

**PHASE 2 GROUND INVESTIGATION REPORT FOR PROPOSED
RESIDENTIAL DEVELOPMENT AT THE
FORMER CROWN PUBLIC HOUSE IN MOBBERLEY, CHEADLE.**



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1 Introduction

- 1.1 It is proposed to construct five residential properties, four of which will be semi-detached and the fifth detached at the Former Crown Public House in Mobberley, Cheadle, Staffordshire.
- 1.2 Upon the instruction of the Architects, Hewitt & Carr, on behalf of the client AJ Developments, an intrusive Phase II ground investigation has been carried out comprising windowless sampler boreholes and rotary open holes, with appropriate sampling and in-situ testing. Following a review by the Senior Pollution Officer at Staffordshire Moorlands District Council further hand excavated pit sampling and testing was undertaken. Where applicable, the fieldwork was undertaken in accordance with BS 5930 ^(Ref. 1). The scope of works was devised by GIP Ltd. A Phase I Desk Study has previously been undertaken under GIP Ref. ML/26529 issued December 2017 and should be read in conjunction with this report. The purpose of the investigation was to assess the prevailing physical and chemical ground conditions with regard to foundation design, contamination and ground gases for the proposed development and past underground mining.
- 1.3 This report contains a description of the site, anticipated geology and strata encountered together with comments and recommendations upon the foundation engineering geology, contamination, potential ground gas protection measures and underground mining with respect to the construction of the proposed development.
- 1.4 The geotechnical laboratory tests were undertaken by GIP Ltd and are accredited by the United Kingdom Accreditation Services (UKAS). However, it should be appreciated that opinions and interpretations expressed in this report are outside the scope of UKAS accreditation. The testing was carried out in accordance with BS 1377 ^(Ref. 2) and comprised:-

Test Description	Part	Method	UKAS Accredited Test	Number of Tests
Moisture Content	2	3	✓	5
Liquid Limit	2	4	✓	5
Plastic Limit	2	5	✓	5

- 1.5 Additional testing for a range of chemical contaminants and concrete classification tests were carried out by Concept Life Sciences Ltd. The results of all the above tests are in Appendix B and C.

- 1.6 We are confident that the conclusions drawn from the findings of this investigation are appropriate for the proposed development. However, we cannot guarantee that they would be accepted by regulatory authorities without question. It is recommended that the reports are submitted and approval gained from such bodies, prior to the undertaking of detailed design, construction work or other irreversible processes.

2 The Site

- 2.1 At the time of the walkover the site consisted of a triangular plot of land bound by Tean Road to the west, Freehay Road to the north-east and another unnamed road to the south. The former Crown Public House building was still standing in the south-western corner of the plot, it is understood that a basement was located beneath the western older portion of the building. The remainder of the plot was covered with hardstanding and small areas of rough grass. The site gently sloped from the east to the west. A hedge was located along the northern-eastern, north-western and south-eastern boundaries. At the time of the return visit to site the existing building was in the process of being demolished. The approximate centre of the site is denoted by Nation Grid Ref. 400780, 341360.



Aerial image of the site.

2.2 Site History

- 2.2.1 The following is a brief summary of the site history, for full details of the site history reference should be made to the Phase I Desk Study report. The earliest available maps dated 1880-1924 show the 'Crown Inn' buildings to be located in the south-western portion of the site, Roads are shown to the south, south-east and west, the western road passes through the south-western corner of the site and the north-eastern road is shown to be running within the site boundary. By 1957 the Crown Inn had been developed into its existing layout and the site is now surrounded by the 'Mobberley Quarry' including 'Sand & Gravel' pits, 'silt beds' and ponds with associated infrastructure such as a 'conveyor'. By 1974 the roads surrounding the site have been realigned into their exiting positions and 1976 the Mobberley Quarry is no longer shown and the surrounding area appears to have been reinstated back to its original layout with all the pits and ponds backfilled.

3 Fieldwork

3.1 General Comments

- 3.1.1 The prevailing ground conditions were determined with the use of windowless sampler boreholes, rotary open drillholes and hand excavated sampling pits. All the exploratory holes were undertaken, where appropriate, in accordance with BS5930 (Ref. 1). The boreholes were positioned to provide the best coverage of the site working around existing buildings and potential buried services.

3.2 Windowless Sampler Boreholes

- 3.2.1 Five windowless sampler boreholes were sunk to a depth of 3.45m below existing ground level to investigate the geotechnical design parameters of the near surface soils. In-situ standard penetration tests (SPTs) were carried out in the granular soils to assess the relative density and in the cohesive soils providing a simple guide to consistency. Engineer verified logs are included within the appendix.

3.3 Rotary Open Drillholes

- 3.3.1 Two rotary open drillholes were drilled to a depth of 40m below existing ground level to investigate the Coal Measures strata beneath the site in relation to potential coal workings.

3.4 Hand Excavated Sampling Pits

- 3.4.1 Following discussion with the Senior Pollution Officer additional hand excavated sampling pits were undertaken to the east and west of the building.

3.4 Instrumentation and Monitoring

- 3.4.1 Combined gas and groundwater monitoring installations have been included within WS1, WS2 and WS4, monitoring of which was undertaken on six occasions.

4 Ground Conditions

4.1 Published Geological Information

- 4.1.1 Within the accuracy of the available geological information (British Geological Survey (BGS) Sheet 124 (Ashbourne) at a scale of 1:50,000) the 'solid' geology beneath the southern portion of the site comprises the Sherwood Sandstone Group which unconformably sits over the Westphalian A Coal Measures which are shown to outcrop beneath the northern portion of the site. To the north-west the Alecs Coal Seam is shown which potentially dips beneath the site. To the north-west a fault is shown running north-south with a downthrow to the west. No superficial deposits are shown to overly the solid geology beneath the site, though an area of 'Till' is shown to the north of the site.

Coal Authority Report

4.2

- 4.2.1 A Coal Authority (CA) mining report was obtained for the site due to it being located in an area that may be affected by coal mining activity. The report is summarised below:

- The CA report indicates that the property is not within a surface area that could be affected by past underground mining.
- The property is not in an area that could be affected by present underground mining.
- The property is not in an area where the CA has granted or plans to grant licences for future mining. However, reserves of coal exist in the local area which could be worked at some time in the future.
- There are no known mine entries within or within 20m of the site boundary.
- The property does not lie within or within 200m of the boundary of any historical, existing or planned opencast sites for coal removal.
- There have been no claims for coal mining subsidence.

4.3 Encountered Ground Conditions

- 4.3.1 For full details of the strata encountered reference should be made to the appended engineer verified logs (appendix A), however, the salient features of the engineering geology can be summarised as follows :-

Made Ground – was recorded in all positions to generally between 0.60m and 1.40m with the exception of WS2 where 2.10m was recorded. The majority of the soils were granular including gravel of brick, concrete and ash. Within WS2 a colliery spoil type made ground was proven from 1.20m to 2.10m, this could represent a possible bell pit.

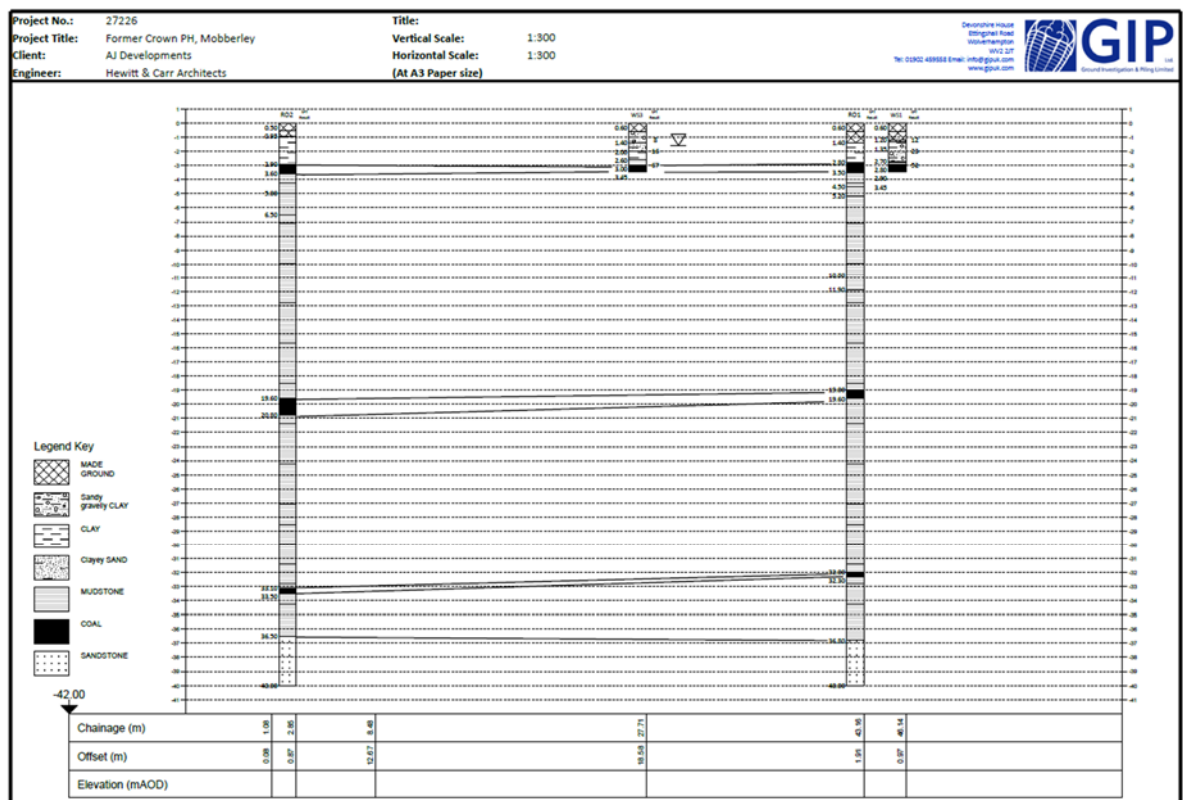
Superficial Till – was encountered in all the WS positions, with the exception of WS2, as a mixture of firm and stiff clays together with loose and medium dense granular soils. The cohesive soils were not noted in the south-western portion of the site.

Coal Measures – were noted beneath the Till or made ground (WS2) as firm through to very stiff clays onto mudstones and coal.

Table 1: Depths (mbgl) and thickness (m) of coal seams recorded within the exploratory positions together with their probable names.

Position	Depth to Coal	Thickness	Coal Seam
WS1	2.90	>0.55	Alecs Coal
WS3	3.00	>0.45	Alecs Coal
RO1	2.80	0.70	Alecs Coal
	19.00	0.60	Foxfield Coal
	32.00	0.30	Mans Coal
RO2	2.90	0.70	Alecs Coal
	19.60	1.20	Foxfield Coal
	33.10	0.40	Mans Coal

Geological cross section



Groundwater – was noted during the drilling process within WS3 at 1.20m, WS4 at 1.40m and WS5 at 1.50m. During the subsequent monitoring water levels of between 1.10m and 1.25m were recorded in WS4 with the remaining standpipes noted as dry on all six visits.

5 Comments and Recommendations: Geotechnical

5.1 General Comments

- 5.1.1 It is proposed to construct five residential properties, four of which will be semi-detached and the fifth detached at the Former Crown Public House in Mobberley, Cheadle, Staffordshire.

5.2 Past Coal Workings

- 5.2.1 As discussed earlier in this report, the site is underlain by the Westphalian A Coal Measures of the Carboniferous, the Sherwood sandstone that the geological map show covering the southern portion of the site has not been encountered within the boreholes. The Coal Authority report indicates that the property is not within a surface area that could be affected by past underground mining and acknowledge that there are coals in the area that could be worked in the future.
- 5.2.2 When assessing the risk of voids associated with old underground coal mine workings affecting a surface development a sufficient thickness of solid rock cover must be present above a potentially worked horizon. This minimum thickness is taken to be ten times the seam thickness or 15m, whichever is the greater. The minimum 15m takes into consideration the presence of roadways of an assumed 1.5m height which would have enabled men to work in the mines. Shallow coal has been encountered at depths of 2.8m and 19m beneath existing ground level, though these have all been recorded as intact it would be prudent to undertake a proof drill and grout exercise of the two shallowest coals beneath the footprints of the proposed building starting on a primary 6m grid with centre points and reducing to secondary holes should significant grout takes be recorded.
- 5.2.3 Whilst the Coal Authority report does not show the presence of any shafts beneath the area of the proposed development, in areas such as this with a long history of mining, unrecorded entries can be present. It is therefore recommended that due to the possibility of the encountering unrecorded shafts a close watch be implemented during development works. If suspect features are identified, reference should be made back to this office or other suitably experienced mining specialist. If any such entries are identified, the development layout may also require amendment.

5.3 Foundation Design

- 5.3.1 The made ground is not recommended as a reliable formation for any form of shallow foundation in its existing untreated state. Due to the variations in made ground thickness, the nature of the superficial deposits and the presence of shallow coal beneath the site together with a possible bell pit in WS2, a semi-raft type foundation is considered to be the most appropriate.
- 5.3.2 A semi raft foundation should have downstand beams extending through the Made Ground and upper loose horizons of the superficial deposits to bear within the underlying firm clays or medium dense granular soils that were noted at depths of between 1.35m and 2.10m. Within the cohesive soils a minimum depth of 0.90m will be required due to the medium volume change potential soils recorded (see section 5.4). On the basis of the exploratory works carried out to date, upon adequately competent natural strata, a presumed nett design bearing pressure in the order of 90kN/m² could be available for the downstand beams with settlements of less than 25mm. The following precautionary measures are recommended to be incorporated into the raft to help minimise the likely order of differential settlements:
- Proof roll the formation soils, following inspection by an engineering geologist, or other suitably qualified and experienced person.
 - Over excavate any loose / soft pockets and replace with well compacted stone.
 - Adequately thickening and reinforcing the raft and span 3m and cantilever 1.5m at each corner.
 - Ensure the service entries are flexible, e.g. water and sewers.
- 5.3.3 During demolition and site clearance any associated footings and basements (should they be encountered) should be fully removed and replaced with a well compacted clean material. Foundations for the proposed buildings should fully penetrate the lines of any previous foundations and bear within the competent natural soils beneath.
- 5.3.4 Groundwater was noted during the drilling process within WS3 at 1.20m, WS4 at 1.40m and WS5 at 1.50m. During the subsequent monitoring water levels of between 1.10m and 1.25m were recorded in WS4 with the remaining standpipes noted as dry on all six visits. The fieldworks and monitoring have been undertaken during a protracted period of dry weather, groundwater problems may be exacerbated during and following periods of prolonged wet weather. As such it is recommended that an allowance be made for some form of dewatering, the groundworks contractor should undertake a number of trial pits to assess this themselves, this will also allow them to view the stability of excavations which could require support where the loose soils are encountered.

5.4 Index Property Tests

- 5.4.1 Index property tests have classified the clay soils as being of low, intermediate and high plasticity and up to medium volume change potential according to the current NHBC guidelines. It is recommended that construction details comply with the above guidelines with respect to any existing, recently removed or proposed trees within influencing distance of the proposed development. As medium volume change potential soils have been revealed, a minimum foundation depth of 0.90m should be adopted regardless.

5.5 Concrete Classification

- 5.5.1 A range of tests have been carried out by Concept Life Sciences Ltd upon selected soil samples in accordance with those listed in BRE Special Digest 1 and the results are included within Appendix C, listed together with the contamination analyses. These tests determine the Class of concrete for the proposed development, the analyses indicate the ACEC Class of AC-1 is required for buried concrete structures.

6 Comments and Recommendations: Contamination

6.1 Conceptual Site Model

6.1.1 In accordance with Environment Agency (EA) document CLR11 'Model Procedures for the Management of Contaminated Land' the information from the desk study and site investigation have been used to generate a risk assessment. The purpose of this is to confirm and modify the initial conceptual site model to establish whether there are any potentially unacceptable risks present and determine the action required to provide any further information to refine the model. The findings of the conceptual site model are summarised below.

- The site is characterised by a cover of made ground of between 0.60m and 2.10m thick, onto superficial Till or the Westphalian A Coal Measures.
- No obvious major contamination (visual or olfactory) was identified during site works.
- One slightly elevated result of Benzo A Pyrene was identified with HP1, located on the south-eastern side of the former pub building.
- Groundwater was noted during the drilling process within WS3 at 1.20m, WS4 at 1.40m and WS5 at 1.50m. During the subsequent monitoring water levels of between 1.10m and 1.25m were recorded in WS4 with the remaining standpipes noted as dry on all six visits.
- Worked coal seams were not recorded by the investigation undertaken, though it is possible that these seams could have been worked.
- It is proposed to construct five residential properties, four of which will be semi-detached and the fifth detached with associated soft and hard landscaping.

6.2 Potential Sources of Contamination

6.2.1 From the desk study and site walk over, potential usages associated with the site and adjacent plots, sources of contamination are identified as:-

6.2.2 Potential On Site Current / Historical Contaminant Sources

- The made ground across the site, including possible colliery spoil.
- Potential heating fuel storage related to the historical pub use prior to the installation of gas boilers.

6.2.3 *Potential Off Site Contaminant Sources*

- The land surrounding the site has been subject to sand & gravel extraction via opencast methods. These excavations have been backfilled and the Envirocheck report does not identify what they were backfilled with, however, they are not identify as landfill.
- The made ground in the surrounding area.

6.3 **Potential Contaminants of Concern**

6.3.1 With reference to current guidelines, there are no potential key contaminants for the site given the absence of known previous development or contaminative land use. In the absence of specific guidelines, the samples have been tested for a general range of commonly occurring contaminants, including:

- Organics: poly aromatic hydrocarbons (PAH), petroleum hydrocarbons (TPH CWG) and phenols.
- Metals / semi metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium and zinc.
- Non metals: total organic carbon, asbestos and cyanide.

6.4 **Potential Receptors**

- Humans including construction works and future occupiers of the proposed development.
- The nearest feature is an unknown feature located 12m to the south and is most likely a ditch.
- Groundwater within the Secondary A Aquifer.
- Building substructures.

6.5 **Potential Pathways**

- Skin / eye contact, ingestion and inhalation during site development and by contact / inhalation from future occupiers / visitors.
- Percolating water may act to mobilise contaminants and transport them downwards under gravity towards the water table.
- Migration of contaminants in groundwater under the local hydraulic gradient.
- Transport of contaminants to the local drainage system via surface run-off.
- Migration of soil gases and volatile vapour flow.

6.6 Contamination Analyses

- 6.6.1 In order to assess the potential for contamination samples of the near surface soils were forwarded to Concept Life Sciences Ltd for analysis of a range of contaminants in accordance with the Conceptual Site Model. The samples tested appeared to be representative of the soils present upon the site. It should be appreciated that there remains the potential for unidentified areas of contamination. Suspect areas as may be identified in the future would have to be further investigated/assessed. Risk assessment work has its limitations and uncertainties ranging from those introduced by the type and quality of the data and analytical methods through to the choice of the model adopted.

6.7 Assessment of Risk to Human Health

- 6.7.1 The CLEA (Contaminated Land Exposure Assessment) model combines information on the toxicity of soil contaminants with estimates of potential exposure by adults and children living, working and/or playing on land affected by contamination over long periods of time. By comparing predicted exposure with health criteria values on tolerable or acceptable contaminant intakes the model can be used to generate Critical Concentrations (C_c).

- 6.7.2 Initially, generic C_c have been used as a screening process adopting Soil Screening Values (SSVs) produced by Atkins Consultants and available from the ATRISK^{soil} web site have been used. In this instance, values for 'residential with plant uptake' are considered to be the most appropriate for the nature of the proposed end usage. Where "non-detects" were recorded in the sample data they have been replaced by the relevant method detection limit.

6.7.4 Metal, Non Metal and Phenol Contamination

- 6.7.4.1 All the results were either below detection limits or the appropriate critical concentration.

6.7.5 Polyaromatic Hydrocarbons (PAH)

- 6.7.5.1 SSVs have been derived for 14 out of the 16 US EPA list of priority contaminants. One elevated results of Benzo A Pyrene was recorded in HP1, with all remaining result either below detection limits or the appropriate critical concentration.

6.7.6 Hydrocarbon Contamination, Benzene, Toluene, Ethylbenzene and Xylene (BTEX)

- 6.7.6.1 SSVs have been derived for the fractionated analysis of hydrocarbons in accordance with those outlined by the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG). The testing, as carried out upon the soil sample taken are separated into an aliphatic / aromatic split and individual carbon chains, as detailed on the results sheets contained within the appendix. All the results were either below detection limits or the appropriate critical concentration.

6.7.7 Asbestos

- 6.7.7.1 An asbestos screen was undertaken on samples, no asbestos was identified in any of the samples.

6.8 Recommendations for Remediation

- 6.8.1 **Impact on Human Health** – One slightly elevated result of Benzo A Pyrene was recorded in HP1 which was located in the area between the gardens of plot 4 and plot 5. No elevated contamination was noted in any of the other positions, the nearest of which was WS3 located in the garden area of plot 3. As such in order to break the source-pathway-receptor linkage it is proposed to place 600mm of clean cover in the garden area of plot 4 and plot 5, where hardstanding is present this would also break the source-pathway-receptor linkage. Construction workers should adopt basic Personnel Protective Equipment (PPE) which should include gloves, boots and overalls and washing facilities should be provided.
- 6.8.2 **Impact on Controlled Waters** - It is the remit of the Environment Agency to protect 'Controlled Waters', which includes groundwater and surface waters. The Agency is also a statutory consultee in the planning process. Given the findings of this investigation and the nature of the proposed development, it is considered unlikely that the Environment Agency would require a specific risk assessment to be carried out for the site under investigation.

7 Comments and Recommendations: Ground Gas

7.1 General Comments

- 7.1.1 Ground gas observation pipes were installed within all the boreholes in order to monitor for the presence of methane, carbon dioxide and oxygen gases within the strata. Gas monitoring was undertaken on six occasions using a Gas Data GFM436-1 infra-red meter. The results are included within the appendix together with details of the barometric pressure, borehole water level and air temperature at the time of each visit.

7.2 Results of In-Situ Monitoring

- 7.2.1 The gas concentrations recorded by this investigation can be summarised as follows:-

- **Methane:** was not recorded throughout the monitoring period.
- **Carbon Dioxide:** levels of up to 15.5% were recorded. Some exceeded the short-term exposure limit of 1.5% by volume and the Building Regulations 'safe' maximum of 5% by volume.
- **Oxygen:** levels as low as 8.1% were recorded, some of which were below the HSE recommended "safe" minimum of 18% for personnel in the working environment.
- **Gas Flow Measurement:** levels of between -2.4 L/h and 0.3 L/h were recorded.

7.3 Environmental Setting

- 7.3.1 There are no recorded landfill sites within 500m of the site, however, there are areas of recorded 'potentially infilled land (non-water)' the nearest of which is located 8m to the north and is listed as 'unknown filled ground (pit quarry etc)' and reflect the backfilled sand & gravel open cast extraction undertaken around the general area of the site. The site is located in an area where coal seams are present that historically could have been worked, where workings are present there is a risk that gasses could build up within voids. Methane was not recorded during this investigation, however, elevated carbon dioxide levels have been recorded in the boreholes together with low flow readings.

7.4 Recommendations for Remediation

- 7.4.1 In accordance with BS 8485:2019 the highest recorded methane and carbon dioxide levels together with the maximum gas flow rate give the site a worst case gas flow rate of 0.36 L/h and would give a 'Characteristic Gas Situation' of '2' (Table 2 of BS 8485). Given that the flow levels are significantly below 70 L/h we feel it would not be appropriate to increase the risk score. As such gas protection measures will be required within the construction of the properties (categorised as a 'Type A' building in accordance with BS 8485), as such a gas protection score of 3.5 will need to be attained. The designer or structural engineer should specify the appropriate gas protection measures in accordance with BS 8485:2019.

- 7.4.2 We have recommended that proof drill and grouting be undertaken beneath the proposed buildings, should significant voids, high grout takes or elevated gas readings are noted during these works then the recommendations made above will need to be reviewed to ensure they remain appropriate.
- 7.4.3 It should be appreciated that these recommendations have not been made with the agreement of the Local Authority who will need to be satisfied that adequate gas control measures have been provided. Should further discussion be required, then reference can be made back to this office.

8 Further Works and Remediation Strategy

8.1 Past Coal Workings

8.1.1 Shallow coal has been encountered at depths of 2.8m and 19m beneath existing ground level, though these have all been recorded as intact it would be prudent to undertake a proof drill and grout exercise of the two shallowest coals beneath the footprints of the proposed building starting on a primary 6m grid with centre points and reducing to secondary holes should significant grout takes be recorded.

8.1.2 Whilst the Coal Authority report does not show the presence of any shafts beneath the area of the proposed development, in areas such as this with a long history of mining, unrecorded entries can be present. It is therefore recommended that due to the possibility of the encountering unrecorded shafts a close watch be implemented during development works. If suspect features are identified, reference should be made back to this office or other suitably experienced mining specialist. If any such entries are identified, the development layout may also require amendment.

8.2 Contamination

8.2.1 As discussed in section 6 of this report one elevated result of Benzo A Pyrene was recorded in HP1 which is located in the garden areas of plot 4 and 5. As such in order to break the source-pathway-receptor linkage it is proposed to place 600mm of clean cover in the garden area of plot 4 and plot 5.

8.2.2 Prior to importing the soils onto site testing certificates should be obtained from the soils supplier, the testing results will be compared against the human health values used in the Phase II report to ensure they are appropriate for use on site. Once the 600mm of clean cover has been laid the thickness should be validated by undertaking hand excavated pits. A report will then be completed to show the recorded thickness of cover and the assessment of the provided testing results.

8.3 Ground Gas

8.3.1 As discussed in section 7 of this report carbon dioxide levels of up to 15.5% were recorded together with flow readings of between -2.4 L/h and 0.3 L/h, this would give the site a worst case 'Characteristic Gas Situation' of '2'. Gas protection measures will therefore be required within the construction of the properties (categorised as a 'Type A' building in accordance with BS 8485), as such a gas protection score of 3.5 will need to be attained.

8.3.2 The designer or structural engineer should specify the appropriate gas protection measures and validation of the installation in accordance with BS 8485:2019. Prior to undertaking the works the measures should be agreed with the Local Authority who will need to be satisfied that adequate gas control measures have been provided.

FOR AND ON BEHALF OF:

GIP LIMITED



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PRINCIPAL ENGINEER.

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MANAGING DIRECTOR.

APPENDIX A





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Windowless Sampler Borehole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 28/06/2018
Diameter: 100mm
Depth Cased:

Borehole:	WS1
Sheet 1 of 1	
Logged By:	ML
Checked By:	CEB
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 3.45m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		SPT 'N' Value [U100 Blows] Hand Vane	Installation /Backfill
					Depth (m bgl)	Type		
MADE GROUND. Tarmac onto brown sandy to very sandy silty GRAVEL. Gravel is angular brick, concrete, tarmac and hardcore.		0.60			0.00	B		
					0.40	ES		
					0.60	ES		
					0.60	D		
MADE GROUND. Brown very gravelly silty SAND. Gravel is sub-angular to sub-rounded quartz, occasional brick, ash and wood.		1.20 1.35			1.20	S 12 (1,1,2,2,3,5)		
					1.20	D		
					1.35	D		
MADE GROUND. Firm brown sandy slightly gravelly CLAY. Gravel is sub-rounded quartz and mudstone.		2.70 2.80 2.90			2.00	S 23 (5,5,5,6,8,4)		
					2.00	B		
Firm becoming stiff (from 1.70m) and very stiff (from 2.40m) red brown variably sandy slightly gravelly CLAY and gravelly slightly sandy CLAY. Gravel is sub-rounded quartz and sandstone. (Till)		2.70 2.80 2.90			2.70	D	52 (10,12,10,12,14,16)	
					2.80	D		
					2.90	D		
					3.00	S		
Very stiff dark grey CLAY with many mudstone lithorelicts. (Coal Measures)		3.45						
Very weak dark grey thinly laminated blocky fractured CARBONACEOUS MUDSTONE. (Coal Measures)		3.45						
Extremely weak black COAL. Recovered as gravel. (Coal Measures)		3.45						
Borehole Complete at 3.45m								

Samples/Tests

U Undisturbed
D Disturbed
B Bulk
W Water
S/C SPT/CPT
ES Environmental Sample
HV Hand Shear Vane
NR No Recovery
 Water Strike
 Water Level

Document 4.144

Other Information:

- Hand excavated service avoidance pit to 1.20m.
- No groundwater noted.
- Gas / groundwater monitoring standpipe installed to 3.00m, slotted in a gravel filter from 3.00m to 1.00m, bentonite from 1.00m with a lockable cover concrete at surface.



Devonshire House
Ettingshall Road
Wolverhampton
WV2 2JT
Tel: 01902 459558
Email: info@gipuk.com
www.gipuk.com

Windowless Sampler Borehole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 28/06/2018
Diameter: 100mm
Depth Cased:

Borehole:	WS2
Sheet 1 of 1	
Logged By:	ML
Checked By:	CEB
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 3.45m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		SPT 'N' Value [U100 Blows] Hand Vane	Installation /Backfill
					Depth (m bgl)	Type		
MADE GROUND. Brown silty SAND and GRAVEL. Gravel is sub-angular to sub-rounded quartz, sandstone, hardcore, brick, concrete and metal.					0.00	B		
					0.40	ES		
					0.70	ES		
MADE GROUND. Firm orange brown and light grey slightly sandy slightly gravelly CLAY. Gravel is sub-rounded quartz.		1.20			1.20	S 11	(2,3,3,3,2,3)	
MADE GROUND. Dark grey becoming brown very silty gravelly SAND with occasional clay pockets and roots. Gravel is sub-angular carbonaceous mudstone. (Colliery Spoil)		1.40			1.20	D		
					1.40	B		
Stiff becoming very stiff light grey with occasional orange brown mottling CLAY with some mudstone lithorelicts. (Coal Measures)		2.10			2.00	S 54	(8,10,12,14,14,14)	
					2.00	B		
Extremely weak becoming very weak dark grey, orange brown and light grey MUDSTONE. (Coal Measures)		2.60			2.60	B		
					3.00	S 86	(12,19,18,20,22,26)	
Borehole Complete at 3.45m		3.45						

Samples/Tests

U Undisturbed
D Disturbed
B Bulk
W Water
S/C SPT/CPT
ES Environmental Sample
HV Hand Shear Vane
NR No Recovery
 Water Strike
 Water Level

Document 4.144

Other Information:

1. Hand excavated service avoidance pit to 1.20m.
2. No groundwater noted.
3. Gas / groundwater monitoring standpipe installed to 3.00m, slotted in a gravel filter from 3.00m to 1.00m, bentonite from 1.00m with a lockable cover concrete at surface.



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Windowless Sampler Borehole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 28/06/2018
Diameter: 100mm
Depth Cased:

Borehole:	WS3
Sheet 1 of 1	
Logged By:	ML
Checked By:	CEB
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 3.45m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		SPT 'N' Value [U100 Blows] Hand Vane	Installation /Backfill
					Depth (m bgl)	Type		
MADE GROUND. Brown very gravelly silty SAND. Gravel is angular to sub-rounded brick, concrete, ash, quartz and tile.		0.60			0.00	B		
					0.30	ES		
					0.60	B		
					0.75	ES		
Firm orange brown, light grey and brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded quartz, sandstone, mudstone and siltstone. (Till)		1.40		▼ 1.20	1.20	S	8 (1,1,2,2,2,2)	
					1.40	B		
Orange brown, red brown and light grey clayey becoming very clayey SAND. (Till)		2.00			2.00	S	16 (2,3,3,4,4,5)	
					2.00	B		
					2.35	B		
Firm becoming stiff dark grey CLAY with some becoming many mudstone lithorelicts. (Coal Measures)		2.60			2.60	B		
Extremely weak dark grey thinly laminated blocky fractured CARBONACEOUS MUDSTONE. (Coal Measures)		3.00			3.00	S	67 (12,13,13,15,18,21)	
Extremely weak black COAL. Recovered as gravel. (Coal Measures)		3.45						
Borehole Complete at 3.45m								

Samples/Tests

U Undisturbed
D Disturbed
B Bulk
W Water
S/C SPT/CPT
ES Environmental Sample
HV Hand Shear Vane
NR No Recovery
 Water Strike
 Water Level

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Other Information:

1. Hand excavated service avoidance pit to 1.20m.
2. Groundwater noted at 1.20m.
3. Borehole backfilled upon completion.



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Windowless Sampler Borehole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 28/06/2018
Diameter: 100mm
Depth Cased:

Borehole:	WS4
Sheet 1 of 1	
Logged By:	ML
Checked By:	CEB
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 3.45m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		SPT 'N' Value [U100 Blows] Hand Vane	Installation /Backfill
					Depth (m bgl)	Type		
MADE GROUND. Tarmac onto dark grey brown very silty very sandy GRAVEL. Gravel is angular to sub-angular brick, concrete, ash, tile and ceramic.					0.20 0.40	B ES		
Loose becoming medium dense (by 2.00m) red brown very gravely silty SAND. Gravel is sub-rounded quartz. (Till)		1.25		▼ 1.40	1.20 1.55 2.00	S 8 (1,1,2,2,2,2) B S 21 (3,3,4,5,4,8)		
No recovery - sample fell out of the liner during extraction (driller's description).		2.45			3.00	C 64 (12,12,14,16,16,18)		
Borehole Complete at 3.45m		3.45						

Samples/Tests

U Undisturbed
D Disturbed
B Bulk
W Water
S/C SPT/CPT
ES Environmental Sample
HV Hand Shear Vane
NR No Recovery
 Water Strike
 Water Level

Document 4.144

Other Information:

1. Hand excavated service avoidance pit to 1.20m.
2. Groundwater noted at 1.40m.
3. Gas / groundwater monitoring standpipe installed to 2.00m, slotted in a gravel filter from 2.00m to 1.00m, bentonite from 1.00m with a lockable cover concrete at surface.



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Windowless Sampler Borehole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 28/06/2018
Diameter: 100mm
Depth Cased:

Borehole:	WS5
Sheet 1 of 1	
Logged By:	ML
Checked By:	CEB
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 3.45m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		SPT 'N' Value [U100 Blows] Hand Vane	Installation /Backfill
					Depth (m bgl)	Type		
MADE GROUND. Tarmac onto light brown silty sandy GRAVEL. Gravel is angular concrete.					0.10	B		
					0.50	ES		
Loose (at 1.20m) orange brown and light grey silty gravelly SAND. Gravel is sub-rounded quartz. (Till)		1.00			1.20	S	8 (1,1,2,2,2,2)	
				▼ 1.50	1.20	B		
Red brown very gravelly silty SAND. Gravel is sub-rounded quartz. (Till)		1.65			1.65	B		
Stiff becoming very stiff dark grey CLAY with occasional mudstone lithorelicts. (Coal Measures)		2.00			2.00	S	17 (4,5,3,3,3,8)	
					2.00	B		
					3.00	S	66 (10,12,14,16,16,20)	
Borehole Complete at 3.45m		3.45						

Samples/Tests

U Undisturbed
D Disturbed
B Bulk
W Water
S/C SPT/CPT
ES Environmental Sample
HV Hand Shear Vane
NR No Recovery
 Water Strike
 Water Level

Document 4.144

Other Information:

- Hand excavated service avoidance pit to 1.20m.
- Groundwater noted at 1.50m.
- Borehole backfilled upon completion.



Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Excavated: 16/11/2018
Plant Used: Hand Tools

Borehole:	HP1
Sheet 1 of 1	
Logged By:	CFM
Checked By:	ML

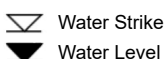
National Grid:
Ground Level:
Final Depth: 1.00m

[illegible]

U	Undisturbed Sample
D	Disturbed Sample
B	Bulk Sample
W	Water Sample
ES	Environmental Sample
HV	Hand Shear Vane

Pit Stability: Sides upright and stable.

1. Densities (in brackets) ascribed to granular soils is based upon speed/ease of excavation and side stability and is therefore approximate only.
2. Groundwater not encountered.
3. Trial pit was back filled with arisings.





Trial Pit Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Excavated: 16/11/2018
Plant Used: Hand Tools

Borehole:	HP2
Sheet 1 of 1	
Logged By:	CFM
Checked By:	ML

National Grid:
Ground Level:
Final Depth: 1.10m

[illegible]

Annotated Sketch Drawing (Not to Scale)

Samples/Tests	Other Information:
U Undisturbed Sample	Pit Stability: Sides upright and stable.
D Disturbed Sample	1. Densities (in brackets) ascribed to granular soils is based upon speed/ease of excavation and side stability and is therefore approximate only.
B Bulk Sample	2. Groundwater not encountered.
W Water Sample	3. Trial pit was back filled with arisings.
ES Environmental Sample	
HV Hand Shear Vane	

 Water Strike
 Water Level



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Rotary Drillhole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 13/07/2018
Diameter: 110mm
Depth Cased: 3.00m

Borehole:	RO1
Sheet 1 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 40.00m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		Rotary Coring				Depth (m)	Installation /Backfill
					Depth (m bgl)	Type	TCR%	SCR%	RQD%	FI		
Tarmac and stone (driller's description).												
Clay fill (driller's description).		0.60										
Brown clay (driller's description).		1.40										
Coal (driller's description).		2.80										
Grey mudstone (driller's description).		3.50										
Black mudstone (driller's description).		4.50										
Grey mudstone (driller's description).		5.20										

Samples/Tests
OH/C Openhole/Cored Drilling
TCR Total Core Recovery
SCR Solid Core Recovery
RQD Rock Quality Designation
FI Fracture Index
NI Non Intact
NR No Recovery
S SPT
 Water Strike
 Water Level

Other Information:
1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



27226
Former Crown PH, Mobberley
AJ Developments
Hewitt & Carr Architects
13/07/2018
110mm
3.00m

Borehole:	R01
Sheet 2 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		Rotary Coring				Installation /Backfill	
					Depth (m bgl)	Type	TCR%	SCR%	RQD%	FI		Depth (m)
Grey mudstone (driller's description).		10.80										
Dark grey mudstone with sandstone bands (driller's description).												
Grey mudstone (driller's description).		11.90										
Coal (driller's description).		19.00										
Grey mudstone with sandstone bands (driller's description).		19.60										
							TCR%	SCR%	RQD%	FI		

Samples/Tests	
OH/C	Openhole/Cored Drilling
TCR	Total Core Recovery
SCR	Solid Core Recovery
RQD	Rock Quality Designation
FI	Fracture Index
NI	Non Intact
NR	No Recovery
S	SPT
	Water Strike
	Water Level

Other Information:

1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



Rotary Drillhole Log

Project Number: 27226

Project Name: Former Crown PH, Mobberley

Client: AJ Developments

Engineer: Hewitt & Carr Architects

Date Drilled: 13/07/2018

Diameter: 110mm

Depth Cased: 3.00m

National Grid:

Ground Level:

Final Depth: 40.00m

Borehole:

Sheet 3 of 4

Logged By:

Checked By:

Drilled By:

R01

[illegible]

Samples/Tests

OH/C Openhole/Cored Drilling

TCR Total Core Recovery

SCR Solid Core Recovery

RQD Rock Quality Designation

FI Fracture Index

NI Non Intact

NR No Recovery

S SPT

 Water Strike

▼ Water Level

Other Information:

1. Rotary open drillhole undertaken using water flush.

2. All strata are described by the driller from chipping returns.

3. Drillhole backfilled with cement/arising mix.



Rotary Drillhole Log

Project Number: 27226

Project Name: Former Crown PH, Mobberley

Client: AJ Developments

Engineer: Hewitt & Carr Architects

Date Drilled: 13/07/2018

Diameter: 110mm

Depth Cased: 3.00m

Borehole:

Sheet 4 of 4

Logged By:

Checked By:

Drilled By:

R01

National Grid:

Ground Level:

Final Depth: 40.00m

[illegible][illegible]

OH/C Openhole/Cored Drilling

TCR Total Core Recovery

SCR Solid Core Recovery

RQD Rock Quality Designation

FI Fracture Index

NI Non Intact

NR No Recovery

S SPT

 Water Strike

▼ Water Level

Document 4.144

Other Information:

1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



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Rotary Drillhole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 16/07/2018
Diameter: 110mm
Depth Cased: 3.00m

Borehole:	RO2
Sheet 1 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 40.00m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		Rotary Coring				Depth (m)	Installation /Backfill
					Depth (m bgl)	Type	TCR%	SCR%	RQD%	FI		
Tarmac onto stone (driller's description).												
Clay fill (driller's description).		0.50										
Brown clay (driller's description).		0.95										
Coal (driller's description).		2.90										
Grey mudstone (driller's description).		3.60										
Black mudstone (driller's description).		5.00										
Grey mudstone with sandstone bands (driller's description).		6.50										

Samples/Tests		Other Information:										
OH/C Openhole/Cored Drilling		1. Rotary open drillhole undertaken using water flush.										
TCR Total Core Recovery		2. All strata are described by the driller from chipping returns.										
SCR Solid Core Recovery		3. Drillhole backfilled with cement/arising mix.										
RQD Rock Quality Designation												
FI Fracture Index												
NI Non Intact												
NR No Recovery												
S SPT												
Water Strike												
Water Level												



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Rotary Drillhole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 16/07/2018
Diameter: 110mm
Depth Cased: 3.00m

Borehole:	RO2
Sheet 2 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 40.00m

Description of Strata	Legend	Depth (m bgl)	Level (mAD)	Water Level (m bgl)	Samples/Tests		Rotary Coring				Depth (m)	Installation /Backfill
					Depth (m bgl)	Type	TCR%	SCR%	RQD%	FI		
Grey mudstone with sandstone bands (driller's description).												
Coal (driller's description).		19.60										

Samples/Tests
OH/C Openhole/Cored Drilling
TCR Total Core Recovery
SCR Solid Core Recovery
RQD Rock Quality Designation
FI Fracture Index
NI Non Intact
NR No Recovery
S SPT
Water Strike
Water Level

Other Information:
1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



Rotary Drillhole Log

Project Number: 27226
Project Name: Former Crown PH, Mobberley
Client: AJ Developments
Engineer: Hewitt & Carr Architects
Date Drilled: 16/07/2018
Diameter: 110mm
Depth Cased: 3.00m

Borehole:	R02
Sheet 3 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

National Grid:
Ground Level:
Final Depth: 40.00m

[illegible]

Samples/Tests	
OH/C	Openhole/Cored Drilling
TCR	Total Core Recovery
SCR	Solid Core Recovery
RQD	Rock Quality Designation
FI	Fracture Index
NI	Non Intact
NR	No Recovery
S	SPT
	Water Strike
	Water Level

Other Information:

1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



27226
Former Crown PH, Mobberley
AJ Developments
Hewitt & Carr Architects
6/07/2018
110mm
3.00m

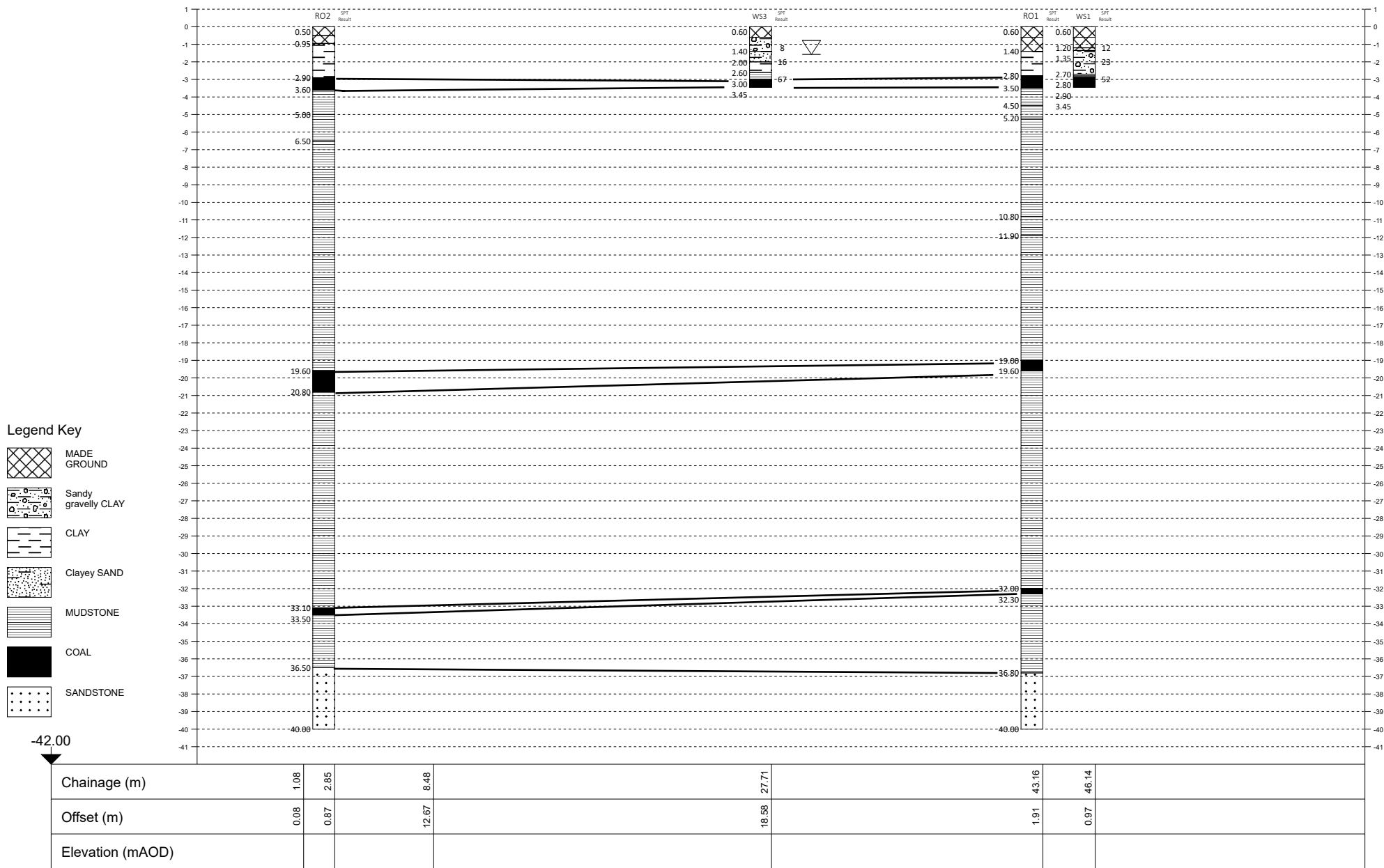
Borehole:	R02
Sheet 4 of 4	
Logged By:	MT
Checked By:	ML
Drilled By:	MT

[illegible]

Samples/Tests	
OH/C	Openhole/Cored Drilling
TCR	Total Core Recovery
SCR	Solid Core Recovery
RQD	Rock Quality Designation
FI	Fracture Index
NI	Non Intact
NR	No Recovery
S	SPT
	Water Strike
	Water Level

Other Information:

1. Rotary open drillhole undertaken using water flush.
2. All strata are described by the driller from chipping returns.
3. Drillhole backfilled with cement/arising mix.



APPENDIX B



LABORATORY REPORT FOR INDEX PROPERTY AND CHEMICAL TESTING

[illegible]

APPENDIX C



Comparison of Analytical Results with Critical Concentrations

Project Number		ML/27226																				
Project Name		Former Crown PH, Mobberley																				
Client		AJ Developments																				
Engineer		Hewitt & Carr Architects																				
Notes		Using SSVs where no free phase hydrocarbons have been observed.																				
		Devonshire House, Ettingshall Road, Wolverhampton. WV2 2JT										Tel 01902 459558 Fax 01902 459085 www.gipuk.com		C _c Values Used Residential with plant uptake (6% SOM)								
Data values in excess of the C _c are shown in Red	Hole ID	Sample Depth (m)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg								
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Inorganic Mercury	Nickel	Selenium	Vanadium	Zinc	Free Cyanide	Phenols								
	WS1	0.60	7	1	1	29	62	1	11	3	17	94	1	1								
	WS2	0.40	12	1	1	52	130	1	17	3	19	180	1	1								
	WS3	0.30	12	2	1	60	160	1	16	3	18	300	1	1								
	WS3	0.75	5	1	1	16	32	1	5	3	14	73	1	1								
	WS4	0.40	16	1	1	69	190	1	27	3	21	200	1	1								
	WS5	0.50	7	2	1	18	39	1	9	3	15	130	1	1								
	HP1	0.50	6	1	1	41	41	1	6	3	15	48	1	1								
	HP2	0.60	2	1	1	8	14	1	4	3	6	30	1	1								
C _c			37	22.1	20.5	4790	200	180	136	375	138	20300	34	1200								
C _c Source			ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	-	-	-	-	-	-	-	
Data values in excess of the C _c are shown in Red	Hole ID	Sample Depth (m)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
			Acenaphthene	Anthracene	Benz (a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(ghi) perylene	Benzo(k) fluoranthene	Chrysene	Dibenzo(ah) anthracene	Fluoranthene	Fluorene	Indeno (123cd) pyrene	Naphthalene	Pyrene						
	WS1	0.60	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
	WS2	0.40	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
	WS3	0.30	0.1	0.1	0.4	0.4	0.3	0.3	0.4	0.4	0.1	0.8	0.1	0.2	0.1	0.8						
	WS3	0.75	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
	WS4	0.40	0.1	0.2	1	1	0.9	0.6	0.6	1	0.3	2.5	0.1	0.5	0.1	2.5						
	WS5	0.50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
	HP1	0.50	0.4	1.4	4.5	3.7	4.4	2.2	3	3.8	1	10	0.5	2.1	0.1	8.6						
	HP2	0.60	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
C _c			2760	26200	8.54	2.05	9.86	103	100	927	1	2980	2610	9.75	12.2	2120						
C _c Source			ATRISK June 2017	ATRISK June 2017	ATRISK 31/03/11	ATRISK 6/17 (MR)	ATRISK 31/03/11	ATRISK 31/03/11	ATRISK 31/03/11	ATRISK 31/03/11	ATRISK 31/03/11	ATRISK June 2017	ATRISK June 2017	ATRISK 31/03/11	ATRISK June 2017	ATRISK June 2017	-	-	-	-	-	
Data values in excess of the C _c are shown in Red	Hole ID	Sample Depth (m)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
			Aliphatic C5-C6	Aliphatic C6-C8	Aliphatic C8-C10	Aliphatic C10-C12	Aliphatic C12-C16	Aliphatic C16-C35	Aromatic C5-C7	Aromatic C7-C8	Aromatic C8-C10	Aromatic C10-C12	Aromatic C12-C16	Aromatic C16-C21	Aromatic C21-C35	Benzene	Toluene	Ethylbenzene	m-Xylene	o-Xylene	p-Xylene	MTBE
	WS1	0.60	0.1	0.1	0.1	1	2	5	0.1	0.1	0.1	1	1	1	1	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WS2	0.40	0.1	0.1	0.1	1	2	5	0.1	0.1	0.1	1	1	1	6	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WS3	0.30	0.1	0.1	0.1	1	2	24	0.1	0.1	0.1	1	1	7	31	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WS3	0.75	0.1	0.1	0.1	1	2	5	0.1	0.1	0.1	1	1	1	2	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WS4	0.40	0.1	0.1	0.1	1	2	5	0.1	0.1	0.1	1	1	4	12	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WS5	0.50	0.1	0.1	0.1	1	2	11	0.1	0.1	0.1	1	1	1	8	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	HP1	0.50	0.1	0.1	0.1	1	6	50	0.1	0.1	0.1	2	42	390	680	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	HP2	0.60	0.1	0.1	0.1	1	2	5	0.1	0.1	0.1	1	1	1	1	0.01	0.01	0.01	0.01	0.01	0.01	0.01
C _c			369	1240	204	1180	4130	210100	0.871	780	232	468	830	1040	1710	0.871	780	453	328	336	312	220
C _c Source			ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017	ATRISK June 2017

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: Supplemental 783943-1

Date of Report: 18-Dec-2018

Customer: Ground Investigation & Piling Ltd
Devonshire House
Ettingshall Road
Wolverhampton
WV2 2JT

Customer Contact: Mr Matt Laws

Customer Job Reference: ML/27226

Customer Purchase Order: 43089

Customer Site Reference: Mobberley

Date Job Received at Concept: 20-Nov-2018

Date Analysis Started: 21-Nov-2018

Date Analysis Completed: 27-Nov-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



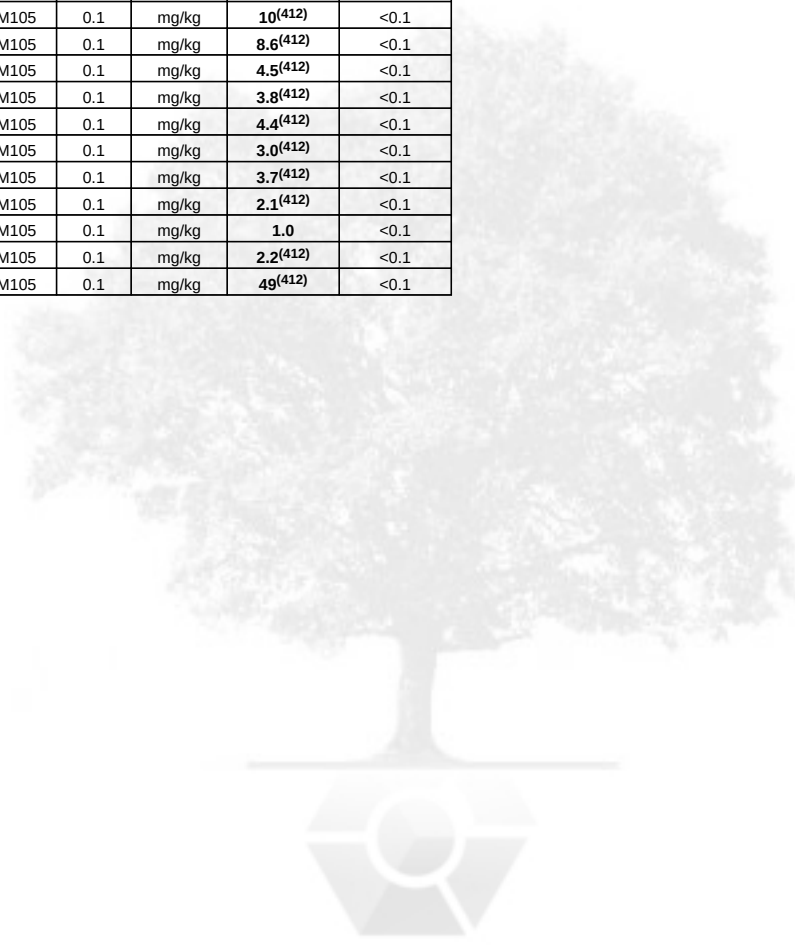
Report checked
and authorised by :
Chloe Kitto
Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Service
Advisor

Concept Reference: 783943 Project Site: Mobberley Customer Reference: ML/27226 Soil Analysed as Soil MCERTS Preparation						
Concept Reference				783943 001	783943 002	
Customer Sample Reference				HP1	HP2	
Top Depth				0.5	0.6	
Date Sampled				15-NOV-2018	15-NOV-2018	
Matrix Class				Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units		
Moisture @105C	T162	AR	0.1	%	6.5	11
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1

Concept Reference: 783943 Project Site: Mobberley Customer Reference: ML/27226 Soil Analysed as Soil GIP2						
Concept Reference				783943 001	783943 002	
Customer Sample Reference				HP1	HP2	
Top Depth				0.5	0.6	
Date Sampled				15-NOV-2018	15-NOV-2018	
Matrix Class				Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units		
Chromium	T6	M40	1	mg/kg	8	5
Zinc	T6	M40	1	mg/kg	48	30
Vanadium	T6	M40	1	mg/kg	15	6
Selenium	T6	M40	3	mg/kg	<3	<3
Cadmium	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	6	4
Chromium VI	T6	A40	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	41	8
Arsenic	T6	M40	2	mg/kg	6	<2
Lead	T6	M40	1	mg/kg	41	14
Mercury	T6	M40	1	mg/kg	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1
pH	T7	A40			8.1	7.9
Organic Matter	T2	A40	0.1	%	3.0	1.2
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1

Concept Reference: 783943 Project Site: Mobberley Customer Reference: ML/27226						
Soil Analysed as Soil PAH US EPA 16 (B and K split)						
Concept Reference			783943 001	783943 002		
Customer Sample Reference			HP1	HP2		
Top Depth			0.5	0.6		
Date Sampled			15-NOV-2018	15-NOV-2018		
Matrix Class			Topsoil	Topsoil		
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	0.4	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.4	<0.1
Fluorene	T207	M105	0.1	mg/kg	0.5	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	5.4⁽⁴¹²⁾	<0.1
Anthracene	T207	M105	0.1	mg/kg	1.4⁽⁴¹²⁾	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	10⁽⁴¹²⁾	<0.1
Pyrene	T207	M105	0.1	mg/kg	8.6⁽⁴¹²⁾	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	4.5⁽⁴¹²⁾	<0.1
Chrysene	T207	M105	0.1	mg/kg	3.8⁽⁴¹²⁾	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	4.4⁽⁴¹²⁾	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	3.0⁽⁴¹²⁾	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	3.7⁽⁴¹²⁾	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	2.1⁽⁴¹²⁾	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	1.0	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	2.2⁽⁴¹²⁾	<0.1
PAH(total)	T207	M105	0.1	mg/kg	49⁽⁴¹²⁾	<0.1



Concept Reference: 783943 Project Site: Mobberley Customer Reference: ML/27226 Soil Analysed as Soil GIP TPHUKCWG						
Concept Reference				783943 001	783943 002	
Customer Sample Reference				HP1	HP2	
Top Depth				0.5	0.6	
Date Sampled				15-NOV-2018	15-NOV-2018	
Matrix Class				Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units		
Benzene	T209	M105	10	µg/kg	<10 ⁽¹³⁾	<10 ⁽¹³⁾
Toluene	T209	M105	10	µg/kg	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	6 ⁽¹³⁾	<2 ⁽¹³⁾
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	24 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	26 ⁽¹³⁾	<4 ⁽¹³⁾
TPH (C16-C35 aliphatic)	T206	M105	5	mg/kg	51	<5
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	22 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (Aliphatic) total	T85	M105		mg/kg	78 ⁽¹³⁾	N.D. ⁽¹³⁾
TPH (C5-C7 aromatic)	T209	M105	0.010	mg/kg	<0.10 ⁽¹⁰⁰⁾	<0.10 ⁽¹⁰⁰⁾
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	2 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	42 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	390 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	680 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (Aromatic) total	T85	M105		mg/kg	1100 ⁽¹³⁾	N.D. ⁽¹³⁾
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	1190 ⁽¹³⁾	N.D. ⁽¹³⁾

Concept Reference: 783943 Project Site: Mobberley Customer Reference: ML/27226 Soil Analysed as Soil Miscellaneous						
Concept Reference				783943 001	783943 002	
Customer Sample Reference				HP1	HP2	
Top Depth				0.5	0.6	
Date Sampled				15-NOV-2018	15-NOV-2018	
Matrix Class				Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units		
Asbestos ID	T27	A40			N.D.	N.D.

Index to symbols used in Supplemental 783943-1

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.

412	Result is based on dilution of sample extract
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Asbestos.
Supplemental report to include undiluted PAH results for sample 001.

Method Index

Value	Description
T2	Grav
T6	ICP/OES
T85	Calc
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)
T546	Colorimetry (CF)
T27	PLM
T8	GC/FID
T7	Probe
T206	GC/FID (MCERTS)
T209	GC/MS (Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Moisture @105C	T162	AR	0.1	%	N	001-002
Retained on 10mm sieve	T2	M40	0.1	%	N	001-002
Arsenic	T6	M40	2	mg/kg	M	001-002
Cadmium	T6	M40	1	mg/kg	M	001-002
Chromium	T6	M40	1	mg/kg	M	001-002
Chromium VI	T6	A40	1	mg/kg	N	001-002
Copper	T6	M40	1	mg/kg	M	001-002
Lead	T6	M40	1	mg/kg	M	001-002
Mercury	T6	M40	1	mg/kg	M	001-002
Nickel	T6	M40	1	mg/kg	M	001-002
Selenium	T6	M40	3	mg/kg	M	001-002
Vanadium	T6	M40	1	mg/kg	M	001-002
Zinc	T6	M40	1	mg/kg	M	001-002
Cyanide(Total)	T546	AR	1	mg/kg	M	001-002
Organic Matter	T2	A40	0.1	%	N	001-002
pH	T7	A40			M	001-002
Phenols(Mono)	T546	AR	1	mg/kg	M	001-002
Naphthalene	T207	M105	0.1	mg/kg	M	001-002
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-002
Acenaphthene	T207	M105	0.1	mg/kg	M	001-002
Fluorene	T207	M105	0.1	mg/kg	M	001-002
Phenanthrene	T207	M105	0.1	mg/kg	M	001-002
Anthracene	T207	M105	0.1	mg/kg	U	001-002
Fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Pyrene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Chrysene	T207	M105	0.1	mg/kg	M	001-002
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-002
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-002
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-002
PAH(total)	T207	M105	0.1	mg/kg	U	001-002
Benzene	T209	M105	10	µg/kg	M	001-002
Toluene	T209	M105	10	µg/kg	M	001-002
EthylBenzene	T209	M105	10	µg/kg	M	001-002
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-002
M/P Xylene	T209	M105	10	µg/kg	M	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
O Xylene	T209	M105	10	µg/kg	M	001-002
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-002
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	001-002
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	001-002
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	001-002
TPH (C16-C35 aliphatic)	T206	M105	5	mg/kg	M	001-002
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	001-002
TPH (Aliphatic) total	T85	M105		mg/kg	N	001-002
TPH (C5-C7 aromatic)	T209	M105	0.010	mg/kg	N	001-002
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	001-002
TPH (Aromatic) total	T85	M105		mg/kg	N	001-002
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001-002
Asbestos ID	T27	A40			SU	001-002



Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 750388-1

Date of Report: 20-Jul-2018

Customer: Ground Investigation & Piling Ltd
Devonshire House
Ettingshall Road
Wolverhampton
WV2 2JT

Customer Contact: Mr Matt Laws

Customer Job Reference: ML/27226

Customer Purchase Order: 43089

Customer Site Reference: Mobberley

Date Job Received at Concept: 09-Jul-2018

Date Analysis Started: 10-Jul-2018

Date Analysis Completed: 20-Jul-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Emma Spear
Customer Service Advisor

Issued by :
Emma Spear
Customer Service Advisor

Concept Reference: 750388										
Project Site: Mobberley										
Customer Reference: ML/27226										
Soil										

Concept Reference: 750388											
Project Site: Mobberley											
Customer Reference: ML/27226											
Soil Analysed as Soil											
Asbestos ID											
Concept Reference				750388 001	750388 002	750388 003	750388 004	750388 005	750388 006		
Customer Sample Reference				WS1	WS2	WS3	WS3	WS4	WS5		
Top Depth				0.6	0.4	0.3	0.75	0.4	0.5		
Depth				0.6	0.4	0.3	0.75	0.4	0.5		
Date Sampled				28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018		
Matrix Class				Sandy Soil	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil		
Determinand		Method	Test Sample	LOD	Units						
Asbestos ID		T27	A40			N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Concept Reference: 750388										
Project Site: Mobberley										
Customer Reference: ML/27226										
Soil GIP2										
Analysed as Soil										
Concept Reference					750388 001	750388 002	750388 003	750388 004	750388 005	750388 006
Customer Sample Reference					WS1	WS2	WS3	WS3	WS4	WS5
Top Depth					0.6	0.4	0.3	0.75	0.4	0.5
Depth					0.6	0.4	0.3	0.75	0.4	0.5
Date Sampled					28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units						
Arsenic	T6	M40	2	mg/kg	7	12	12	5	16	7
Lead	T6	M40	1	mg/kg	62	130	160	32	190	39
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3	<3
Vanadium	T6	M40	1	mg/kg	17	19	18	14	21	15
Zinc	T6	M40	1	mg/kg	94	180	300	73	200	130
Copper	T6	M40	1	mg/kg	29	52	60	16	69	18
Nickel	T6	M40	1	mg/kg	11	17	16	5	27	9
Cadmium	T6	M40	1	mg/kg	<1	1	2	<1	1	2
Chromium	T6	M40	1	mg/kg	9	12	12	8	11	11
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1	<1
pH	T7	A40			7.0	7.5	7.4	7.3	7.4	10.7
Organic Matter	T2	A40	0.1	%	4.8	6.9	7.5	3.2	8.0	3.6
Phenols(Mono)	T546	AR	1	ma/kg	<1	<1	<1	<1	<1	<1

Concept Reference: 750388
Project Site: Mobberley
Customer Reference: ML/27226

Soil
Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference					750388 001	750388 002	750388 003	750388 004	750388 005	750388 006
Customer Sample Reference					WS1	WS2	WS3	WS3	WS4	WS5
Top Depth					0.6	0.4	0.3	0.75	0.4	0.5
Depth					0.6	0.4	0.3	0.75	0.4	0.5
Date Sampled					28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units						
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	<0.1	0.5	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	0.2	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	0.1	0.8	<0.1	2.5	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	0.1	0.8	<0.1	2.5	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.4	<0.1	1.0	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.4	<0.1	1.0	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	<0.1	0.9	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.4	<0.1	0.6	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.4	<0.1	1.0	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	0.5	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	<0.1	0.6	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	0.2	4.6	<0.1	12	<0.1



Concept Reference: 750388 Project Site: Mobberley Customer Reference: ML/27226										
Soil			Analysed as Soil							
GIP TPHUKCWG										
Concept Reference					750388 001	750388 002	750388 003	750388 004	750388 005	750388 006
Customer Sample Reference					WS1	WS2	WS3	WS3	WS4	WS5
Top Depth					0.6	0.4	0.3	0.75	0.4	0.5
Depth					0.6	0.4	0.3	0.75	0.4	0.5
Date Sampled					28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018	28-JUN-2018
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units						
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	(13) <2	(13) <2	(13) <2	(13) <2	(13) <2	(13) <2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) 2	(13) <1	(13) <1	(13) <1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	(13) <4	(13) <4	(13) 22	(13) <4	(13) <4	(13) 11
TPH (C16-C35 aliphatic)	T206	M105	5	mg/kg	<5	<5	24	<5	<5	11
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) 1	(13) 2
TPH (Aliphatic) total	T85	M105		mg/kg	(13) N.D.	(13) N.D.	(13) 24	(13) N.D.	(13) 1.0	(13) 13
TPH (C5-C7 aromatic)	T209	M105	0.010	mg/kg	(100) <0.10	(100) <0.10	(100) <0.10	(100) <0.10	(100) <0.10	(100) <0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	(13) <1	(13) 1	(13) 7	(13) <1	(13) 4	(13) <1
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	(13) 1	(13) 6	(13) 31	(13) 2	(13) 12	(13) 8
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) 2	(13) <1	(13) <1	(13) <1
TPH (Aromatic) total	T85	M105		mg/kg	(13) 1.0	(13) 6.0	(13) 40	(13) 2.0	(13) 16	(13) 8.0
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	(13) 1.00	(13) 7.00	(13) 64.0	(13) 2.00	(13) 17.0	(13) 21.0

Index to symbols used in 750388-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
A40	Assisted dried < 40C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
100	LOD determined by sample aliquot used for analysis
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Samples 001-006 have been analysed exceeding recommended holding times for pH. It is possible therefore that the results provided may be compromised.
Asbestos was sub-contracted to REC Asbestos.

Method Index

Value	Description
T6	ICP/OES
T27	PLM
T85	Calc
T2	Grav
T206	GC/FID (MCERTS)
T8	GC/FID
T7	Probe
T162	Grav (1 Dec) (105 C)
T209	GC/MS (Head Space)(MCERTS)
T207	GC/MS (MCERTS)
T546	Colorimetry (CF)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzene	T209	M105	10	µg/kg	M	001-006
Toluene	T209	M105	10	µg/kg	M	001-006
EthylBenzene	T209	M105	10	µg/kg	M	001-006
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-006
M/P Xylene	T209	M105	10	µg/kg	M	001-006
O Xylene	T209	M105	10	µg/kg	M	001-006
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-006
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-006
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-006
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	001-006
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	001-006
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	001-006
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	001-006
TPH (C16-C35 aliphatic)	T206	M105	5	mg/kg	M	001-006
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	001-006
TPH (Aliphatic) total	T85	M105		mg/kg	N	001-006
TPH (C5-C7 aromatic)	T209	M105	0.010	mg/kg	N	001-006
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-006
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-006
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	001-006
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	001-006
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	001-006
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	001-006
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	001-006
TPH (Aromatic) total	T85	M105		mg/kg	N	001-006
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001-006
Moisture @105C	T162	AR	0.1	%	N	001-006
Retained on 10mm sieve	T2	M40	0.1	%	N	001-006
Arsenic	T6	M40	2	mg/kg	M	001-006
Cadmium	T6	M40	1	mg/kg	M	001-006
Chromium	T6	M40	1	mg/kg	M	001-006
Chromium VI	T6	A40	1	mg/kg	N	001-006
Copper	T6	M40	1	mg/kg	M	001-006
Lead	T6	M40	1	mg/kg	M	001-006
Mercury	T6	M40	1	mg/kg	M	001-006
Nickel	T6	M40	1	mg/kg	M	001-006
Selenium	T6	M40	3	mg/kg	M	001-006
Vanadium	T6	M40	1	mg/kg	M	001-006
Zinc	T6	M40	1	mg/kg	M	001-006
Cyanide(Total)	T546	AR	1	mg/kg	M	001-006
Organic Matter	T2	A40	0.1	%	N	001-006
pH	T7	A40			M	001-006
Phenols(Mono)	T546	AR	1	mg/kg	M	001-006
Naphthalene	T207	M105	0.1	mg/kg	M	001-006
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-006
Acenaphthene	T207	M105	0.1	mg/kg	M	001-006
Fluorene	T207	M105	0.1	mg/kg	M	001-006
Phenanthrene	T207	M105	0.1	mg/kg	M	001-006
Anthracene	T207	M105	0.1	mg/kg	U	001-006
Fluoranthene	T207	M105	0.1	mg/kg	M	001-006
Pyrene	T207	M105	0.1	mg/kg	M	001-006
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-006
Chrysene	T207	M105	0.1	mg/kg	M	001-006
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-006

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-006
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-006
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-006
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-006
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-006
PAH(total)	T207	M105	0.1	mg/kg	U	001-006
Asbestos ID	T27	A40			SU	001-006



Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 756491-1

Date of Report: 10-Aug-2018

Customer: Ground Investigation & Piling Ltd
Devonshire House
Ettingshall Road
Wolverhampton
WV2 2JT

Customer Contact: Mr Matt Laws

Customer Job Reference: ML/27226

Customer Purchase Order: 43089

Customer Site Reference: Mobberley

Date Job Received at Concept: 01-Aug-2018

Date Analysis Started: 02-Aug-2018

Date Analysis Completed: 10-Aug-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



1549

Report checked
and authorised by :
Jack Nagy
Customer Service Advisor

Issued by :
Jack Nagy
Customer Service Advisor

Concept Reference: 756491 Project Site: Mobberley Customer Reference: ML/27226								
Soil GIP5								
Analysed as Soil								
Concept Reference					756491 001	756491 002	756491 003	756491 004
Customer Sample Reference					WS5	WS4	WS5	WS3
Top Depth					2.0	1.55	1.20	2.35
Date Sampled					Deviating	Deviating	Deviating	Deviating
Determinand	Method	Test Sample	LOD	Units				
pH	T7	A40			7.0	7.5	7.5	6.7
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	60	<0.05	<0.05	<0.05
(Acid Soluble) SO4	T192	A40	0.01	%	0.04	<0.01	<0.01	0.02
Sulphur (total)	T1055	A40	0.01	%	0.06	<0.01	<0.01	0.02
(Total Potential) SO4(Total) Expressed as SO4	T403	A40	0.03	%	0.18	<0.03	<0.03	0.06
(Oxidisable) Sulphide Expressed as SO4	T194	A40	0.03	%	0.14	<0.03	<0.03	0.04

Index to symbols used in 756491-1

Value	Description
A40	Assisted dried < 40C
U	Analysis is UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T7	Probe
T403	Calc (TRL 447 T4.13 ICP/OES)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T194	Calc (TRL 447 T 4.11)
T1055	ICP/OES (TRL 447 T4)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
pH	T7	A40			U	001-004
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	U	001-004
(Acid Soluble) SO4	T192	A40	0.01	%	U	001-004
Sulphur (total)	T1055	A40	0.01	%	U	001-004
(Total Potential) SO4(Total) Expressed as SO4	T403	A40	0.03	%	U	001-004
(Oxidisable) Sulphide Expressed as SO4	T194	A40	0.03	%	U	001-004

APPENDIX D





STANDPIPE GAS & GROUNDWATER MONITORING RESULTS

CONTRACT No. 27226

SITE	Mobberley
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CLIENT :	AJ Developments
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REPORT DATE	03/09/2018
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ENGINEER : Hewitt & Carr Architects

CHECKED

NOTES

[illegible]

APPENDIX E



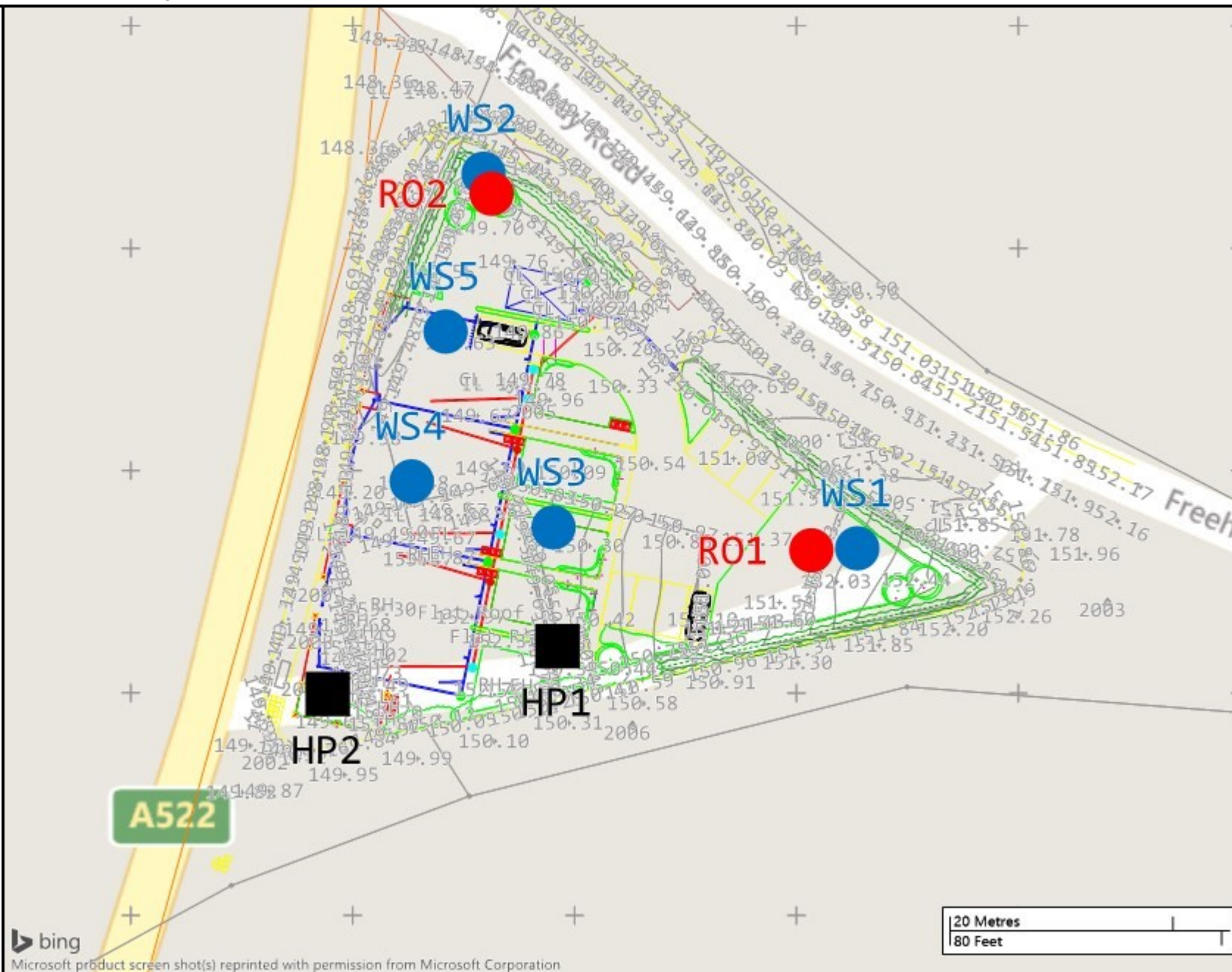
Project Id: 27226
Project Title: Former Crown PH, Mobberley
Location:
Client: AJ Developments

Title: Site Plan
Scale: 1:500
Engineer: Hewitt & Carr Architects
Contractor:



Legend Key

- Approximate Rotary Openhole Location
- Approximate Windowless Sampler Borehole Location
- Approximate Hand Dug Pit Location



APPENDIX F



General Notes

1. The copyright of this report and other plans and documents prepared by Ground Investigation and Piling Limited are owned by them. No such report plan or document may be produced, published or adapted without the written consent of Ground Investigation and Piling Limited. Copies of this report may however, be made and distributed by the Client as an expedient in dealing with matters related to its commission.
2. This report is provided for sole use by the client and is confidential to the Client and the Clients professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any other person other than the client.
3. The report and/or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Ground Investigation and Piling Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.
4. The report will be based on the ground conditions encountered in the exploratory holes together with results of field and laboratory testing in the context of the proposed development. Conditions between exploratory holes have been interpolated, however soils and rock conditions are highly variable and may differ from our interpolation. There may be conditions, appertaining to the site, which may not be revealed by the investigation, and which may not be taken into account in the report.
5. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.
6. The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.
7. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.
8. Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated on the light of these data by the supervising geotechnical engineers.
9. Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.
10. Unless specifically stated, the investigation will not take into account possible effects of mineral extraction.
11. The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.



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