed lithologies.
		1.00	SPT	N=8 (2,2/2,2,2,2)				Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		2.00	SPT	N=14 (3,3/3,3,3,5)	2.00			Very weak to weak buff SANDSTONE and SILTSTONE (WEATHERED PMCMF).
		3.00	SPT	50 (8,8/50 for 210mm)				
					3.36			End of Borehole at 3.360m SPT refusal

Groundwater: None encountered

Backfill: Monitoring pipework installed.

Remarks: Monitoring pipe installed. Plain pipe with bentonite surround from ground level to 1m. Slotted pipe with gravel surround from 1m to 2.9m.

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Windowless Sample Log

Borehole No. **WS03**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439022.77 - 402446.95	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30 - 0.70	ES		0.20			MADE GROUND: Limestone gravel.
								MADE GROUND: dark brown gravelly CLAY. Gravel is of mixed lithologies.
		1.00	SPT	N=10 (3,3/3,3,2,2)	0.90			MADE GROUND: Gravel of mixed lithologies.
					1.20			Very dark brown soft organic rich CLAY.
		1.80 - 2.00	D		1.60			Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		2.00	SPT	N=12 (2,3/3,3,3,3)				
					2.20			stiff to very stiff (high strength) buff and grey mottled sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular of sandstone and siltstone (RESIDUAL PMCMF).
		3.00	SPT	N=30 (4,4/6,8,8,8)				
					3.50			Extremely weak to very weak dull grey MUDSTONE (WEATHERED PMCMF).
		4.00	SPT	50 (7,9/50 for 190mm)				
					4.34			End of Borehole at 4.340m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion.

Remarks: None

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Windowless Sample Log

Borehole No. **WS04** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439127.64 - 402455.62	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.40 - 0.80	ES		0.40			MADE GROUND: Limestone gravel.
					0.80			MADE GROUND: Brown clay with gravel of mixed lithologies (desiccated).
		1.00	SPT	N=27 (2,6/8,8,6,5)	0.90			Very dark brown silty organic rich CLAY. Firm to stiff (high strength) buff sandy silty CLAY (suspected to be desiccated) (RESIDUAL PMCMF).
		2.00	SPT	N=30 (5,5/5,7,8,10)				
		2.70 - 3.00	D		2.50			Extremely weak to very weak dull grey and buff mottled SILTSTONE (WEATHERED PMCMF).
		3.00	SPT	50 (25 for 145mm/50 for 40mm)	3.11			End of Borehole at 3.110m SPT refusal

Groundwater: None encountered

Backfill: Monitoring pipework installed.

Remarks: Monitoring pipe installed. Plain pipe with bentonite surround from ground level to 1m. Slotted pipe with gravel surround from 1m to 2.9m.

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Windowless Sample Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439086.29 - 402422.81	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.70 - 1.00	ES					MADE GROUND: brown slightly sandy slightly gravelly silty CLAY. Gravel is of mixed lithologies but mostly brick.
		1.00	SPT	N=7 (1,1/2,1,2,2)				
		2.00	SPT	N=2 (1,0/1,0,1,0)				
					2.20			Firm to stiff (high strength) buff and grey mottled sandy silty CLAY (RESIDUAL PMCMF).
		3.00	SPT	N=21 (4,3/3,5,6,7)				
		4.00	SPT	N=50 (8,10/12,14,16,8)	3.90			Extremely weak to very weak dull grey MUDSTONE (WEATHERED PMCMF).
					4.45			End of Borehole at 4.450m SPT refusal

1 2 3 4 5 6 7 8

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

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Windowless Sample Log

Borehole No. **WS06**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 438994.45 - 402517.69	Date 02/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Concrete slab with reinforcement mesh.
					0.37			
					0.50			MADE GROUND: limestone gravel.
					0.80			MADE GROUND: Dark brown gravel of mixed lithologies.
		1.00	SPT	N=9 (2,2/2,2,3,2)				MADE GROUND: Soft buff and stained dark brown gravelly slightly sandy silty CLAY. Gravel is of brick.
					1.20			
		2.00	SPT	N=13 (4,4/3,3,3,4)				Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
					2.50			
		2.70	SPT	50 (25 for 75mm/50 for 155mm)				Very weak to weak buff SANDSTONE (WEATHERED PMCMF).
					2.93			End of Borehole at 2.930m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

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Windowless Sample Log

Borehole No. **WS07** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439080.33 - 402455.41	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.16			Concrete slab including mesh reinforcement.
		0.50 - 0.90	ES		0.50			MADE GROUND: Limestone gravel.
					0.90			MADE GROUND: light grey and brown angular gravel of mixed lithologies.
		1.00	SPT	N=7 (0,0/1,2,1,3)	1.20			MADE GROUND: (suspected reworked ground) as soft brown slightly sandy silty CLAY.
		2.00	SPT	N=18 (3,3/4,4,5,5)				Firm to stiff (high strength) buff sandy silty CLAY (RESIDUAL PMCMF).
	▼	3.00	SPT	N=40 (6,6/7,9,10,14)	3.00			Soft (very high strength) buff and grey mottled sandy silty CLAY (water strike likely to have softened clay sample that was logged) (RESIDUAL PMCMF).
		4.00	SPT	N=50 (8,8/11,13,15,11)	3.50			Extremely weak to very weak dull grey MUDSTONE (WEATHERED PMCMF).
					4.45			End of Borehole at 4.450m SPT refusal

Groundwater: Wet at 3m

Backfill: Monitoring pipework installed.

Remarks: Monitoring pipe installed. Plain pipe with bentonite surround from ground level to 1m. Slotted pipe with gravel surround from 1m to 3m.

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Windowless Sample Log

Borehole No. **WS08** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439145.76 - 402480.08	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Concrete slab including reinforcement mesh.
					0.40			MADE GROUND: Limestone gravel.
		0.50 - 0.80	ES					MADE GROUND: Soft dark brown slightly sandy slightly gravelly silty CLAY. Gravel is of mixed lithologies.
		1.00	SPT	N=4 (1,1/1,1,1,1)	1.10			Soft very dark brown silty organic rich CLAY.
					1.20			Firm to stiff (high strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		2.00	SPT	N=30 (3,2/5,5,10,10)				
					2.60			Very weak to weak buff SANDSTONE (WEATHERED PMCMF).
		2.80	SPT	50 (25 for 40mm/50 for 70mm)	2.91			End of Borehole at 2.910m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

ARP Geotechnical Limited	Windowless Sample Log	Borehole No. **WS09** Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439020.70 - 402483.31	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Concrete slab with reinforcement mesh
		0.40 - 0.80	ES		0.40			MADE GROUND: Limestone gravel
					0.80			MADE GROUND: gravel of brick and concrete with some sandstone.
		1.00	SPT	N=13 (2,2/3,3,3,4)	1.00			Very dark brown silty organic rich CLAY.
		2.00	SPT	N=13 (4,4/3,3,3,4)				Firm to stiff (medium strength) buff sandy silty CLAY (RESIDUAL PMCMF).
					2.70			Very stiff to hard dark brown silty CLAY.
		3.00	SPT	50 (25 for 70mm/50 for 80mm)	2.75 2.95 3.15			very stiff (medium strength) buff very sandy silty CLAY (RESIDUAL PMCMF). Very weak to weak buff SANDSTONE (WEATHERED PMCMF). End of Borehole at 3.150m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

ARP Geotechnical Limited

Windowless Sample Log

Borehole No. **WS10**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439014.52 - 402498.69	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.35	ES		0.20			Concrete slab including mesh reinforcement.
					0.35			MADE GROUND: Limestone gravel.
					0.70			Soft very dark brown silty organic rich CLAY.
		1.00	SPT	N=36 (9,9/9,9,9,9)				Firm to stiff (high strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		2.00	SPT	50 (11,14/50 for 125mm)	1.80			Very weak to weak buff SANDSTONE (WEATHERED PMCMF).
					2.25			End of Borehole at 2.250m SPT refusal

Groundwater: None encountered

Backfill: Backfilled with arisings upon completion

Remarks: None

ARP Geotechnical Limited

Windowless Sample Log

Borehole No. **WS11**

Sheet 1 of 1

Project Name: Hough Lane, Wombwell	Project No. HOO/01	Co-ords: 439003.34 - 402495.41	Date 03/06/2020
Location: Hough Lane, Wombwell, Barnsley		Level:	Scale 1:40
Client: Hoober Homes Ltd		Rig Crew: RP Drilling	Logged: AMJ

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.14			Concrete slab with reinforcement mesh.
					0.20			MADE GROUND: Limestone gravel.
								Firm to stiff (high strength) buff sandy silty CLAY (RESIDUAL PMCMF).
		1.00	SPT	N=25 (3,5/6,7,7,5)				
		2.00	SPT	N=49 (7,12/13,11,13,12)	2.00			Very weak to weak buff SANDSTONE (WEATHERED PMCMF).
		2.50	SPT	50 (25 for 60mm/50 for 115mm)	2.68			End of Borehole at 2.680m SPT refusal

Groundwater: None encountered

Backfill: Monitoring pipework installed.

Remarks: Monitoring pipe installed. Plain pipe with bentonite surround from ground level to 1m. Slotted pipe with gravel surround from 1m to 2.5m.

APPENDIX C

LABORATORY TEST CERTIFICATES AND SCREENING VALUES

2531

ANALYTICAL TEST REPORT

Contract no: 86520(1)

Contract name: Hough Lane, Wombwell

Client reference: Hoober Homes

Clients name: ARP Associates

Clients address: 5 & 6 Northwest Business Park
Servia Hill
Leeds
LS6 2QH

Samples received: 08 June 2020

Analysis started: 09 June 2020

Analysis completed: 25 June 2020

Report issued: 25 June 2020

This is a supplementary report to report number 86520 issued 16 June 2020.

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.
BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Dave Bowerbank
Customer Support Hero

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
86520-1	TP1	0.50-0.90	Clayey Sand with Gravel	-	-	15.5
86520-2	TP1	1.00-1.30	Sandy Clay with Gravel	-	-	8.7
86520-3	TP3	0.30-0.60	Clayey Sand with Gravel	-	-	9.0
86520-4	TP4	0.00-0.20	Sandy Clay with Gravel & Roots	-	-	4.4
86520-5	TP5	1.20-1.40	Sandy Clay	-	-	17.7
86520-6	TP6	1.20-1.60	Sandy Clay with Gravel	-	-	20.2
86520-7	TP7	0.50-0.70	Sand with Gravel & Roots	-	-	6.4
86520-8	TP8	0.40-0.80	Sand with Gravel	-	-	8.2
86520-9	TP9	0.80-1.20	Sand with Gravel	-	-	11.9
86520-10	TP10	0.70-1.00	Clayey Sand with Gravel	-	-	11.1
86520-11	TP11	0.80-1.20	Clayey Sand with Gravel	-	-	18.0
86520-12	TP12	0.80-1.00	Sand with Gravel	-	-	11.4
86520-13	WS1	0.12-0.50	Sand with Gravel	-	-	5.2
86520-14	WS2	0.30-0.60	Sand with Gravel	-	-	5.8
86520-15	WS3	0.30-0.70	Sandy Clay with Gravel	-	-	8.8
86520-16	WS4	0.40.-0.80	Sandy Clay with Gravel & Roots	-	-	7.7
86520-17	WS5	0.70-1.00	Sand with Gravel	-	-	17.4
86520-18	WS6	0.50-0.80	Sand with Gravel	-	-	8.4
86520-19	WS7	0.50-0.90	Sandy Clay with Gravel	-	-	10.8
86520-20	WS8	0.50-0.90	Sandy Clay with Gravel & Roots	-	-	16.3
86520-21	WS9	0.40-0.80	Sandy Clay with Gravel	-	-	14.8
86520-22	WS10	0.20-0.35	Sand with Gravel	-	-	12.3

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SOILS

Lab number			86520-1	86520-2	86520-3	86520-4	86520-5	86520-6
Sample id			TP1	TP1	TP3	TP4	TP5	TP6
Depth (m)			0.50-0.90	1.00-1.30	0.30-0.60	0.00-0.20	1.20-1.40	1.20-1.60
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	20	8.7	8.1	11	7.6	12
Cadmium (total)	CE127 M	mg/kg Cd	<0.2	<0.2	0.3	<0.2	<0.2	0.3
Chromium (total)	CE127 M	mg/kg Cr	23	25	392	84	49	93
Chromium (III)	CE208	mg/kg CrIII	23	25	392	84	49	93
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	36	16	37	23	36	28
Lead (total)	CE127 M	mg/kg Pb	55	20	89	47	20	59
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	26	28	34	33	56	34
Selenium (total)	CE127 M	mg/kg Se	1.7	1.2	1.5	1.2	3.1	1.5
Zinc (total)	CE127 M	mg/kg Zn	56	56	244	100	82	98
pH	CE004 M	units	7.7	6.5	8.2	7.0	4.8	6.3
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	71	52	86	21	59	98
Sulphate (total)	CE062 M	mg/kg SO_4	553	308	858	260	512	562
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	4.8	0.3	0.8	2.1	0.3	2.6
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	8.3	0.6	1.4	3.6	0.4	4.6
PAH								
Naphthalene	CE087 M	mg/kg	0.09	<0.02	0.05	<0.02	<0.02	0.09
Acenaphthylene	CE087 M	mg/kg	0.03	<0.02	0.02	<0.02	<0.02	0.05
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.03
Fluorene	CE087 U	mg/kg	<0.02	<0.02	0.02	<0.02	<0.02	0.04
Phenanthrene	CE087 M	mg/kg	0.18	<0.02	0.31	0.05	<0.02	0.47
Anthracene	CE087 U	mg/kg	0.04	<0.02	0.06	<0.02	<0.02	0.12
Fluoranthene	CE087 M	mg/kg	0.30	<0.02	0.58	0.11	<0.02	0.90
Pyrene	CE087 M	mg/kg	0.24	<0.02	0.48	0.10	<0.02	0.75
Benzo(a)anthracene	CE087 U	mg/kg	0.17	<0.02	0.25	0.05	<0.02	0.35
Chrysene	CE087 M	mg/kg	0.31	<0.03	0.33	0.08	<0.03	0.43
Benzo(b)fluoranthene	CE087 M	mg/kg	0.23	<0.02	0.34	0.07	<0.02	0.53
Benzo(k)fluoranthene	CE087 M	mg/kg	0.09	<0.03	0.14	<0.03	<0.03	0.20
Benzo(a)pyrene	CE087 U	mg/kg	0.20	<0.02	0.47	0.13	<0.02	0.66
Indeno(123cd)pyrene	CE087 M	mg/kg	0.27	<0.02	0.35	0.15	<0.02	0.92
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	0.07	0.03	<0.02	0.17
Benzo(ghi)perylene	CE087 M	mg/kg	0.16	<0.02	0.56	0.09	<0.02	0.83
PAH (total of USEPA 16)	CE087	mg/kg	2.28	<0.34	4.04	0.86	<0.34	6.54
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	-	-	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	-	-	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-1	86520-2	86520-3	86520-4	86520-5	86520-6
Sample id			TP1	TP1	TP3	TP4	TP5	TP6
Depth (m)			0.50-0.90	1.00-1.30	0.30-0.60	0.00-0.20	1.20-1.40	1.20-1.60
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	-	-	-	-	-	-
VPH (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH (>C10-C35)	CE033	mg/kg	8	11	28	14	<7	93
TPH (>C8-C35)	-	mg/kg	<10	11	28	14	<10	93
Volatiles								
MTBE	CE192 U	mg/kg	-	-	-	-	-	-
Benzene	CE192 U	mg/kg	-	-	-	-	-	-
Toluene	CE192 U	mg/kg	-	-	-	-	-	-
Ethylbenzene	CE192 U	mg/kg	-	-	-	-	-	-
m & p-Xylene	CE192 U	mg/kg	-	-	-	-	-	-
o-Xylene	CE192 U	mg/kg	-	-	-	-	-	-
Dichlorodifluoromethane	CE174	mg/kg	-	-	-	-	-	-
Chloromethane	CE174	mg/kg	-	-	-	-	-	-
Vinyl chloride	CE174	mg/kg	-	-	-	-	-	-
Bromomethane	CE174	mg/kg	-	-	-	-	-	-
Chloroethane	CE174	mg/kg	-	-	-	-	-	-
Trichlorofluoromethane	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
Trans-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloroethane	CE174	mg/kg	-	-	-	-	-	-
2,2-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Cis-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
Bromochloromethane	CE174	mg/kg	-	-	-	-	-	-
Chloroform	CE174	mg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	CE174	mg/kg	-	-	-	-	-	-
Carbon tetrachloride	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichloroethane	CE174	mg/kg	-	-	-	-	-	-
Trichloroethene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Dibromomethane	CE174	mg/kg	-	-	-	-	-	-
Bromodichloromethane	CE174	mg/kg	-	-	-	-	-	-
cis-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-
trans-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-1	86520-2	86520-3	86520-4	86520-5	86520-6
Sample id			TP1	TP1	TP3	TP4	TP5	TP6
Depth (m)			0.50-0.90	1.00-1.30	0.30-0.60	0.00-0.20	1.20-1.40	1.20-1.60
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
1,1,2-Trichloroethane	CE174	mg/kg	-	-	-	-	-	-
Tetrachloroethene	CE174	mg/kg	-	-	-	-	-	-
1,3-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Dibromochloromethane	CE174	mg/kg	-	-	-	-	-	-
1,2-Dibromoethane	CE174	mg/kg	-	-	-	-	-	-
Chlorobenzene	CE174	mg/kg	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	-	-
Styrene	CE174	mg/kg	-	-	-	-	-	-
Tribromomethane	CE174	mg/kg	-	-	-	-	-	-
Isopropylbenzene	CE174	mg/kg	-	-	-	-	-	-
Bromobenzene	CE174	mg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	CE174	mg/kg	-	-	-	-	-	-
Propylbenzene	CE174	mg/kg	-	-	-	-	-	-
2-Chlorotoluene	CE174	mg/kg	-	-	-	-	-	-
4-Chlorotoluene	CE174	mg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	CE174	mg/kg	-	-	-	-	-	-
tert-Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	CE174	mg/kg	-	-	-	-	-	-
sec-Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
4-Isopropyltoluene	CE174	mg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	CE174	mg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Hexachloro-1,3-butadiene	CE174	mg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Semi-volatiles								
N-Nitrosodimethylamine	CE189	mg/kg	-	-	-	-	-	-
Phenol	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroethyl)ether	CE189	mg/kg	-	-	-	-	-	-
2-Chlorophenol	CE189	mg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
2-Methylphenol	CE189	mg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	CE189	mg/kg	-	-	-	-	-	-
3&4-Methylphenol	CE189	mg/kg	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	CE189	mg/kg	-	-	-	-	-	-
Hexachloroethane	CE189	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-1	86520-2	86520-3	86520-4	86520-5	86520-6
Sample id			TP1	TP1	TP3	TP4	TP5	TP6
Depth (m)			0.50-0.90	1.00-1.30	0.30-0.60	0.00-0.20	1.20-1.40	1.20-1.60
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Nitrobenzene	CE189	mg/kg	-	-	-	-	-	-
Isophorone	CE189	mg/kg	-	-	-	-	-	-
2,4-Dimethylphenol	CE189	mg/kg	-	-	-	-	-	-
2-Nitrophenol	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	CE189	mg/kg	-	-	-	-	-	-
2,4-Dichlorophenol	CE189	mg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
4-Chloroaniline	CE189	mg/kg	-	-	-	-	-	-
Hexachlorobutadiene	CE189	mg/kg	-	-	-	-	-	-
4-Chloro-3-methylphenol	CE189	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	CE189	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	CE189	mg/kg	-	-	-	-	-	-
Hexachlorocyclopentadiene	CE189	mg/kg	-	-	-	-	-	-
2,4,6-Trichlorophenol	CE189	mg/kg	-	-	-	-	-	-
2,4,5-Trichlorophenol	CE189	mg/kg	-	-	-	-	-	-
2-Chloronaphthalene	CE189	mg/kg	-	-	-	-	-	-
2-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
Dimethyl phthalate	CE189	mg/kg	-	-	-	-	-	-
2,6-Dinitrotoluene	CE189	mg/kg	-	-	-	-	-	-
3-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
2,4-Dinitrophenol	CE189	mg/kg	-	-	-	-	-	-
4-Nitrophenol	CE189	mg/kg	-	-	-	-	-	-
2,4-Dinitrotoluene	CE189	mg/kg	-	-	-	-	-	-
Dibenzofuran	CE189	mg/kg	-	-	-	-	-	-
Diethyl phthalate	CE189	mg/kg	-	-	-	-	-	-
4-Chlorophenylphenyl ether	CE189	mg/kg	-	-	-	-	-	-
4-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
2-Methyl-4,6-dinitrophenol	CE189	mg/kg	-	-	-	-	-	-
Azobenzene	CE189	mg/kg	-	-	-	-	-	-
4-Bromophenylphenyl ether	CE189	mg/kg	-	-	-	-	-	-
Hexachlorobenzene	CE189	mg/kg	-	-	-	-	-	-
Pentachlorophenol	CE189	mg/kg	-	-	-	-	-	-
Carbazole	CE189	mg/kg	-	-	-	-	-	-
Di-n-butyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Butylbenzyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	CE189	mg/kg	-	-	-	-	-	-
Di-n-octyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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SOILS

Lab number			86520-7	86520-8	86520-9	86520-10	86520-11	86520-12
Sample id			TP7	TP8	TP9	TP10	TP11	TP12
Depth (m)			0.50-0.70	0.40-0.80	0.80-1.20	0.70-1.00	0.80-1.20	0.80-1.00
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	4.7	7.9	18	15	16	14
Cadmium (total)	CE127 M	mg/kg Cd	0.3	<0.2	1.2	1.3	1.4	0.4
Chromium (total)	CE127 M	mg/kg Cr	28	31	129	156	147	39
Chromium (III)	CE208	mg/kg CrIII	28	31	129	156	147	39
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	12	17	132	116	151	52
Lead (total)	CE127 M	mg/kg Pb	16	21	336	121	134	73
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	14	49	53	33	59	21
Selenium (total)	CE127 M	mg/kg Se	1.1	1.5	1.8	1.6	1.9	3.1
Zinc (total)	CE127 M	mg/kg Zn	57	51	805	423	464	194
pH	CE004 M	units	9.1	7.0	8.1	8.1	8.0	10.5
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	67	89	101	67	194	143
Sulphate (total)	CE062 M	mg/kg SO_4	505	382	894	644	1616	4042
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	13	<0.5	1.2	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	0.9	0.2	6.0	4.2	3.2	1.0
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	1.6	0.3	10.4	7.2	5.5	1.7
PAH								
Naphthalene	CE087 M	mg/kg	<0.02	<0.02	0.95	0.09	0.33	1.67
Acenaphthylene	CE087 M	mg/kg	<0.02	<0.02	<0.02	0.09	0.21	3.46
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	0.14	0.12	3.54
Fluorene	CE087 U	mg/kg	<0.02	<0.02	2.90	0.11	0.18	3.87
Phenanthrene	CE087 M	mg/kg	0.03	<0.02	6.51	2.48	2.55	31.28
Anthracene	CE087 U	mg/kg	<0.02	<0.02	2.46	0.88	0.62	17.36
Fluoranthene	CE087 M	mg/kg	<0.02	<0.02	7.51	5.69	6.01	83.28
Pyrene	CE087 M	mg/kg	<0.02	<0.02	6.92	5.07	5.10	86.46
Benzo(a)anthracene	CE087 U	mg/kg	<0.02	<0.02	3.81	2.91	2.64	37.49
Chrysene	CE087 M	mg/kg	<0.03	<0.03	3.81	3.30	3.38	35.22
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.02	<0.02	6.66	5.74	3.39	25.12
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.03	<0.03	2.51	2.43	1.33	11.71
Benzo(a)pyrene	CE087 U	mg/kg	0.02	<0.02	6.62	4.75	5.27	82.58
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02	<0.02	6.60	3.88	4.04	53.16
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	1.19	0.68	0.67	10.52
Benzo(ghi)perylene	CE087 M	mg/kg	<0.02	<0.02	6.42	3.54	2.87	42.53
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	<0.34	64.9	41.8	38.7	529
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	<0.01	-	-	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	<0.01	-	-	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	0.12	-	-	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	-	-	2	-	-	3
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	-	-	10	-	-	8
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	-	-	28	-	-	221

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Lab number			86520-7	86520-8	86520-9	86520-10	86520-11	86520-12
Sample id			TP7	TP8	TP9	TP10	TP11	TP12
Depth (m)			0.50-0.70	0.40-0.80	0.80-1.20	0.70-1.00	0.80-1.20	0.80-1.00
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	-	-	33	-	-	255
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	-	-	7	-	-	44
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	<0.1	-	-	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	0.2	-	-	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	3.0	-	-	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	-	-	402	-	-	12
EPH Aliphatic (>C12-C16)	CE068	mg/kg	-	-	2427	-	-	96
EPH Aliphatic (>C16-C35)	CE068	mg/kg	-	-	4641	-	-	587
EPH Aliphatic (>C35-C44)	CE068	mg/kg	-	-	510	-	-	270
VPH (>C8-C10)	CE067	mg/kg	<0.1	<0.1	3.2	<0.1	<0.1	<0.1
EPH (>C10-C35)	CE033	mg/kg	<7	<7	7497	126	767	1182
TPH (>C8-C35)	-	mg/kg	<10	<10	7500	126	767	1182
Volatiles								
MTBE	CE192 U	mg/kg	-	-	-	-	<0.02	-
Benzene	CE192 U	mg/kg	-	-	-	-	<0.01	-
Toluene	CE192 U	mg/kg	-	-	-	-	<0.01	-
Ethylbenzene	CE192 U	mg/kg	-	-	-	-	<0.01	-
m & p-Xylene	CE192 U	mg/kg	-	-	-	-	<0.02	-
o-Xylene	CE192 U	mg/kg	-	-	-	-	<0.01	-
Dichlorodifluoromethane	CE174	mg/kg	-	-	-	-	<0.01	-
Chloromethane	CE174	mg/kg	-	-	-	-	<0.01	-
Vinyl chloride	CE174	mg/kg	-	-	-	-	<0.01	-
Bromomethane	CE174	mg/kg	-	-	-	-	<0.03	-
Chloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
Trichlorofluoromethane	CE174	mg/kg	-	-	-	-	<0.01	-
1,1-Dichloroethene	CE174	mg/kg	-	-	-	-	<0.01	-
Trans-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	<0.01	-
1,1-Dichloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
2,2-Dichloropropane	CE174	mg/kg	-	-	-	-	<0.01	-
Cis-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	<0.01	-
Bromochloromethane	CE174	mg/kg	-	-	-	-	<0.01	-
Chloroform	CE174	mg/kg	-	-	-	-	<0.01	-
1,1,1-Trichloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
Carbon tetrachloride	CE174	mg/kg	-	-	-	-	<0.01	-
1,1-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2-Dichloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
Trichloroethene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2-Dichloropropane	CE174	mg/kg	-	-	-	-	<0.01	-
Dibromomethane	CE174	mg/kg	-	-	-	-	<0.01	-
Bromodichloromethane	CE174	mg/kg	-	-	-	-	<0.01	-
cis-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	<0.01	-
trans-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	<0.01	-

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Lab number			86520-7	86520-8	86520-9	86520-10	86520-11	86520-12
Sample id			TP7	TP8	TP9	TP10	TP11	TP12
Depth (m)			0.50-0.70	0.40-0.80	0.80-1.20	0.70-1.00	0.80-1.20	0.80-1.00
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
1,1,2-Trichloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
Tetrachloroethene	CE174	mg/kg	-	-	-	-	<0.01	-
1,3-Dichloropropane	CE174	mg/kg	-	-	-	-	<0.01	-
Dibromochloromethane	CE174	mg/kg	-	-	-	-	<0.01	-
1,2-Dibromoethane	CE174	mg/kg	-	-	-	-	<0.01	-
Chlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,1,1,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
Styrene	CE174	mg/kg	-	-	-	-	<0.01	-
Tribromomethane	CE174	mg/kg	-	-	-	-	<0.01	-
Isopropylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
Bromobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,1,2,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	<0.01	-
1,2,3-Trichloropropane	CE174	mg/kg	-	-	-	-	<0.01	-
Propylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
2-Chlorotoluene	CE174	mg/kg	-	-	-	-	<0.01	-
4-Chlorotoluene	CE174	mg/kg	-	-	-	-	<0.01	-
1,3,5-Trimethylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
tert-Butylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2,4-Trimethylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
sec-Butylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,3-Dichlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
4-Isopropyltoluene	CE174	mg/kg	-	-	-	-	<0.01	-
1,4-Dichlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2-Dichlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
Butylbenzene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2-Dibromo-3-chloropropane	CE174	mg/kg	-	-	-	-	<0.01	-
1,2,4-Trichlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
Hexachloro-1,3-butadiene	CE174	mg/kg	-	-	-	-	<0.01	-
1,2,3-Trichlorobenzene	CE174	mg/kg	-	-	-	-	<0.01	-
Semi-volatiles								
N-Nitrosodimethylamine	CE189	mg/kg	-	-	-	-	<0.1	-
Phenol	CE189	mg/kg	-	-	-	-	<0.1	-
Bis(2-chloroethyl)ether	CE189	mg/kg	-	-	-	-	<0.1	-
2-Chlorophenol	CE189	mg/kg	-	-	-	-	<0.1	-
1,3-Dichlorobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
1,4-Dichlorobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
2-Methylphenol	CE189	mg/kg	-	-	-	-	<0.1	-
1,2-Dichlorobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
Bis(2-chloroisopropyl)ether	CE189	mg/kg	-	-	-	-	<0.1	-
3&4-Methylphenol	CE189	mg/kg	-	-	-	-	<0.1	-
N-Nitrosodi-n-propylamine	CE189	mg/kg	-	-	-	-	<0.1	-
Hexachloroethane	CE189	mg/kg	-	-	-	-	<0.1	-

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Lab number			86520-7	86520-8	86520-9	86520-10	86520-11	86520-12
Sample id			TP7	TP8	TP9	TP10	TP11	TP12
Depth (m)			0.50-0.70	0.40-0.80	0.80-1.20	0.70-1.00	0.80-1.20	0.80-1.00
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Nitrobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
Isophorone	CE189	mg/kg	-	-	-	-	<0.1	-
2,4-Dimethylphenol	CE189	mg/kg	-	-	-	-	<0.1	-
2-Nitrophenol	CE189	mg/kg	-	-	-	-	<0.1	-
Bis(2-chloroethoxy)methane	CE189	mg/kg	-	-	-	-	<0.1	-
2,4-Dichlorophenol	CE189	mg/kg	-	-	-	-	<0.1	-
1,2,4-Trichlorobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
4-Chloroaniline	CE189	mg/kg	-	-	-	-	<0.1	-
Hexachlorobutadiene	CE189	mg/kg	-	-	-	-	<0.1	-
4-Chloro-3-methylphenol	CE189	mg/kg	-	-	-	-	<0.1	-
2-Methylnaphthalene	CE189	mg/kg	-	-	-	-	<0.1	-
1-Methylnaphthalene	CE189	mg/kg	-	-	-	-	<0.1	-
Hexachlorocyclopentadiene	CE189	mg/kg	-	-	-	-	<0.1	-
2,4,6-Trichlorophenol	CE189	mg/kg	-	-	-	-	<0.1	-
2,4,5-Trichlorophenol	CE189	mg/kg	-	-	-	-	<0.1	-
2-Chloronaphthalene	CE189	mg/kg	-	-	-	-	<0.1	-
2-Nitroaniline	CE189	mg/kg	-	-	-	-	<0.1	-
Dimethyl phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
2,6-Dinitrotoluene	CE189	mg/kg	-	-	-	-	<0.1	-
3-Nitroaniline	CE189	mg/kg	-	-	-	-	<0.1	-
2,4-Dinitrophenol	CE189	mg/kg	-	-	-	-	<0.1	-
4-Nitrophenol	CE189	mg/kg	-	-	-	-	<0.1	-
2,4-Dinitrotoluene	CE189	mg/kg	-	-	-	-	<0.1	-
Dibenzofuran	CE189	mg/kg	-	-	-	-	<0.1	-
Diethyl phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
4-Chlorophenylphenyl ether	CE189	mg/kg	-	-	-	-	<0.1	-
4-Nitroaniline	CE189	mg/kg	-	-	-	-	<0.1	-
2-Methyl-4,6-dinitrophenol	CE189	mg/kg	-	-	-	-	<0.1	-
Azobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
4-Bromophenylphenyl ether	CE189	mg/kg	-	-	-	-	<0.1	-
Hexachlorobenzene	CE189	mg/kg	-	-	-	-	<0.1	-
Pentachlorophenol	CE189	mg/kg	-	-	-	-	<0.1	-
Carbazole	CE189	mg/kg	-	-	-	-	<0.1	-
Di-n-butyl phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
Butylbenzyl phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
Bis(2-ethylhexyl)phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
Di-n-octyl phthalate	CE189	mg/kg	-	-	-	-	<0.1	-
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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Lab number			86520-13	86520-14	86520-15	86520-16	86520-17	86520-18
Sample id			WS1	WS2	WS3	WS4	WS5	WS6
Depth (m)			0.12-0.50	0.30-0.60	0.30-0.70	0.40.-0.80	0.70-1.00	0.50-0.80
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	4.4	11	13	10	25	10
Cadmium (total)	CE127 M	mg/kg Cd	0.2	0.7	<0.2	0.2	<0.2	<0.2
Chromium (total)	CE127 M	mg/kg Cr	9.3	21	27	22	16	15
Chromium (III)	CE208	mg/kg CrIII	9.3	21	27	22	16	15
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	9.1	57	28	20	54	22
Lead (total)	CE127 M	mg/kg Pb	16	95	23	22	24	163
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	12	26	40	35	47	23
Selenium (total)	CE127 M	mg/kg Se	0.7	1.2	2.4	1.7	5.2	2.8
Zinc (total)	CE127 M	mg/kg Zn	18	177	144	44	7.1	41
pH	CE004 M	units	8.9	8.6	8.6	7.5	7.8	8.2
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	27	49	41	19	38	16
Sulphate (total)	CE062 M	mg/kg SO_4	599	826	984	1540	12946	1642
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	1.2	4.1	0.9	0.7	15.4	3.5
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	2.1	7.1	1.6	1.1	26.5	6.1
PAH								
Naphthalene	CE087 M	mg/kg	<0.02	0.06	0.08	0.06	1.75	0.15
Acenaphthylene	CE087 M	mg/kg	<0.02	0.04	0.16	0.03	6.25	0.17
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	0.46	0.07	0.46	0.05
Fluorene	CE087 U	mg/kg	<0.02	0.03	0.23	0.04	0.86	0.06
Phenanthrene	CE087 M	mg/kg	0.02	0.32	3.26	0.83	9.43	0.82
Anthracene	CE087 U	mg/kg	<0.02	0.11	1.22	0.12	15.75	0.51
Fluoranthene	CE087 M	mg/kg	0.02	0.82	16.00	2.15	171.66	3.65
Pyrene	CE087 M	mg/kg	0.03	0.66	15.49	1.83	178.38	3.34
Benzo(a)anthracene	CE087 U	mg/kg	<0.02	0.36	11.38	0.79	124.11	1.41
Chrysene	CE087 M	mg/kg	<0.03	0.40	11.55	0.98	103.09	1.54
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.02	0.54	20.02	1.14	105.99	3.46
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.03	0.18	7.66	0.46	40.91	1.16
Benzo(a)pyrene	CE087 U	mg/kg	0.04	0.67	36.71	1.38	183.69	2.95
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02	0.48	46.04	1.02	125.18	2.89
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	4.89	0.13	29.60	0.64
Benzo(ghi)perylene	CE087 M	mg/kg	0.04	0.76	26.29	1.54	101.13	2.58
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	5.41	201	12.6	1198	25.4
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	-	-	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	-	-	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-13	86520-14	86520-15	86520-16	86520-17	86520-18
Sample id			WS1	WS2	WS3	WS4	WS5	WS6
Depth (m)			0.12-0.50	0.30-0.60	0.30-0.70	0.40.-0.80	0.70-1.00	0.50-0.80
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	-	-	-	-	-	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	-	-	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	-	-	-	-	-	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	-	-	-	-	-	-
VPH (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH (>C10-C35)	CE033	mg/kg	<7	78	198	9	2827	212
TPH (>C8-C35)	-	mg/kg	<10	78	198	<10	2827	212
Volatiles								
MTBE	CE192 U	mg/kg	-	-	-	-	-	-
Benzene	CE192 U	mg/kg	-	-	-	-	-	-
Toluene	CE192 U	mg/kg	-	-	-	-	-	-
Ethylbenzene	CE192 U	mg/kg	-	-	-	-	-	-
m & p-Xylene	CE192 U	mg/kg	-	-	-	-	-	-
o-Xylene	CE192 U	mg/kg	-	-	-	-	-	-
Dichlorodifluoromethane	CE174	mg/kg	-	-	-	-	-	-
Chloromethane	CE174	mg/kg	-	-	-	-	-	-
Vinyl chloride	CE174	mg/kg	-	-	-	-	-	-
Bromomethane	CE174	mg/kg	-	-	-	-	-	-
Chloroethane	CE174	mg/kg	-	-	-	-	-	-
Trichlorofluoromethane	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
Trans-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloroethane	CE174	mg/kg	-	-	-	-	-	-
2,2-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Cis-1,2-Dichloroethene	CE174	mg/kg	-	-	-	-	-	-
Bromochloromethane	CE174	mg/kg	-	-	-	-	-	-
Chloroform	CE174	mg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	CE174	mg/kg	-	-	-	-	-	-
Carbon tetrachloride	CE174	mg/kg	-	-	-	-	-	-
1,1-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichloroethane	CE174	mg/kg	-	-	-	-	-	-
Trichloroethene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Dibromomethane	CE174	mg/kg	-	-	-	-	-	-
Bromodichloromethane	CE174	mg/kg	-	-	-	-	-	-
cis-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-
trans-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-13	86520-14	86520-15	86520-16	86520-17	86520-18
Sample id			WS1	WS2	WS3	WS4	WS5	WS6
Depth (m)			0.12-0.50	0.30-0.60	0.30-0.70	0.40.-0.80	0.70-1.00	0.50-0.80
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
1,1,2-Trichloroethane	CE174	mg/kg	-	-	-	-	-	-
Tetrachloroethene	CE174	mg/kg	-	-	-	-	-	-
1,3-Dichloropropane	CE174	mg/kg	-	-	-	-	-	-
Dibromochloromethane	CE174	mg/kg	-	-	-	-	-	-
1,2-Dibromoethane	CE174	mg/kg	-	-	-	-	-	-
Chlorobenzene	CE174	mg/kg	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	-	-
Styrene	CE174	mg/kg	-	-	-	-	-	-
Tribromomethane	CE174	mg/kg	-	-	-	-	-	-
Isopropylbenzene	CE174	mg/kg	-	-	-	-	-	-
Bromobenzene	CE174	mg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	CE174	mg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	CE174	mg/kg	-	-	-	-	-	-
Propylbenzene	CE174	mg/kg	-	-	-	-	-	-
2-Chlorotoluene	CE174	mg/kg	-	-	-	-	-	-
4-Chlorotoluene	CE174	mg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	CE174	mg/kg	-	-	-	-	-	-
tert-Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	CE174	mg/kg	-	-	-	-	-	-
sec-Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
4-Isopropyltoluene	CE174	mg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Butylbenzene	CE174	mg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	CE174	mg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Hexachloro-1,3-butadiene	CE174	mg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	CE174	mg/kg	-	-	-	-	-	-
Semi-volatiles								
N-Nitrosodimethylamine	CE189	mg/kg	-	-	-	-	-	-
Phenol	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroethyl)ether	CE189	mg/kg	-	-	-	-	-	-
2-Chlorophenol	CE189	mg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
2-Methylphenol	CE189	mg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	CE189	mg/kg	-	-	-	-	-	-
3&4-Methylphenol	CE189	mg/kg	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	CE189	mg/kg	-	-	-	-	-	-
Hexachloroethane	CE189	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			86520-13	86520-14	86520-15	86520-16	86520-17	86520-18
Sample id			WS1	WS2	WS3	WS4	WS5	WS6
Depth (m)			0.12-0.50	0.30-0.60	0.30-0.70	0.40.-0.80	0.70-1.00	0.50-0.80
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**						
Nitrobenzene	CE189	mg/kg	-	-	-	-	-	-
Isophorone	CE189	mg/kg	-	-	-	-	-	-
2,4-Dimethylphenol	CE189	mg/kg	-	-	-	-	-	-
2-Nitrophenol	CE189	mg/kg	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	CE189	mg/kg	-	-	-	-	-	-
2,4-Dichlorophenol	CE189	mg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	CE189	mg/kg	-	-	-	-	-	-
4-Chloroaniline	CE189	mg/kg	-	-	-	-	-	-
Hexachlorobutadiene	CE189	mg/kg	-	-	-	-	-	-
4-Chloro-3-methylphenol	CE189	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	CE189	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	CE189	mg/kg	-	-	-	-	-	-
Hexachlorocyclopentadiene	CE189	mg/kg	-	-	-	-	-	-
2,4,6-Trichlorophenol	CE189	mg/kg	-	-	-	-	-	-
2,4,5-Trichlorophenol	CE189	mg/kg	-	-	-	-	-	-
2-Chloronaphthalene	CE189	mg/kg	-	-	-	-	-	-
2-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
Dimethyl phthalate	CE189	mg/kg	-	-	-	-	-	-
2,6-Dinitrotoluene	CE189	mg/kg	-	-	-	-	-	-
3-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
2,4-Dinitrophenol	CE189	mg/kg	-	-	-	-	-	-
4-Nitrophenol	CE189	mg/kg	-	-	-	-	-	-
2,4-Dinitrotoluene	CE189	mg/kg	-	-	-	-	-	-
Dibenzofuran	CE189	mg/kg	-	-	-	-	-	-
Diethyl phthalate	CE189	mg/kg	-	-	-	-	-	-
4-Chlorophenylphenyl ether	CE189	mg/kg	-	-	-	-	-	-
4-Nitroaniline	CE189	mg/kg	-	-	-	-	-	-
2-Methyl-4,6-dinitrophenol	CE189	mg/kg	-	-	-	-	-	-
Azobenzene	CE189	mg/kg	-	-	-	-	-	-
4-Bromophenylphenyl ether	CE189	mg/kg	-	-	-	-	-	-
Hexachlorobenzene	CE189	mg/kg	-	-	-	-	-	-
Pentachlorophenol	CE189	mg/kg	-	-	-	-	-	-
Carbazole	CE189	mg/kg	-	-	-	-	-	-
Di-n-butyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Butylbenzyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	CE189	mg/kg	-	-	-	-	-	-
Di-n-octyl phthalate	CE189	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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SOILS

Lab number			86520-19	86520-20	86520-21	86520-22
Sample id			WS7	WS8	WS9	WS10
Depth (m)			0.50-0.90	0.50-0.90	0.40-0.80	0.20-0.35
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**				
Arsenic (total)	CE127 M	mg/kg As	14	14	13	21
Cadmium (total)	CE127 M	mg/kg Cd	0.4	0.6	<0.2	0.2
Chromium (total)	CE127 M	mg/kg Cr	14	41	23	21
Chromium (III)	CE208	mg/kg CrIII	14	41	23	21
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	27	43	26	113
Lead (total)	CE127 M	mg/kg Pb	39	169	48	62
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	21	45	30	23
Selenium (total)	CE127 M	mg/kg Se	1.6	2.0	1.8	2.3
Zinc (total)	CE127 M	mg/kg Zn	39	164	68	48
pH	CE004 M	units	7.0	7.8	8.1	9.0
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	59	34	75	41
Sulphate (total)	CE062 M	mg/kg SO_4	369	532	1546	3268
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	1.6	3.1	1.2	0.6
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	2.7	5.4	2.0	1.0
PAH						
Naphthalene	CE087 M	mg/kg	0.13	0.04	0.02	0.05
Acenaphthylene	CE087 M	mg/kg	0.02	0.02	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	0.02	<0.02	<0.02	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	0.33	0.27	0.05	0.08
Anthracene	CE087 U	mg/kg	0.08	0.33	<0.02	<0.02
Fluoranthene	CE087 M	mg/kg	0.63	0.61	0.16	0.26
Pyrene	CE087 M	mg/kg	0.55	0.57	0.15	0.24
Benzo(a)anthracene	CE087 U	mg/kg	0.41	0.40	0.15	<0.02
Chrysene	CE087 M	mg/kg	0.36	0.35	0.12	<0.03
Benzo(b)fluoranthene	CE087 M	mg/kg	0.58	0.56	0.19	<0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	0.25	0.24	0.10	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	0.44	0.42	0.19	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	0.37	0.35	0.18	0.30
Dibenz(ah)anthracene	CE087 M	mg/kg	0.09	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.32	0.30	0.07	0.31
PAH (total of USEPA 16)	CE087	mg/kg	4.57	4.48	1.38	1.25
TPH						
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	<0.01	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	<0.01	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	<0.01	-	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	-	<1	-	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	-	<1	-	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	-	3	-	-

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SOILS

Lab number			86520-19	86520-20	86520-21	86520-22
Sample id			WS7	WS8	WS9	WS10
Depth (m)			0.50-0.90	0.50-0.90	0.40-0.80	0.20-0.35
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**				
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	-	4	-	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	-	1	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	<0.1	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	<0.1	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	<0.1	-	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	-	<4	-	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	-	7	-	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	-	94	-	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	-	26	-	-
VPH (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1
EPH (>C10-C35)	CE033	mg/kg	43	109	27	43
TPH (>C8-C35)	-	mg/kg	43	109	27	43
Volatiles						
MTBE	CE192 U	mg/kg	-	-	<0.02	-
Benzene	CE192 U	mg/kg	-	-	<0.01	-
Toluene	CE192 U	mg/kg	-	-	<0.01	-
Ethylbenzene	CE192 U	mg/kg	-	-	<0.01	-
m & p-Xylene	CE192 U	mg/kg	-	-	<0.02	-
o-Xylene	CE192 U	mg/kg	-	-	<0.01	-
Dichlorodifluoromethane	CE174	mg/kg	-	-	<0.01	-
Chloromethane	CE174	mg/kg	-	-	<0.01	-
Vinyl chloride	CE174	mg/kg	-	-	<0.01	-
Bromomethane	CE174	mg/kg	-	-	<0.03	-
Chloroethane	CE174	mg/kg	-	-	<0.01	-
Trichlorofluoromethane	CE174	mg/kg	-	-	<0.01	-
1,1-Dichloroethene	CE174	mg/kg	-	-	<0.01	-
Trans-1,2-Dichloroethene	CE174	mg/kg	-	-	<0.01	-
1,1-Dichloroethane	CE174	mg/kg	-	-	<0.01	-
2,2-Dichloropropane	CE174	mg/kg	-	-	<0.01	-
Cis-1,2-Dichloroethene	CE174	mg/kg	-	-	<0.01	-
Bromochloromethane	CE174	mg/kg	-	-	<0.01	-
Chloroform	CE174	mg/kg	-	-	<0.01	-
1,1,1-Trichloroethane	CE174	mg/kg	-	-	<0.01	-
Carbon tetrachloride	CE174	mg/kg	-	-	<0.01	-
1,1-Dichloro-1-propene	CE174	mg/kg	-	-	<0.01	-
1,2-Dichloroethane	CE174	mg/kg	-	-	<0.01	-
Trichloroethene	CE174	mg/kg	-	-	<0.01	-
1,2-Dichloropropane	CE174	mg/kg	-	-	<0.01	-
Dibromomethane	CE174	mg/kg	-	-	<0.01	-
Bromodichloromethane	CE174	mg/kg	-	-	<0.01	-
cis-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	<0.01	-
trans-1,3-Dichloro-1-propene	CE174	mg/kg	-	-	<0.01	-

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SOILS

Lab number			86520-19	86520-20	86520-21	86520-22
Sample id			WS7	WS8	WS9	WS10
Depth (m)			0.50-0.90	0.50-0.90	0.40-0.80	0.20-0.35
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**				
1,1,2-Trichloroethane	CE174	mg/kg	-	-	<0.01	-
Tetrachloroethene	CE174	mg/kg	-	-	<0.01	-
1,3-Dichloropropane	CE174	mg/kg	-	-	<0.01	-
Dibromochloromethane	CE174	mg/kg	-	-	<0.01	-
1,2-Dibromoethane	CE174	mg/kg	-	-	<0.01	-
Chlorobenzene	CE174	mg/kg	-	-	<0.01	-
1,1,1,2-Tetrachloroethane	CE174	mg/kg	-	-	<0.01	-
Styrene	CE174	mg/kg	-	-	<0.01	-
Tribromomethane	CE174	mg/kg	-	-	<0.01	-
Isopropylbenzene	CE174	mg/kg	-	-	<0.01	-
Bromobenzene	CE174	mg/kg	-	-	<0.01	-
1,1,2,2-Tetrachloroethane	CE174	mg/kg	-	-	<0.01	-
1,2,3-Trichloropropane	CE174	mg/kg	-	-	<0.01	-
Propylbenzene	CE174	mg/kg	-	-	<0.01	-
2-Chlorotoluene	CE174	mg/kg	-	-	<0.01	-
4-Chlorotoluene	CE174	mg/kg	-	-	<0.01	-
1,3,5-Trimethylbenzene	CE174	mg/kg	-	-	<0.01	-
tert-Butylbenzene	CE174	mg/kg	-	-	<0.01	-
1,2,4-Trimethylbenzene	CE174	mg/kg	-	-	<0.01	-
sec-Butylbenzene	CE174	mg/kg	-	-	<0.01	-
1,3-Dichlorobenzene	CE174	mg/kg	-	-	<0.01	-
4-Isopropyltoluene	CE174	mg/kg	-	-	<0.01	-
1,4-Dichlorobenzene	CE174	mg/kg	-	-	<0.01	-
1,2-Dichlorobenzene	CE174	mg/kg	-	-	<0.01	-
Butylbenzene	CE174	mg/kg	-	-	<0.01	-
1,2-Dibromo-3-chloropropane	CE174	mg/kg	-	-	<0.01	-
1,2,4-Trichlorobenzene	CE174	mg/kg	-	-	<0.01	-
Hexachloro-1,3-butadiene	CE174	mg/kg	-	-	<0.01	-
1,2,3-Trichlorobenzene	CE174	mg/kg	-	-	<0.01	-
Semi-volatiles						
N-Nitrosodimethylamine	CE189	mg/kg	-	-	<0.1	-
Phenol	CE189	mg/kg	-	-	<0.1	-
Bis(2-chloroethyl)ether	CE189	mg/kg	-	-	<0.1	-
2-Chlorophenol	CE189	mg/kg	-	-	<0.1	-
1,3-Dichlorobenzene	CE189	mg/kg	-	-	<0.1	-
1,4-Dichlorobenzene	CE189	mg/kg	-	-	<0.1	-
2-Methylphenol	CE189	mg/kg	-	-	<0.1	-
1,2-Dichlorobenzene	CE189	mg/kg	-	-	<0.1	-
Bis(2-chloroisopropyl)ether	CE189	mg/kg	-	-	<0.1	-
3&4-Methylphenol	CE189	mg/kg	-	-	<0.1	-
N-Nitrosodi-n-propylamine	CE189	mg/kg	-	-	<0.1	-
Hexachloroethane	CE189	mg/kg	-	-	<0.1	-

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SOILS

Lab number			86520-19	86520-20	86520-21	86520-22
Sample id			WS7	WS8	WS9	WS10
Depth (m)			0.50-0.90	0.50-0.90	0.40-0.80	0.20-0.35
Date sampled			02/06/2020	02/06/2020	02/06/2020	02/06/2020
Test	**Method**	**Units**				
Nitrobenzene	CE189	mg/kg	-	-	<0.1	-
Isophorone	CE189	mg/kg	-	-	<0.1	-
2,4-Dimethylphenol	CE189	mg/kg	-	-	<0.1	-
2-Nitrophenol	CE189	mg/kg	-	-	<0.1	-
Bis(2-chloroethoxy)methane	CE189	mg/kg	-	-	<0.1	-
2,4-Dichlorophenol	CE189	mg/kg	-	-	<0.1	-
1,2,4-Trichlorobenzene	CE189	mg/kg	-	-	<0.1	-
4-Chloroaniline	CE189	mg/kg	-	-	<0.1	-
Hexachlorobutadiene	CE189	mg/kg	-	-	<0.1	-
4-Chloro-3-methylphenol	CE189	mg/kg	-	-	<0.1	-
2-Methylnaphthalene	CE189	mg/kg	-	-	<0.1	-
1-Methylnaphthalene	CE189	mg/kg	-	-	<0.1	-
Hexachlorocyclopentadiene	CE189	mg/kg	-	-	<0.1	-
2,4,6-Trichlorophenol	CE189	mg/kg	-	-	<0.1	-
2,4,5-Trichlorophenol	CE189	mg/kg	-	-	<0.1	-
2-Chloronaphthalene	CE189	mg/kg	-	-	<0.1	-
2-Nitroaniline	CE189	mg/kg	-	-	<0.1	-
Dimethyl phthalate	CE189	mg/kg	-	-	<0.1	-
2,6-Dinitrotoluene	CE189	mg/kg	-	-	<0.1	-
3-Nitroaniline	CE189	mg/kg	-	-	<0.1	-
2,4-Dinitrophenol	CE189	mg/kg	-	-	<0.1	-
4-Nitrophenol	CE189	mg/kg	-	-	<0.1	-
2,4-Dinitrotoluene	CE189	mg/kg	-	-	<0.1	-
Dibenzofuran	CE189	mg/kg	-	-	<0.1	-
Diethyl phthalate	CE189	mg/kg	-	-	<0.1	-
4-Chlorophenylphenyl ether	CE189	mg/kg	-	-	<0.1	-
4-Nitroaniline	CE189	mg/kg	-	-	<0.1	-
2-Methyl-4,6-dinitrophenol	CE189	mg/kg	-	-	<0.1	-
Azobenzene	CE189	mg/kg	-	-	<0.1	-
4-Bromophenylphenyl ether	CE189	mg/kg	-	-	<0.1	-
Hexachlorobenzene	CE189	mg/kg	-	-	<0.1	-
Pentachlorophenol	CE189	mg/kg	-	-	<0.1	-
Carbazole	CE189	mg/kg	-	-	<0.1	-
Di-n-butyl phthalate	CE189	mg/kg	-	-	<0.1	-
Butylbenzyl phthalate	CE189	mg/kg	-	-	<0.1	-
Bis(2-ethylhexyl)phthalate	CE189	mg/kg	-	-	<0.1	-
Di-n-octyl phthalate	CE189	mg/kg	-	-	<0.1	-
Subcontracted analysis						
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD

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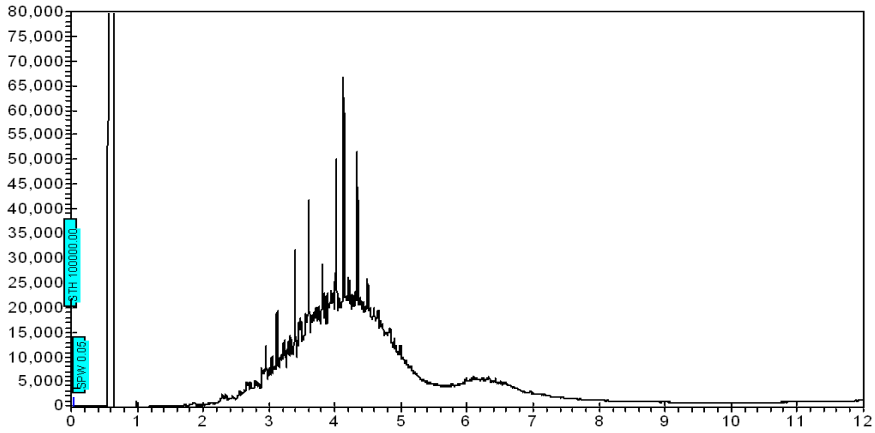
PREPARED LEACHATES

Lab number			86520-12L	86520-20L
Sample id			TP12	WS8
Depth (m)			0.80-1.00	0.50-0.90
Test	**Method**	**Units**		
PAH				
Naphthalene	CE051	µg/l	13.1	<0.1
Acenaphthylene	CE051	µg/l	<0.1	<0.1
Acenaphthene	CE051	µg/l	2.9	1.6
Fluorene	CE051	µg/l	1.9	1.1
Phenanthrene	CE051	µg/l	3.7	0.1
Anthracene	CE051	µg/l	0.6	0.4
Fluoranthene	CE051	µg/l	0.6	1.1
Pyrene	CE051	µg/l	0.4	0.7
Benzo(a)anthracene	CE051	µg/l	0.1	<0.1
Chrysene	CE051	µg/l	0.1	<0.1
Benzo(b)fluoranthene	CE051	µg/l	0.3	0.1
Benzo(k)fluoranthene	CE051	µg/l	<0.1	<0.1
Benzo(a)pyrene	CE051	µg/l	0.2	<0.1
Indeno(123cd)pyrene	CE051	µg/l	<0.1	<0.1
Dibenz(ah)anthracene	CE051	µg/l	<0.1	<0.1
Benzo(ghi)perylene	CE051	µg/l	<0.1	<0.1
PAH (total of USEPA 16)	CE051	µg/l	23.9	5.1

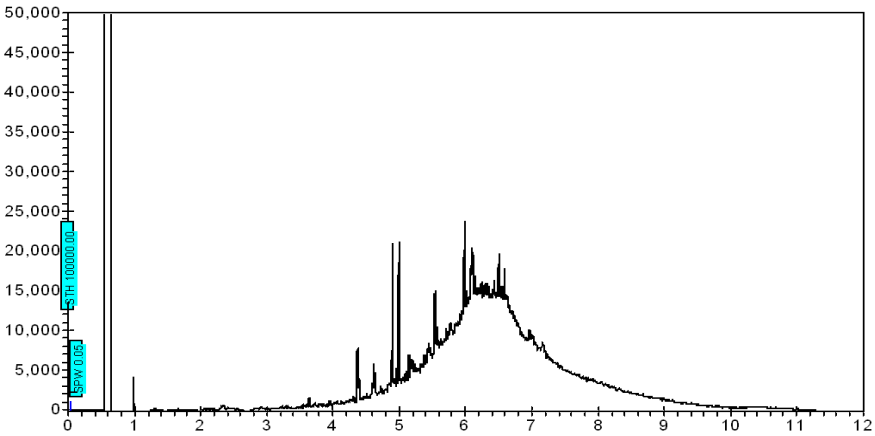
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CHROMATOGRAMS

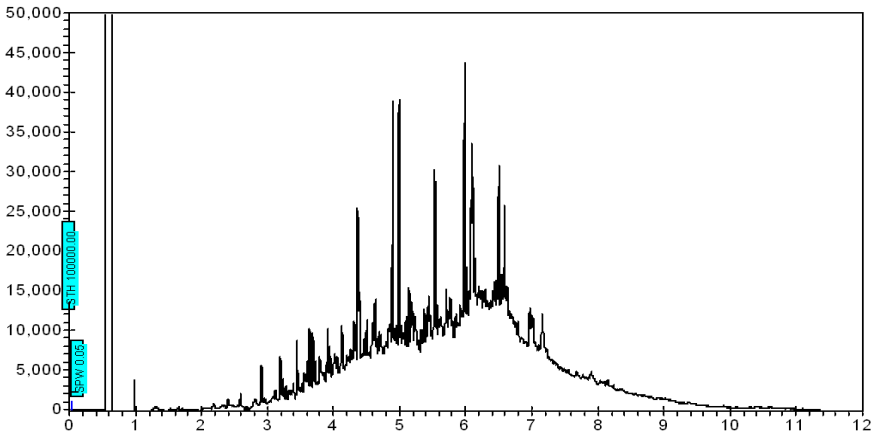
Lab number	86520-9
Sample id	TP9
Depth (m)	0.80-1.20
Date sampled	02/06/2020
TPH C5-C40 (mg/kg)	7500
Hydrocarbon range(s)	C10-C28, C25-C40
Characteristic	Diesel, Heavy Oil



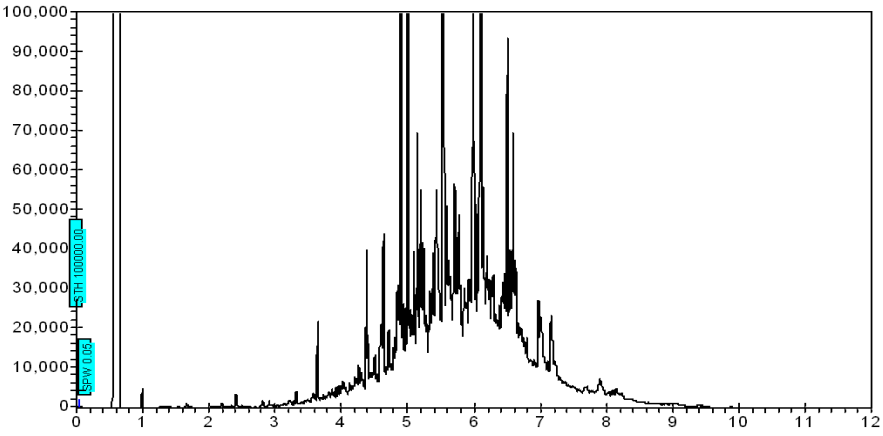
Lab number	86520-11
Sample id	TP11
Depth (m)	0.80-1.20
Date sampled	02/06/2020
TPH C5-C40 (mg/kg)	767
Hydrocarbon range(s)	C16-C40+
Characteristic	Motor Oil



Lab number	86520-12
Sample id	TP12
Depth (m)	0.80-1.00
Date sampled	02/06/2020
TPH C5-C40 (mg/kg)	1182
Hydrocarbon range(s)	C12-C40+
Characteristic	Unknown Oil



Lab number	86520-17
Sample id	WS5
Depth (m)	0.70-1.00
Date sampled	02/06/2020
TPH C5-C40 (mg/kg)	2827
Hydrocarbon range(s)	C14-C40+
Characteristic	Unknown Oil



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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
CE067	VPH (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE033	EPH (>C10-C35)	Solvent extraction, GC-FID	As received		7	mg/kg
-	TPH (>C8-C35)	Sum of VPH (>C8-C10) & EPH (>C10-C35)	As received		10	mg/kg
CE192	MTBE	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE174	Dichlorodifluoromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Chloromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Vinyl chloride	Headspace GC-MS	As received		0.01	mg/kg
CE174	Bromomethane	Headspace GC-MS	As received		0.03	mg/kg
CE174	Chloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Trichlorofluoromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1-Dichloroethene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Trans-1,2-Dichloroethene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1-Dichloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	2,2-Dichloropropane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Cis-1,2-Dichloroethene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Bromochloromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Chloroform	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1,1-Trichloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Carbon tetrachloride	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1-Dichloro-1-propene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2-Dichloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Trichloroethene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2-Dichloropropane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Dibromomethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Bromodichloromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	cis-1,3-Dichloro-1-propene	Headspace GC-MS	As received		0.01	mg/kg
CE174	trans-1,3-Dichloro-1-propene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1,2-Trichloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Tetrachloroethene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,3-Dichloropropane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Dibromochloromethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2-Dibromoethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Chlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1,1,2-Tetrachloroethane	Headspace GC-MS	As received		0.01	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE174	Styrene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Tribromomethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Isopropylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Bromobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,1,2,2-Tetrachloroethane	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2,3-Trichloropropane	Headspace GC-MS	As received		0.01	mg/kg
CE174	Propylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	2-Chlorotoluene	Headspace GC-MS	As received		0.01	mg/kg
CE174	4-Chlorotoluene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,3,5-Trimethylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	tert-Butylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2,4-Trimethylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	sec-Butylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,3-Dichlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	4-Isopropyltoluene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,4-Dichlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2-Dichlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Butylbenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2-Dibromo-3-chloropropane	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2,4-Trichlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE174	Hexachloro-1,3-butadiene	Headspace GC-MS	As received		0.01	mg/kg
CE174	1,2,3-Trichlorobenzene	Headspace GC-MS	As received		0.01	mg/kg
CE189	N-Nitrosodimethylamine	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Phenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Bis(2-chloroethyl)ether	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Chlorophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	1,3-Dichlorobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	1,4-Dichlorobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Methylphenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	1,2-Dichlorobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Bis(2-chloroisopropyl)ether	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	3&4-Methylphenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	N-Nitrosodi-n-propylamine	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Hexachloroethane	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Nitrobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Isophorone	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4-Dimethylphenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Nitrophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Bis(2-chloroethoxy)methane	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4-Dichlorophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	1,2,4-Trichlorobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Chloroaniline	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Hexachlorobutadiene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Chloro-3-methylphenol	Solvent extraction, GC-MS	As received		0.1	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE189	2-Methylnaphthalene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	1-Methylnaphthalene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Hexachlorocyclopentadiene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4,6-Trichlorophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4,5-Trichlorophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Chloronaphthalene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Nitroaniline	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Dimethyl phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,6-Dinitrotoluene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	3-Nitroaniline	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4-Dinitrophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Nitrophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2,4-Dinitrotoluene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Dibenzofuran	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Diethyl phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Chlorophenylphenyl ether	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Nitroaniline	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	2-Methyl-4,6-dinitrophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Azobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	4-Bromophenylphenyl ether	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Hexachlorobenzene	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Pentachlorophenol	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Carbazole	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Di-n-butyl phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Butylbenzyl phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Bis(2-ethylhexyl)phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
CE189	Di-n-octyl phthalate	Solvent extraction, GC-MS	As received		0.1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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METHOD DETAILS

METHOD	PREPARED LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE002	Leachate preparation (EA)	L:S 10:1		-	-
CE051	Naphthalene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Acenaphthylene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Acenaphthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Fluorene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Phenanthrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(a)anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Chrysene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(b)fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(k)fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(a)pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Indeno(123cd)pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Dibenz(ah)anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(ghi)perylene	Solvent extraction, GC-MS		0.1	µg/l
CE051	PAH (total of USEPA 16)	Solvent extraction, GC-MS		1.6	µg/l

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
86520-1	TP1	0.50-0.90	N	
86520-2	TP1	1.00-1.30	N	
86520-3	TP3	0.30-0.60	N	
86520-4	TP4	0.00-0.20	N	
86520-5	TP5	1.20-1.40	N	
86520-6	TP6	1.20-1.60	N	
86520-7	TP7	0.50-0.70	N	
86520-8	TP8	0.40-0.80	N	
86520-9	TP9	0.80-1.20	N	
86520-10	TP10	0.70-1.00	N	
86520-11	TP11	0.80-1.20	N	
86520-12	TP12	0.80-1.00	N	
86520-13	WS1	0.12-0.50	N	
86520-14	WS2	0.30-0.60	N	
86520-15	WS3	0.30-0.70	N	
86520-16	WS4	0.40.-0.80	N	
86520-17	WS5	0.70-1.00	N	
86520-18	WS6	0.50-0.80	N	
86520-19	WS7	0.50-0.90	N	
86520-20	WS8	0.50-0.90	N	
86520-21	WS9	0.40-0.80	N	
86520-22	WS10	0.20-0.35	N	

Chemtech Environmental Limited

TEST REPORT REVISIONS

The table below identifies ammendments that have been made to this test report for each revision.

Test Report Reference	Details of amendments to test report	Issue Date
86520	Original report issued	16 June 2020
86520(1)	Aliphatic/Aromatic C5-C44 added for 86520-9, 86520-12, & 86520-20 Prepared leachates added	25 June 2020

LABORATORY REPORT

4043

Contract Number: PSL20/2823

Report Date: 22 June 2020

Client's Reference: HOO/01

Client Name: ARP Associates
Northwest House
5/6 Northwest Business Park
Servia Hill
Leeds
LS6 2QH

For the attention of: Andrew Jones

Contract Title: Hough Lane, Wombwell, Barnsley

Date Received: 10/6/2020
Date Commenced: 10/6/2020
Date Completed: 22/6/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. 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 other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
S Royle (Laboratory Manager)	S Eyre (Senior Technician)	L Knight (Senior Technician)

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fax: +44 (0)844 815 6642
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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP3			1.80	2.00	Brown mottled grey sandy CLAY.
TP11			2.80	3.00	Grey mottled brown sandy CLAY.
TP12			2.00	2.20	Brown gravelly slightly clayey SAND.
WS3			1.80	2.00	Grey mottled brown CLAY.
WS4			2.70	3.00	Brown gravelly sandy CLAY.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP3			1.80	2.00	18			46	21	25	100	Intermediate plasticity CI.
TP11			2.80	3.00	15			41	20	21	100	Intermediate plasticity CI.
TP12			2.00	2.20	12				NP			
WS3			1.80	2.00	19			61	26	35	100	High plasticity CH.
WS4			2.70	3.00	10			38	19	19	88	Intermediate plasticity CI.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hough Lane, Wombwell, Barnsley

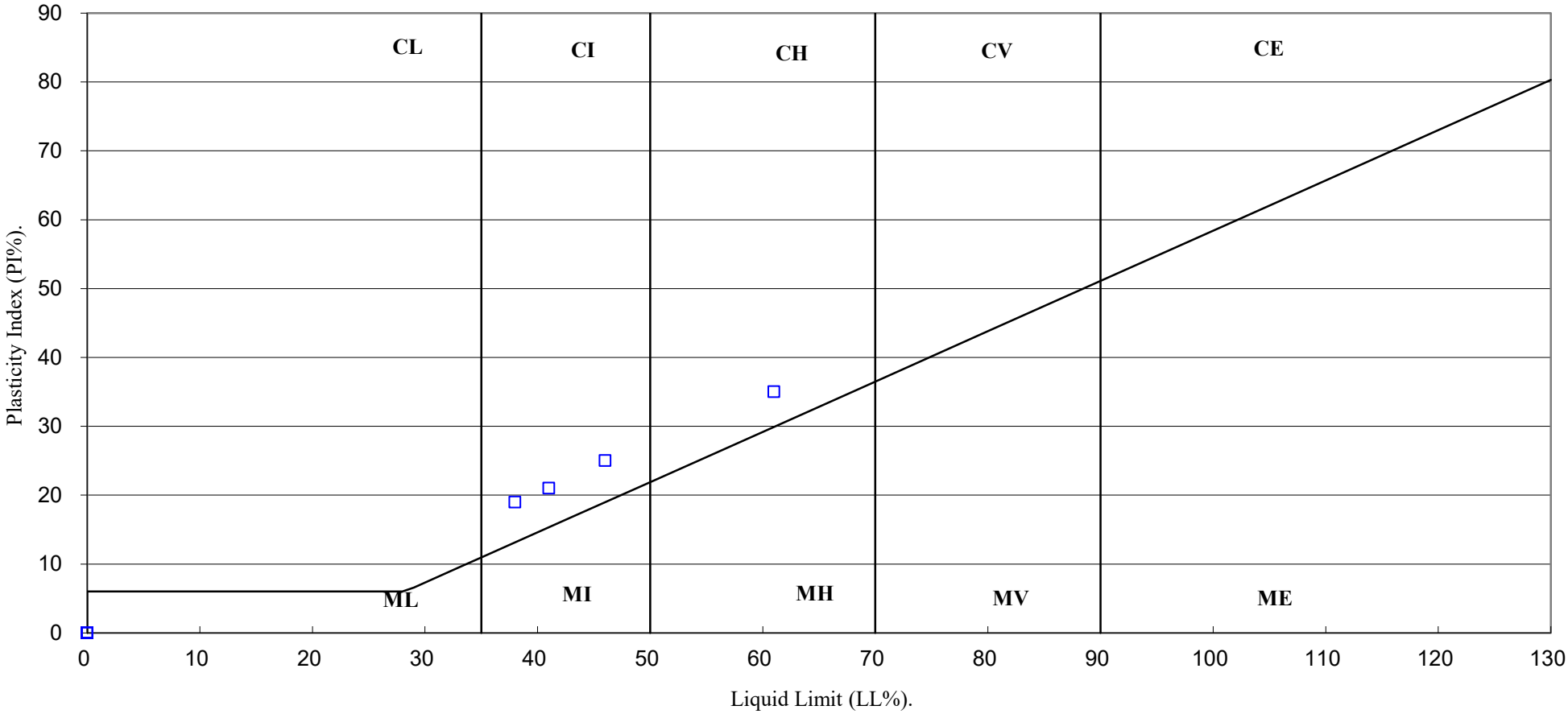
Contract No:

PSL20/2823

Client Ref:

HOO/01

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Hough Lane, Wombwell, Barnsley	Contract No: PSL20/2823
			Client Ref: HOO/01

Certificate of Analysis

Certificate Number	20-10555

23□□□□20

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference	20-10555
Client Reference	PSL20/2823
Order No	(not supplied)
Contract Title	Hough Lane, Wombwell, Barnsley
Description	5 Soil samples.
Date Received	16-Jun-20
Date Started	16-Jun-20
Date Completed	23-Jun-20
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

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-10555
Client Ref PSL20/2823
Contract Title Hough Lane, Wombwell, Barnsley

			Lab No	1684327	1684328	1684329	1684330	1684331
			Sample ID	TP3	TP11	TP12	WS3	WS4
			Depth	1.80-2.00	2.80-3.00	2.00-2.20	1.80-2.00	2.70-3.00
			Other ID					
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
pH	DETSC 2008#		pH	6.2	5.4	7.6	5.9	5.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	62	33	200	65	14

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 20-10555
Client Ref PSL20/2823
Contract Hough Lane, Wombwell, Barnsley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1684327	TP3 1.80-2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1684328	TP11 2.80-3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1684329	TP12 2.00-2.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1684330	WS3 1.80-2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1684331	WS4 2.70-3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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

ARP GEOTECHNICAL LIMITED
SOIL CONTAMINANT SCREENING VALUES
RESIDENTIAL WITH HOME-GROWN PRODUCE

Determinand	S4UL (mg/kg)			C4SL (mg/kg)		
Arsenic	37			37		
Cadmium	11			22		
Chromium (trivalent)	910					
Chromium (hexavalent)	6			21		
Copper	2400					
Lead				200		
Inorganic Mercury	40					
Nickel	180					
Selenium	250					
Zinc	3700					
Acidity (pH)	*Should be Greater Than 5			*Should be Greater Than 5		
	1% SOM	**2.5% SOM**	**6% SOM**	**1% SOM**	**2.5% SOM**	**6% SOM**
Naphthalene	2.3	5.6	13			
Acenaphthylene	170	420	920			
Acenaphthene	210	510	1,100			
Fluorene	170	400	860			
Phenanthrene	95	220	440			
Anthracene	2,400	5,400	11,000			
Fluoranthene	280	560	890			
Pyrene	620	1,200	2,000			
Benzo(a)anthracene	7.2	11	13			
Chrysene	15	22	27			
Benzo(b)fluoranthene	2.6	3.3	3.7			
Benzo(k)fluoranthene	77	93	100			
Benzo(a)pyrene	2.2	2.7	3			5
Indeno(1,2,3-cd)pyrene	27	36	41			
Dibenzo(a,h)anthracene	0.24	0.28	0.30			
Benzo(g,h,I)perylene	320	340	350			
Phenols	120	200	380			
Total TPH	*Above 500, speciate and compare with values below:					
C5 to C6 Aliphatic	42	78	160			
C6 to C8 Aliphatic	100	230	530			
C8 to C10 Aliphatic	27	65	150			
C10 to C12 Aliphatic	130	330	760			
C12 to C16 Aliphatic	1100	2,400	4,300			
C16 to C35 Aliphatic	65,000	92,000	110,000			
C35 TO C44 Aliphatic	65,000	92,000	110,000			
C5 to C7 Aromatic (Benzene)	70	140	300			
C7 to C8 Aromatic (Toluene)	130	290	660			
C8 to C10 Aromatic	34	83	190			
C10 to C12 Aromatic	74	180	380			
C12 to C16 Aromatic	140	330	660			
C16 to C21 Aromatic	260	540	930			
C21 TO C35 Aromatic	1100	1,500	1,700			
C35 TO C44 Aromatic	1100	1,500	1,700			
Asbestos	*Should be None Detected			*Should be None Detected		

* In House Value/Approach S4UL = Suitable 4 Use Level, CIEH/LQM 2014 C4SL = Cat 4 Screening Level, DEFRA, 2014

Blank cell indicates no published value or in-house value. Some values presented are above saturation limits.

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ARP GEOTECHNICAL LTD
Chartered Consulting Engineers

CONTROLLED WATERS SCREENING VALUES

Determinand	Screening Value for Potable Use * (µg/l)	Screening Value for Environment # (µg/l)
Arsenic	10	50
Boron	1000	2000
Cadmium	5	0.08-0.25
Chromium (total)	50	4.7
Copper	2000	1-28
Lead	10	7.2
Mercury	1	0.05
Selenium	10	-
Nickel	20	20
Zinc	5000	8-125
Sulphate	250,000	400,000
pH	6.5-10	6-9
Anthracene	-	0.1
Benzo(a)pyrene	0.01	0.05
Benzo(b)fluoranthene	Sum (4) <0.1	Sum (2) <0.03
Benzo(k)fluoranthene		
Benzo(g,h,i)perylene		Sum (2) <0.002
Indeno(1,2,3-c,d)pyrene		
Fluoranthene	-	0.1
Naphthalene	-	2.4
Phenols	0.5 (BWR)	7.7
Benzene	1	10
Toluene	700 (WHO)	50
Ethylbenzene	300 (WHO)	-
Xylene	30 (WHO)	30
Total TPH	-	200 (SWAD)

JUNE 2014

Sources, unless indicated otherwise above:

* = UK Drinking Water Standards (DWS)

= Environmental Quality Standards (EQS), hardness dependent where range shown.

WHO = World Health Organisation Drinking Water

BWR = Bathing Water (Classification) Regulations 1991

SWAD = Surface Water (Abstraction for Drinking Water) (Classification) Regulations 1996

A P P E N D I X D

RISK CATEGORISATION TABLES

Severity of Consequence

Severe	Short term (acute) risks to human health, likely to result in significant harm. Major pollution of (watercourses or groundwater)
Medium	Long-term (Chronic) damage (significant harm) to human health. Pollution of sensitive water resources.
Mild	Pollution of non-sensitive water resources.
Minor	Non-permanent health effects easily prevented by use of personal protective equipment during site works.

Probability of Risk Event Occurring

High Likelihood	There is a pollutant linkage and an event that either appears very likely in the short term, almost inevitable in the long term, or there is evidence of harm or pollution at the receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, so that a risk event is possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which a risk event could occur. However, it is not certain that such an event would take place even over a longer period, and even less likely in the short term.
unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

Comparison of Probability Against Severity of Consequence

		Severity of Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	**Very High Risk**	**High Risk**	**Moderate Risk**	**Moderate/ Low Risk**
	Likely	**High Risk**	**Moderate Risk**	**Moderate/ Low Risk**	**Low Risk**
	Low Likelihood	**Moderate Risk**	**Moderate/ Low Risk**	**Low Risk**	**Very Low Risk**
	Unlikely	**Moderate/ Low Risk**	**Low Risk**	**Very Low Risk**	**Very Low Risk**

Risk Categories - Definitions

Very High Risk	High probability that severe harm could arise to a receptor, or there is evidence that severe harm is already occurring. Urgent investigation is required and urgent remediation is likely to be required.
High Risk	Harm is likely to arise to a receptor. Urgent investigation is required and remediation may be necessary in the short term and likely over the longer term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Investigation normally required to clarify risk. Some remedial works may be required in the long-term.
Moderate/ Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild.
Very Low Risk	Low possibility that harm could arise to a receptor. Such harm is unlikely to be any worse than mild.

APPENDIX E

CONTAMINATION REMEDIATION STATEMENT



CONTAMINATION REMEDIATION STATEMENT

FOR

LAND OFF HOUGH LANE WOMBWELL BARNSLEY

ON BEHALF OF

HOOBER HOMES LTD

ARP GEOTECHNICAL LTD

CHARTERED CONSULTING ENGINEERS

Northwest House 5/6 Northwest Business Park Servia Hill Leeds LS6 2QH

0113 245 8498 leeds@arpgeotechnical.co.uk www.arpconsultingengineers.co.uk

CLIENT: HOOBER HOMES LTD

JOB NUMBER: HOO/01

PROJECT: LAND OFF HOUGH LANE, WOMBWELL, BARNSLEY

REPORT TYPE: CONTAMINATION REMEDIATION STATEMENT

REPORT REFERENCE: HOO/01rem

	Name	**Signature**
Prepared By:	A M Jones BSc FGS	
Authorised By:	J Race BSc CGeol FGS EurGeol	

ISSUE	**DATE**	**STATUS**
1	10th JULY 2020	V1 FINAL

1.0 Introduction

1.1 This document has been prepared to provide information for the Client and other interested parties, such as the Regulatory Authorities, outlining how contamination encountered on the site will be managed to ensure that the site is environmentally suitable for the intended residential use. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

2.0 The Site

2.1 The ARP Geotechnical Ltd Stage 2 Geo-environmental Report, dated July 2020 under reference HOO/01r1, makes an assessment of contamination, along with other aspects.

2.2 The conceptual site model is for a residential development, including private gardens and communal landscaping.

2.3 The site comprises the disused, former Balmoral Tanks factory site. The site is occupied by a large (approximate 130m long and 15m wide) warehouse type building just south of the centre of the site, and numerous other factory buildings that are located closer to the access to the site off Hough Lane. A large telephone mast with associated small substation is located in the southwest of the site. The site is covered in a combination of concrete and bituminous hardstanding, and rough open ground.

2.4 The main area of the site is relatively flat, but the access from Hough Lane into the main site area slopes downwards from the road. The southern and southwestern boundary of the site is higher than the surrounding land. There are some large mature trees around the boundaries.

2.5 The geological maps show the site to be underlain by the Pennine Middle Coal Measures Formation comprising interbedded pale grey sandstone, siltstone, grey mudstone and coal seams. There are no faults shown to affect the site. The Swinton Pottery Coal is identified to outcrop approximately 55m to the northeast of the site and the Newhill Coal seam is identified to outcrop 45m to the southwest of the site. The strata are progressively younger towards the northeast, and of the two outcrops, only the Newhill Coal will underlie the site.

2.6 A Coal Mining Risk Assessment (dated 2nd July 2020) has been produced by ARP Geotechnical Ltd and reviews the Coal Mining Report and all of the available geological information in detail. It is recommended that the CMRA is read in entirety but it is concluded that the Swinton Pottery Coal does not underlie the site, and there is a low to very low risk that workings are present within the Newhill Coal seam that could affect some of the site. An intrusive investigation is recommended to be undertaken to confirm the low/very low risk presented by the Newhill Coal.

2.7 The strata beneath the site are classed as a Secondary A Aquifer. There are no groundwater abstractions within 1km of the site.

2.8 The nearest surface water feature downslope, which is a river, is located 140m (taken from the Envirocheck Report data) to the south of the site. However, there are no surface water abstractions within 1km of the site.

2.9 No radon protective measures are stated to be necessary for new dwellings or extensions on the site but the site is within an "intermediate probability radon area". In these circumstances of apparent conflict, it may be prudent to assume basic radon protection is required, to prevent conveyancing difficulties. However, ground gas protection is required in any event, as discussed below.

2.10 There is a landfill located adjacent (identified possibly to be as close as 25m) to the south of the site. Gas monitoring to date has identified maximum carbon dioxide and methane concentrations of 0% and 9.6% respectively. Risk assessment indicates that gas protection of properties, against carbon dioxide, is required, as CS2 conditions are indicated. However, this will be confirmed by separate letter report on completion of the monitoring.

2.11 Ordnance Survey archive maps show no development on the site prior to the 1930s. Development on the site was progressive after this time. A garage has been present in the north of the site and a works in the northwest. The wider buildings have been used for the manufacture of galvanised steel and fibreglass tanks and containers. It is known that associated engineering work, fuel and lubricant oil storage also will have been undertaken on site. A reservoir and an old quarry were also present to the north. A foundry was adjacent to the west, recently replaced by a housing estate.

2.12 The ground investigation revealed the made ground over the majority of the site was present as a mixture of granular and cohesive made ground to depths of between 0.2m and 1.7m, with a typical depth of approximately 1m. Deeper made ground, typically as clay with gravel of mixed lithologies, was identified in the southwest of the site, behind the large warehouse building. Made ground in this area was up to 2.8m deep. Hydrocarbon odours were noted in TP9 from 0.8m to 1.2m depth, and in TP11 from 0.5m to 1.5m depth.

2.13 Below the made ground was typically a firm to stiff clay (residual Pennine Middle Coal Measures Formation (PMCMF)), which slowly graded into a weathered mudstone bedrock or weathered sandstone bedrock (weathered PMCMF). Occasionally, a weathered siltstone was identified. The weathered bedrock was encountered at depths of between 1.3m (TP4) and 3.9m (WS5) but is typically encountered across the site at depths of between 2m and 3m. Groundwater was rarely encountered during the site investigation. Recent monitoring visits showed groundwater at depths of between 1.03m and 2.8m below existing ground level.

2.14 Localised instability of the trial pit sides was identified where deep made ground was encountered. Groundwater was not typically encountered during the site investigation but was in TP5 and TP6 at depths of 3.4m and 3.75m respectively. A water strike was also

encountered in WS7 at 3m depth. The trial pits and window samples were backfilled with the arisings on completion (WS2, WS4, WS7 and WS11 were installed with monitoring pipework).

2.15 The contamination assessment identified the made ground to contain localised elevated concentrations of lead, PAH and TPH in the west of the site only. A small stockpile of asbestos cement sheeting is present to the rear of the large warehouse building on site.

3.0 Remediation Strategy

3.1 Any asbestos should be removed from existing buildings, by suitably qualified operatives, and disposed to a licenced landfill. The same applies to the small stockpile of asbestos cement sheeting (and any affected underlying soil) that is present to the rear of the large warehouse building on site. It is recommended that all records, including method statements, for the asbestos removal are kept as evidence to present to the Local Authority. This will provide evidence that that soils on site have not been contaminated with asbestos during removal works. It should be noted that any soils subsequently being taken off site containing visible asbestos fragments will be classed as hazardous waste.

3.2 Where any garden or landscape areas overlie the contaminated existing made ground in the west of the site, as indicated on the attached drawing, a minimum 0.6m thickness of uncontaminated soils (topsoil and subsoil) as a cover blanket should be provided. In areas of hardstanding or building footprints, the cover blanket is not required. Due to the extent of made ground across the site it is recommended that all gardens have a minimum of 0.3m imported clean soil. This will need to be agreed by the local authority. If any contamination is found or suspected on the wider site where only 0.3m soils are being provided, then a cover blanket should be placed similar to that specified for the west of the site.

3.3 The cover blanket (where required in the west of the site) must be clean and uncontaminated, and include at least 0.45m thickness of material containing at least 35% silt/clay content (at least 35% passing a 63 micron sieve), for example clay, sandy clay, or gravelly clay. Details are provided below.

Thickness (m)	Description
Minimum 0.15	Topsoil
Minimum 0.45	Subsoil with a minimum 35% silt/clay content

3.4 Where the 0.3m of clean soil is required (this can be a combination of topsoil and subsoil but a minimum of 0.15m topsoil is recommended) this does not have to contain at least 35% silt/clay. This material is considered necessary to provide a minimum thickness of growing medium. The material must be tested and be clean in the same way the cover blanket material is.

3.5 When cohesive cover blankets are being used, external levels and surface water drainage will need to be carefully designed to avoid localised surface water ponding.

3.6 Alternatively, the made ground may be removed off site and taken to a suitably licensed landfill. It is possible that the contamination extent could be delineated by further sampling on a closer grid so that selective removal could be carried out. However, in many cases, such contaminants are found to be sporadic and selective removal may not possible. The waste receiver may require Waste Acceptance Criteria Testing (WAC).

3.7 Gas monitoring is currently ongoing. Currently the monitoring is indicating that the site will classify as Characteristic Situation 2 which requires gas mitigation for structures. This typically comprises of a ventilated void below a suspended floor and a gas membrane fully sealed beneath the footprint of the plot. These measures, if required, will require validation when they are installed. Once the gas regime has been established, and following detailed foundation design, and decisions from the client in relation to selection of products/suppliers for gas protection, and who installs the protection, a Statement on Gas Protection should be prepared, outlining how gas protection measures will be implemented and the installation verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities.

4.0 Validation

4.1 To satisfy the Regulatory Authorities, verification that the above measures have been successfully implemented needs to be independently confirmed, in accordance with the guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): "Guidance on the Verification Requirements for Cover Systems". The measures described below will be required to ensure compliance with the document.

4.2 Following placement of the cover soils in residential garden areas and public open spaces, it will be necessary to confirm the required 0.6m cover of uncontaminated soil has been placed, by excavating trial pits to 0.6m depth across these areas on the basis of a likely frequency of one pit per every three plots and pits on a maximum 25m spacing on public open space. The trial pits will be photographed, to include a reference scale, and the photographs included within any report to enable the location on site to be identified.

4.3 If any contaminated material is disposed off-site, the disposal/transfer documents should be retained for inclusion in the Validation Report. If contaminated made ground is removed to provide an effectively uncontaminated site, then no cover blanket should be necessary. However, to verify this, an inspection should be carried out by the Engineer Sampling and testing of the surface will be necessary, for a standard suite, on a 25m grid. The area will be photographed and all the details included within a Validation Letter Report. The disposal/transfer documents should be retained for inclusion in the Validation Report.

5.0 Laboratory Testing

5.1 For any imported subsoil and topsoil used, the source will need to be confirmed, and the material tested for the attached suite of contaminants, to comply with the maximum screening values listed. The frequency of testing is given on the table below. Any samples

already tested in the site investigation carried out to date can be considered part of the overall total required.

Material Type	Number of Samples
Topsoil or subsoil from greenfield site	Minimum 3No. or 1 per 250m^3 (whichever is greater)
Topsoil or subsoil from brownfield site	Minimum 6No. or 1 per 100m^3 (whichever is greater)

5.2 The material should be placed in quarantined stockpiles prior to sampling and once a stockpile has been approved by the Engineer, no further material should be added to the stockpile, and any further import should be stockpiled separately. Any cross contamination of materials should be avoided, and further testing carried out where any cross contamination is suspected to have occurred.

5.3 If space is insufficient on the site to store quarantined stockpiles, topsoil/subsoil can be placed directly into the appropriate landscape areas, but samples of each material would need to be tested by taking samples from the validation trial pits.

5.4 The results of all the laboratory analysis, excavation logs, plans, photographs, and import documents will form part of the Remediation Validation Report.

5.5 In order to assist with progress of the scheme, interim Validation Reports may be prepared for specific areas, if required, showing how the contamination has been dealt with. On completion of the development, the discharge of any associated planning condition may be achieved by submission of all the interim validation letters, or issuing the information as a single combined Validation Report.

6.0 Unexpected Contamination

6.1 Any unexpected contamination uncovered during the works shall be inspected, sampled and analysed in laboratory for the suite of determinands appended to this Remediation Statement, and compared to the maximum concentration levels listed on the enclosure. Works on the affected materials shall cease until the appraisal is complete and, if necessary, a revised Remediation Statement is to be prepared and approved by the Planning Authority before work is recommenced.

7.0 Protection of Workers and the Public During Development Works

7.1 Damping down of the contaminated made ground should be implemented during dry periods, and timely placement of the contaminated material below barriers.

7.2 Washing facilities and a clean mess room from which work boots and overalls are excluded should be provided.

7.3 Site fencing will be provided to exclude access to members of the public, and contaminated material will be contained within the site boundary, and placed below barriers as soon as possible.

7.4 Workers will be educated to use adequate hygiene and PPE.

7.5 Movement of contamination off site on vehicle wheels shall be minimised by cleaning of vehicle wheels and/or use of road sweeper, as required.

ARP GEOTECHNICAL LIMITED
SOIL CONTAMINANT SCREENING VALUES
RESIDENTIAL WITH HOME-GROWN PRODUCE

Determinand	S4UL (mg/kg)			C4SL (mg/kg)		
Arsenic	37			37		
Cadmium	11			22		
Chromium (trivalent)	910					
Chromium (hexavalent)	6			21		
Copper	2400					
Lead				200		
Inorganic Mercury	40					
Nickel	180					
Selenium	250					
Zinc	3700					
Acidity (pH)	*Should be Greater Than 5			*Should be Greater Than 5		
	1% SOM	**2.5% SOM**	**6% SOM**	**1% SOM**	**2.5% SOM**	**6% SOM**
Naphthalene	2.3	5.6	13			
Acenaphthylene	170	420	920			
Acenaphthene	210	510	1,100			
Fluorene	170	400	860			
Phenanthrene	95	220	440			
Anthracene	2,400	5,400	11,000			
Fluoranthene	280	560	890			
Pyrene	620	1,200	2,000			
Benzo(a)anthracene	7.2	11	13			
Chrysene	15	22	27			
Benzo(b)fluoranthene	2.6	3.3	3.7			
Benzo(k)fluoranthene	77	93	100			
Benzo(a)pyrene	2.2	2.7	3			5
Indeno(1,2,3-cd)pyrene	27	36	41			
Dibenzo(a,h)anthracene	0.24	0.28	0.30			
Benzo(g,h,I)perylene	320	340	350			
Phenols	120	200	380			
Total TPH	*Above 500, speciate and compare with values below:					
C5 to C6 Aliphatic	42	78	160			
C6 to C8 Aliphatic	100	230	530			
C8 to C10 Aliphatic	27	65	150			
C10 to C12 Aliphatic	130	330	760			
C12 to C16 Aliphatic	1100	2,400	4,300			
C16 to C35 Aliphatic	65,000	92,000	110,000			
C35 TO C44 Aliphatic	65,000	92,000	110,000			
C5 to C7 Aromatic (Benzene)	70	140	300			
C7 to C8 Aromatic (Toluene)	130	290	660			
C8 to C10 Aromatic	34	83	190			
C10 to C12 Aromatic	74	180	380			
C12 to C16 Aromatic	140	330	660			
C16 to C21 Aromatic	260	540	930			
C21 TO C35 Aromatic	1100	1,500	1,700			
C35 TO C44 Aromatic	1100	1,500	1,700			
Asbestos	*Should be None Detected			*Should be None Detected		

* In House Value/Approach S4UL = Suitable 4 Use Level, CIEH/LQM 2014 C4SL = Cat 4 Screening Level, DEFRA, 2014

Blank cell indicates no published value or in-house value. Some values presented are above saturation limits.

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Project	Hough Lane Wombwell
Client	Hoober Homes Ltd
Title	REMEDIATION PLAN
Date	July 2020
Drawn	AMJ
Scale	NTS
Job No.	HOO/01