



COUNTRYSIDE PROPERTIES

**DRAKELOW PARK,
BURTON-UPON-TRENT**

**GEO-ENVIRONMENTAL
ASSESSMENT AND
REMEDIATION STRATEGY**

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1. INTRODUCTION

1.1 Introduction

- 1.1.1 This report has been prepared in accordance with instructions received from Mr Paul Costiff of Countryside Properties following Travis Baker Geo-Environmental Limited's proposal via an email send on 9 March 2020.
- 1.1.2 This report has been compiled to provide an assessment of ground conditions and identify potential development constraints in respect of a proposed residential development at 'Drakelow Park' which includes part of the former Drakelow Power Station, Drakelow Park Industrial Estate and an area of agricultural land. The proposals for the site include two to three storey residential housing and apartments with associated gardens, landscaping and infrastructure across the majority of the site. The wider development area will also include a primary school, care facilities and employment land.
- 1.1.3 The proposed development is approximately 100 hectares in area and has included multiple land uses. The desk study researches are summarised in Patrick Parsons' 'Phase I Site Appraisal' issued in April 2019 (Rev 1). The Drakelow Park site has also been subject to a previous phase of investigation undertaken by Patrick Parsons, the findings of which were published in their report initially dated June 2019 and updated (Rev 4) in February 2020. We have carried out a review of these reports and have updated the research where necessary by examining web-based archive information, site observations and anecdotal information provided by site personnel. Details of all the archive information used in this report is provided in the list of information sources included in Appendix 1.
- 1.1.4 Given the size and complexity of the site, the site was divided by Patrick Parsons into 19 land parcels (A to S) with a small number sub-divided further. For continuity and ease of reference, we have adopted Patrick Parsons' referencing system. The land parcels are summarised on Drawing No. 20040-GE03.
- 1.1.5 Some of the site remained operational therefore exploratory holes were locally constrained by active services and roadways. Nesting birds were also recorded during an ecological survey of the site; investigations in these areas were directly supervised by an ecologist and moved in accordance with their instruction.
- 1.1.6 The information contained within this report describes the historical, geological, mining and environmental setting of the site and immediate area, and provides a record of the site investigation works undertaken across the proposed development area. The report describes the results of an initial site investigation undertaken by Patrick Parsons and the recent supplementary investigation works undertaken by Travis Baker Geo-Environmental Ltd in June 2020. These supplementary intrusive investigations comprised the drilling of 10 dynamic sampling boreholes, the excavation of 23 trial pits and additional sampling for geotechnical and geochemical assessments (TPA-TPJ and SS5 to SS9, respectively). The works were undertaken under the direct supervision of Travis Baker Geo-Environmental Ltd. The locations of the exploratory boreholes are illustrated on Drawing No. 20040-GE04A.
- 1.1.7 This investigation has generally been carried out in accordance with the guidance provided in the Environment Agency (EA) and National House Building Council (NHBC) publication 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008) and the Investigation of Potentially Contaminated Sites – Code of Practice (BS10175 2011).
- 1.1.8 This report has been prepared for the sole internal use and reliance of Countryside Properties. This report shall not be relied upon or transferred to other parties without the written authorisation of Travis Baker Geo-Environmental Ltd (TBGE).

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- 1.1.9 The findings of this report have been based on information provided from a number of different sources; TBGE have carried out all reasonable care in examining and interpreting this information to confirm its reliability, however, we cannot guarantee the authenticity of this information.
- 1.1.10 The findings of this report are based on the ground conditions identified at the individual exploratory holes and the associated laboratory testing. TBGE use best skill and diligence in interpreting the conditions between the exploratory hole locations, however we do not accept any liability for conditions that are not revealed by the exploratory holes / test data. Our recommendations on the ground conditions between or beneath exploratory hole locations are therefore for general guidance only and should be confirmed at or prior to construction.

2. BACKGROUND

2.1 Background Information

- 2.1.1 The total site area comprises approximately 100 hectares of land associated with the former Drakelow Power Station, Drakelow Park Industrial Estate and an area of agricultural land. The site is approximately centred at National Grid Reference 424200, 320270. Due to the size and complexity of the former site uses, the site has been divided into multiple land parcels, typically based on the former land uses. The land parcels are illustrated on Drawing No. 20040-GE03; a number of the historic land uses are illustrated on the Constraints Plan i.e. Drawing No. 20040-GE05 and summarised in Table 1, below.

Table 1 – Summary of Land Parcels and Former Land Use

Land Parcel	Land Use
A	Open undeveloped farmland
B	Eastern industrial estate
C	Central / western area of industrial estate and open storage areas
D	South western area of industrial estate (Bullivant and AMCO)
E	Woodland
F	Concrete hardstanding – DUO Plant Hire storage, former 4ment plant
G	Woodland
H	Drakelow Hall stable block, former Drakelow Hall, gardens and wooded area
I	Rough open land
J	Former railway embankment
K	Former railway embankment
L	Former coal yard
M	Drakelow 'A' power station
N	Drakelow 'B' power station
O	Southern cooling towers
P	Former railway lines (raised ground)
Q	Raised ground
R	Former truck storage, more recently inert waste storage
S	Former railway cuttings (now raised ground)

2.2 Previous Reports

- 2.2.1 The proposed development area has been the subject of an initial phase of investigation comprising desk study researches and preliminary intrusive site investigations by Patrick Parsons. The results of their assessment are reported in their 'Phase I' and 'Phase II' Site Appraisal Reports dated April 2019 and June 2019, respectively. The reports reference a number of previous site investigation reports produced for specific areas of the site between 1999 and 2017. We have not been provided with these original documents; however, we have reviewed the latest Patrick Parsons reports which include any pertinent points from the original investigations. Where appropriate, we have updated the research with a check on web-based archive information, as outlined in Appendix 1.
- 2.2.2 We have provided a brief summary of the relevant desk-based researches in the following section; if further detail is required reference should be made to the original documents. On the basis of our review of the report and site visit we have prepared an initial conceptual site model and preliminary risk assessment in Section 3.

2.3 Current Status

2.3.1 The site area comprises an irregular area of land, approximately 100 hectares in total, split into land parcels A to S according to exiting / former land use. At the time of the recent site works (June 2020), the site included an industrial estate in the east of the site (land parcels B, C, D and F totalling approximately 16 hectares) the majority of which appeared to remain active. The industrial estate area in the east of the site comprises a number of commercial / industrial units. The buildings are primarily within land parcels B and C (in the east of the site) and consist of various construction. There are extensive areas of concrete / asphalt hardstanding around the industrial estate used for roads and storage. The site also includes an area formerly used as a coal yard and power station (Drakelow 'A' and 'B') which includes the majority of the western site area. The northern area is approximately 14 hectares and includes agricultural fields (currently in use therefore access was unavailable during the June 2020 investigations). The remaining site area comprises woodland, generally in the central site area associated with Darklands Brook (which intersects the site approximately north / south), land adjacent to the River Trent to the north and an area adjacent to Walton Road in the south of the site.

2.3.2 The land use remains similar to those reported by Patrick Parsons therefore we have not provided a detailed description for the site; reference should be made to the Phase I and II Site Appraisal Reports for full details. For ease of reference, a brief description is provided in Table 1 in Section 2.1; the main differences noted between the time of our site works in June 2020 and the status reported as part of the 2019 works are summarised below:

- Area R was no longer in use as truck storage; waste industrial products were observed on the hard standing such as cardboard and evidence of possible waste burning.
- The previous reports describe four main large industrial units; there are several additional smaller temporary and permanent buildings than shown on the topographic survey provided.
- Several more stockpiles have been added including demolition rubble, PFA and sand and gravel (all suspected to originate from the site).

2.4 Site History

2.4.1 At the time of the first available Ordnance Survey historical mapping in 1883, the site generally comprises a mixture of open undeveloped land or woods. The area is labelled 'Drakelow Park' and includes Drakelow Hall and gardens within the west of the site and a deer park. Other ancillary buildings are also recorded i.e. two boathouses. A number of small ponds and a larger 'fishing pond' are present locally. The subsequent mapping shows the presence of the listed 'sunken garden'.

2.4.2 The mappings of the later 1940s / early 1950s show the presence of two railways crossing the northern half of the site on embankments; it is understood that the lines continued into the south of the site (as per later mappings). Two large buildings and several smaller structures are shown in the northeast of the site. One of the structures is labelled as an electrical sub-station.

2.4.3 It is understood that Drakelow 'A' & 'B' power stations were completed in 1955 and 1960, respectively in the central western site area. Four cooling towers (two off site and two immediately west of the site) are recorded. The number of rail lines has increased and includes additional sidings, structures and electrical substations shown adjacent to the railway lines. An open area, understood to be a coal storage yard is recorded with a travelling crane and conveyors. Further rail lines are recorded. A 'sewage works' and a 'water treatment plant' is recorded centrally. Some of the buildings appear to have been replaced by large buildings labelled 'Building Blocks Factory' which is later shown to have been replaced by another factory in the 2000's.

- 2.4.4 The 1990s maps show an aqueduct associated with the power station. Following decommissioning in the 1990s, the 2002 map edition shows that 'Drakelow A and B' and cooling towers have been demolished. During the early 2000's, the railway lines are removed and further buildings are recorded as part of the industrial estate.
- 2.4.5 It is understood that the superficial sand and gravel deposits recorded across a significant portion of the site have been extracted. The Patrick Parsons report include references to extraction in the area of the former coal yard (to depths of 2m-4m), the majority of which has subsequently been backfilled with Pulverised Fuel Ash (PFA). Some of the south eastern area of the site has reportedly been backfilled with materials such as demolition arisings from Drakelow 'A' & 'B' Power Stations. In addition, the area of the former Drakelow Hall is also recorded to have been excavated for sand and gravel and backfilled with PFA.
- 2.4.6 The area of the former water treatment works (central southern area) is also recorded to have been excavated for sand and gravel and backfilled prior to 2001 with unknown materials (although understood not to have been PFA).
- 2.4.7 The sand and gravel in the location of the former southern railway embankment is also recorded to have been excavated. Subsequently, it is understood to have been used for a PFA and lime stabilisation trial of ground improvement Roger Bullivant Ltd. The outcome of this trial is not known and the exact trial area is unclear, however, the area is understood to coincide with a raised storage area retained by gabions to the west of the industrial estate buildings.
- 2.4.8 It is understood that the demolition works associated with Drakelow 'A' & 'B' Power Station included the removal of above ground structures, however, the basement structures to Drakelow 'A' (north) remain in-situ and were backfilled with PFA to a depth of up to 3.5m bgl. The above ground structures associated with Drakelow 'B' (south) and the two water cooling towers were demolished, however, the floor slab and sub-structure remain in-situ.
- 2.4.9 It is understood that an unknown volume of 'contaminated silt' from the cooling towers was disposed of within the base of the southern cooling tower and capped over under an Environment Agency waste license. Further information with regards to the type of material disposed of and the parameters of the license are required.
- 2.4.10 An area of raised ground in the southeast of the site is understood to have been built up, primarily with PFA. There is also likely to be varying depths of made ground associated with the railway construction including cuttings. The Patrick Parsons report states that anecdotal evidence suggests asbestos contamination may be present within the most easterly railway cutting, possibly associated with the demolition of the power stations. Prior to the area being raised, it is understood that the area was used for the testing of piles and piling rigs; concrete obstructions are anticipated in this area.
- 2.4.11 Additional filling activities are recorded to the west of the industrial estate, the north of the former southern railway and the south of the northern railway which have been raised to create a level plateau used for sand processing. The reports suggest that the area to the east of this was 'soil stabilised and rolled' i.e. ground improvement possibly carried out in order to allow the area to be used as part of Roger Bullivant Ltd's operations. It is also understood that area has been raised prior to construction of the southern building of the industrial estate, where unknown materials were used to raise the levels by approximately 5m prior to 1999. It has been suggested that the materials used may have included former railway embankment fill. The area to the south-west of this is recorded to comprise 'very hard consolidated PFA'.

2.5 Geology

- 2.5.1 The published geological mapping (BGS Geology of Britain Viewer) indicates that the majority of the site is recorded to be overlain by superficial deposits of River Terrace Deposits comprising sand and gravel. Alluvium (typically a combination of clay, silt sand and gravel) is shown to cross the site approximately northwest to southeast associated with the brook and the far north west of the site associated with the River Trent. Superficial deposits are recorded to be absent over the south eastern extent (i.e. Parcel B and the east of Parcel C).
- 2.5.2 Beneath the superficial deposits, where present, the underlying bedrock is typically recorded to comprise strata of the Mercia Mudstone Formation. However, the south west of the site is underlain by sandstone of the Edwalton Member whilst a small area along the central southern boundary is recorded to be underlain by mudstone of the Gunthorpe Member.
- 2.5.3 The BGS GeoIndex online mapping shows 'artificial ground' is recorded across the south west of the site. Given the historic land uses across large areas of the site, significant depths of made ground are anticipated locally.

2.6 Mining

- 2.6.1 A Coal Authority Mining Report for the main site area was obtained by Patrick Parsons as part of their desk study researches in 2019. The site is not within an area which could be affected by past or present mining activities. There are no coal mine entries within the site boundary or within 20m of the site. Given the recorded geology, there is no risk to the proposed development from underground coal mining. Further investigations or treatment works are not considered necessary at the site.
- 2.6.2 Sand and gravel have been extracted from the site and surrounding areas. It is understood that these have been abstracted from the surface and subsequently backfilled, mainly with PFA from the former Drakelow Power Station.

2.7 Hydrogeology / Hydrology

- 2.7.1 The Government website 'MAGIC' has been consulted in respect of the underlying aquifer designation. The river terrace deposits are classified as a Secondary A Aquifer. The bedrock underlying the site is classified as a Secondary B aquifer.
- 2.7.2 The site is not located within a Groundwater Source Protection Zone.
- 2.7.3 The Darklands Brook traverses the central site area running approximately south to north to the River Trent which flows west to east along much of the northern boundary of the site.

2.8 Radon

- 2.8.1 The site is not within an area affected by radon; radon protection measures are not required in new properties.

2.9 Landfill Sites

- 2.9.1 The Patrick Parsons report states there are no active or historic landfills or other waste sites listed within 500m of the site. We have checked with the Environment Agency spatial database which concurs with Patrick Parsons report. However, we note that references are made to landfill sites within an EIA report from 2008 by Watermans. Consultation with the Local Authority and site personnel suggest there were landfill activities on site i.e.

- Asbestos Disposal Cell (for Roger Bullivant Ltd). It is understood that the basement of the former Drakelow 'A' Power Station was to be used as an asbestos landfill. The Estates Manager apparently suggested that the licence had never been used as it was issued after such waste was removed from site.
- Comments from the Contaminated Land Officer of South Derbyshire Council as part of the EIA include reference to a landfill site which is understood to be licensed to accept sewage sludge and ash at a former gravel pit in the northwest of the site.
- Drakelow Landfill Site operated by Roger Bullivant Ltd for waste landfilling with >10t/d with capacity of >25,000T excluding inert waste. This is noted having a status as 'Determination' rather than being in effect.
- A licensed waste site: A11 – household, commercial and industrial wastes in the southeast of the site although no further licence details were provided.

2.9.2 There are two records of waste treatment plants on site from the historical mapping conjectured to be associated with the former water treatment plant. There are three records of waste treatment, transfer or disposal sites within the site boundary. Two relate to 'Roger Bullivant mobile plant'; whilst the licence is registered to the site, the use of the mobile plant to treat contaminated soils is assumed to be at various other premises associated with remedial works. The third record relates to a waste transfer station (Sapphire Energy Recovery Ltd) associated with the transfer of rubber chips (recycled tyres) in a compound to the north-west of the industrial estate.

2.10 Environmental

2.10.1 There are a number of environmental licences / permits / processes which are considered to potentially impact the site i.e.:

- Six Part A(1) and IPPC authorised activities associated with the site. Five relate to combustion processes for Drakelow 'D' Power Station for E.ON UK PLC (west of the site). One record is for Drakelow Landfill Site operated by Roger Bullivant Ltd for waste landfilling with >10t/d with capacity of >25,000T excluding inert waste. This is noted having a status as 'Determination' rather than being in effect.
- There are two Part B activities on site relating to the use of bulk cement by Roger Bullivant Ltd and Buchan Concrete Solutions.
- There are five Licensed Discharge Consents on site, five of which relate to discharge of sewage and trade effluent to Darklands Brook (all but one have been revoked). A further two are listed as being on site but actually appear to relate to sewage discharges (final/treated effluent) into Dunstall Brook to the north west of the site boundary.
- There is a record on the National Incident Recording System (List 2) associated with the site relating to hydraulic oils which was categorised as having a minor impact to water (no impact to land or air).
- There are twenty records of historic IPC authorisations within 250m of the site, all relating to combustion processes at Drakelow 'B' Power Station 7m south-west of the site and now revoked.
- There are twenty-nine recorded historical tanks listed on site.
- Fourteen historic energy features are listed on site, all relating to power stations and electricity substations, predominantly to the southern half of the site.

2.11 UXO Potential

2.11.1 Reference has been made to Zetica UXO' risk map. The site is considered to be at 'low' risk of unexploded bombs associated with World War II.

2.12 Potential Contamination Sources

2.12.1 On the basis of the background researches, a number of the following potential sources of contamination have been identified within the Drakelow Park site, illustrated on Drawing No. 20040-GE05 and summarised below:

On Site

- Above ground fuel storage tank(s)
- Underground tanks
- Made ground associated with the existing and former structures
- Made ground associated with infilling of former excavations
- Construction and use of former railway lines
- Embankments associated with the former railway
- Demolition of former structures (e.g. asbestos)
- Asbestos cement within the construction of industrial units
- Storage of various types of chemicals, oils, degreasers etc
- Spills and leakages from chemicals/substances on site
- Former coal yard
- Former wash down areas
- Electrical sub-stations
- Former sewage treatment and water treatment works
- Former car parking / truck storage areas - leaks and spills
- Plant maintenance activities
- Site-won and imported stockpiles
- Contaminated silts in cooling tower
- Scrap metal storage
- Waste burning

Off Site

- Various industrial works in close proximity to the site
- Various infilled ground

3.0 PREVIOUS SITE INVESTIGATIONS

3.1 Introduction

- 3.1.1 We have been provided with the most recent Phase I and Phase II Site Appraisal Reports issued by Patrick Parsons in 2019. These reports include a precis of a number of previous localised investigations which we have not been provided. Given that many of these reports were undertaken locally and are likely to be outdated, we have supplemented the Patrick Parsons data with an updated targeted site investigation where considered appropriate. For completeness, we have provided a brief summary of the pertinent previous information summarised within the Patrick Parsons report to assist with the formation of the conceptual site model but have not been. For clarity, the Patrick Parsons datasets have been included within our site assessment, however, the data from previous investigations have not.
- 3.1.2 There remain localised areas of the site which have not been fully investigated due to access issues (buildings remaining in use, embankments, live services etc). The intrusive investigations are summarised in turn under the following section.

3.2 Interpretive Report Drakelow Power Station, by BWB Partnerships Ltd - June 1999

- 3.2.1 A detailed review of the reports available prior to 2008 was undertaken by Waterman as part of their Phase 1 Assessment; the salient points are summarised below:
- 3.2.2 The report included an intrusive investigation of the former railway siding at the former Drakelow Power Station. The report indicates that during demolition of the power station the railway cutting was infilled with blended silt from the interior of the former cooling towers to restore the former railway cutting for tree planting. The investigation was to ascertain any impact that the infilled material may have had on groundwater quality and to sample three mounds (two silt and timber and one ash and concrete), all of which were on hardstanding.
- 3.2.3 The report identified that the site was underlain by poorly compacted made ground comprising loose ashy fill with wood, gravel, brick, metal and plastic with occasional hydrocarbon odours (and occasional slag identified to be from the former railway line) to depths of up to 4m bgl. The made ground was underlain by loose orange brown sand and gravels of the River Terrace Deposits.
- 3.2.4 Water strikes ('slight' to 'fast') within the River Terrace Deposits; the groundwater levels across the site varied between 1.5m and 5.0m bgl.
- 3.2.5 The results of the chemical analysis were compared to the ICRCL Guidance 59/83 non-domestic thresholds (now superseded). Elevated concentrations of metals (including arsenic, cadmium and the phytotoxic metals) were identified and the downgradient groundwater contained elevated TPH (total petroleum hydrocarbons). BWB concluded that there would not be any detrimental effect on the groundwater due to the immobility of the contaminants identified and little variation in the groundwater sampled taken upstream and downstream of the cutting.
- 3.2.6 BWB identified similar contaminants of soil samples taken from two of the silt mounds to those found in the soil samples of the infilled cutting albeit some showed a higher leachability than the infilled cutting soil samples. However, BWB concluded that these elements did not negatively impact groundwater quality of the area.
- 3.2.7 A number of recommendations were made: the restoration works should be completed with acceptance of the EA and the ash and concrete of 'Silt Mound 3' should be added to the other two mounds to improve the quality of the silt. It is not known whether these works were completed.

3.3 Site Specific Risk Assessment Drakelow Power Station, BWB - September 1999

- 3.3.1 Following the submission of the June 1999 report to the EA, further information was requested by the EA. BWB's 'Risk Assessment' report clarified the report was to provide information to enable the site to be registered as an exempt activity under Paragraph 19 of the Waste Management Regulations 1994.
- 3.3.2 BWB clarified that the infilled cutting was approximately 10m to 25m wide and 100m in length (volume of soil of approximately 5,200m³). The trial pits were undertaken at 10m intervals with sampling equating to one result per 180m³ of material within the infilled cutting.
- 3.3.3 The risk assessment indicated that there was low/negligible risk associated with the fill material within its environmental setting and associated use.
- 3.3.4 The report concluded that the leachability results "that once the dilution effects are taken into consideration none of the elements would appear to be present at such levels as to prevent the current or future use of the water underlying the site as drinking water". However, the report does not appear to include a Detailed Groundwater Risk Assessment. The exploratory hole logs and laboratory analyses referred to were not included in the reports provided therefore the conclusions of the report could not be fully checked against current guidance. Based on the limited chemical data in the report text, Patrick Parsons concluded that the soils would exceed the General Assessment Criteria (GAC) for Residential end-use with plant uptake for arsenic, cadmium and nickel.

3.4 Desk Study and Site Reconnaissance at Drakelow - Contamination Issues, Geotechnics - Oct 1999

- 3.4.1 The purpose of the reports was to obtain information on ground and groundwater conditions relating to the land previously occupied by 'Drakelow 'A' & 'B' Power Station.
- 3.4.2 Twenty-five trial pits and sixteen cable percussion boreholes (with standpipes) were completed. In-situ permeability tests were also undertaken within the River Terrace Deposits in five of the boreholes which exhibited permeabilities of between $1.74 \times 10^{-6} \text{ms}^{-1}$ and $3.91 \times 10^{-6} \text{ms}^{-1}$.
- 3.4.3 Made ground was recorded to depths of between 0.1m and 2.9m bgl, comprising grey/black ashy, sandy gravels with clinker in the area of the former coal storage facilities and demolition waste comprising sandy gravel with cobbles, brick, wood and metal in the area of the former power stations and associated infrastructure. River Terrace Deposits underlay the made ground, proven to a maximum depth of 11.9m bgl although typically much shallower. These superficial deposits comprise medium dense orange brown fine to medium sand with some fine to coarse gravel which in turn overlay the Mercia Mudstone Group (some reworked) which typically comprise stiff hard red brown friable silty clay. Groundwater seepages were recorded within the River Terrace Deposits during drilling at levels between 0.75m and 6.28m bgl. The hydraulic gradient across the site falls from east/south-east towards the River Trent.
- 3.4.4 Elevated carbon dioxide was recorded in two of the monitoring boreholes.
- 3.4.5 The results of thirty-six soil samples (13 made ground, 9 River Terrace Deposits and 14 mudstone) and sixteen groundwater samples were compared with 'Industrial/commercial use' based on ICRCL Guidance Note 59/83. The report stated that the results were generally below the ICRCL Guidance for non-domestic uses with the exception of the spoil heaps and in the area of the infilled cutting, isolated areas of elevated arsenic, boron and lead within the made ground and elevated nickel in the Mercia Mudstone.

- 3.4.6 The report states that two spoil heaps containing elevated contaminants had already been removed by Powergen prior to the finalisation of the Geotechnics report and that the material from the infilled cutting would also be removed.
- 3.4.7 Geotechnics recommended the made ground should be removed from beneath proposed buildings and capping to be provided over landscaping areas with a 'building specific investigation' recommended once the proposed layout is known to assess the potential gas issue.
- 3.4.8 Elevated concentrations of metals and phenol were encountered within the groundwater; however, Geotechnics stated that the discharges via the groundwater to the River Trent would not pose a significant risk due to the control of release by the permeability of the soil and the hydraulic gradient and the high flows of the River Trent.
- 3.4.9 Geotechnics concluded that the "naturally occurring materials have not been significantly contaminated by past use" and that the "activities on the site have not significantly impacted the quality of the groundwater beneath it".

3.5 Groundwater Monitoring, Geotechnics Ltd - June 2001 to December 2002

- 3.5.1 Groundwater monitoring was undertaken by Geotechnics in the south western part of the site between June 2001 and December 2002. The groundwater samples were submitted for a suite of metals and inorganics. Since this monitoring, there has been significant earthworks in the vicinity of the Boreholes and the monitoring is outdated.
- 3.5.2 Waterman Environmental compared the chemical groundwater data with 2008 standards (Environmental Quality Standards (EQS) or UK DWS). The laboratory Limits of Detection (LOD) for chromium, copper, zinc and ammonia concentrations were above the EQS. Recorded concentrations of zinc, nickel, iron, copper, magnesium, aluminium and arsenic concentrations exceed the respective screening value in various locations and severities with little consistency.

3.6 Ground Investigation at Drakelow PPC Permit, Geotechnics – December 2005

- 3.6.1 The investigation involved ground and groundwater testing for a proposed Asbestos Disposal Cell on behalf of Roger Bullivant Ltd adjacent to the former basement of the Drakelow 'A' Power Station in support of an PPC application to use the former power station basement as an asbestos landfill.
- 3.6.2 Three cable percussive boreholes up to 8.90m bgl with monitoring installations were completed. Both cohesive and granular made ground was recorded to a maximum depth of 5.10m depth overlying River Terrace Deposits comprising sand, sand and gravel and clayey gravelly sand. The top of the Mercia Mudstone was recorded at depths of between 4.60m and 7.70m bgl.
- 3.6.3 The groundwater results show exceedances for manganese and a slight exceedance for lead on one occasion of sampling. No other information is provided.

3.7 Environmental Statement for Proposed Combined Cycle Gas Turbine Power Station At The Former Drakelow Power Station Site, E.On - September 2005

- 3.7.1 The above report was to accompany the application to construct a Combined Cycle Gas Turbine (CCGT) power plant in the west of the site (former coal yard).
- 3.7.2 Site investigations were undertaken in 2000 and 2004. The geology of the site was described as up to 3m of made ground (ashy sand, clay, coal, mudstone and brick) overlying River Terrace Deposits comprising sand and gravel with occasional clay which in turn overly Mercia Mudstone.

- 3.7.3 The report stated that the results indicate that the “current risks to human health from dry soil contamination may be relatively low and that continued usage as an industrial/commercial site would be unlikely to pose significant risks to human health”.
- 3.7.4 Groundwater chemical analysis indicated that concentrations of boron, sulphate, magnesium and manganese, within the River Terrace Deposits, were above the relevant UK Drinking Water Standards and elevated concentrations of selenium, potassium, chromium and hydrocarbons were detected in a minority of samples; however, the report stated that there was no measurable impact in the down gradient groundwater.
- 3.7.5 Waterman’s assessment indicated that the concentrations of metals encountered in the previous site investigation were elevated in comparison with the 2008 UK guidance values for a residential use. The laboratory data is not available to allow comparison to current guidance.

3.8 Groundwater Risk Assessment at Roger Bullivant Ltd, WSP - March 2006

- 3.8.1 This risk assessment was undertaken in support of the use of PFA on site under exemption from Waste Management Licensing Regulations. The risk assessment was based on the 2005 ground investigation and groundwater testing undertaken by Geotechnics (Section 3.6). The risk assessment highlighted 'modest exceedances infrequently noted'. The future risk to the ground water from the continued use of PFA on site was assessed as negligible and therefore requested that the exemption from the Waste Management Licensing Regulations for the continued use of PFA. The rate of spread of PFA would be 20,000m³/ha and a maximum depth of 2m. It is assumed that these volumes and thicknesses apply to the area to the east of the former Drakelow 'A' & 'B' Power Station.

3.9 Drakelow Park, Burton upon Trent Phase 1 Land Quality Assessment, Waterman Environmental - August 2008

- 3.9.1 The Phase 1 land quality assessment was undertaken as part of an Environmental Impact Assessment (EIA) study and comprised a desk top review of the available environmental information, generally summarised above.
- 3.9.2 Comments from the Contaminated Land Officer of South Derbyshire Council included the presence of a landfill site licensed to accept sewage sludge and PFA at former gravel pits in the north west of the site. An EA licensed PPC A1 process was also listed i.e. landfill of asbestos in the west site and the presence of a licensed waste site (A11 – household, commercial and industrial wastes) in the southeast of the site.
- 3.9.3 Comments from the Planning Officer of South Derbyshire Council at the time also highlighted a number of approvals for the site including:
- Regrading of land and erection of batching plant, both approved in 2000;
 - Change of use to circulation/storage use including raising of the land, approved in 2000, silt treatment, approved in 2001, alteration and reduction of land levels, both approved in 2001;
 - Formation of asbestos landfill facility, approved in 2005.
- 3.9.4 Comments from the then Estates Manager included:
- The outfall from the decommissioned sewage works in the north and centre of the site, remained.

- Most of the former Power Stations 'A' & 'B' area had been backfilled with PFA, with some being imported to site for engineering to make up a shortfall of material.
- No contamination related remediation works were carried out as part of the Power Stations 'A' & 'B' demolition. Resulting crush/Type 1 site won materials were kept on site and reused for backfilling and profiling works on site. Asbestos was present in all Power Stations.
- A licence for the landfilling of asbestos had previously been sought by Roger Bullivant Ltd and issued by the Environment Agency. However, the licence had never been used as it was issued after such waste was removed from site.

3.10 Drakelow Combine Cycle Gas Turbine Power Station Extension, Environmental Statement, E.ON Engineering - April 2009;

- 3.10.1 The proposed facility was off-site and the report reviewed was incomplete therefore this report has not been considered further.

3.11 Phase I & Phase II Geo-Environmental Assessment, Geo-Environmental Group - March 2017

- 3.11.1 This desk study intrusive investigation was undertaken for a proposed residential development with an area of the site comprising approximately 10.38ha within the former coal storage yard to the north-east, east and south-east of the former Drakelow 'B' Power Station. The investigation comprised 13 dynamic sampling boreholes, 38 trial pits and 2 infiltration tests.
- 3.11.2 Made ground was reported across the majority of the site to a maximum depth of the base of the exploratory hole at 5.45m bgl and comprised a mixture of sandy gravelly clay, clayey gravelly medium sand, PFA, cobbles and boulders of brick and concrete and occasional clayey sandy gravelly silt. Gravel to cobble-sized pockets of ash were encountered at 17 locations up to 4.30m bgl. Occasional to rare gravel to cobble-sized fragments of timber, fabric, plastic, glass and metal were found in some trial pits. Topsoil was encountered locally in two exploratory holes. River Terrace Deposits were encountered locally across the site underlying the topsoil / made ground at locations up to a maximum of 4.80m bgl comprising loose to dense slightly clayey slightly gravelly medium sand. Subordinate horizons of firm very sandy slightly gravelly clay were encountered locally. The weathered Mercia Mudstone was encountered at 2 locations in the east of the site.
- 3.11.3 Arsenic and localised lead contamination was recorded compared to the guidance for residential end-use.
- 3.11.4 Gas monitoring recorded methane concentrations of 0.1% to 6.0% and carbon dioxide concentrations of 0.1% to 1.4% with a maximum flow rate 0.8 l/hr. Amber 2 gas protection Measures were recommended.

3.12 Phase II Site Appraisal, Patrick Parsons – June 2019 (Rev 4 dated February 2020).

- 3.12.1 The report covers the whole of the development site (approximately 100 hectares). The initial ground investigation was carried out between 25 March 2019 and 24 May 2019. A total of 44 cable percussion boreholes, 48 dynamic sampling boreholes, 8 rotary cored / dynamic sampler boreholes, and 124 trial pits were completed. Where possible, boreholes which terminated due to obstructions were advanced with cable percussion and/or rotary techniques. Six gas and groundwater monitoring visits were undertaken between May 2019 and September 2019. Additional continual gas monitoring of 3 boreholes was carried out in August and September 2019. A further 17 additional standpipes were installed in October 2019.

3.12.2 Given the size of the site and different land uses, we have summarised the site investigation works by area (as defined by Patrick Parsons). Table 2, below, summarises the site investigation information by area.

Table 2 – Summary of Patrick Parsons Exploratory Holes

Area	Land Use	Trial Pits	Cable Percussion Boreholes	Dynamic Sampling Boreholes	Rotary Boreholes	Supplementary WS Borehole (Gas)
A	Agricultural	15	4	-	-	
B	Eastern industrial estate	-	2	11	1	
C	Central western industrial estate / open storage areas	-	3	8	3	
D	South western area of industrial estate (Bullivant & AMCO)	-	1	5	-	
E	Woodland	-	-	3	-	
F	Concrete hardstanding – DUO Plant Hire storage	-	-	3	1	
G	Woodland	2	1	2	-	
H	Drakelow Hall stable block, former Drakelow Hall, gardens and wooded area	9	1	2	-	2
I	Rough open land	9	1	6	-	
J	Former railway embankment	8	3	1	-	1
K	Former railway embankment	5	2	4	-	4
L	Former coal yard	41	12	7	-	7
M	Drakelow 'A' power station	7	2	-	-	
N	Drakelow 'B' power station	6	2	2	2	2
O	Southern cooling towers	-	2	7	-	
P	Former railway lines (raised ground)	9	2	-	-	
Q	Raised ground	2	-	-	-	
R	Truck storage	-	2	2	1	2
S	Former railway cuttings (now raised ground)	5	3	-	-	

Ground Conditions

Area A

- 3.12.3 The twenty exploratory holes within Area A generally indicate grass or rough vegetation onto silty gravelly sandy topsoil to depths of between 0.3m and 0.5m bgl with the exception of two exploratory holes in the north east which recorded man-made inclusions such as brick within the topsoil. The materials were considered to have been disturbed on site rather than representing imported materials. Beneath the topsoil / made ground are typically medium dense to dense silty and / or gravelly sand with lenses of slightly silty sandy slightly gravelly clay. Where the base of superficial deposits was proven (3 locations between 1.1m and 3.2m bgl), a firm to stiff silty clay with mudstone lithorelicts was encountered considered to represent weathered strata of the Mercia Mudstone Formation.
- 3.12.4 Groundwater seepages were recorded within the River Terrace Deposits between 1.2m bgl and 2.6m bgl. A groundwater strike was recorded within the weathered mudstone at 3.10m bgl. The monitoring recorded groundwater levels between 0.85m bgl and 0.90m bgl during the monitoring period.
- 3.12.5 Of the samples tested, only one slight exceedance was recorded compared to the Suitable for Use Level; the recorded dibenzo(a,h)anthracene concentration of 0.3mg/kg from TP114 at 0.20m was above the S4UL of 0.24mg/kg based on a residential land use with proposed gardens.
- 3.12.6 Six gas monitoring visits completed within two boreholes in Area A indicate maximum methane and carbon dioxide concentrations of 0.4% and 1.6%, respectively. A maximum flow rate of 1.5l/hr was recorded.

Area B

- 3.12.7 The majority of the exploratory holes encountered concrete or asphalt hardstanding to depths of between 0.1m bgl and 0.35m bgl. A compacted silty, sandy gravel was encountered in the north east of Area B to depths of between 0.30m and 0.55m bgl. One exploratory hole was carried out in an area of landscaping in the south east which recorded grass onto slightly sandy slightly clayey silt topsoil to a depth of 0.35m bgl.
- 3.12.8 Made ground was recorded in every exploratory hole, generally recorded as silty, gravelly sand although a silty, gravelly, sandy clay was also recorded. Gravel typically included brick, ash and concrete to depths of between 0.50m bgl and 1.10m bgl although locally up to 1.85m. Three exploratory holes WS30, WS43 and WS43B did not penetrate the full extent of made ground due to 'refusal'. A subsequent rotary borehole (PPR08) was undertaken to determine the depth of the made ground. The ground level in the south west are elevated compared to the surrounding land; it is assumed that site levels have historically been raised in this area to form a level plateau. The borehole undertaken in this area proved 1.6m of made ground.
- 3.12.9 The made ground (or localised topsoil) is generally directly underlain by weathered Mercia Mudstone comprising firm to stiff silty slightly sandy, friable clay with mudstone lithorelicts. However, thin horizons of superficial sand deposits are present in the north of the site.
- 3.12.10 Groundwater was only encountered in two exploratory holes i.e. WS29 at 2.00m bgl and CP39 at 4.10m bgl.
- 3.12.11 The chemical testing recorded elevated concentrations of three determinands at two locations:
- CP39 at 0.5m - 500mg/kg lead
 - WS29 at 0.4m - 1,100mg/kg lead

- 5,700mg/kg zinc
- Asbestos detected (0.001%)

3.12.12 Nine gas monitoring visits completed in a single borehole in Area B indicate maximum methane and carbon dioxide concentrations of 0.2% and 0.8%, respectively. No flow rate was recorded.

Area C

3.12.13 The majority of the exploratory holes were undertaken within concrete or asphalt hardstanding, encountered to depths of between 0.1m bgl and 0.35m bgl. In one location, WS24 in the west of Area C, a layer of concrete horizon of concrete was recorded between 0.2m and 0.5m bgl.

3.12.14 Made ground was encountered in every exploratory hole. Eight of the exploratory boreholes terminated within the made ground due to 'refusal'. The made ground typically comprises gravelly sand and sandy gravel with localised slightly clayey, gravelly sand and sandy gravel with gravel of brick and concrete to depths between 0.3m to 1.1m bgl beneath which was a clayey, sandy, silty gravel (predominately pulverised fuel ash (PFA)) to a maximum depth of 3.5m bgl (where proven). The made ground in the west of Area C was considered to represent material placed to form a level plateau, some 3m to 4m higher than the assumed natural ground surface within the woodland to the west of Area C and up to approximately 2m above the level of Area D to the south west.

3.12.15 Natural superficial deposits were encountered directly below the made ground in 6 of the exploratory boreholes. Depths ranged between 0.3m and a maximum proven depth of 6m bgl. These deposits are described as slightly silty, slightly sandy clay or gravelly sand. The top of the weathered Mercia Mudstone was encountered below the superficial deposits in five locations, ranging in depth between 2.4m and 6m.

3.12.16 Groundwater was encountered at between 1.2m bgl and 2m bgl.

3.12.17 The chemical testing recorded elevated concentrations of two determinands at a single location:

- WS28 at 0.7m - 43mg/kg arsenic
- Asbestos detected (<0.001%)

3.12.18 Ten gas monitoring visits completed within a single borehole in Area C indicate maximum methane and carbon dioxide concentrations of 1.2% and 4.9%, respectively. The elevated concentration of methane was only detected on one occasion, the remaining none results were less than 1% v/v. A maximum flow rate of 0.1l/hr was recorded.

Area D

3.12.19 Area D comprises an area of storage along a former railway. The railway was previously on an embankment which has been removed leaving Area D relatively flat. Six exploratory holes (5 dynamic sampling boreholes and one cable percussion borehole) was undertaken by Patrick Parsons in Area D.

3.12.20 The area was surfaced with concrete (locally reinforced) or asphalt to depths ranging between 0.07m bgl and 0.35m bgl. The total depth of made ground ranged between 1.9m and 2.9m bgl and was variable in nature comprising a combination of cohesive and granular soils with inclusions of organic materials, brick and wood. The deepest area of made ground coincided with land adjacent to the culverted Darklands Brook. The made ground was interpreted as reworked former embankment fill materials associated with the former embankment.

3.12.21 WS33 and WS34 were terminated in made ground i.e. concrete at 0.3m and very dense, slightly silty, sandy gravel described as ash at 1.2m bgl. Anecdotal records suggest this area was raised to form current site levels and the material used was highly compacted.

3.12.22 Soils considered representative of the granular superficial deposit soils were identified along the northern boundary of Area D comprising occasionally slightly clayey, gravelly sand / sandy gravel to between 3.9m bgl and greater than 5m bgl centrally (WS22) where the base of deposits was not proven. Cohesive superficial soils comprising sandy, gravelly clay were recorded below the made ground in the north eastern corner (CP36) between 2.5m and 3.3m bgl.

3.12.23 Weathered Mercia Mudstone strata was encountered locally beneath the superficial deposits at depths of between 3.3m bgl (CP36 in the north east) and 4m bgl (WS21 in the south west).

3.12.24 Shallow groundwater was encountered locally within the superficial deposits between 2m and 3.1m bgl.

3.12.25 The chemical testing recorded elevated concentrations of one fraction of TPH at a single location:

- CP36 at 0.5m – 1,900mg/kg Aromatic C21-C35

3.12.26 Ten gas monitoring visits completed within one borehole in Area D indicate maximum methane and carbon dioxide concentrations of 4.2% and 0.9%, respectively. The 1% threshold for methane was exceeded on two occasions. A maximum flow rate of 0.6l/hr was recorded.

Area E

3.12.27 Area E comprises an area of woodland the southeast of the industrial estate. The Patrick Parsons report states that the ground level was approximately 0.5m to 1m below the adjacent road and is considered to represent site levels closer to the historical 'natural' ground level. Three exploratory holes were completed in Area E which encountered 0.15m to 0.4m of topsoil. Slightly silty, sandy clay and clayey sand were recorded to a depth of 1.85m bgl; Patrick Parsons considered these materials to represent the recorded superficial deposits which in turn overlay a firm to stiff silty clay (i.e. weathered Mercia Mudstone). The remaining two exploratory holes recorded weathered Mercia Mudstone strata directly beneath the topsoil. Groundwater was not encountered in Area E.

3.12.28 The report states that the chemical testing indicated that all of the determinands tested were below their relevant guidance values based on a residential end use with plant uptake. No chemical data has been supplied to us for this area.

3.12.29 Gas monitoring was not carried out within Area E.

Area F

3.12.30 Area F comprises an area of concrete hardstanding with some localised areas of gravel hardstanding. The investigation was limited in scope due to access around the plant being stored on site. Three dynamic sampling boreholes were carried out, all of which terminated within the made ground at depths of between 0.52m and 1.6m. The concrete hardstanding was reinforced and extended to 0.4m to 0.55m bgl. The underlying made ground comprised slightly silty, slightly gravelly clay or gravelly sand to the base of the hole (terminated due to SPT 'refusal' or concrete obstruction (WS07)). A slight hydrocarbon odour was recorded in WS08 and WS09 throughout the made ground. Subsequently, a combined rotary open hole with dynamic sampling (R04) was undertaken in this area which recorded made ground to a depth of 3m bgl comprising sandy gravel of brick and tile. A buried concrete obstruction was encountered between 1.40m and 1.80m bgl (unclear whether the feature was in-situ). Medium dense gravelly sand (superficial deposits) were

recorded between 3m and the base of hole at 4m. Perched groundwater was recorded at 1m bgl in within the made ground.

3.12.31 The chemical testing indicated that all of the determinands tested were below their relevant guidance values based on a residential end use with plant uptake.

3.12.32 Gas monitoring was not carried out within Area F.

Area G

3.12.33 Patrick Parsons carried out five exploratory holes within the woodland area of Area G. Approximately 0.1m to 0.25m of 'topsoil' was recorded above a generally granular made ground to depths of between 0.9m bgl and greater than 2.4m bgl. PFA was recorded in each location to varying depths of between 0.45m and a maximum depth of 2.4m. The underlying superficial deposits were typically recorded as dense to very dense, slightly silty, slightly gravelly sand and sandy gravel although localised loose materials were recorded. The base of superficial deposits were not proven.

3.12.34 Groundwater was encountered in these exploratory holes.

3.12.35 The chemical testing recorded elevated concentrations of arsenic at a single location:

- TP001 at 0.4m – Arsenic 48mg/kg

3.12.36 Ten gas monitoring visits completed within one borehole in Area G indicate maximum methane and carbon dioxide concentrations of 1.4% and 6.9%, respectively. The thresholds of 1% for methane and 5% for carbon dioxide were exceeded on two and one occasion, respectively. A maximum flow rate of 0.5l/hr was recorded.

Area H

3.12.37 Area H includes the former Drakelow Hall; thirteen exploratory holes were undertaken. Topsoil was recorded locally (TP003 and TP004) which was recorded to comprise silty, slightly gravelly sand. Made ground was recorded in every exploratory hole either beneath the topsoil or at ground level; many of the exploratory holes described rail ballast at or near the surface. Depths of made ground varied between 0.4m (CP03) and greater than 3m (WS117) but was typically in the range of say 0.6m to 1.7m bgl. With the exception of two exploratory holes (TP018 and WS117), superficial deposits comprising slightly silty, gravelly sand was recorded to depths of between 1.5m (TP017) and 4.2m bgl (CP03A). Cohesive superficial soils were recorded locally. The base of superficial deposits was not proven in many of the exploratory holes to depths ranging between 2.42m and 4m.

3.12.38 Weathered strata of the Mercia Mudstone Group was recorded in six of the exploratory holes beneath the superficial deposits, generally comprising a firm to stiff, (locally soft to firm), slightly silty, friable clay at depths between 1.5m (TP017) and 4.2m bgl (CP03A) grading to a weak mudstone with depth.

3.12.39 Groundwater seepages were recorded locally; a moderate groundwater inflow was recorded in PP-TP017 at 1.20m within the granular superficial soils. A groundwater strike was recorded at 6.10m bgl in CP03A within the mudstone.

3.12.40 The chemical testing recorded elevated concentrations of two determinands at three locations:

- TP014 at 0.6m – Arsenic 67mg/kg
- TP003 at 0.5m – Asbestos (chrysotile and amosite 0.038%)

- TP028 at 0.2m – Asbestos (amosite <0.001%)

3.12.41 Five gas monitoring visits completed within two boreholes in Area H indicate maximum methane and carbon dioxide concentrations of 1.4% and 4.8%, respectively. The 1% threshold for methane was exceeded on one occasion. A maximum flow rate of 0.1l/hr was recorded.

Area I

3.12.42 Area I includes an area of rough ground adjacent to the listed 'Sunken Garden'. A sewage works was previously recorded in the east including filter beds / tanks. The Patrick Parsons report states that anecdotal evidence indicates excavation for sand and gravel was undertaken locally. A large concrete structure remains in dense vegetation in the northeast Area I. Twenty exploratory holes were undertaken in Area I.

3.12.43 Made ground was recorded in every exploratory hole comprising variable materials including brick, concrete, metal, plastic, glass, ceramic and timber. The depth of made ground was not typically proven in the trial pits and some of the dynamic sampling boreholes to depths of 3m to 5m in the area of the former sewage works. Concrete obstructions were recorded at 1.5m bgl and 0.6m bgl associated with TP005 and TP006, respectively. Where proven, made ground was relatively shallow in TP007 and TP008 on the edge of the sewage works, however typically deeper ranged between 2.1m (WS06) and 3.6m (WS04).

3.12.44 Superficial deposits were recorded in three exploratory holes comprising silty, gravelly sand to depths between 1.5m bgl and greater than 5m (WS01). Weathered Mercia Mudstone strata was encountered below the superficial soils TP007 and PP-TP008 and directly below the made ground in four other exploratory holes.

3.12.45 Groundwater seepages were recorded locally in TP012 and TP013 (1.9m and 1.2m bgl, respectively). Groundwater was recorded within borehole WS04 at 2.10m bgl.

3.12.46 The chemical testing indicated that the majority of samples tested positively identified asbestos fibres. In addition, a species of PAH was identified in a single sample. The exceedances are summarised below:

- TP005 at 0.7m – Asbestos (chrysotile and amosite <0.001%)
- TP007 at 0.2m – Asbestos (chrysotile 0.002%)
- TP008 at 0.5m – Asbestos (chrysotile 0.002%)
- TP009 at 1.8m – Asbestos (crocidolite <0.001%)
 - Dibenzo(a,h)anthracene 0.28mg/kg
- TP011 at 0.4m – Asbestos (chrysotile <0.001%)
- TP019 at 0.5m – Asbestos (amosite <0.001%)
- TP020 at 0.8m – Asbestos (chrysotile and amosite 0.017%)
- TP021 at 1.0m – Asbestos (amosite <0.001%)

3.12.47 Gas monitoring was not carried out within Area I.

Area J

3.12.48 Twelve exploratory holes were undertaken by Patrick Parsons along the embankment, all of which encountered made ground. Where proven, the depths ranged between 2.6m (TP029) and 7.1m (CP04), however, the seven of the exploratory holes did not penetrate the base of made ground at depths ranging between 2.5m and 4m. Made ground included reworked clayey gravelly sand with

brick and concrete, considered to represent reworked superficial deposits used to construct the embankment. Localised areas of ballast surfacing were recorded associated with the former railway. Darklands Brook is culverted below part of the embankment.

3.12.49 The made ground was recorded to be underlain by generally granular superficial deposits comprising silty, gravelly sand and localised silty, slightly sandy clay. Sandy and gravelly clay with organic material was recorded below 9.2m bgl. The base of the superficial deposits was encountered between 6.8m and 11.7m where weathered bedrock of the Mercia Mudstone Group was recorded to the base of the hole consisting of stiff to very stiff friable silty clay grading to a mudstone with depth.

3.12.50 Groundwater was encountered at two locations (6m and 11.6m bgl).

3.12.51 The chemical testing recorded elevated concentrations of three determinands at a single location:

- TP030 at 0.5m – arsenic - 87mg/kg
- lead - 500mg/kg
- asbestos detected (crocidolite 0.004%)

3.12.52 Area J has been split into J and J1 for the purposes of the gas assessment. A borehole in Area J was monitored on ten occasions with maximum methane and carbon dioxide concentrations of 3.1% and 8%, respectively. The 1% and 5% thresholds for methane and carbon dioxide were exceeded on four and two occasions, respectively. A maximum flow rate of 0.1l/hr was recorded.

3.11.53 Area J1 included two boreholes, one of which had continuous monitoring carried out. The maximum methane and carbon dioxide concentrations of 24.6% and 17.3%, respectively. The 1% and 5% thresholds for methane and carbon dioxide were exceeded on multiple occasions. A maximum flow rate of 0.1l/hr was recorded.

Area K

3.12.54 Thirteen exploratory holes were undertaken in the western embankment, all of which recorded made ground varying between depths of 0.3m (WS101) and 6.1m (CP01), where proven; six of the exploratory holes terminated within made ground at depths of between 1.2m and 4.5m.

3.12.55 All of the exploratory holes were undertaken in rail ballast at the surface which extended to depths of between 0.40m and 0.70m bgl. This is underlain by generally granular (locally cohesive) made ground, generally clayey, gravelly sand or sandy gravel including brick and concrete considered representative of reworked superficial deposits.

3.12.56 With the exception of CP02B, the made ground was recorded to be underlain by granular superficial deposits soils generally comprising silty, gravelly sand. The full depth of superficial deposits was not always penetrated; proven depths ranged between 3m and 9m bgl. The superficial deposits and made ground in CP02B were underlain by weathered Mercia Mudstone strata comprising stiff to very stiff, slightly silty clay grading to a weak mudstone with depth.

3.12.57 Localised perched groundwater was encountered within TP023 and TP024 (0.45m and 0.4m bgl, respectively) as a fast inflow. Groundwater was also encountered at 7.90m bgl in CP01 and 6.1m bgl in CP02B within the superficial soils and weathered Mercia Mudstone strata, respectively.

3.12.58 The chemical testing indicated that all of the determinands tested were below their relevant guidance values based on a residential end use with plant uptake.

3.12.59 Up to nine gas monitoring visits were completed within five boreholes in Area K1; maximum methane and carbon dioxide concentrations of 74.9% and 22.1% were recorded, respectively. The

monitoring suggests one borehole (CP01) had consistently significantly elevated concentrations of both carbon dioxide and methane. A maximum flow rate of 0.4l/hr was recorded.

Area L

3.12.60 Fifty-nine exploratory holes were undertaken across the former coal yard area by Patrick Parsons. Made ground was encountered within all of the exploratory holes to depths ranging between 1.4m (TP059) and 5.5m (CP14A). However, the full depth of made ground was not penetrated in 34 of the locations tested at depths ranging between 1.5m and 5m, typically greater than 4m. The made ground generally comprises a combination of variable cohesive and granular materials with variable volumes of demolition waste type materials such as brick, concrete, metal, plastic pipe and clinker either overlying or with lenses of pulverised fuel ash (PFA). Patrick Parsons suggest that the PFA may have been capped with approximately 0.5m to 2m of non PFA made ground materials (with an average of say 1m – 1.5m). Soft orange brown silt lenses were recorded which was anecdotally described as a by-product of the washing of the sand and gravel, extracted from the area of the coal yard and was backfilled alongside the PFA. Stability was noted to be an issue within the made ground locally. A concrete obstruction was encountered at 4.9m within trial pit PP-TP092, conjectured to be a buried foundation associated with the former coal yard infrastructure; further obstructions are anticipated within this area.

3.12.61 Variable superficial deposits comprising variably gravelly sand, sandy gravel and sandy, gravelly clay were recorded locally in fifteen of the exploratory holes with proven basal depths ranging between 4.8m to 7.4m bgl. Weathered Mercia Mudstone was encountered below the superficial deposits or directly beneath the made ground at depths ranging between 4m (TP061) and 7.4m (CP30).

3.12.62 Numerous shallow groundwater seepages were recorded, typically at the base of made ground, above the cohesive Mercia Mudstone. Groundwater was recorded within the superficial deposits at 3.1m and 5.1m locally; groundwater was also recorded within the Mercia Mudstone between 7m and 9.1m locally.

3.12.63 The chemical testing recorded elevated concentrations of two determinands at seven locations:

- TP059 at 0.5m – asbestos detected (chrysotile <0.001%)
- TP061 at 0.4m - asbestos detected (chrysotile <0.001%)
- TP064 at 0.2m - asbestos detected (chrysotile <0.001%)
- TP065 at 1.1m - asbestos detected (chrysotile <0.001%)
- TP073 at 0.9m – arsenic – 85mg/kg
- TP081 at 4.0m – arsenic – 130mg/kg
- TP093 at 0.6m – arsenic – 110mg/kg

3.12.64 Up to ten gas monitoring visits were completed within five boreholes in Area L and a further five in Area L1. The monitoring in Area L indicates maximum methane and carbon dioxide concentrations of 1.0% and 3.9%, respectively. A maximum flow rate of 1.8l/hr was recorded. The monitoring in Area L1 indicates maximum methane and carbon dioxide concentrations of 42.2% and 4.5%, respectively. The methane was consistently elevated locally. The maximum flow rate in L1 was recorded as 0.6l/hr.

Area M

3.12.65 Ten exploratory holes were undertaken by Patrick Parsons in Area M, the former Drakelow 'A' Powers Station. All of the locations investigated identified variable made ground to depths ranging between 1.5m (TP101) to 4.6m (TP084). The base of made ground was not penetrated at eight

locations, up to 5m bgl. Materials varied but were typically granular deposits silty gravelly sand including brick, concrete, metal and PFA. Stability of pits within the made ground was an issue locally. A buried concrete obstruction was recorded in CP13 at 3.9m bgl.

3.12.66 Two exploratory holes encountered natural ground; granular superficial deposits were encountered to a depth of 4m bgl in TP101 overlying weathered Mercia Mudstone strata. TP084 recorded weathered strata of the Mercia Mudstone directly beneath the made ground at 4.6m bgl.

3.12.67 Perched groundwater was recorded within the made ground in two locations (TP086 and TP101).

3.12.68 The chemical testing recorded elevated concentrations of two determinands at seven locations:

- TP082 at 0.7m – asbestos detected (chrysotile 0.002%)
- TP084 at 2.5m – arsenic – 97mg/kg
- TP085 at 0.5m - asbestos detected (chrysotile 0.001%)
- TP086 at 2.5m - arsenic – 110mg/kg
- TP102 at 0.6m – arsenic – 91mg/kg
- TP120 at 0.3m – arsenic – 69mg/kg
- CP13 at 0.3m – arsenic – 81mg/kg
- CP13 at 2.5m – arsenic – 55mg/kg

3.12.69 Gas monitoring was not carried out within Area I.

Area N

3.12.70 Nine exploratory holes were undertaken by Patrick Parsons in Area N, the former Drakelow 'B' Power Station. All of the locations investigated identified made ground and typically terminated on suspected concrete obstructions at approximately 3.2m to 3.4m bgl, conjectured to be the floor slab of the basement of the former generating hall. TP099 also terminated on a concrete obstruction at 0.60m bgl. TP100 reportedly encountered a concrete obstruction at one end of the pit and was subsequently extended past the obstruction encountering the base of the made ground at 1.90m bgl, overlying superficial deposit soils comprising sandy gravelly clay. Patrick Parsons suggested that TP100 was likely to coincide with the edge of the basement structure. A subsequent rotary borehole was undertaken in the area to penetrate the depth of concrete floor; the slab was approximately 0.2m thick and found directly on granular superficial deposit materials.

3.12.71 The report also states that the concrete obstruction identified in TP099 at 0.6m was subsequently investigated by PPR03 and was interpreted to be the basement wall and foundation which extends between 0.9m and 5m bgl directly on to weathered Mercia Mudstone. Further buried concrete obstructions are evident where a basement is exposed.

3.12.72 Groundwater was encountered within the made ground (basement backfill) at depths of between 0.9m and 1.7m bgl.

3.12.73 The chemical testing recorded elevated concentrations of one determinand (arsenic) at a single location:

- TP096 at 0.4m – arsenic 80mg/kg

3.12.74 Up to ten gas monitoring visits were completed within three boreholes in Area N. The monitoring indicates maximum methane and carbon dioxide concentrations of 0.3% and 0.5%, respectively. A maximum flow rate of 0.6l/hr was recorded.

Area O

3.12.75 Ten exploratory holes were undertaken within Area O associated with the former cooling towers. The area includes a relatively level open area in place of the former cooling towers. There are also several stockpiles and a mound to the south. All of the exploratory holes encountered made ground, none of which penetrated the full extent at depths ranging between 1.5m and 3.3m bgl. The majority of exploratory holes were suspected to have terminated on concrete, conjectured to be the in-situ base of the former cooling towers. The cable percussion borehole, CP12, chiselled through a layer of concrete between 0.9m and 1.3m, respectively, however, a subsequent layer of concrete at the base prevented further progression at a depth of 1.7m. CP22 which was undertaken on the mound encountered similar conditions albeit starting at a slightly higher elevation, terminating on suspected concrete base at 3.3m. Above the concrete, the made ground across the majority of Area O was recorded as a thin layer of clayey gravelly sand with brick, ash, concrete and metal to depths of between 0.2m and 0.3m overlying PFA. Locally, a gravelly sand / sandy gravelly clay with brick, concrete and metal was also recorded.

3.12.76 The mound comprised made ground from surface comprising sandy gravelly clay with brick, concrete and asphalt, terminating on obstructions typically between 1.5m and 1.8m.

3.12.77 The report also states that no visual evidence was recorded of the anecdotally recorded contaminated silts which were reportedly placed within this area.

3.12.78 The chemical testing recorded elevated concentrations of three determinands at two locations:

- WS17 at 1.8m – arsenic - 150mg/kg
- CP22 at 2.5m – PCBs – 0.045mg/kg
- asbestos detected

3.12.79 Gas monitoring was not carried out within Area O.

Area P

3.12.80 Area P is generally slightly elevated compared to the adjacent land and has numerous stockpiles. Eleven exploratory holes were undertaken across the area. With the exception of two trial pits undertaken through topsoil stockpiles (TP40 and TP44), all recorded made ground to depths varying between 2.4m (CP07) and 5.9m (CP08). The made ground was variable but typically comprised clayey, gravelly sand and sandy, gravelly clay with brick and concrete generally overlying PFA. Lenses of an orange brown silt (similar the former coal yard) was also recorded. The volume of PFA varies significantly but extends to the base of made ground at 5.9m in CP08. The deeper made ground is conjectured to be associated with the infilling of the former railway cuttings.

3.12.81 The made ground overlies generally granular superficial deposits in four locations, the base of which varied between 4.2m and 6.6m (unproven at 4m in TP38). The made ground directly overlay weathered Mercia Mudstone strata in TP45.

3.12.82 Perched groundwater was encountered within the made ground at varying depths.

3.12.83 The chemical testing recorded elevated concentrations of two determinands at nine locations:

- CP07 at 1.0m – arsenic – 45mg/kg
- CP08 at 2.0m – arsenic – 75mg/kg

- CP08 at 2.0m – arsenic – 88mg/kg
- TP037 at 0.5m – arsenic - 60mg/kg
- TP038 at 0.4m – asbestos (chrysotile <0.001%)
- TP039 at 1.0m - arsenic - 58mg/kg
- TP041 at 0.2m – asbestos (chrysotile <0.001%)
- TP041 at 1.0m – asbestos (chrysotile <0.001%)
- TP044 at 1.0m – asbestos (chrysotile <0.001%)
- TP045 at 1.2m - asbestos (amosite <0.001%)
- TP045 at 3.0m - asbestos (amosite <0.001%)
- arsenic – 70mg/kg
- TP046 at 0.9m – arsenic 58mg/kg

3.12.84 Up to nine gas monitoring visits were completed within two boreholes in Area P. The monitoring indicates maximum methane and carbon dioxide concentrations of 0.3% and 1.7%, respectively. A maximum flow rate of 0.2l/hr was recorded.

Area Q

3.12.85 Area Q is elevated approximately 1.5m above the adjacent former cooling towers to the north-west. A former building floor slab remains; the majority of the surrounding area is surfaced with gravel. Two trial pits were undertaken where access allowed; beneath the 0.2m gravel / 0.3m topsoil was granular superficial deposits to depths of 2.9m to 3.2m bgl. A soft silty clay (weathered Mercia Mudstone) was recorded beneath the superficial deposits in TP132 at a depth of 2.9m. Groundwater was not encountered.

3.12.86 Deeper made ground and / or buried obstructions are anticipated with the former building in this area which could not be investigated due to access restrictions.

3.12.87 Only one sample was tested from Area Q which was tested for metals, PAHs and TPH, all of which were below the S4UL guidance levels for a proposed residential land use. Patrick Parsons concluded that 'the chemical analyses of the near surface soils have shown no exceedances when compared against the GACs for a commercial end-use. No other gross contamination was recorded'.

3.12.88 Gas monitoring was not carried out within Area Q.

Area R

3.12.89 Area R comprises level concrete hardstanding and an area of rough hardstanding in the north west of the site, previously used for trailer storage although the area appeared to be used for waste storage such as cardboard; evidence of a previous bonfire was noted during our June 2020 visit. In the southern area, four exploratory holes encountered locally reinforced concrete between 0.16m - 0.4m bgl which was in turn underlain by typically granular made ground containing brick and ash onto very dense PFA which could not be penetrated without the rotary rig. RO1 proved the base of made ground (PFA) at 4m bgl. The four exploratory holes undertaken in the northern area undertaken in areas of a gravel surfaced former car park recorded significantly varying depths of made ground i.e. 0.2m (WS106) to greater than 5m (TP119), the deeper of which may relate to the location of a former fish pond.

3.12.90 Where penetrated, the made ground was underlain by granular superficial deposits typically comprising silty gravelly sand. The base of the superficial soils was not proven at depths of up to

8.84m (CP26). Groundwater was encountered within the made ground at 2m bgl in RO1. Groundwater was encountered within the superficial soils at 6.70m bgl.

3.12.91 Only one sample was tested from Area R which was tested for metals and PAHs, all of which were below the S4UL guidance levels for a proposed residential land use. Patrick Parsons concluded that 'the chemical analyses of the near surface soils have shown no exceedances when compared against the GACs for a commercial end-use. No other gross contamination was recorded'.

3.12.92 Up to ten gas monitoring visits were completed within three boreholes in Area R. The monitoring indicates maximum methane and carbon dioxide concentrations of 4.5% and 8.3%, respectively. A maximum flow rate of 9.6l/hr was recorded.

Area S

3.12.93 A total of eight exploratory holes were undertaken in Area S which includes a number of stockpiles; historically the area had a number of railway lines, some of which were within cuttings. Made ground was recorded at every location to varying depths of between 1.2m (TP48) and 4.4m (TP47), where proven. Two of the trial pits did not penetrate fully to the base at 3.5m and 4m bgl. Six of the exploratory holes identified PFA to varying depths ranging between 1.2m (TP48) to 4.1m (TP50). Other made ground materials included a sandy gravelly clay with brick and concrete or silty gravelly sand.

3.12.94 Granular superficial deposits were generally encountered beneath the made ground comprising silty gravelly sand to depths ranging between 3.9m (CP11) and 5.7m (CP09). Weathered Mercia Mudstone was recorded beneath the superficial deposits (or directly below the made ground in TP50) comprising silty clay grading to a weak mudstone with depth.

3.12.95 Perched groundwater was recorded within the made ground. Groundwater strikes were recorded within the mudstone at a depth of 6m within two of the cable percussion boreholes.

3.12.96 The chemical testing recorded elevated concentrations of three determinands at four locations:

- TP043 at 0.4m – asbestos (chrysotile <0.001%)
- TP047 at 1.2m - asbestos (chrysotile <0.001%)
- lead – 230mg/kg
- TP049 at 1.0m – arsenic – 44mg/kg
- TP050 at 0.5m - asbestos (chrysotile <0.001%)
- TP050 at 1.5m – arsenic – 160mg/kg

3.12.97 Up to ten gas monitoring visits were completed within two boreholes in Area S. The monitoring indicates maximum methane and carbon dioxide concentrations of 1.2% and 1.3%, respectively. The 1% threshold for methane was only exceeded on one occasion. A maximum flow rate of 0.2l/hr was recorded.

3.13 Groundwater Risk Assessment

3.13.1 A groundwater risk assessment was undertaken by Patrick Parsons as part of their Phase II works. Potential critical receptors were identified as the River Trent (north of the site), Darklands Brook (through the site), the principal aquifer to the southeast and east of the site and the source protection zone to the north of the site. The groundwater within the superficial deposits is likely to be in hydraulic continuity with the River Trent and Darklands Brook.

3.13.2 The laboratory soils leachate testing identified elevated arsenic, chromium and selenium when compared to the UK Drinking Water Standards (DWS). The laboratory testing of groundwater

samples recovered from the monitoring installations identified elevated arsenic, mercury, selenium, sulphate and pH when compared to the UK DWS. No elevated hydrocarbons were detected within the water samples tested.

- 3.13.3 The elevated results are generally restricted to the areas of the former coal yard (Area L), former railway cuttings in the south (Area P) and samples of the groundwater within the made ground soils within the former Drakelow 'B' Power Station basement (Area N). The principal source of the arsenic, selenium and mercury is likely to be the PFA and former power station materials placed in the former coal yard (Area L) and the railway cuttings to the south (Area P) during subsequent filling operations.
- 3.13.4 The results suggest that the elevated concentrations appear to attenuate over relatively short distances, particularly between the source and the receiving water (River Trent). Although the groundwater within the made ground and superficial soils shows elevated concentrations of arsenic, selenium and mercury, the groundwater tested within the bedrock do not appear to be contaminated.
- 3.13.5 Surface water samples were taken from the upstream and downstream of the site within the River Trent (north of the site) and Darklands Brook which crosses the site. The results of the samples tested from the River Trent do not show any significant increase in any of the determinants assessed between the upstream and downstream samples. It was concluded that the site does not pose a risk to controlled waters (River Trent, principal aquifer offsite, the underlying secondary aquifer on site or the nearby groundwater source protection zone), therefore a Detailed Quantitative Risk Assessment is not required.

4.0 CONCEPTUAL SITE MODEL AND PRELIMINARY RISK ASSESSMENT

4.1 Initial Conceptual Site Model

4.1.1 This conceptual site model (CSM) represents the environmental characteristics the Drakelow site, and illustrates the relationships between the identified contaminants, pathways and receptors. The CSM identifies the potential contaminant linkages, which may exist at the site. The aim of the CSM is to provide a qualitative assessment of risk posed to both human health and environmental receptors from possible on and off-site contamination sources and to inform the design of the intrusive site investigation works. In order for a contaminant linkage to exist, each of the three elements need to be present i.e. the source (contaminant), pathway and receptor. These elements are defined as:

- Source - Substance that can cause harm;
- Pathway - A credible pollutant linkage between the source and target;
- Target - A receptor, which could be harmed.

4.2 Sources

4.2.1 The initial CSM has been based on the findings of the background information described within Sections 1 to 3 of this report.

4.2.2 Desk study research has identified numerous sources of contamination to be present on-site. The sources of contamination are considered to be associated with extensive previous industrial uses, presence of made ground associated with the previous development (and localised demolition) of the site and areas of infilled ground. A summary of potential sources and associated contaminants that may be hazardous to receptors identified in Section 4.4.1 is presented in Table 3, below.

Table 3 – Potential Contamination Sources

	Source	Potential Contaminant
1.	Former power station – construction, operation, storage of coal, waste products etc	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, semi volatile organic compounds, asbestos, polychlorinated biphenyls
2.	Above ground fuel storage tanks.	Petroleum hydrocarbons
3.	Made ground associated with the existing and former structures.	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, semi volatile organic compounds, asbestos
4.	Infilling of former railway cuttings	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, semi volatile organic compounds, asbestos, ground gases
5.	Asbestos within the construction of industrial units	Asbestos – chrysotile, amosite, crocidolite and other amphibole containing products
6.	Storage of various types of chemicals, oils, degreasers within industrial estate etc	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, volatile organic compounds, semi volatile organic compounds
7.	Spills and leakages from chemicals/substances on site	Petroleum hydrocarbons, polyaromatic hydrocarbons, volatile organic compounds, semi volatile organic compounds

	Source	Potential Contaminant
8.	Former furnace and heavy machinery	Petroleum hydrocarbons, polyaromatic hydrocarbons,
9.	Infilled sand / gravel pits	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, sVOC, ground gases.
10.	Former sewage plant	Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, semi volatile organic compounds
11.	Electrical sub-stations	Polychlorinated biphenyls and total petroleum hydrocarbons
12.	Former car parking areas / vehicle / plant storage - leaks and spills	Petroleum hydrocarbons
13.	Pesticides (Area A)	Organochlorine and organophosphorus insecticides

4.3 Pathways

4.3.1 The list below summarises possible pathways, which could allow potential receptors to be exposed to any contamination present at the site:

- Dermal contact, ingestion or inhalation of soil contaminants by site users;
- Ingestion of contaminated soil;
- Inhalation of contaminated dust;
- Migration of soil borne gases and vapour into new buildings;
- Migration of contaminants via service routes and foundations;
- Leaching of contaminants and migration through strata;
- Groundwater including perched groundwater;
- Surface water run-off;
- Direct contact between contaminated soils and building substructures.

4.4 Targets

4.4.1 Potential receptors to any contamination identified at the site include:

- Humans – during construction phase and subsequent site users;
- Flora and fauna on the site (dependent upon final site design);
- Secondary aquifers underlying the site;
- Local water courses (Darklands Brook and River Trent)
- Buildings and buildings sub-structures;
- Adjacent sites.

4.5 Preliminary Risk Assessment

- 4.5.1 The methodology used in this assessment is broadly analogous with that presented in the EA/NHBC document R&D Publication 66 "Guidance for the Safe Development of Housing on Land Affected by Contamination" (2008) and has been used to evaluate a level of risk for each contaminant linkage identified in the conceptual model. This is a qualitative approach based upon the classification of the probability of occurrence and the potential consequence (severity).
- 4.5.2 We have used the risk classification system described in R&D Publication 66 in this appraisal, the degree of risk is based on an assessment of consequence of an event occurring and the probability of a pollutant linkage. Table 4 below is the Categorisation of Risk table from the document, in which the likelihood of each pollutant linkage being realised is compared with the severity of the consequence. This provides a qualitative assessment of potentially unacceptable risks.

Table 4 – Categorisation of Risk

		Consequence			
		Severe	Medium	Mild	Minor
Probability of Pollutant Linkage	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate to Low Risk
	Likely	High Risk	Moderate Risk	Moderate to Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate to Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate to Low Risk	Low Risk	Very Low Risk	Very Low Risk

- 4.5.3 The definitions of the risk terms used in describing the risk levels in Table 4 above are based on those provided in CIRIA 552, Contaminated Land Risk Assessment, a guide to Good Practice 2001a.
- Very High Risk - There is a probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
 - High Risk - Harm is likely to arise to the designated receptor from an identified hazard at the site without appropriate action.
 - Moderate Risk - It is possible that without appropriate remediation action harm could arise to the designated receptor. It is relatively unlikely that such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
 - Low Risk - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst, if any harm were realised, any effects would be mild.
 - Very Low Risk - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.
- 4.5.4 We understand that development proposals for Drakelow site comprises residential housing, gardens, landscaping, public open space and infrastructure. For the purposes of the assessment, we have assumed a residential land use with gardens across the entire site as the most conservative land use. Areas of public open space / commercial end uses will need to be reassessed upon receipt of detailed proposals.
- 4.5.5 This assessment of the potential harm to either human health or the local environment is based on our experience and judgement.

4.6 Pollution Linkages

- 4.6.1 On the basis of the sources, pathways and targets described previously we have summarised the identified pollutant linkages within our Conceptual Site Model and Qualitative Risk Assessment included within Appendix 2.
- 4.6.2 Based on the proposed end use, the site is considered to represent a moderate risk to human health rising to a high risk locally. A moderate risk to controlled waters has been identified. This risk has been investigated by means of additional site investigation works detailed within Section 5 of this report.

4.7 Contaminants of Concern

- 4.7.1 Based on the identified potential contamination sources and development proposals the following contaminants of concern have been identified:
- metals and metalloids including arsenic, beryllium, boron, cadmium, chromium, chromium VI, copper, lead, mercury, nickel, selenium, vanadium and zinc;
 - pH;
 - cyanide and phenols;
 - sulphate, sulphide and sulphur;
 - speciated polyaromatic hydrocarbons;
 - petroleum hydrocarbons
 - volatile organic compounds
 - polychlorinated biphenyls;
 - asbestos;
 - ground gases.
- 4.7.2 Should there be any visual or odorous evidence of such contamination then the testing will be undertaken accordingly.

4.8 Site Investigation Strategy

- 4.8.1 Against the background of the CSM and preliminary risk assessment, a site investigation has been designed and implemented. The investigation has been designed to validate the findings of the previous investigations and to carry out further targeted investigations where necessary, as described below:
- To provide samples of the additional stockpiles (in Parcels L, M and O) previously not tested.
 - To further investigate the extent of buried obstructions associated within the former power station buildings in Parcels N and M.
 - Provide samples in Parcel O where PCB contamination is reported and to investigate former cooling tower bases.
 - To investigate the recorded waste treatment plant and anecdotal evidence of test area of soil stabilisation (Parcel F).

- To investigate depth and nature of made ground in the railway embankment in the western part of Parcel J.
- To investigate and provide samples around the existing buildings and recorded fuel tank (Parcels B and C).
- Provide additional samples for compaction and natural moisture content testing (railway embankment).
- To provide additional samples from (Parcel A) to determine whether the single sample of contaminated soil is a 'hot spot' of more ubiquitous. Including spot sampling around reported hot spot (TP14). Issues with access to Area A means that these works remain outstanding at the time of issue.

4.8.2 Further investigations were proposed in areas of the site where it has been established that there is deep made ground and there is already sufficient chemical testing to establish the contamination status of the area i.e.

- the former coal storage area where former sand and gravel pits have been largely backfilled with PFA (Parcel L and L1);
- the former railway embankments (Parcels K, K1, H, J1, P and S);
- the former sewage works.

5. ADDITIONAL SITE INVESTIGATION WORKS – 2020

5.1 Travis Baker Geo-Environmental Site Investigation

- 5.1.1 To supplement the results of the previous investigations, particularly the 2019 Patrick Parsons investigation, further investigation has been undertaken by Travis Baker Geo-Environmental Ltd. The initial phase of investigation comprised ten dynamic sampling boreholes (DS203-DS212) and the excavation of 24 trial pits (TP207-TP209, TP213-TP225 and TP227-TP233 including TP229A) in June 2020. Further six trial pits and four surface samples are proposed within Area A once access becomes available. The dynamic sampling boreholes included standard penetration testing at 1m intervals. The exploratory holes were positioned supplement existing data. The investigation was as far as possible undertaken in accordance with BS10175:2011 + A2:2017 Investigation of Potentially Contaminated Sites; BS5930:2015 + A1:2020 Code of Practice for Site Investigation and BS EN ISO 14688-2:2018 – Geotechnical Investigation and Testing. The dynamic sampling borehole logs and trial pit logs are included as Appendices 3 and 4, respectively.
- 5.1.2 An ecologist from Falco Ecology supervised the works where ground nesting birds (Little Ringed Plover) had already been identified in the west of the site. The proposed TP226 could not be excavated due to nesting birds; TP225 was moved approximately 5m west of the original proposed location in accordance with the ecologist's instruction. Seventeen of the trial pits were supervised by Falco Ecology i.e. TP221-TP227, TP217-TP219 and TPA-TPG.
- 5.1.3 Representative soil samples of each soil type encountered were taken from the trial pits and dynamic sampling boreholes. Soil samples were collected for contamination analyses and placed into appropriate sampling containers (plastic tubs, amber jars and vials). The samples were then placed in cool boxes together with ice packs. These were collected by the laboratory and delivered to i2.
- 5.1.4 Soil samples were obtained for human health assessments and to assess the aggressiveness of the soils in terms of sulphate attack on concrete. Geotechnical testing was undertaken on samples from each soil type to identify the engineering properties of the soils.

Testing

- 5.1.5 A programme of geotechnical laboratory testing was undertaken in accordance with BS1377:1990. The testing included the following:
- 9 No. Natural moisture content determination
 - 9 No. Compaction testing (4.5kg rammer)
 - 5 No. Particle size distribution tests
 - pH and soluble sulphate for concrete conditions
- 5.1.6 The results of the supplementary laboratory geotechnical testing is included as Appendix 5.
- 5.1.7 To supplement the initial testing carried out in 2019, a further 53 samples were tested for a range of potential contaminants, as identified in the CSM, outlined in Table 5, below.

Table 5 – Summary of Chemical Testing Soil Samples – 2020

Testing Suite	No. Samples Tested
Travis Baker Brownfield Suite ◇	26
Travis Baker Greenfield Suite #	13
Speciated PAH	35
Asbestos Screen	24
TPH CWG	10

Testing Suite	No. Samples Tested
PCBs	7
VOCs	7

◇: Travis Baker Brownfield Suite includes arsenic, beryllium, boron, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, total cyanide, free cyanide, phenol, sulphate (total) sulphate (soluble), sulphur, pH

Travis Baker Greenfield Suite includes arsenic, boron, cadmium, total chromium, copper, lead, mercury, nickel, selenium, zinc, sulphate (soluble), pH

5.2 Ground Conditions

5.2.1 The majority of the dynamic sampling boreholes were positioned within the former industrial units to determine the depth of made ground and to take further samples for laboratory chemical testing. The trial pits were generally undertaken to investigate buried obstructions, stockpiles and take further samples for geotechnical and chemical testing. The results of the exploratory holes generally identified similar materials to those reported during the 2019 investigation although additional investigation works are likely to be required once the existing structures are removed. The results are summarised by area, below. Only areas which have been further investigated by Travis Baker Geo-Environmental Ltd have been summarised in the following paragraphs; in areas where no supplementary works have been undertaken, please see summary of Patrick Parsons report in Section 3 for ground conditions.

Areas B and C - Eastern Industrial Estate

5.2.2 Ten exploratory holes were undertaken within Area B and C. Concrete surfacing ranging in thickness between approximately 0.05m and 0.4m was generally present across Area B and C. Macadam surfacing was present locally.

5.2.3 Made ground was encountered at each of the exploratory hole locations. The depth of made ground identified varied between 0.6m (DS210) and 3m (DS205). The full depth of made ground was not penetrated in TP209 at 2.9m bgl. The depth varied across short distances. No exploratory holes were undertaken within the existing buildings. The made ground was variable in nature and composition comprising gravelly sand, gravelly clay or PFA. An obstruction was present at 0.5m bgl in DS207 which prevented further progression. In DS212, the borehole 'refused' at a depth of 1.43m bgl within a dense ash.

5.2.4 Five of the exploratory holes encountered variably gravelly sand considered to represent the recorded superficial sand and gravel deposits. Depth and thicknesses varied; the base of superficial deposits varied between 1.3m (DS212) and 3.4m (DS206). However, two of the exploratory holes did not fully penetrate the superficial deposits at a depth of 4.44m bgl.

5.2.5 A firm silty sandy clay with lithorelicts was recorded from depths of 0.6m bgl in DS210 and 3.4m in DS206. The clay typically graded to a weak mudstone with depth, representative of the Mercia Mudstone.

Areas F and G – Western Industrial Estate

5.2.6 Two trial pits were undertaken, TP213 and TP214. A further trial pit was proposed (TP212) but could not be carried out at the intended location due to restrictions of a building; the JCB could not gain access elsewhere in the area around due to items and plant being stored around the building and yard.

5.2.7 TP213 had a thin layer of topsoil onto made ground of varying composition including gravelly sand, and ashy clay; the base of made ground was not proven at 2.85m. Spalling was noted at a depth of between 1.2m and 2.5m.

5.2.8 TP214 recorded various made ground, primarily a gravelly sand with anthropogenic inclusions of brick, concrete and wood. The base of made ground was not penetrated at a depth of 3m bgl.

5.2.9 Groundwater was not recorded within either of the exploratory holes.

Areas J and K – Embankment

5.2.10 Nine soil surface samples were taken across Areas J and K to supplement the testing already taken (SS5 to SS9). In addition, three trial pits were undertaken in the eastern extent of Area J i.e. TP207, TP208 and TP233.

5.2.11 The trial pits recorded variable made ground to depths of 1.7m (TP233) to 2.5m bgl (TP207 and TP208). The made ground comprises variable gravelly sand, gravelly clay with inclusions of brick, macadam, clinker, plastic, brick, wood and coal. Directly beneath the made ground are typically gravelly sands with localised gravelly clay considered to represent the River Terrace Deposits. The base of these superficial deposits was not recorded at depths of between 3.05m and 3.2m bgl. Spalling of these natural granular deposits was recorded.

5.2.12 Groundwater was not recorded within the exploratory holes in Area J.

Area L – Former Coal Yard

5.2.13 Six trial pits were carried out within Area L (TP215-TP220). Six stockpile samples were also taken (TPA-TPE and TPG).

5.2.14 Made ground was encountered at every location. The full extent of made ground was not typically reached at depths ranging between 2.55m and 3.3m. Only one trial pit (TP217) penetrated the base of made ground i.e. TP217 where a typically gravelly sand is present to 2.8m bgl. Layers of PFA were also recorded locally at various depths and thicknesses (0.2m to >0.9m thick at depths ranging between 1.15m to >2.95m bgl).

5.2.15 Directly beneath the made ground is an orange brown slightly gravelly fine to medium grained sand, considered to represent the recorded River Terrace Gravels, the base of which was not reached at 3.4m bgl. The made ground comprises variable gravelly sand, gravelly clay with inclusions of brick, macadam, clinker, plastic, brick, wood and coal. Directly beneath the made ground are typically gravelly sands with localised gravelly clay considered to represent the River Terrace Deposits. The base of these superficial deposits was not recorded at depths of between 3.05m and 3.2m bgl. Spalling of these natural granular deposits was recorded.

5.2.16 The made ground was recovered damp from 2.65m bgl in TP219. No other evidence of groundwater was recorded.

Area M – Former Drakelow A

5.2.17 A total of three trial pits were carried out within Area M (TP229, TP229A and TP230).

5.2.18 Made ground was encountered at all three locations within Area M. The full extent of made ground was not proven at a depth of 2.65m bgl in TP230. TP229 was abandoned at 0.6m due to thick metal rebar which prevented further excavation; TP229A was carried out approximately 80m north which recorded approximately 1.7m of typically gravelly sand anthropogenic inclusions including brick, ceramic, clinker and coal. A slight hydrocarbon odour was recorded within a granular layer of made ground between 0.5m and 0.75m bgl.

5.2.19 Directly beneath the made ground in TP229A is an orange brown gravelly slightly cobbly sand, considered to represent the recorded River Terrace Gravels, the base of which was not reached at 2.2m bgl.

- 5.2.20 A fast groundwater seepage was recorded within the made ground in TP229A at 1.4m bgl. Spalling was recorded within TP229A which ultimately required the termination of the trial pit at 2.2m bgl.

Area N – Former Drakelow B

- 5.2.21 Five trial pits were carried out within Area N (TP222 to TP227). TP226 could not be carried out due to the presence of nesting little ring plovers in accordance with the ecologist's advice.
- 5.2.22 Made ground was encountered at all locations within Area N. The full depth of made ground was only identified within one trial pit (TP222) at a depth of 2.7m bgl. Trial pits TP223 and TP227 were terminated prematurely at depths of 1.45m and 0.65m bgl due to dense PFA and a concrete obstruction, respectively. Trial pits TTP224 and TP225 were terminated at depths of 2.95m and 3.1m bgl, respectively within made ground. The composition of made ground varies but is typically a gravelly sand with inclusions of brick, ceramic etc. Significant thicknesses of PFA are present locally (2.2m thick in TP225), to a maximum depth of 2.7m bgl (also TP225).
- 5.2.23 Directly beneath the made ground in TP222 is light brown gravelly sand, considered to represent the recorded River Terrace Gravels, the base of which was not reached at 3.2m bgl.
- 5.2.24 Rapid groundwater seepages were recorded within the made ground in TP224 at 1.45m bgl and TP225 at 2.6m bgl. Spalling was recorded within TP229A which ultimately required the termination of the trial pit at 2.2m bgl.

Area O – Former Cooling Towers

- 5.2.25 Three trial pits were carried out within Area O (TP228, TP231 and TP232). In addition, three stockpile samples were taken from TPH, TPI and TPJ.
- 5.2.26 Made ground was encountered at all three locations within Area O to the base of excavation at depths of between 2m and 2.2m due to a suspected concrete obstruction. The made ground is variable in composition but typically consists of a gravelly sand with brick, concrete, coal, metal and wood inclusions or pulverised fuel ash.
- 5.2.27 A groundwater seepage was recorded within the made ground in TP228 at 1.9m bgl, beneath which the recovered materials were completely saturated. Spalling was also recorded in TP228 from 1.7m bgl.

Area R – Hardstanding with Storage

- 5.2.28 A single trial pit was carried out within Area R (TP221).
- 5.2.29 Made ground was recorded to the base of TP221 at 2.85m bgl; the made ground comprises variable gravelly sand and clay with inclusions of brick, concrete and coal. A layer of PFA was recorded between 2.05m and 2.7m bgl. The trial pit remained dry and stable.

Stockpiles

- 5.2.30 A number of stockpiles have been identified during both phases of investigation. An updated survey provided suggests that the stockpiles across Areas L, N and O were placed since the 2019 investigation works. The trial pits indicate similar materials encountered, as summarised in Table 6, below:

Table 6 – Summary of Stockpile Materials

Stockpile Reference	Description
TPA	Brown gravelly sand - quartzite, brick, metal

Stockpile Reference	Description
TPB	Brown slightly cobbly gravelly sand - quartzite, brick, concrete
TPC	Orange Brown slightly gravelly sand - quartzite and rootlets
TPD	Brown slightly gravelly sand - quartzite and rootlets
TPE	Brown very gravelly sand - quartzite, rootlets and metal
TPF	Dark brown very gravelly sand - quartzite, brick, concrete
TPG	Brown very gravelly sand - quartzite, rootlets
TPH	Brown slightly silty gravelly sand - quartzite, coal, brick
TPI	Brown gravelly sand - quartzite, rootlets, coal
TPJ	Dark brown very gravelly sand - quartzite, coal, brick and concrete

5.3 In-Situ Testing

Standard Penetration Tests (SPT's)

- 5.3.1 A total of 30 standard penetration tests (SPT's) were undertaken at 1m intervals within the various materials encountered in the dynamic sampling boreholes to a maximum depth of 5m bgl. A summary of the SPT results against depth is presented within the following Table 7.

Table 7 - SPT Summary of Dynamic Sampling Boreholes

Borehole Ref.	SPT 'N' Value				
	1m	2m	3m	4m	5m
DS203	24	9	9	50 70mm	
DS204	8	41	33	50 40mm	
DS205	35	15	12	50 60mm	
DS206	8	5	8	24	49
DS207	Terminated at 0.5m				
DS208	12	4	50 40mm		
DS209	10	14	50 50mm		
DS210	43	50 10mm			
DS211	12	22	26	50 60mm	
DS212	50 50mm				

	Made ground
	Granular river terrace deposits
	Cohesive river terrace deposits
	Mercia Mudstone

5.4 Groundwater

- 5.4.1 At the time of the recent site works, significant groundwater was not generally encountered. Where recorded, the seepages or saturated materials were generally associated with the made ground and are therefore likely to be perched pockets and not representative of a single shallow groundwater horizon across the site.
- 5.4.2 Table 8 below provides a summary of the groundwater encountered and comments of the nature of the groundwater observed.

Table 8 - Summary of Groundwater Observations during Intrusive Site Works

Location	Depth (bgl)	Comment
TP219	2.65m	Made ground recovered damp from 2.65m
TP224	1.45m	Rapid inflow at 1.45m bgl. Made ground saturated below 1.6m.
TP225	2.6m	Rapid inflow at 2.6m bgl. Water level on completion of trial pit at 2.7m bgl.
TP228	1.9m	Water seepage at 1.9m, made ground saturated from 1.7m bgl.
TP229A	1.4m	Rapid inflow at 1.4m bgl.
DS203	1m	Recovered wet from below 1m.
DS205	4.44m	Groundwater at base of borehole upon completion.
DS208	1.3m	Groundwater at 1.3m on completion of drilling

5.4.3 It should be noted that groundwater levels fluctuate throughout the year and between years due to the dynamic balance between groundwater recharge, storage and discharge. Factors affecting groundwater levels include seasonal / climatic variation and groundwater abstraction.

5.4.4 It is considered that the groundwater observations are indicative of a series of discontinuous perched groundwater bodies within the more granular near surface soils, which are confined by the underlying cohesive soils. Some larger bodies of groundwater will be present in the areas of deeper made ground e.g. the former sand and gravel pits where ground water was encountered at approximately 3m. The groundwater identified by the site investigations undertaken to date are not considered to represent the main groundwater horizon underlying the site.

5.5 Borehole and Trial Pit Stability

5.5.1 The borehole and trial pits generally remained stable during and shortly after drilling / excavation with a few exceptions, as detailed in Table 9, below.

Table 9 – Summary of Trial Pit Observations

Location	Depth (bgl)	Area	Comment
TP207	2.5m-3.05m	J	Spalling of granular River Terrace Deposits
TP208	2.5m-3.2m	J	Spalling of granular River Terrace Deposits
TP213	1.2m-2.5m	G	Slight spalling of walls in made ground
TP215	1m-1.3m	L	Slight spalling of walls in made ground
TP219	2.5m-2.95m	L	Slight spalling of walls in made ground
TP224	1.6m-2.95m	N	Slight spalling of walls in made ground
TP225	2m-3.1m	N	Spalling of walls in made ground
TP228	1.7m-2.1m	O	Spalling of walls in made ground
TP229A	1m-2.2m	M	Slight spalling of walls in made ground & granular River Terrace Deposits

5.6 Laboratory Geotechnical Testing

5.6.1 Five bulk samples were subjected to particle size distribution (PSD) tests. The results were variable although show typically granular materials, as summarised in Table 10, below.

Table 10 – Summary of PSD Testing

Location	Depth (bgl)	Area	Comment
TPD	Stockpile	L	Clayey gravelly sand
TPJ	Stockpile	O	Clayey sand and gravel
SS5	Surface	J	Clayey very gravelly sand
SS8	Surface	K	Clayey sand and gravel

TP220	0.8m-1m	L	Sandy very gravelly clay
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5.6.2 Nine bulk samples were subjected to laboratory compaction testing (4.5kg rammer), as summarised in Table 11, below.

Table 11 – Summary of Laboratory Compaction Testing

Location	Depth (bgl)	Area	Natural Moisture Content (%)	Optimum Moisture Content (%)	Maximum Dry Density (Mg/m ³)
TPA	Stockpile	L	12	8.6	2.03
TPD	Stockpile	L	5.2	7.5	2.06
TPH	Stockpile	O	11	11	1.94
TPJ	Stockpile	O	9.6	8.9	2.04
SS5	Surface	J	3.5	7.8	2.05
SS7	Surface	J1	11	13	1.81
SS8	Surface	K	17	16	1.58
SS9	Surface	K	12	8	2.05
TP220	0.8m - 1m	L	15	10	2.01

5.6.3 The laboratory results were variable showing some materials are slightly wet whilst some materials are slightly dry of their optimum moisture content. This will need to be taken account during any earthworks operations.

5.7 Concrete Classification

5.7.1 Patrick Parsons undertook an area specific analysis of concrete conditions which indicates the following conditions:

- Area A - DS-1, AC-1
- Area B - DS-3, AC-3
- Area C - DS-1, AC-1
- Area D - DS-1, AC-1
- Area E - DS-1, AC-1
- Area F - DS-1, AC-1
- Area G - DS-1, AC-1
- Area H - DS-1, AC-1
- Area I - DS-1, AC-1
- Area J - DS2, AC-2 (shallow). Concrete deeper than 5m DS-3, AC-4
- Area K - DS-1, AC-1
- Area L - DS-3, AC-3
- Area M - DS-4, AC-4
- Area N - DS-3, AC-3
- Area O - DS-2, AC-2
- Area P - DS-2, AC-2
- Area Q - DS-1, AC-1
- Area R - DS-1, AC-1
- Area S - DS-2, AC-2

5.8 Soakaway Potential

- 5.8.1 Based on the identified depths of made ground across the majority of the area it was considered that shallow soakaways would not be an appropriate drainage strategy for the site. Soakaway tests were therefore not completed as part of these investigations, however, there may be areas of the site where soakaway may be feasible, subject to the final layout and in-situ infiltration testing.

5.9 Hard Strata / Obstructions

- 5.9.1 Naturally occurring hard strata is considered unlikely across the site. However, a number of exploratory holes encountered buried obstructions considered to be associated with the previous buildings which will need to be addressed as part of the redevelopment. A summary of the obstructions is provided in Table 12, below and illustrated on Drawing No. 20040-GE09.

Table 12 – Summary of Obstructions, 2019 and 2020 Investigations

SI	Location	Depth (bgl)	Area	Comment
TB	TP208	0.2m-1m	J	Hard digging within made ground with JCB although materials were penetrated.
TB	TP219	1.35m-1.55m	L	Hard digging through PFA with JCB although materials were penetrated.
TB	TP220	0.4m-0.6m	L	Hard digging within made ground with JCB although materials were penetrated.
TB	TP223	1.45m	N	Unable to penetrate with JCB at 1.45m in PFA.
TB	TP227	0.55m	N	Reinforced concrete 0.55m – 0.65m bgl – thick metal rebar prevented further penetration.
TB	TP228	2.1m	O	Concrete obstruction at 2.1m.
TB	TP229	0.6m	N	Reinforced concrete GL-0.2m bgl – thick metal rebar prevented further penetration at 0.6m.
TB	TP231	2.2m	O	Concrete obstruction at 2.2m.
TB	TP232	2m	O	Concrete obstruction at 2m.
TB	DS207	0.5m	C	Obstruction at 0.5m within dynamic sampling borehole.
PP	CP37	0.8m	C	Concrete obstruction at 0.8m.
PP	CP37A	0.5m	C	Concrete obstruction at 0.5m.
PP	WS07	0.52m	F	Concrete obstruction at 0.52m.
PP	WS08	1.6m	F	Concrete obstruction at 1.6m.
PP	WS09	1.4m-1.8m	F	Concrete obstruction at 1.4m-1.8m.
PP	TP005	1.5m	I	Concrete obstruction at 1.5m – possible former sewage works
PP	TP006	0.6m	I	Concrete obstruction at 0.6m – possible former sewage works
PP	TP092	4.9m	L	Concrete obstruction at 4.9m.
PP	CP25	3.2m	N	Concrete obstruction at 3.2m
PP	TP099/R03	0.6m-5.0m	N	Concrete obstruction at 0.6m to 5m bgl
PP	TP100	-	N	Edge of concrete obstruction 'near surface'
PP	CP12A	2m	M	Concrete obstruction at 2m bgl
PP	CP13	3.9m	M	Concrete obstruction at 3.9m bgl
PP	WS15	1.5m	O	Concrete obstruction at 1.5m
PP	WS16	1.5m	O	Concrete obstruction at 1.5m
PP	WS17	2.0m	O	Concrete obstruction at 2.0m
PP	WS18	2.0m	O	Concrete obstruction at 2.0m
PP	WS19	2.0m	O	Concrete obstruction at 2.0m
PP	WS20	2.0m	O	Concrete obstruction at 2.0m
PP	CP22	1.7m-2.1m & 3.3m	O	Concrete obstruction at 1.7-2.1m (chiselled through) and 3.3m
PP	CP12	1.7m	O	Concrete obstruction at 1.7m

5.10 Foundation Horizon

5.10.1 The weak and variable made ground materials identified across the majority of the site area will not form a suitable horizon for founding without some form of ground improvement exercise. The underlying river terrace deposits are generally relatively deep and typically display 'soft' consistencies or 'loose' relative densities and are therefore unlikely to be suitable for founding across the majority of the site. It is likely that foundations will generally need to extend into the underlying competent Mercia Mudstone although it is likely that shallower foundations may be viable in localised areas, subject to the proposed site levels.

5.10.2 The foundation options are discussed in further detail in Section 7.

5.11 Gas and Groundwater Monitoring

5.11.1 Up to 10 rounds of gas monitoring and localised continuous monitoring has been carried out by Patrick Parsons. In the absence of a detailed housing layout ahead of the 2020 supplementary works, further works were not considered necessary during this phase. Further monitoring and detailed assessment will be required to refine the ground gas risk assessment findings to date. Reference should be made to the original report for details, however, we have summarised the Patrick Parsons' findings for completeness in Table 13, below.

Table 13 – Summary of Ground Gas Assessment by Patrick Parsons

Area	Characteristic Situation Categorisation	Gas Protection Measures Required
Area A	CS1	None required
Area B	CS1	None required, subject to additional monitoring.
Area C	CS1 conditions generally, increasing to CS2 locally.	Localised gas protection measures likely to be required.
Area D	CS1 conditions generally, increasing to CS2 locally.	Localised gas protection measures likely to be required.
Area E	None required	None required, subject to additional monitoring.
Area F	CS2	Gas protection measures required, subject to additional monitoring.
Area G	CS2	Gas protection measures required, subject to additional monitoring.
Area H	CS2	Gas protection measures required, subject to additional monitoring.
Area I	CS2	Gas protection measures required, subject to additional monitoring.
Area J	CS2 increasing to CS3/4 locally (J1)	Gas protection measures required, enhanced measures possible locally.
Area K	CS2 increasing to CS3/4 locally (K1)	Gas protection measures required, enhanced measures possible locally.
Area L	Generally CS1, increasing to CS3/4 locally (L1).	Gas protection measures not generally required, however, enhanced measures possible locally.
Area M	CS1	None required, subject to additional monitoring.
Area N	CS1	None required, subject to additional monitoring.
Area O	CS1	None required, subject to additional monitoring.
Area P	CS1	None required, subject to additional monitoring.
Area Q	CS1	None required, subject to additional monitoring.
Area R	CS1	None required, subject to additional monitoring.
Area S	CS1 increasing to CS2 locally	Localised gas protection measures required (elevated methane).

7.9.2 The ground gas risk assessment will need to be further refined in accordance with the receipt of the housing layout. Additional targeted monitoring will be required to define the areas where elevated ground gases have already been identified.

6.0 CONTAMINATION ASSESSMENT

6.1 Human Health Risk Assessment

- 6.1.1 Data obtained from the site investigation has been used to assess the contamination status of the site. We have utilised the current technical guidance published by the Environment Agency (EA) i.e. their Contaminated Land Exposure Assessment (CLEA) model. The Chartered Institute of Environmental Health (CIEH) and Land Quality Management (LQM) published updated Suitable for Use Levels (S4ULs) in January 2015 for a number of potential contaminants of concern (COC). These include those with previously published soil guidance values (SGVs) available from the EA. The published S4ULs are designed to be used as generic screening values. The new S4ULs have been produced to incorporate updates to toxicological data, where available, together with adaptations to the exposure modelling originally proposed by Defra in the production of Category 4 Screening Levels (C4SL). However, unlike the C4SLs, the S4ULs are still based on the concept of minimal risk and are considered appropriate for use in generic quantitative risk assessment (GQRA). The S4UL have been used in accordance with following:

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- 6.1.2 Where available, Generic Assessment Criteria (GAC) values published by the Environmental Industry Commission (EIC) have been used for substances with no published S4UL. There are a number of additional potential Contaminants of Concern (COC) where there is currently no available guidance based on minimal risk and/or it is not considered appropriate to derive in-house GAC values using the CLEA model. The initial screening of geochemical results for these contaminants has therefore been undertaken in accordance with the principles outlined in the 6.1.3 and 6.1.4.
- 6.1.3 With regard to lead the former SGV for residential land uses of 450mg/kg (now withdrawn) was formally recognised guidance in the UK as representing a level of minimal risk. However, review of toxicological research has indicated that lead may affect IQ in children even at low exposures; the value of 450mg/kg is therefore not considered suitably protective. The Category 4 Screening Level (C4SL) for lead, published by Defra in March 2014, related to the revised Part 2A statutory guidance based on a low level of toxicological concern (opposed to minimal risk) is 200mg/kg for the standard residential with homegrown produce land use. This level is considered conservative and appropriate as an initial screening value for the site.
- 6.1.4 The critical exposure to cyanide in soils is considered to be from acute exposure rather than the chronic exposure as assessed within the CLEA methodology. In the past the Risk Based Corrective Action (RBCA) tool kit has been used to derive a "Risk Based Screening Level" for chronic exposure to soil impacted by cyanide of circa 600mg/kg. However as acute exposure to cyanide may be more critical, an in-house screening value based on published acute free/easily liberated cyanide toxicity of 60mg/kg has been derived to be protective of a female child in a residential scenario.
- 6.1.5 It is understood that proposals for the Drakelow site area will generally comprise residential housing, gardens, landscaping, associated infrastructure and public open space. For the purposes of this initial assessment published screening criteria for a 'residential with plant uptake' land use has therefore been used in this assessment to assess the most sensitive potential end use for the site.
- 6.1.6 Assessment criteria for organic contaminants vary dependent on the soil organic matter (SOM) content of the material. A conservative value of 1.0% SOM has been applied to all soils for the

purposes of this assessment. A summary of the target values used in the human health risk assessment is included in Appendix 7.

- 6.1.7 In accordance with current best practice outlined within 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' (May 2008) published by CL:AIRE we have reviewed the borehole and trial pit logs to determine any differences within the soil types encountered at the site. Several different materials types have been identified i.e. 'general' made ground, PFA, stockpiles, river terrace deposits and Mercia Mudstone as described in the following text. Given the depth and lateral extent of made ground, testing was focussed on the made ground, particularly those likely to be moved around as part of the enabling works such as the embankments and stockpiles. To provide an assessment of the geochemical nature of the near surface materials, a total of 53 samples were scheduled for laboratory analysis as summarised, below.

Metals, pH	- Up to 39 No.
Polyaromatic Hydrocarbons (PAH)	- 35 No.
Total Petroleum Hydrocarbons (TPH)	- 10 No.
Asbestos	- 24 No.
Polychlorinated biphenyls (PCBs)	- 7 No.

- 6.1.8 As detailed previously this supplementary phase of investigation is intended to provide further information to assess the ground conditions and the contamination status of the site. Additional testing is likely to be required following the demolition of the buildings and remaining sub-structures.
- 6.1.9 The testing regime for this supplementary phase of works was based on further characterising the contamination status site materials, most notably the embankment, fill materials and stockpiles on site. On this basis samples were selected for a general suite of potential contaminants found on brownfield sites i.e. metals, metalloids, phenol, cyanide, asbestos, polyaromatic hydrocarbons (PAH) and asbestos. Targeted TPH testing was undertaken in areas where visual / olfactory evidence were recorded. PCB testing was undertaken in areas associated former power station. In addition, asbestos was screened in a number of the made ground samples, the volume of which was quantified if a positive result was identified.
- 6.1.10 Our assessment is based on chemical testing associated with a total of approximately 142 machine excavated trial pits, 91 dynamic sampling boreholes, 43 cable percussion boreholes and 8 rotary boreholes.
- 6.1.11 We have initially undertaken a direct comparison of the contamination test results with the adopted guidance values for a residential end use with plant uptake. Once the final layout / land uses are confirmed, the areas should be reassessed accordingly. A copy of the laboratory test report is included as Appendix 6 together with a list of the guideline values used for this initial assessment in Appendix 7. Based on this direct comparison it was noted that the target values for arsenic, beryllium and several individual species of PAH were exceeded in at a number of samples. We have therefore undertaken a statistical analysis on the results as described in further detail in the following section. Statistical analysis has not been undertaken on the targeted testing undertaken as the sources represent potential hotspots which would need to be analysed separately.

6.2 Statistical Assessment

- 6.2.1 An initial statistical assessment has been undertaken on the metals and polyaromatic hydrocarbon suites for the site. A brief description of the statistical analysis is provided below.

- 6.2.2 Initially each data set has been investigated using 'Grubbs Test' to determine whether there are any statistical outliers within the data set. Where outliers have been identified we have revisited the trial pit and borehole logs to determine whether there are any obvious sources for the elevated value(s). If the logs indicate a clear material difference between the soil sample containing the outlier and the remaining soils then the data for that sample can be removed and assessed independently.
- 6.2.3 Where there is no clear cause for the outlier we have assumed that the selected values are representative of the population. The outliers have therefore been retained within the data set for subsequent statistical analysis.
- 6.2.4 Following the removal of outliers, where applicable, both a Shapiro-Wilk Normality Test and a visual check are undertaken to determine whether the data set has a 'normal' or 'non normal' distribution. For data with a 'normal' distribution the 'one sample T Test' is used to calculate the 95th percentile confidence level. Where the data set forms a 'non-normal' distribution the Chebychev Theorem is used to determine the 95th percentile confidence level. This 95th percentile value is then compared with the relevant critical concentration (i.e. S4UL / C4SL / EA CLEA) guidance value.
- 6.2.5 The final stage of the assessment is to provide an indication of how confident we are that the contaminant concentration will fall below the relevant critical concentration; this 'level of confidence' is represented as a percentage.
- 6.2.6 We have included the historical data as part of the statistical analysis. Statistical analysis has therefore been undertaken on both the Patrick Parsons and Travis Baker metals and speciated PAH data for each area / material type. We have not undertaken any statistical assessment on the asbestos, TPH or PCB data as the testing is generally targeted due to potential contamination sources. As such, the assessment would be skewed therefore we have directly compared the data against their relevant guidance values. A summary of the range of results, statistical analysis and guidance values are included with the results in Appendix 6.

6.3 Area A

Arsenic, Cadmium, Boron, Chromium, Chromium VI, Copper, Lead, Mercury, Selenium, Vanadium and Zinc

- 6.3.1 Thirteen samples were tested across the Patrick Parsons 2019 investigation. Access was still being arranged for Area A when the June 2020 investigations took place therefore further works are to be undertaken in this area. Thirteen samples from the 2019 investigation were analysed for a suite of metals (nine topsoil, one made ground and three river terrace deposits). All of the samples tested recorded concentrations below their relevant current guidance (Suitable for Use Level – S4UL) for arsenic, cadmium, boron, chromium, chromium VI, copper, mercury, selenium, vanadium and zinc or C4SL for lead.

PAH

- 6.3.5 Thirteen samples were tested for a suite of PAHs from the 2019 investigation (nine topsoil, one made ground and three river terrace deposits). All but one of the samples tested in Area A were below their relevant S4ULs for a proposed residential land use. One topsoil sample (TP114 at 0.2m) recorded marginally elevated concentration of dibenzo(ah)anthracene – 0.3mg/kg compared with the S4UL of 0.24mg/kg). All of the other samples were below the laboratory limit of detection of 0.05mg/kg. Statistical analysis of the 13 samples indicates that the sample is considered an outlier. However, even if the outlier is not removed from the dataset, the 95th percentile is 0.15mg/kg i.e. less than the S4UL of 0.24mg/kg. Based on the testing carried out to date, PAH is not considered an issue within Area A.

Asbestos

- 6.3.6 Thirteen samples were screened for the presence of asbestos as part of the 2019 investigations by Patrick Parsons (nine topsoil, one made ground and three river terrace deposits). Asbestos was not detected in any of the samples tested.

TPH, PCBs, VOCs

- 6.3.7 Given the general absence of potential industrial processes in Area A, TPH, PCB and VOC testing was not carried out. No visual or olfactory evidence of contamination was identified in Area A; issues relating to these determinands are considered unlikely.

Pesticides

- 6.3.8 A suite of pesticides / herbicides were absent in three of the samples (two topsoil and one river terrace deposits) tested as part of the 2019 investigations.

6.4 Area B

Arsenic, Cadmium, Boron, Chromium, Chromium VI, Copper, Mercury and Selenium

- 6.4.1 All ten of the samples tested across the two phases of investigation (Patrick Parsons 2019 and Travis Baker Geo-Environmental 2020) recorded concentrations below their relevant current guidance (Suitable for Use Level – S4UL) for cadmium, boron, chromium, chromium VI, copper, mercury, selenium and vanadium. The majority of samples were taken from the made ground.

Beryllium and Vanadium

- 6.4.2 Beryllium and vanadium were not included within the 2019 testing suite. The four samples tested as part of the 2020 investigation indicate that all four made ground samples were below their relevant S4UL guidance values. Beryllium and vanadium are therefore not considered to pose a risk to future users in Area B.

Lead

- 6.4.3 A total of 10 samples were tested within Area B; two weathered Mercia Mudstone strata samples and eight made ground samples. Two of the made ground samples recorded elevated concentrations of lead i.e. 500mg/kg and 1,100mg/kg compared with the C4SL of 200mg/kg. Although the dataset is relatively limited, the samples were sub-divided to remove the two natural samples from the data so statistical analysis was only undertaken on the eight samples of made ground. The 95th percentile for lead in the made ground in Area B is 831mg/kg which exceeds the C4SL. No statistical outliers were identified in the dataset. On this basis the concentrations of lead within the made ground, Area B is considered to potentially hazardous to human health for the proposed residential land use (with gardens) and will need some form of remediation.

Zinc

- 6.4.4 A total of 10 samples were tested within Area B; two weathered Mercia Mudstone strata samples and eight made ground samples. One of the made ground samples recorded elevated concentrations of zinc i.e. 5,700mg/kg compared with the S4UL of 3,700mg/kg. Although the dataset is relatively limited, the samples were sub-divided to remove the two natural samples from the data so statistical analysis was only undertaken on the eight samples of made ground. The 95th percentile for zinc in the made ground in Area B is 3,846mg/kg which exceeds the S4UL. However, a statistical outlier was identified in the dataset (i.e. WS29 at 0.4m). Once the outlier was removed from the dataset, the 95th percentile was 102mg/kg, far below the S4UL. Based on the statistical analysis, there is a 'hotspot' of zinc associated with WS29. Given that the made ground will need to be remediated due to the elevated concentrations of lead identified in this area, any proposed remedial measures should address the identified zinc hotspot too.

- 6.4.5 Incidentally, by removing the sample associated with the hotspot of zinc, the 95th percentile value falls significantly but remains above the C4SL at 406mg/kg.

PAH

- 6.4.6 All nine of the samples (seven made ground and 2 Mercia Mudstone) tested for PAH in Area B were below their relevant S4ULs for a proposed residential land use. Consequently, PAH is not considered an issue in Area B.

Asbestos

- 6.4.7 Ten samples were screened for the presence of asbestos across the two investigations (8 made ground and 2 Mercia Mudstone). One sample detected chrysotile (0.001%). The presence of asbestos will need to be considered as part of the remedial measures required across Area B.

TPH

- 6.4.8 Six samples were tested for TPH, two of which were reported to have a hydrocarbon odour when logged. All of the samples tested were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs

- 6.4.9 Two samples were screened for the presence of seven possible congeners; both samples were below the laboratory limit of detection (0.001mg/kg) for each of the congeners analysed. On the basis of the testing, PCBs are unlikely to pose an issue within Area B.

VOCs / SVOCs

- 6.4.10 Two samples were screened for a suite of VOCs and SVOCs. The majority of determinands tested were below the laboratory limit of detection. The samples were below their respective S4UL guidance values for the determinands with published guidance values. On the basis of the testing undertaken, VOCs and SVOCs are unlikely to pose an issue within Area B.

6.5 Area C

Cadmium, Boron, Chromium, Chromium VI, Copper, Lead, Mercury, Selenium and Zinc

- 6.5.1 To supplement the 6 samples (4 made ground, 2 River Terrace Deposits) from the 2019 investigation, ten additional samples were tested (nine made ground and one River Terrace Deposits). All sixteen of the samples tested across the two phases of investigation recorded concentrations below their relevant current guidance (Suitable for Use Level – S4UL) for cadmium, boron, chromium, chromium VI, copper, lead, mercury, selenium and zinc.

Beryllium and Vanadium

- 6.5.2 Beryllium and vanadium were not included within the 2019 testing suite. The seven samples tested as part of the 2020 investigation indicate that all samples were below their relevant S4UL guidance values for vanadium. However, three of the samples indicated elevated concentrations of beryllium. A statistical analysis was carried out on the seven available samples from Area C. The 95th percentile for beryllium in Area C is 3.7mg/kg which exceeds the S4UL of 1.7mg/kg. No statistical outliers were identified in the dataset. On this basis the concentrations of beryllium are considered potentially hazardous to human health for the proposed residential land use with gardens and will need some form of remediation.

Arsenic

- 6.5.3 To supplement the 6 samples (4 made ground, 2 River Terrace Deposits) from the 2019 investigation, ten additional samples were tested (nine made ground and one River Terrace Deposit). All of the River Terrace Deposit samples were below S4UL of 37mg/kg; four of the made ground samples were above the S4UL guidance. Although the dataset is relatively limited,

the samples were sub-divided to remove the three natural samples from the data so statistical analysis was only undertaken on the thirteen samples of made ground. The 95th percentile for arsenic in the made ground in Area C is 57mg/kg which exceeds the S4UL. No statistical outliers were identified in the dataset. On this basis, the concentrations of arsenic within the made ground in Area C are considered to be potentially hazardous to human health for the proposed residential land use (with gardens) and will need some form of remediation.

PAH

- 6.5.4 All thirteen samples tested for PAH in Area C were below their relevant S4ULs for a proposed residential land use. Consequently, PAH is not considered an issue in Area C.

Asbestos

- 6.5.5 Twelve samples were screened for the presence of asbestos across the two investigations. Five samples detected chrysotile, as follows:
- DS205 at 0.7m-0.8m
 - DS207 at 0.1m-0.5m
 - DS212 at 0.1m-0.2m
 - TP209 at 0.2m-0.3m
 - WS28 at 0.4m

- 6.5.6 Four of the five positive samples indicated <0.001% chrysotile, however, one TP209 indicated 0.001%. The presence of asbestos within the made ground will need to be considered as part of the remedial measures required across Area C.

TPH

- 6.5.7 Eleven samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs

- 6.5.8 Three samples were screened for the presence of seven possible congeners; all samples were below the laboratory limit of detection (0.001mg/kg) for each of the congeners analysed. On the basis of the testing, PCBs are unlikely to pose an issue within Area C.

VOCs / SVOCs

- 6.5.9 One sample were screened for a suite of VOCs and SVOCs as part of the 2019 works. The majority of determinands tested were below the laboratory limit of detection. The samples were below their respective S4UL guidance values for the determinands with published guidance values. On the basis of the testing undertaken, VOCs and SVOCs are unlikely to pose an issue within Area C.

6.6 Areas D and F

- 6.6.1 No additional testing has been carried out during Area D; one supplementary trial pit was undertaken in Area F (TP214) which was tested for a suite of metals and PAH and screened for asbestos. Given the similar historic land use, we have chemically assessed Areas D and F together.
- 6.6.2 A total of six samples (five made ground and one sample of river terrace deposits) were tested for metals, PAH and screened for asbestos. All of the samples were below their relevant current guidance (Suitable for Use Level – S4UL). No asbestos was detected. Five samples were tested for TPH, four of which were below their relevant S4UL guidance. However, one sample (CP36 at 0.5m) showed marginally elevated aromatic fractions for the C21-C35 band. There is no

mention of hydrocarbon odours or staining or coal based deposits within the log. Further localised investigation may be required to address this TPH 'hotspot'.

PCBs

- 6.6.3 One sample (Area F) was screened for the presence of seven possible congeners; all samples were below the laboratory limit of detection (0.001mg/kg) for each of the congeners analysed. On the basis of the testing, PCBs are unlikely to pose an issue.

VOCs / SVOCs

- 6.6.4 One sample (Area F) were screened for a suite of VOCs and SVOCs as part of the 2019 works. The majority of determinands tested were below the laboratory limit of detection. The samples were below their respective S4UL guidance values for the determinands with published guidance values. On the basis of the testing undertaken, VOCs and SVOCs are unlikely to pose an issue within Area F.

6.7 Area E

- 6.7.1 No additional testing has been carried out in Area E during the 2020 investigation. Given that the area is currently wooded, access was an issue therefore the investigation points are limited to three Patrick Parsons exploratory holes across Area E.
- 6.7.2 The Patrick Parsons report states that the chemical testing indicated that all of the determinands tested were below their relevant guidance values based on a residential end use with plant uptake. No chemical data has been supplied to us for this area therefore it is unclear what has been tested; given the absence of made ground recorded within the logs, contamination is considered unlikely.

6.8 Area G

- 6.8.1 One supplementary trial pit was undertaken in Area G (TP213) which was tested for a suite of metals and PAH. Given that the area is currently wooded, access was an issue therefore the investigation points are limited across Area G.
- 6.8.2 Two samples (both made ground) were tested for metals and PAH. Both of the samples were below their relevant current guidance (Suitable for Use Level – S4UL) for PAH, however, TP001 was identified as having elevated arsenic within the PFA sample tested. One sample was screened for asbestos; none was detected. Given the lack of data, it is not possible to undertake statistical analysis, however, it is noted that PFA has been identified within the majority of exploratory holes. Given the elevated concentration of arsenic identified within the made ground (specifically the PFA), some form of remediation will be required in in Area G to allow re-use of these materials within proposed garden areas.

6.9 Areas H and I

- 6.9.1 No supplementary exploratory holes have been undertaken in Areas H or I.
- 6.9.2 A total of seventeen samples were tested for a suite of metals and PAH across areas H and I during the Patrick Parsons investigation. One of the samples (CP03 at 0.5m) was from the naturally occurring river terrace deposits and was tested for metals, PAH and TPH. The aforementioned sample and one from 1m from the same location were also screened for asbestos. The sample of river terrace deposits was under the relevant S4UL guidance levels for metals, PAH and TPH. In addition, no asbestos was detected by the laboratory in either sample. These materials are considered suitable for re-use and have not been assessed further.

- 6.9.3 The sixteen made ground samples were tested for a suite of metals and PAH. Two separate samples had elevated concentrations of arsenic (TP014 – Area H) and dibenzo(a,h)anthracene (TP009 – Area I). A statistical assessment has been undertaken on the made ground across these areas.
- 6.9.4 The 95th percentile for arsenic in the made ground in Areas H and I is 34mg/kg which is below the S4UL of 37mg/kg. No statistical outliers were identified in the dataset. On this basis, the concentrations of arsenic within the made ground in Areas H and I are not considered to pose a significant risk to human health for the proposed residential land use with gardens.
- 6.9.5 The 95th percentile for dibenzo(a,h)anthracene in the made ground in Areas H and I is 0.13mg/kg which is below the S4UL of 0.24mg/kg. The elevated result is shown to be a statistical outlier, however as the 95th percentile remains under the guidance value no action is required. On this basis, the concentrations of dibenzo(a,h)anthracene within the made ground in Areas H and I are not considered to pose a significant risk to human health for the proposed residential land use with gardens.
- 6.9.6 Eighteen samples were screened for asbestos across areas H and I. Asbestos was positively identified in 12 of the 18 samples. Of the six samples where asbestos was not detected, two were natural samples. The asbestos was primarily identified as chrysotile although amosite and crocidolite were also detected. Seven of the samples had asbestos at <0.001% however the remaining samples had percentages between 0.002% and 0.038%. The made ground will not be suitable for re-use without remediation with this level of asbestos. The asbestos was identified throughout area I and within the south west of Area H primarily associated with the former sewage works and part of the grounds of the former Drakelow House.

TPH

- 6.9.7 Fourteen samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs / VOCs

- 6.9.8 No PCB / VOC testing was carried out across Areas H and I.

Pesticide Suite

- 6.9.9 One sample (TP017 at 0.5m) was screened for the presence of pesticides; none were detected.

6.10 Areas J & K

- 6.10.1 Twenty samples were tested for a suite of metals, all but one were of the made ground. However, beryllium and vanadium were only analysed as part of the 2020 investigation (5 samples). With the exception of arsenic and beryllium, the samples tested were all below their respective S4UL (or C4SL for lead).
- 6.10.2 The nineteen made ground samples were tested for a suite of metals. Three samples had elevated concentrations of arsenic (TP233 at 0.1m-0.2m, TP030 at 0.5m both Area J and SS8 in Area K). A statistical assessment has been undertaken on the made ground across these areas which shows that the 95th percentile for arsenic is 37mg/kg i.e. the same as the S4UL. No statistical outliers were identified in the dataset. On this basis, the concentrations of arsenic within the made ground in Areas J and K are not considered to pose a significant risk to human health for the proposed residential land use with gardens.
- 6.10.3 There is insufficient data to complete a statistical assessment on the beryllium dataset (5 samples), however, four ranging between 1.8mg/kg and 4.6mg/kg. Based on the widespread

presence, beryllium is considered to be an issue across Areas J and K and will require remediation for future re-use at the site.

6.10.4 Nineteen samples were analysed for a suite of PAH (18 made ground and one river terrace deposits). Three samples of made ground recorded elevated concentrations of up to 6 species of PAH. A statistical assessment has been undertaken on the 18 samples of made ground from across Areas J and K which indicate the 95th percentiles exceeded the S4UL for benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene. However, an outlier was recorded within each of these datasets – TP233 at 0.1m-0.2m. The log indicates a black ashy sand with inclusions of asphalt and concrete in this sample. The elevated result is shown to be a statistical outlier; once removed the 95th percentile falls beneath the S4UL for each of the PAH species. The data has been entered into the LQM 'double plot' to provide an indication of the likely source; the results suggest that the elevated PAH levels may represent carbonisation / coke oven tar associated with potential combustion. A localised PAH 'hotspot' associated with TP233 has been identified which will be dealt with as part of the wider remediation strategy for Areas J and K to address the elevated concentrations of beryllium.

6.10.5 Seventeen samples were screened for asbestos across areas J and K (sixteen made ground and one river terrace deposit). Asbestos was positively identified in 1 of the made ground samples; quantification indicated 0.004% crocidolite in TP030 at 0.5m. Further investigation / localised remedial works are recommended in the area of TP030.

TPH

6.10.6 Thirteen samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs

6.10.7 No PCB testing was carried out across Areas J and K.

VOCs

6.10.8 Six samples were tested for VOCs and SVOCs. The majority of determinands tested were below the laboratory limit of detection. The samples were below their respective S4UL guidance values for the determinands with published guidance values. On the basis of the testing undertaken, VOCs and SVOCs are unlikely to pose an issue within Area J and K.

6.11 Area L

6.11.1 Twenty-nine samples were tested for a suite of metals; two samples were river terrace deposits, six were of the stockpiles (analysed separately) and the remaining samples were made ground. However, beryllium and vanadium were only analysed as part of the 2020 investigation (4 samples). With the exception of arsenic, the samples tested were all below their respective S4UL (or C4SL for lead). Three of the arsenic tests exceeded the S4UL of 37mg/kg.

6.11.2 The twenty-five arsenic results from the made ground samples have been statistically analysed. The 95th percentile for arsenic is 44mg/kg i.e. the above the S4UL of 37mg/kg. Statistical outliers were identified in the dataset; of further interrogation of the data, all three samples above the guidance values were associated with samples from the pulverised fuel ash. Four of the made ground were interpreted as PFA. On this basis, it is considered that the elevated concentrations of arsenic are restricted to the PFA; depending on proposed site levels, remediation will be required to protect future users of the site within proposed garden areas.

6.11.3 Twenty nine samples were analysed for a suite of PAH; all samples were below their respective S4UL values. PAH is not considered an issue within Area L.

6.11.4 Twenty five samples were screened for asbestos across Area L; two samples were river terrace deposits, six were of the stockpiles (analysed separately) and the remaining samples were made ground. Asbestos was positively identified in 5 of the made ground samples; quantification indicated <0.001% chrysotile in four of the positive samples (TP059, TP061, TP064 and TP065). However, a sample taken from TP217 recorded 0.001% of crocidolite. Further investigation / localised remedial works are recommended within Area L with regards to asbestos.

TPH

6.11.5 Eleven samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs

6.11.6 Three samples were tested for PCBs; the testing indicated results less than the laboratory limit of detection. PCBs are not considered an issue within Area L.

VOCs

6.11.7 Three samples were tested for VOCs and SVOCs. The majority of determinands tested were below the laboratory limit of detection. The samples were below their respective S4UL guidance values for the determinands with published guidance values. On the basis of the testing undertaken, VOCs and SVOCs are unlikely to pose an issue within Area L.

6.12 Areas M and N

6.12.1 A total of nineteen samples were tested for a suite of metals and PAH across areas M and N (all made ground). Beryllium and vanadium were only included in the testing suites from the 2020 investigation; only three results are available which indicate all three beryllium results are above the S4UL. Eight out of the nineteen samples tested were above the S4UL guidance. Many of the samples from Areas M and N were either of the PFA or included ash based materials. Given the widespread nature of the PFA and inconsistent depths and thicknesses encountered, the ash based materials are unlikely to be treated differently to the surrounding made ground.

6.12.2 The 95th percentile for arsenic in the made ground in Areas M and N is 77mg/kg which is above the S4UL of 37mg/kg. No statistical outliers were identified in the dataset. On this basis, the concentrations of arsenic and beryllium within the made ground in Areas M and N are considered to pose a risk to human health for the proposed residential land use with gardens; remediation will be required to protect future users.

6.12.3 All nineteen samples were below their respective S4UL guidance values. PAH is not considered an issue within Areas M and N.

6.12.4 Nineteen samples were screened for asbestos across areas M and N. Asbestos was positively identified in 3 samples (two in Area M and one in Area N); all asbestos was chrysotile. The content varied between 0.001% and 0.002%. The made ground will not be suitable for re-use without remediation.

TPH

6.12.5 Thirteen samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

6.13 Area O

6.13.1 A total of nine samples were tested for a suite of metals across Area O, however, two of these were the stockpile samples and have been assessed separately. Two of the seven made ground samples had elevated concentrations of arsenic and one of the two samples had elevated beryllium when compared directly to their S4ULs. The remaining metals tested were below their relevant S4ULs. PFA and ash based materials are commonly found across Area O, however, given the small data set it is not possible to determine whether the significant exceedences of the S4UL are restricted to the PFA. Again, given the variability of the PFA, it is unlikely that the materials would not be mixed to some degree. The made ground has been statistically analysed as one dataset.

6.13.2 The 95th percentile for arsenic in the made ground in Area O is 120mg/kg which is above the S4UL of 37mg/kg. No statistical outliers were identified in the dataset although the dataset is relatively small. On this basis, the concentrations of arsenic and beryllium within the made ground in Areas O are considered to pose a risk to human health for the proposed residential land use with gardens; remediation will be required to protect future users.

6.13.3 Ten samples (2 stockpile and 8 made ground samples) were tested for a suite of PAHs. All results were below their respective S4UL guidance values. PAH is not considered an issue within Area O.

6.13.4 Seven samples were screened for asbestos across O. Asbestos was positively identified in 1 sample (one stockpile sample and the rest made ground). Amosite and chrysotile were detected at 0.001% in a single location (CP22 at 2.5m bgl). The made ground at this location will not be suitable for re-use without remediation.

TPH

6.13.5 Five samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions.

PCBs

6.13.6 Six samples were screened for PCBs across the two phases of investigation, three of which were under the laboratory limit of detection of 0.007mg/kg. However, three samples of the made ground had concentrations of Total PCBs of 0.038mg/kg and 0.045mg/kg. There are no published guideline values for PCBs, however, Patrick Parsons used soil guideline values previously derived by the Environment Agency which suggested a guideline value of 0.008mg/kg for total PCBs within the soil for a residential end-use. The exceedences are listed below:

- TP231 at 1.3m-1.4m – 0.038mg/kg
- TP232 at 1.7m-1.8m – 0.039mg/kg
- CP22 at 2.5m – 0.045mg/kg

6.13.7 PCBs are considered an issue within Area O and will need to be addressed as part of the proposed remediation works.

VOCs

6.13.8 Two samples were screened for VOCs and SVOCs. Based on the results, VOCs and SVOCs are not considered an issue within Area O.

6.14 Areas P and S

- 6.14.1 Areas P and S have been assessed together given the same historic land use (railway lines). No additional site investigation has been undertaken as part of the Travis Baker Geo-Environmental works.
- 6.14.2 A total of twenty eight samples were tested for a suite of metals and PAH across areas P and S (three river terrace deposits, two stockpile materials and twenty three made ground). The same samples were also screened for the presence of asbestos. The stockpile results are assessed separately.
- 6.14.3 From direct comparison of the data to their relevant guidance levels, all metals and are below their respective S4UL (or C4SL for lead) with the exception of arsenic. Note, beryllium was not included in the Patrick Parsons testing suite. Both of the natural samples were below the S4UL for arsenic, however, nine of the twenty three samples of made ground exceeded the S4UL of 37mg/kg for arsenic ranging between 44mg/kg and 160mg/kg. The exceedences included all types of made ground (i.e. PFA based and otherwise). The made ground results have been statistically analysed to determine the 95th percentile value.
- 6.14.4 The 95th percentile for arsenic in the made ground in Areas P and S is 71mg/kg which is above the S4UL of 37mg/kg. No statistical outliers were identified in the dataset. On this basis, the concentrations of arsenic within the made ground in Areas P and S are considered to pose a risk to human health for the proposed residential land use with gardens; remediation will be required to protect future users from the made ground.
- 6.14.5 Twenty eight samples were screened for asbestos across areas P and S. Asbestos was positively identified in 9 samples which were spread across Area P and S. All samples were below 0.001%; two samples detected amosite and the remainder detected chrysotile. The made ground will not be suitable for re-use without remediation.

TPH

- 6.14.6 Twenty one samples were tested for TPH, all of which were below their relevant S4UL guidance values with respect to their individual fractions. Of the samples, two were natural river terrace deposits and the remainder were made ground.

VOCs

- 6.14.7 Two samples were screened for VOCs and SVOCs. Based on the results, VOCs and SVOCs are not considered an issue within Areas P and S.

PCBs

- 6.14.8 Three samples were tested for PCBs; the testing indicated results less than the laboratory limit of detection. PCBs are not considered an issue within Areas P and S.

6.15 Area Q

- 6.15.1 No additional site investigation has been undertaken as part of the Travis Baker Geo-Environmental works. Two trial pits were undertaken in Area Q, only one of which was chemically analysed. The sample at 0.2m bgl from TP123 was tested for a suite of metals, PAH, TPH and PCBs, all of which were below their relevant screening values. The materials encountered within Area Q are different from the remaining site area. The logs indicate limited topsoil or gravel onto river terrace deposits. Based on the limited testing, Area Q appears to be chemically suitable for re-use. However, if significant depths of made ground are encountered, additional chemical assessment may be required.

6.16 Area R

- 6.16.1 One additional trial pit was undertaken as part of the Travis Baker Geo-Environmental works. The results of the single sample analysed has been added to the previous chemical testing undertaken by Patrick Parsons i.e. a single sample from CP26.
- 6.16.2 Two samples were tested for a suite of metals and PAH across Area R (both made ground). The same samples were also screened for the presence of asbestos. With the exception of a slight exceedance of beryllium (2mg/kg compared with the S4UL of 1.7mg/kg), all metals and PAH were below their relevant guidance values. In addition, no asbestos was detected in either sample. One sample was also screened for TPH and PCBs. The TPH concentrations were all below their relevant guidance values and the PCBs were below the laboratory limit of detection.
- 6.16.3 Based on the limited testing, the chemical data suggests that Area R may have issues with slightly elevated beryllium. It is also noted that deep made ground exists in Area R associated with a former pond and embankment which has yet to be fully assessed. It is considered likely that remediation will be required in Area R.

6.17 Stockpiles

- 6.17.1 A number of stockpiles have been identified during both phases of investigation. An updated survey provided suggests that the stockpiles across Areas L, N and O were placed since the 2019 investigation works. A total of 12 samples have been taken from various stockpiles of various composition.

Table 14 – Summary of Stockpiles Identified within Land Parcels L, N and O

Stockpile Reference	Description
TPA	Brown gravelly sand. Gravel is quartzite, brick, metal.
TPB	Brown slightly cobbly gravelly sand. Gravel is quartzite, brick, concrete.
TPC	Orange Brown slightly gravelly sand with rootlets. Gravel is quartzite.
TPD	Brown slightly gravelly sand with rootlets. Gravel is quartzite.
TPE	Brown very gravelly sand with rootlets. Gravel is quartzite and metal.
TPF	Dark brown very gravelly sand. Gravel is quartzite, brick, concrete.
TPG	Brown very gravelly sand with rootlets. Gravel is quartzite.
TPH	Brown slightly silty gravelly sand. Gravel is quartzite, coal, brick.
TPI	Brown gravelly sand with rootlets. Gravel is quartzite and coal.
TPJ	Dark brown very gravelly sand. Gravel is quartzite, coal, brick and concrete.

- 6.17.2 The results of the chemical testing indicate the majority of stockpiles to be chemically suitable for re-use. However, one sample from TP044 in Area P indicated <0.001% chrysotile in the sample. The materials associated with the aforementioned stockpile should not be used within garden / landscaping areas.

7.0 REMEDIATION STRATEGY

7.1 Identified Constraints

7.1.1 Against the background of the desk study researches and site investigations undertaken to date, the following issues will need further consideration in respect of remedial measures at the Drakelow site for a residential end use:

- The presence of asbestos containing materials within the existing building construction and the potential for additional buried asbestos associated with foundation / floor slab shuttering or service ducts.
- The presence of existing surface concrete and macadam hardstanding that will require grubbing out and crushing for re-use or offsite disposal.
- Areas of deep fill (former sand and gravel pits) which have been subsequently backfilled with made ground (including PFA).
- The presence of buried obstructions associated with the existing and former structures that occupy / occupied the site and possible 'test pile' areas.
- The presence of deep made ground deposits across the majority of the site.
- The presence of embankments with variable composition in localised areas of the site.
- Regrading exercise required locally to provide a suitable development platform (embankments).
- Elevated concentrations of metals (widespread arsenic and beryllium and localised lead and zinc) and localised PAH (Area J) TPH (Area D) and PCBs (Area O).
- Localised oil staining noted during walkover.
- Localised presence of tanks (possible fuel).
- Elevated levels of carbon dioxide and methane.
- Presence of stockpiles within the west of the site, some of which are chemically unsuitable for re-use.

7.1.2 The outline remediation strategy has been prepared to address the contamination and ground related issues identified at the site. In this respect, remedial measures are to be adopted in order that any remaining contaminants will not represent a potential risk to controlled waters or the local environment and, following localised remediation, will not present a human health risk to future users of the site.

7.2 Scope of Remedial Works

7.2.1 The remedial works are to include the following:-

1. - Carry out asbestos survey of buildings to be demolished
2. - Disconnection of services.
3. - Removal of asbestos containing materials from buildings.
4. - Soft strip and demolition of existing buildings.

5. - Crushing and processing of brick and other suitable products from underground structures / demolished buildings.
6. - Vegetation clearance and top soil strip of any landscape areas within the proposed development areas. Topsoil materials to be tested to confirm they are suitable for re-use.
7. - Grubbing out and processing of buried obstructions associated with existing and former site structures. All obstructions are to be removed from proposed housing areas.
8. - Re-profiling of site to form levels suitable for direct development.
9. - Investigation of TPH hotspot at locations CP36 and multiple asbestos hotspots. Possible hotspot removal / validation.
10. - The remedial proposals will include the placement of up to 600mm of clean cover soils over selected garden and landscape areas of the finished development. Enhanced clean cover may be required locally to protect against the presence of asbestos. The thickness and areas of clean cover to be agreed by NHBC. The placement of the clean cover will be undertaken by the housing developer.
11. - Validation of the remedial works including the validation of hot spot removal by sampling and laboratory testing of soils from the base and sides of excavations. The depth and suitability of clean cover materials will also need to be validated.
12. - The incorporation of gas protection measures within the building foundations.

7.3 Building Demolition

- 7.3.1 A pre-demolition asbestos survey will be required to identify any asbestos containing products within the existing building construction. All asbestos identified during the survey will need to be removed by appropriate personnel prior to the soft stripping works commencing.

7.4 Grubbing Out

- 7.4.1 Following demolition of the existing buildings, the foundations, floor slabs, former services and hardstanding areas are to be grubbed out. The areas where obstructions have been encountered or are anticipated due to existing / previous development are highlighted on Drawing No. location of the former buildings are illustrated on Drawing 20040-GE09. The arisings should be processed and stockpiled for re-use where possible. Any crushed tarmacadam materials should be stockpiled separately from the brick and concrete.
- 7.4.2 Of particular note are the obstructions associated with the former cooling towers and power station buildings. Based on the works to date these are substantial underground structures. If housing is proposed in these areas then removal is likely to be a significant operation.
- 7.4.3 There are reports of both asbestos and PCB contamination associated with former power station sub-structures. A careful watch will need to be maintained when excavating within these parcels M, N and O.

- 7.4.4 A careful watch will be maintained during the grubbing out exercise for any evidence of asbestos containing materials attached to the buried concrete or within any underground ducts or piping. A careful watch should also be maintained for loose asbestos sheeting within the made ground around obstructions to ensure they are not transferred with the concrete to crush stockpile. If any evidence of asbestos is identified within the working area, the grubbing out works should cease and the asbestos removed by appropriate experienced personnel. Any concrete contaminated with suspected asbestos should be transferred to a clearly labelled quarantine area for testing, covering and removing from site as appropriate.
- 7.4.5 All man-made hard materials including concrete slabs, hardstanding, brickwork, foundations, utilities etc. shall be broken out in their entirety from beneath the development platform. The location and depth of the below ground structures shall be recorded by the Contractor.
- 7.4.6 Prior to crushing an inspection of the stockpile of materials to be crushed shall be made to identify and remove any suspected asbestos containing materials. A careful watch will be maintained by the crushing operatives for any signs of asbestos before they are placed in the crusher.
- 7.4.7 The recovered concrete hardstanding, brickwork etc. which are intended for re-use shall be crushed and graded to 6F2 and stockpiled for re-use by the developer. Chemical testing of the stockpile should be undertaken at ratio of 1 test per 500m³ to confirm suitability for re-use within working platforms, scaffold mats, roads and drives (testing should include TPH CWG, asbestos screen and quantification, speciated PAH and metals).

7.5 Site Levels

- 7.5.1 The current levels on site are in appropriate for direct development without some reprofiling, particularly in the former railway embankment areas. A cut and well exercise will be required to form a development area suitable for directed development.

7.6 Soils Remediation – Metals, Asbestos, TPH, PAH and PCBs

- 7.6.1 Further delineation of hotspots will be required to determine whether they can be treated with clean cover as part of the wider remedial works or whether they should be delineated and removed. The removal of the contaminated made ground to landfill is unviable given the vast volumes of contaminated soils at the site.
- 7.6.2 Given the nature of the contaminants (metals, asbestos in particular) it is considered that bio-remediation and soil vapour extraction techniques would not be appropriate.
- 7.6.3 There are a number of soil mixing / stabilisation technologies that could potentially address some of the contamination issues at the site by binding the contaminants to the soil matrix. These techniques can potentially reduce some contamination concentrations and decrease the potential mobility, however, it is likely that the residual contaminant levels will still be elevated in comparison to suitable levels for gardens and therefore also require clean cover. Given the sizeable area and soil volume that would need to be treated it is considered that such techniques would be cost prohibitive and would still not address the widespread asbestos across the site.
- 7.6.4 We have also considered the use of clean cover in garden and landscape areas to separate the end users of the site from the underlying contamination. In areas of hardstanding the buildings, roads, drives etc would act as the barrier between the occupiers and underlying soils. The benefits of such a strategy are that it is a relatively low cost and would limit the requirements

for offsite disposal of contaminated soils. The provision of clean cover is a commonly used technique on similarly contaminated sites across the UK.

- 7.6.5 As the contaminated soils will remain in-situ, there is still potential for contaminants to leach from the soils through water infiltration and potentially influence the quality of the groundwater / surface waters. The provision of building / hardstanding across much of the site area will prevent rainwater from penetrating the made ground. The proposal for the surface water drainage will need to be drainage via a sewer network; soakaway drainage would only be permitted in areas that are uncontaminated.
- 7.6.6 To minimise the amount of rainwater infiltration in the garden and landscape areas, low permeability clean cover materials are to be used as the sub-soil. Following the development the amount of rainwater percolation through the soils will be minimised and therefore reduce that the risk of mobilising contaminants in the underlying made ground based soils.
- 7.6.7 On the basis of the above assessment it is considered that the provision of clean cover is the most sustainable remedial option available and will protect both the human health of future occupiers and controlled waters
- 7.6.8 The contamination assessment, including statistical analysis, has indicated that the 95th percentile values for arsenic and / or beryllium are an issue across large areas of the site. In addition, hotspots of zinc, lead, TPH, PAH and PCBs have been identified when compared to their target values (see Appendix 7). Furthermore, asbestos has been detected locally and sometimes across more widespread areas linked to former development / demolition. The made ground as a whole is therefore considered to be unsuitable for the proposed end use without some form of remediation.
- 7.6.9 Where asbestos has been identified, the standard 600mm of clean cover is not generally considered appropriate and enhanced clean cover measures are required. To provide adequate protection the options include:
- Include a 150mm hard to dig layer beneath the 600mm of clean top soil and sub-soil.
 - Include a hard to dig / warning membrane at the base of the 600mm of clean cover system.
 - Increase the thickness of clean cover (up to say 1000mm).
- 7.6.10 Several hotspots of contamination have been identified. A hotspot of TPH contamination centred at CP36 (Area D) and a hotspot of PCB contamination centred at CP22 / TP231 / TP232 will need to be investigated prior to construction. Several hotspots of asbestos contamination have also been identified which will require further sampling and laboratory testing to confirm the clean cover requirements. The zinc and lead hotspots identified will be addressed as part of the wider clean cover strategy in the affected areas. It is recommended that a number of trial pits are dug at and around each of these locations to sample and test the soils where contamination was recorded previously. If contamination is identified, the contamination hotspot should be delineated to determine the most appropriate form of remediation. Depending on the concentrations of the determinands and the volumes affected, remediation options could include ex-situ bioremediation, excavation and removal or enhanced clean cover.
- 7.6.11 The location of the hot spots of TPH contamination are illustrated on Drawing 20040-GE07.
- 7.6.12 The results of the testing have been compared to a residential with plant uptake end land use. The requirement for remediation should be confirmed for each area following confirmation of the final layout.

7.7 Mains Water Service Pipes

- 7.7.1 It is anticipated that water pipes will generally be placed within made ground materials; given the broad range of contaminants across the site it is considered that barrier pipes will be required across the development. A copy of the chemical test results should be provided to the water supplier for confirmation of the protection measures required.

7.8 Validation Plan

- 7.8.1 To validate that each house plot has the required clean cover layer installed, trial excavations will be dug usually at a frequency of in 1 of every 4 completed plots. Samples of the site won (if appropriate) or imported subsoil and top soil materials will be analysed to demonstrate they are suitable for use i.e. contaminant concentrations are below the remediation target values detailed within Appendix 8. A report including photographs of the trial excavations and copies of the sub soil / top soil laboratory test results will be provided to validate the placement of the clean cover layer.
- 7.8.2 As demolition materials are likely in various locations across the site by the site investigation works it is recommended that a careful watch for potential asbestos containing materials during the redevelopment. Any additional material suspected of containing asbestos containing materials should be quarantined until properly assessed and tested.

7.9 Unrecorded Contaminants

- 7.9.1 Given the development history of the site and presence of made ground materials across the Drakelow site, there is the potential for areas of contamination which have not been identified by the trial pits and boreholes carried out to date. Preliminary site works have and will involve 'grubbing out' of relic obstructions and regrading of the site to form the proposed development platform. A careful watch is to be maintained during these works (and the subsequent construction phase); if there is any visual or odorous evidence of contamination, the works should be suspended and the area inspected by a qualified environmental engineer. The area would be segregated whilst samples are taken and analysed. Following receipt of the additional analysis the conceptual site model and risk assessment will need to be updated and a strategy developed for addressing any unacceptable risks.

7.10 Materials Management Plan

- 7.10.1 Given the requirement for the following works a Materials Management Plan in accordance with CL:AIRE Definition of Waste: Development Industry Code of Practice will be required for the site.
- Demolition and grubbing out works may result in the presence of numerous voids across the site which will require infilling in a controlled manner with suitable materials with;
 - The proposed remediation works will create additional voids, which will also require infilling, following the removal of contaminated soils;
 - Remediation proposals prescribe the placement of 'clean cover' capping layer within garden and landscape areas of the site;
 - Materials generated on-site from the construction of roads, sewers and foundations will predominantly comprise contaminated made ground which is unsuitable for use within the proposed clean cover layer and will need to be placed in less sensitive areas.

- With the exception of a single agricultural field, much of the site is generally void of topsoil, some topsoil will therefore need to be imported.

5.11 Excavated Materials – Foundation / Service Trenches

- 5.11.1 Any material requiring excavation to enable foundation and services to be installed will require appropriate disposal and duty of care procedures to be followed. If contaminated materials are excavated during such works, WAC test results should be provided to the landfill operator if the materials are removed off-site. Further chemical testing of this material may be requested by the waste receiver.
- 5.11.2 There are current plans are to re-use any of the site won arisings where possible. Should a source of potentially clean materials be identified which could potentially be used and reduce the requirement for imported soils, before they could be accepted as suitable the testing should be undertaken at a rate of 1 sample per 250m³ for each of the determinands listed in Appendix 7 and meet the same target values.
- 5.11.3 Records shall be kept of any material removed off-site as a waste destined for landfill. Duty of care and consignment notes should be kept for verification of the soils management undertaken.

7.12 Gas Protection Measures

- 7.12.1 No additional gas monitoring has been undertaken as part of our additional works. Up to 10 rounds of gas monitoring including localised continuous monitoring has been completed by Patrick Parsons which is detailed in their Phase II report. Reference should be made to the original document for details of the assessment but their findings are summarised in Section 5.11 for completeness.
- 7.12.2 The ground gas risk assessment will need to be further refined in accordance with the receipt of the housing layout. Additional targeted monitoring will be required to define the areas where elevated ground gases have already been identified.
- 7.12.3 It is recommended that these initial recommendations are forwarded to the local Authority and NHBC for their comment.

7.13 Proposed Foundations

- 7.13.1 In the north west of the site (outside of any former development), the natural undisturbed river terrace deposits should provide a suitable founding strata for the traditional 2 to 2½ storey housing constructed on strip and trench fill foundations. Light mesh reinforcing should be introduced within the foundation to accommodate any minor settlements between the cohesive and granular fractions and potential hard spots caused by boulders. A net allowable bearing pressure of 125kN/m² is considered appropriate for strip / trench foundations up to 1m wide. Settlements would be restricted to less than 25mm for such a foundation.
- 7.13.2 Geotechnical testing has confirmed that the clay based deposits have a medium volume change potential. A minimum founding depth of 0.9m below existing / proposed ground level (which ever the greater) will be required. Founding depths will need to be extended where the proposed house plots are within the influencing distance of proposed or existing trees and/or hedgerows. Piled foundations will be required where founding depths are greater than 2.5m

due to tree influence. Piles in these areas should be restricted to steel tube, CFA or precast concrete designed to withstand lateral heave.

7.13.3 Across the majority of the site, the superficial deposits will be too deep for founding (or would be subject to collapse at say 2m to 2.5m). In such areas, piling would be the most economic option through the variable made ground and superficial deposits. A number of areas (primarily associated with the former power stations, cooling towers, sewage works and water treatment plant), have buried concrete obstructions which will prevent piling. Such areas will require breaking out of the in-situ structures at depth (up to say 5m bgl) and grubbing out any associated obstructions. These areas would then need to be piled as other ground improvement techniques (such as vibro replacement / dynamic compaction) would not be appropriate, particularly given the abundance of PFA identified. There are a small number of localised areas where piling will be required within the presence of possible tree influence (primarily Area A). In such areas, piles will need to be limited to steel tube or precast concrete designed to withstand lateral heave forces.

7.13.4 A piling contractor should be consulted to determine the most appropriate piling solution for each area and approximate pile lengths.

7.13.5 The foundation assessment will need to be revised following receipt of a detailed layout and proposed levels. Our preliminary foundation assessment is included as Drawing No. 20040-GE10B which may be used for initial costing purposes (not for construction).

7.14 Drainage Strategy

7.14.1 In-situ soakaway testing may be possible in Area A and locally within Area H within the areas of thicker sand and gravel deposits. Once a layout has been confirmed, in-situ soakaway testing will be required to confirm the viability of soakaway drainage in these areas. Soakaway drainage is unlikely to be viable across the remainder of the site due to deep made ground and the contamination issues identified.

7.15 Slope Stability Assessment

7.15.1 There are a number of slopes and steep embankments across the site (particularly the railway embankments in the north of the site). Depending on the final layout and levels, a slope stability assessment is likely to be required.

APPENDICES

APPENDIX 1

List of Information Sources

APPENDIX 1

LIST OF INFORMATION SOURCES – DRAKELOW, BURTON-UPON-TRENT

The following principal sources of information have been consulted in the preparation of this report:

- Coal Authority on-line data base;
- Environment Agency – Online data base;
- Ordnance Survey County Series and National Grid Mapping;
- British Geological Survey – Online data base & Interactive mapping;
- BS5930:2015 + A1:2020 Code of Practice for Site Investigation (2015) ;
- BS10175:2011 + A2:2017 British Standards Institution (2011) Investigation of Potentially Contaminated Sites;
- BS1377-2:1990 Methods of test for soils for civil engineering purposes
- BS EN ISO 14688-2:2018 – Geotechnical Investigation and Testing. Principles for Classification.
- EA R&D Publication 66 : 2008 Guidance for the Safe Development of Housing on Land Affected by Contamination Volume 1 and 2
- CIRIA publications including C665 Assessing risks posed by hazardous ground gases to Building;
- Contaminated Land Risk Management (LCRM) Guidance on www.gov.uk/government/publications dated October 2020 – Environment Agency);
- Chartered Institute of Environmental Health (CIEH) and Land Quality Management (LQM) S4ULs for Human Health Risk Assessment (2015) – Publication Number S4UL3689
- Environmental Protection Act 1990, Part 2A, Section 78 (as amended by Environment Act 1995);
- Contaminated Land Statutory Guidance (April 2012), DEFRA
- Environment Agency (2000) Technical Aspects of Guidance of Site Investigation (2 volumes) R&D Technical Report P5-065;
- Environment Agency (2000) Secondary Model Procedures for the development of Appropriate Soil Sampling Strategies for Land Contamination, R&D Technical Report P5-066;
- Environment Agency - Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination (2006)
- BRE (2005) Concrete in aggressive ground, Special Digest 1;
- BRE (2015) Radon Guidance on protective measures for new buildings, BR 211;
- Information provided by Countryside Properties:
 - Phase I Site Appraisal Report Rev 1 by Patrick Parsons dated April 2019.
 - Phase II Site Appraisal Report Rev 4 by Patrick Parsons dated June 2019.
 - Trial pit logs TP100-TP124 by Patrick Parsons dated April 2019.
 - Feasibility Layout Rev E

APPENDIX 2

Conceptual Site Model and Qualitative Risk Assessment

**Appendix 2- Conceptual Site Model and Qualitative Risk Assessment
Drakelow, Burton-upon-Trent**

Conceptual Model			Qualitative Risk		
Source	Pathway	Target	Consequence	Probability	Risk
Asbestos in buildings (Asbestos – chrysotile, amosite, crocidolite)	Inhalation	Residents of site and public	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate
Made ground materials associated with the embankment, infilling of the former railway cuttings, filling for construction plateaus	Dermal contact	Residents of site and public	Severe	Likely	High
		Construction worker	Mild	Likely	Moderate / Low
	Ingestion of soil	Residents of site and public	Medium	Low	Moderate / Low
		Construction worker	Mild	Unlikely	Very Low
	Inhalation of wind borne dust (asbestos)	Residents of site and public	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low

Appendix 2- Conceptual Site Model and Qualitative Risk Assessment
Drakelow, Burton-upon-Trent

Conceptual Model			Qualitative Risk		
Source	Pathway	Target	Consequence	Probability	Risk
Made ground associated with former and existing buildings. (metals, metalloids, cyanide, phenol, sulphate, polycyclic aromatic hydrocarbons, asbestos, pH, petroleum hydrocarbons)	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Medium	Low	Moderate / Low
		Construction worker	Mild	Unlikely	Very Low
	Inhalation of wind borne dust (asbestos)	Residents of site and public	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low
Petroleum hydrocarbons associated with fuel usage / storage on site	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Inhalation of vapours	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Mild	Low	Low
	Direct contact	Foundations and other buried, structures	Minor	Low	Very Low

**Appendix 2- Conceptual Site Model and Qualitative Risk Assessment
Drakelow, Burton-upon-Trent**

Conceptual Model			Qualitative Risk		
Source	Pathway	Target	Consequence	Probability	Risk
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Direct contact	Drinking water pipes	Mild	Low	Low
Former car parking areas, i.e. spills, leakages	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Inhalation of vapours	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Mild	Low	Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low
Electrical sub-station (Polychlorinated biphenyls)	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Inhalation of vapours	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Unlikely	Very Low
Soil-gas migration from infilled ground (on site) (Carbon dioxide and methane)	Inhalation of noxious gases	Residents of site	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate
	Migration and collection of methane in confined spaces	Residents of site	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate

**Appendix 2- Conceptual Site Model and Qualitative Risk Assessment
Drakelow, Burton-upon-Trent**

Conceptual Model			Qualitative Risk		
Source	Pathway	Target	Consequence	Probability	Risk
Possible spills/leakage of various liquids stored on site including lubricants and oils (Metals, metalloids, petroleum hydrocarbons, polyaromatic hydrocarbons, phenols, cyanide, volatile organic compounds, semi volatile organic compounds)	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Medium	Low	Moderate / Low
		Construction worker	Mild	Unlikely	Very Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low
Made ground associated with infilled pits and former interceptor chambers (metals, metalloids, cyanide, phenol, sulphate, polyaromatic hydrocarbons, asbestos, pH, petroleum hydrocarbons)	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Medium	Low	Moderate / Low
		Construction worker	Mild	Unlikely	Very Low
	Inhalation of wind borne dust (asbestos)	Residents of site and public	Severe	Low	Moderate
		Construction worker	Severe	Low	Moderate
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low

**Appendix 2- Conceptual Site Model and Qualitative Risk Assessment
Drakelow, Burton-upon-Trent**

Conceptual Model			Qualitative Risk		
Source	Pathway	Target	Consequence	Probability	Risk
Residue from former furnace and heavy machinery stored and used on site	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Severe	Low	Moderate / Low
		Construction worker	Severe	Unlikely	Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low
Storage / burial of waste products i.e. spills and leakages of waste	Dermal contact	Residents of site and public	Severe	Low	Moderate
		Construction worker	Mild	Low	Low
	Ingestion of soil	Residents of site and public	Medium	Low	Moderate / Low
		Construction worker	Mild	Unlikely	Very Low
	Direct contact	Drinking water pipes	Medium	Low	Moderate / Low
	Ingestion via home grown vegetables	Residents of site	Severe	Low	Moderate
	Uptake via flora and fauna	Plants and pets	Minor	Unlikely	Very Low
	Migration of contaminants via groundwater	Controlled waters	Minor	Low	Very Low
	Direct contact	Foundations and other buried structures	Minor	Low	Very Low

APPENDIX 3

Dynamic Sampling Borehole Logs



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS203
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Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Countryside Properties	Job Number 20040
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020	Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.50	D				0.05 (0.25) 0.30 (0.45) 0.75	Cored concrete. MADE GROUND Recovered as sand and gravel of concrete. MADE GROUND Orange brown slightly clayey gravelly sand. Gravel is fine to coarse rounded quartzite, chert and conglomerate. MADE GROUND		
1.00-1.45	SPT N=24		5,6/6,6,6,6		(1.75)	Medium dense becoming loose at 2m brown very gravelly locally clayey sand. Gravel is fine to coarse angular to rounded quartzite, chert. MADE GROUND		
1.80-1.90	D							
2.00-2.45	SPT N=9		8,4/3,2,2,2					
2.50-2.60	D				2.50 (0.50)	Firm black and brown sandy slightly gravelly clay. Gravel is fine to medium angular mudstone and fine to coarse brick fragments. MADE GROUND		
3.00-3.45	SPT N=9		2,1/2,2,2,3		3.00 (1.44)	Loose becoming very dense brown slightly clayey slightly gravelly SAND. Gravel is fine to coarse rounded quartzite.		
4.00-4.45	SPT 50/295		10,13/13,13,12,12		4.44	Complete at 4.44m		

Remarks Borehole remained stable Material recovered wet from 1m	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS203	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS204
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Drive-in Windowless Sampler						Countryside Properties		20040	
		Location (Handheld GPS)		Dates		Engineer		Sheet	
		Refer to plan		04/06/2020		Travis Baker Geo-Environmental Ltd		1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.40-0.50 0.50-0.60	B D		2,2/2,2,2,2		0.05	Cored macadam. MADE GROUND			
					(0.35)	Cored cemented crush material. MADE GROUND			
0.40	Slightly clayey sand and gravel of brick, concrete, quartzite and mudstone. MADE GROUND								
0.50									
(0.25)	Firm brown very sandy slightly gravelly clay. Gravel is fine to coarse rounded quartzite and fine brick fragments. Slight TPH odour. MADE GROUND								
0.75									
(0.25)	Firm brown and red brown slightly silty very sandy slightly gravelly CLAY. Gravel is fine to coarse rounded quartzite and rare mudstone fragments. (Superficial material)								
1.00									
(0.50)	Loose red brown and brown very clayey gravelly SAND. Gravel is fine to coarse subrounded quartzite. (Superficial deposit)								
1.50									
1.60	Firm red brown locally light grey silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.								
(0.20)									
1.80	Stiff light grey silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.								
(2.15)									
	Very stiff red brown locally light grey silty gravelly CLAY with mudstone with lithorelicts. Gravel is fine to coarse angular mudstone.								
Recovered as sand and gravel of extremely weak red brown and light grey MUDSTONE.									
	3.95	Complete at 4.18m							
(0.23)									
4.18									

Remarks Borehole remained dry and stable						Scale (approx) 1:50	Logged By L Glover
						Figure No. 20040.DS204	



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Number
DS205

Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 05/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.70-0.80	D				0.10 (0.30) 0.40 0.50	Cored concrete. MADE GROUND		
1.00-1.45	SPT N=35		4,6/8,10,8,9		(1.70)	Recovered as slightly cemented gravel of concrete. MADE GROUND		
						Broken brick cobble. MADE GROUND		
2.00-2.45	SPT N=15		7,10/5,4,3,3		2.20 (0.50)	Dense becoming medium dense from 2.0m, grey slightly clayey slightly gravelly silty ash. Gravel is fine to coarse rounded quartzite and brick fragments. MADE GROUND		
2.80-2.90	D				2.70 (0.30)	Firm slightly sandy silt with rare gravel of fine to coarse rounded quartzite. MADE GROUND		
3.00-3.45	SPT N=12		1,1/2,1,3,6		3.00 (0.50)	Firm dark grey and brown silty sandy gravelly clay. Gravel is brick, coal, quartzite and mudstone. MADE GROUND		
					3.50	Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse rounded quartzite.		
4.00-4.44	SPT 50/290		4,6/8,14,14,14		(0.94)	Very dense brown coarse grained wet gravelly SAND with quartzite cobbles. Gravel is fine to coarse rounded quartzite.		
					4.44	Complete at 4.44m		

Remarks Borehole remained stable throughout Groundwater at base upon completion							Scale (approx) 1:50	Logged By L Glover
							Figure No. 20040.DS205	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS206
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)	
		Location (Handheld GPS) Refer to plan		Dates 05/06/2020	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)
0.70-0.80	D				(0.25) 0.25 0.30
1.00-1.45	SPT N=8		4,4/2,2,2,2		(1.10)
1.40-1.50	D				1.40 (0.30) 1.70
2.00-2.45	SPT N=5		1,1/1,1,1,2		(0.50)
2.40-2.50 2.50-3.00	D B				2.20 (0.60)
3.00-3.45	SPT N=8		3,3/2,2,2,2		2.80 (0.60)
4.00-4.45	SPT N=24		2,3/5,5,6,8		3.40 (1.10)
5.00-5.45	SPT N=49		12,9/9,10,12,18		4.50 (0.95) 5.45

Cored concrete. MADE GROUND	
Sand and gravel of concrete. MADE GROUND	
Loose brown gravelly sand. Gravel is fine to coarse angular to rounded quartzite, wood and former tree branches. MADE GROUND	
Firm black and dark grey gravelly sandy clay. Gravel is wood, coal, quartzite, concrete, brick fragments. MADE GROUND	
Loose brown slightly clayey gravelly SAND. Gravel is fine to coarse rounded quartzite.	
Soft brown locally grey very sandy slightly gravelly CLAY. Gravel is fine to medium rounded quartzite.	
Loose red brown and brown very clayey slightly gravelly SAND. Gravel is fine to medium rounded quartzite.	
Stiff red brown locally light grey slightly silty gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.	
Very stiff red brown locally light grey slightly silty gravelly CLAY with much lithorelicts. Gavel is fine to coarse angular mudstone.	
Complete at 5.45m	

Remarks Borehole remained dry and stable throughout.				Scale (approx) 1:50	Logged By L Glover
				Figure No. 20040.DS206	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS207
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Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Countryside Properties	Job Number 20040
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020	Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.50	D				0.05 (0.45) 0.50	Cored concrete. MADE GROUND Sand and gravel of concrete, brick and quartzite. MADE GROUND Abandoned at 0.50m		

Remarks Abandoned on an assumed obstruction at 0.5m.	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS207	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS208
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-0.60	D				0.10 (0.30) 0.40	Cored concrete. MADE GROUND Sand and gravel of concrete and macadam. Subbase. MADE GROUND		
1.00-1.45	SPT N=12		3,2/3,2,4,3		(2.10)	(No recovery between 1.0m and 1.9m) Medium dense, becoming very loose at 2m brown, grey and black clayey sand and gravel of brick, concrete, wood, plastic, pipe, fabric and sandstone. Slight hydrocarbon odour. MADE GROUND		
1.90-2.00 2.00-2.45	D SPT N=4		1,1/1,1,1,1		2.50	Very stiff red brown silty gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
3.00-3.42	SPT 50/265		2,3/10,13,13,14		(0.92) 3.42	Complete at 3.42m		

Remarks Borehole remained dry. Groundwater at 1.3m on completion of drilling.	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS208	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS209
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location (Handheld GPS) Refer to plan	Dates 04/06/2020

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.25-0.40	D				(0.25)	Cored concrete. MADE GROUND		
0.50-0.70	D				(0.25)	Grey brown and black very gravelly sandy clay with cobbles of brick. Gravel is concrete, macadam, brick and quartzite. MADE GROUND		
0.70-0.90	D				(0.50)	MADE GROUND		
1.00-1.45	SPT N=10		2,3/2,3,2,3		(0.20)	Grey solidified porous ash deposit. MADE GROUND		
					(0.90)	Black and brown clayey sand and gravel of brick, concrete, macadam and mudstone. MADE GROUND		
					(0.30)	Broken brick cobble. MADE GROUND		
					(0.20)	Firm dark brown locally black slightly sandy gravelly clay. Gravel is fine brick fragments, coal and quartzite. MADE GROUND		
2.00-2.45	SPT N=14		5,4/3,4,3,4		(0.70)	Firm brown slightly sandy slightly gravelly clay. Gravel is quartzite, sandstone and rare brick fragments. MADE GROUND		
2.00-2.40	B				(0.20)	Firm red brown slightly silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
					(0.20)	Firm light grey slightly silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
3.00-3.43	SPT 50/275		5,7/7,11,13,19		(0.48)	Firm red brown slightly silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
					3.43	Firm light grey slightly silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
						Firm red brown slightly silty slightly sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
						Recovered as sand and gravel of extremely weak red brown MUDSTONE.		
						Complete at 3.43m		

Remarks Borehole remained dry and stable	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS209	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS210
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Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Countryside Properties	Job Number 20040
	Location (Handheld GPS) Refer to plan	Dates 04/06/2020	Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.60	D				(0.20) 0.20 (0.20) 0.40 (0.20) 0.60	Cored concrete. MADE GROUND Sand and gravel of quartzite, concrete, brick. Subbase material. MADE GROUND		
1.00-1.45	SPT N=43		5,7/11,10,10,12		(1.35)	Very stiff im red brown and black slightly silty slightly sandy gravelly clay. Gravel is brick, wood, coal and quartzite. MADE GROUND		
1.20-1.30	D					Very stiff red brown with occasional light grey lenses slightly silty very gravelly CLAY with much lithorelicts. Gravel is fine to coarse angular mudstone.		
2.00-2.39	SPT 50/235		10,12/15,16,15,4		1.95 (0.44) 2.39	Recovered as sand and gravel of extremely weak red brown MUDSTONE.		
						Complete at 2.39m		

Remarks	Scale (approx)	Logged By
	1:50	L Glover
	Figure No. 20040.DS210	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS211
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)	
		Location (Handheld GPS) Refer to plan		Dates 04/06/2020	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)
0.20-0.30	D				0.10 0.20 (0.30)
1.00-1.45 1.10-1.20	SPT N=12 D		2,2/3,3,3,3		0.50 0.60 (0.20) 0.80 (0.20) 1.00
1.50-1.60 1.60-2.00	D B				(0.30) 1.30
2.00-2.45	SPT N=22		2,3/4,6,6,6		(1.00)
3.00-3.45	SPT N=26		4,5/6,6,7,7		2.30 (1.20)
4.00-4.44	SPT 50/285		11,13/11,13,13,13		3.50 (0.40) 3.90 (0.54) 4.44

Description	Legend	Water
Cored concrete. MADE GROUND		
Brown poorly sorted sand and gravel of quartzite, mudstone, slate, brick, concrete and macadam. MADE GROUND		
Black and brown friable very sandy very gravelly clay. Gravel is coal, macadam, quartzite, sandstone, brick, concrete, siltstone, sandstone, tile. MADE GROUND		
Grey solidified ash. MADE GROUND		
Very clayey slightly sandy gravel of concrete, tile, pottery, ceramic and quartzite. MADE GROUND		
Brown sandy slightly gravelly clay. Gravel is fine brick fragments, coal, quartzite, wire and rootlets. MADE GROUND		
Firm brown sandy gravelly CLAY. Gravel is coarse rounded quartzite. (Superficial material)		
Stiff red brown silty slightly sandy gravelly CLAY with rare lithorelicts. Gravel is fine to coarse angular mudstone.		
Very stiff orange brown sandy gravelly CLAY with lithorelicts. Gravel is fine to coarse angular mudstone.		
Very stiff friable red brown with light grey lenses gravelly slightly sandy CLAY with much lithorelicts. Gravel is fine to coarse angular mudstone.		
Recovered as sand and gravel of extremely weak red brown and grey MUDSTONE.		
Complete at 4.44m		

Remarks Borehole remained dry and stable throughout	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS211	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Number DS212
Client Countryside Properties	Job Number 20040
Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	D				0.05 (0.45)	Cored concrete. MADE GROUND Brown and grey sandy gravelly clay. Gravel is brick, concrete, quartzite, wood, sandstone, mudstone. MADE GROUND		
1.00-1.43	SPT 50/275		6,10/13,12,13,12		(0.93) 1.43	Grey slightly clayey slightly gravelly slightly sandy ash. Gravel is fine to coarse rounded quartzite. MADE GROUND Complete at 1.43m		

Remarks	Scale (approx) 1:50	Logged By L Glover
	Figure No. 20040.DS212	

APPENDIX 4

Trial Pit Logs



Drakelow, Burton-Upon-Trent

**Trial Pit
Number**
TP207

Trial Pit

Dimensions

Ground Level (mOD)

Client	
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Countryside Properties

**Job
Number**
20040

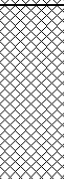
Location (Handheld GPS)
Refer to plan

Dates	05/06/2020
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Engineer

Travis Baker Geo-Environmental Ltd

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.50	D					Brown slightly clayey gravelly sand. Gravel sized fragments of brick, roadstone and rootlets. MADE GROUND.		
					0.30 (0.35)	Black slightly sandy gravelly ash. Gravel is fine to medium subrounded quartzite with fragments of macadam and clinker. MADE GROUND.		
1.30-1.40	D				0.65 (0.60)	Dark brown/black slightly ashy gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of plastic, brick and wood. MADE GROUND.		
					1.25 (1.25)	Soft red brown slightly sandy slightly gravelly clay with pockets of black sand. Gravel is fine to coarse subrounded quartzite with fragments of fine brick and coal. MADE GROUND.		
					2.50 (0.55)	Light brown gravelly fine to coarse grained SAND. Gravel is fine to coarse subrounded to rounded quartzite. (River Terrace Deposits).		
					3.05	Complete at 3.05m		

Remarks

Trial pit was dry during excavation
Trial pit was spalling between 2.50m to 3.05m
Trial pit was backfilled upon completion

Scale (approx)

1:25

Logged By

JD

Figure No.

20040.TP207



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP208
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Excavation Method Trial Pit	Dimensions	Ground Level (mOD)	Client Countryside Properties	Job Number 20040
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020	Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.50	D				(0.20) 0.20	Black slightly ashy gravelly sand. Gravel is fine to coarse subrounded quartzite with much igneous aggregate. MADE GROUND.		
					(0.95)	Stiff red brown slightly silty gravelly clay. Gravel is fine to coarse subrounded quartzite with fragments of brick, plastic, wood and concrete. MADE GROUND.		
					1.15	Dark brown/black gravelly fine to medium grained sand. Gravel is fine to medium subrounded quartzite with fragments of rare brick with rootlets. MADE GROUND.		
					(1.35)			
					2.50	Light brown slightly cobbly gravelly fine to coarse grained sand. Gravel is fine to coarse subrounded quartzite. Cobbles of quartzite. MADE GROUND.		
(0.70) 3.20	Complete at 3.20m							

Plan	Remarks Hard digging from 0.2m to 1.0m Trial pit was backfilled upon completion Spalling was observed within natural strata Trial pit was dry during excavation										
Scale (approx) 1:25 Logged By JD Figure No. 20040.TP208											



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP209
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Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 05/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30	D				(0.10) 0.10	Tarmac. MADE GROUND.		
					(0.30)	Grey gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of concrete and brick. MADE GROUND.		
					0.40 (0.10) 0.50	Light grey slightly sandy slightly gravelly cobbles. Gravel and cobbles of concrete and brick. MADE GROUND.		
0.60-0.70	D				(0.60)	Grey slightly sandy ash. (Pulverised fuel ash). MADE GROUND.		
					1.10 (0.20) 1.30	Grey/dark grey sandy gravelly ash. Gravel is fine to medium subrounded quartzite with fragments of roadstone and brick. MADE GROUND.		
					(1.60)	Grey slightly sandy ash. (Pulverised fuel ash). MADE GROUND.		
					2.90	Complete at 2.90m		

Plan					Remarks			
.	.	.	.	.	Trial pit was dry and stable during excavation			
.	.	.	.	.	Trial pit was backfilled upon completion			
.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
					Scale (approx)	Logged By	Figure No.	
					1:25	JD	20040.TP209	



Drakelow, Burton-Upon-Trent

**Trial Pit
Number**
TP213

Trial Pit

Dimensions

Ground Level (mOD)

Countryside Properties

**Job
Number**
20040

Location (Handheld GPS)
Refer to plan

Dates	04/06/2020
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Travis Baker Geo-Environmental Ltd

Sheet
1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water	
-------	--

0.30-0.40

D

2.70-2.80

D

(0.20)
0.20

(0.95)

1.15

(1.45)

2.60

(0.40)

3.00

Grassed over dark brown slightly clayey slightly gravelly sand. Gravel is fine to coarse quartzite with fragments of fine brick and rootlets. TOPSOIL.

Dark brown very gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, timber, coal and roots. MADE GROUND.

Orange brown very gravelly fine to medium grained sand.
Gravel is fine to coarse subrounded to rounded quartzite.
MADE GROUND.

Black ash slightly gravelly clay. Gravel is fine to coarse subrounded to rounded quartzite with fragments of plastic and roots. MADE GROUND.

Complete at 3.00m

Plan

Remarks

Slight spalling of trial pit walls between 1.2m to 2.5m
Trial pit was dry during excavation
Trial pit was backfilled upon completion
Black plastic sheet at 0.2m

Scale (approx)

1:25

Logged By

JD

Figure No.

20040.TP213



Drakelow, Burton-Upon-Trent

**Trial Pit
Number
TP214**

Trial Pit

Dimensions

Ground Level (mOD)

Countryside Properties

Job Number
20040

Location (Handheld GPS)
Refer to plan

Dates	04/06/2020
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Travis Baker Geo-Environmental Ltd

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.50	D				(0.30)	Grey/brown slightly cobbly slightly gravelly sand. Gravel sized fragments of concrete, brick and roadstone. Cobbles of concrete. MADE GROUND.		
					0.30 (0.25)	Brown very gravelly sand. Gravel is fine to medium subrounded quartzite with fragments of brick, roadstone and coal. MADE GROUND.		
0.70-0.80	D				0.55 (0.55)	Dark brown gravelly fine to coarse grained sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, plastic, plastic wire, wood and ceramic. MADE GROUND.		
					1.10 (1.10)	Brown gravelly sand. Gravel sized fragments of brick and wood. MADE GROUND.		
					2.20 (0.65)	Orange brown/dark brown very gravelly fine to medium grained sand. Gravel is fine to coarse subrounded quartzite with fragments of occasional brick and concrete. MADE GROUND.		
					2.85	Complete at 2.85m		

Remarks

Trial pit was dry and stable during excavation
Trial pit was backfilled upon completion

Scale (approx)

1:25

Logged By

Figure No.

20040.TP214



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP216

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 04/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30	D				(0.30)	Grassed over light grey slightly gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of plastic, brick and concrete. MADE GROUND.		
0.60-0.70	D				0.30 (0.50)	Loose dark brown very gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of roadstone, metal and coal. MADE GROUND.		
1.00-1.20	B				0.80 (0.80)	Dark grey slightly cobbly slightly gravelly sand. Gravel sized fragments of wood, brick, coal and metal. MADE GROUND.		
					1.60 (1.00)	Orange brown/black very gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, coal and ceramic. MADE GROUND.		
					2.60 (0.40)	Soft black/grey slightly silty gravelly clay. Gravel is fine to coarse subrounded quartzite with fragments of much coal and occasional brick. MADE GROUND.		
					3.00	Complete at 3.00m		

Plan .					Remarks Trial pit was dry and stable during excavation Trial pit was backfilled upon completion			
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP216



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP219

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 09/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	D				(0.20) 0.20 (0.30) 0.50	Grassed over dark brown very sandy slightly gravelly clay. Gravel is fine to coarse subrounded quartzite with rootlets. TOPSOIL. Yellow brown/brown clayey gravelly sand. Gravel is fine to coarse subangular mudstone with fragments of roadstone. MADE GROUND.	 	
0.90-1.00	D				(0.85) 1.35 (0.20) 1.55 (0.50) 2.05 (0.90) 2.95	Black slightly cobbly slightly gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of plastic, wood, concrete and brick. MADE GROUND. Grey ash. (Pulverised fuel ash). MADE GROUND. Light brown/black gravelly sand. Gravel sized fragments of brick and concrete. MADE GROUND. Grey ash with slightly clayey pockets. (Pulverised fuel ash). MADE GROUND.	   	
						Complete at 2.95m		

Plan					Remarks			
.	.	.	.	.	PFA at 1.35m to 1.55m hard to dig Trial pit was backfilled upon completion Material was damp from 2.65m Slight spalling of trial pit walls from 2.5m			
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.	.	.	.	.				
.	.	.	.	.				
					Scale (approx) 1:40		Logged By JD	Figure No. 20040.TP219



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP220
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Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 04/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	D				(0.25)	Grassed over dark brown gravelly sand. Gravel is fine to coarse subrounded quartzite with brick fragments and coal. MADE GROUND.		
0.30-0.40	D				0.25 (0.15) 0.40	Brown very gravelly sand. Gravel sized fragments of brick, coal, chert and brick. MADE GROUND.		
					(0.20) 0.60	Dark brown slightly sandy slightly cobbly gravel. Gravel and cobble sized fragments of concrete and brick. MADE GROUND.		
0.80-1.00	B				(0.60)	Soft grey/orange brown silty slightly gravelly friable clay. Gravel is fine to medium subrounded to subangular quartzite and mudstone. MADE GROUND.		
					1.20			
					(0.40)	Soft black/red brown slightly sandy slightly gravelly clay. Gravel is fine to coarse subrounded quartzite with rare fragments of brick. MADE GROUND.		
1.60-1.70	D				1.60 (0.40)	Black slightly ashy slightly cobbly slightly gravelly sand. Gravel sized fragments of concrete, brick, metal wire, plastic and ceramic. MADE GROUND.		
					2.00			
					(0.55)	Dark grey slightly sandy ash. (Pulverised fuel ash). MADE GROUND.		
					2.55			
						Complete at 2.55m		

Plan					Remarks			
.	.	.	.	.	Hard to dig from 0.4m to 0.6m Trial pit was backfilled upon completion Trial pit was dry and stable during excavation			
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.	.	.	.	.				
.	.	.	.	.				
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP220



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP221
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Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 08/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.40	D				(0.20)	Concrete. (Reinforced).		
					0.20 (0.20)	Dark brown clayey slightly gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, concrete and coal. MADE GROUND.		
0.80-0.90	D				0.40 (0.35)	Orange brown slightly cobbly gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of coal. MADE GROUND.		
					0.75 (0.40)	Soft light grey/green slightly silty slightly gravelly clay. Gravel is fine to coarse subrounded quartzite with fragments of coal. MADE GROUND.		
					1.15 (0.90)	Dark brown gravelly fine to coarse grained sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, rare coal and roots. MADE GROUND.		
					2.05 (0.65)	Grey slightly sandy ash. (Pulverised fuel ash). MADE GROUND.		
					2.70 (0.15)	Dark brown slightly gravelly sand. Gravel is fine to coarse subrounded quartzite. MADE GROUND.		
					2.85	Complete at 2.90m		

Plan					Remarks			
.	.	.	.	.	Trial pit was backfilled upon completion Trial pit was dry and stable during excavation			
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.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
					Scale (approx)	Logged By	Figure No.	
					1:25	JD	20040.TP221	



Drakelow, Burton-Upon-Trent

**Trial Pit
Number
TP223**

Trial Pit

Dimensions

Ground Level (mOD)

Client	
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Countryside Properties

**Job
Number**
20040

Location (Handheld GPS) Refer to plan

Dates	09/06/2020
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Engineer

Travis Baker Geo-Environmental Ltd

Sheet
1/1

Dept
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water	
-------	--

0.40-0.50

D

$$\begin{array}{l} \text{---} \\ \text{---} \\ \text{---} \end{array} \quad (1.45)$$

1.45

Grey ash. (Pulverised fuel ash). MADE GROUND.

Terminated at 1.45m

Plan

Remarks

Unable to use breaker due to nesting birds
Trial pit terminated at 1.45m due to very hard ground
Trial pit was backfilled upon completion
Trial pit was dry and stable during excavation

Scale (approx)

1:40

Logged By

JD

Figure No.

20040.TP223



Drakelow, Burton-Upon-Trent

Job Number
20040

Trial Pit

Location (Handheld GPS)
Refer to plan

Dates	08/06/2020
--------------	------------

Countryside Properties

Travis Baker Geo-Environmental Ltd

1/1

Sample / Tests

Field Records

Depth
(m)
(Thickness)

Description

Legend

Water

0.10-0.20

D

(0.30)

Dark brown slightly cobbly gravelly sand. Gravel sized fragments of concrete and brick. MADE GROUND.

0.30

Grey very clayey ash. (Pulverised fuel ash). MADE GROUND.

(0.15)
0.45

Dark brown slightly cobbly gravelly sand with pockets sandy ash. Gravel sized fragments of concrete, brick, tarmac and igneous aggregate. **MADE GROUND.**

(0.75)

1.20

Red brown sandy gravelly clay. Gravel is fine to coarse subrounded quartzite with fragments of much brick. MADE GROUND.

(0.40)

Red brown slightly sandy slightly silty gravelly clay. Gravel is fine to coarse subrounded quartzite and mudstone with rare fragments of brick and ceramic. (Saturated). MADE GROUND.

(1.35)

2.95

Complete at 2.95m

Plan

Remarks

Rapid water inflow at 1.45m
1.6m to 2.9m saturated material
Spalling of trial pit walls from 1.6m
Trial pit backfilled upon completion

Scale (approx)

1:25

Logged By

JD

Figure No.

20040.TP224



Drakelow, Burton-Upon-Trent

**Job
Number**
20040

Trial Pit

Location (Handheld GPS)
Refer to plan

Dates	08/06/2020
--------------	------------

Countryside Properties

Travis Baker Geo-Environmental Ltd

Sheet
1/1

Sample / Tests

Field Records

Depth
(m)
(Thickness)

Description

Legend

Water

0.30-0.50	0.30-0.50
-----------	-----------

BD

L (0.55)

Grassed over brown gravelly sand. Gravel is fine to coarse subrounded quartzite with much concrete fragments and rootlets. MADE GROUND.

Concrete. (Reinforced)

Terminated at 0.65m

Plan

Remarks

Concrete obstruction at 0.55m
Unable to excavate further due to thick metal rebar
Trial pit was dry during excavation
Trial pit was backfilled upon completion

Scale (approx)

1:25

Logged By

JD

Figure No.

20040.TP227



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP228

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 03/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.25-0.30	D				(0.15) 0.15 (0.15) 0.30	Grassed over grey slightly cobbly slightly sandy gravel. Gravel sized fragments of concrete, brick and rare ceramic. MADE GROUND. Dark orange brown sandy gravel. Gravel is fine to medium subangular chert and fragments of much brick. MADE GROUND.		
0.65-0.70	D				(0.45) 0.75 (0.70) 1.45 (0.65) 2.10	Grey slightly gravelly ash. Gravel is fine to coarse ash. (Pulverised fuel ash). MADE GROUND. Grey clayey ash. (Damp). (Pulverised fuel ash). MADE GROUND. Dark grey clayey fine ash. (Saturated) (Pulversied fuel ash). MADE GROUND. Terminated at 2.10m		

Plan					Remarks			
.	.	.	.	.	Trial pit was backfilled upon completion Water seepage at 1.9m Very saturated material from 1.7m Spalling of trial pit walls from 1.7m Concrete obstruction at 2.1m			
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.	.	.	.	.				
.	.	.	.	.				
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP2228



Drakelow. Burton-Upon-Trent

Job Number
20040

Trial Pit

Location (Handheld GPS)	Refer to plan
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Dates	04/06/2020
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Countryside Properties

Travis Baker Geo-Environmental Ltd

Job Number
20040

Sheet
1/1

Plan 	Remarks Trial pit was dry and stable during excavation Terminated at 0.6m due to thick rebar - unable to excavate			
	Scale (approx) 1:25			Logged By JD



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP229A

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 03/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30	D				(0.20) 0.20 (0.15) 0.35	Tarmac. MADE GROUND. Loose dark brown/pink sand with plastic sheet. MADE GROUND.		
0.50-0.60	D				(0.15) 0.50	Loose light brown slightly sandy slightly cobbly gravel. Gravel sized fragments of brick, concrete and roadstone. Cobbles of brick. MADE GROUND.		
					(0.25) 0.75	Black gravelly sand. Gravel is fine to coarse subrounded quartzite, sandstone with fragments of clinker, coal. (Slight hydrocarbon odour). MADE GROUND.		
					(0.25) 1.00	Orange brown gravelly fine to medium grained sand. Gravel is fine to coarse subrounded quartzite. MADE GROUND.		
1.20-1.30	D				(0.70) 1.70	Black/orange brown slightly gravelly fine to coarse grained sand. Gravel is fine to coarse subrounded quartzite with fragments of rare brick and ceramic. MADE GROUND.		
					(0.50) 2.20	Orange brown gravelly slightly cobbly SAND. Gravel is fine to coarse subrounded to rounded quartzite. Cobbles of rounded quartzite. (River Terrace Deposits)		
						Complete at 2.20m		

Plan					Remarks			
.	.	.	.	.	Spalling within granular materials from 1m Rapid water inflow from 1.4m Water level at end of excavation within trial pit Trial pit terminated at 2.2m due to collapsing of walls			
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.	.	.	.	.				
.	.	.	.	.				
					Scale (approx)	Logged By	Figure No.	
					1:25	JD	20040.TP229A	



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP230
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Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 03/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.35-0.45	D				(0.20) 0.20	Grassed over dark brown slightly silty gravelly sand. Gravel is fine to coarse subrounded quartzite with rare fine brick fragments and rootlets. MADE GROUND.		
0.60-0.70	D				(0.40) 0.60	Dark grey slightly ashy gravelly fine sand. Gravel is fine to coarse subrounded quartzite and mudstone. MADE GROUND.		
					(0.80) 1.40	Orange brown slightly cobbly gravelly sand. Gravel is fine to coarse subrounded quartzite with much brick fragments. Cobbles of quartzite. MADE GROUND.		
1.90-2.00	D				(0.60) 2.00	Soft red brown sandy slightly gravelly clay. Gravel is fine to coarse subrounded quartzite with fine coal and brick fragments. MADE GROUND.		
					(0.65) 2.65	Dark grey slightly gravelly fine ash. Gravel is fine subrounded quartzite. MADE GROUND.		
						Complete at 2.85m		

Plan					Remarks			
.	.	.	.	.	Trial pit was dry and stable during excavation Trial pit was backfilled upon completion			
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.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
.	.	.	.	.				
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP230



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP231

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 03/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.50	D				(0.70)	Grassed over black slightly cobbly slightly gravelly sand. Gravel is fine to coarse subrounded to angular quartzite with fragments of brick, concrete, clinker, wood and metal. Cobbles of brick. MADE GROUND.		
					0.70 (0.20)	Loose dark brown gravelly fine grained sand. Gravel is fine to coarse subrounded quartzite. MADE GROUND.		
					0.90 (0.40)	Black/dark brown ashy gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, concrete and wood. MADE GROUND.		
1.30-1.40	D				1.30 (0.70)	Black/dark brown gravelly fine to coarse grained sand. Gravel is fine to medium subrounded quartzite with fragments of wood and brick. MADE GROUND.		
2.00-2.10	D				2.00 (0.20)	Grey slightly gravelly fine grained sand. Gravel is fine to coarse subrounded quartzite and ash. (Pulverised fuel ash). MADE GROUND.		
					2.20	Terminated at 2.20m		

Plan					Remarks Trial pit was backfilled upon completion Trial pit was dry and stable during excavation Concrete obstruction at 2.20m			
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP231



Travis Baker Geo-Environmental Ltd

Site
Drakelow. Burton-Upon-Trent

Trial Pit Number
TP232

Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Countryside Properties		Job Number 20040	
		Location (Handheld GPS) Refer to plan		Dates 03/06/2020		Engineer Travis Baker Geo-Environmental Ltd		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.40	D				(0.25)	Grassed over grey gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of brick, concrete and ceramic. MADE GROUND		
					0.25 (0.25)	Loose orange brown slightly gravelly sand. Gravel is fine to medium subrounded with much brick fragments. MADE GROUND.		
0.80-0.90	D				0.50	Black slightly clayey slightly gravelly fine to medium grained sand. Gravel is fine to coarse subrounded quartzite with fragments of concrete, coal, metal and wood. MADE GROUND.		
					(1.00)			
1.70-1.80	D				1.50 (0.20)	Black ashy gravelly sand. Gravel sized fragments of brick, ceramic and roadstone. MADE GROUND.		
					1.70 (0.30)	Grey slightly sandy slightly gravelly ash. Gravel is fine to coarse subrounded quartzite. MADE GROUND.		
					2.00	Terminated at 2.00m		

Plan .					Remarks Concrete obstruction at 2m Trial pit was dry and stable during excavation Trial pit was backfilled upon completion			
					Scale (approx) 1:25		Logged By JD	Figure No. 20040.TP232



Travis Baker Geo-Environmental Ltd

Site Drakelow. Burton-Upon-Trent	Trial Pit Number TP233
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Excavation Method Trial Pit	Dimensions	Ground Level (mOD)	Client Countryside Properties	Job Number 20040
	Location (Handheld GPS) Refer to plan	Dates 05/06/2020	Engineer Travis Baker Geo-Environmental Ltd	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	D				(0.20)	Black slightly ashy very gravelly sand. Gravel is fine to coarse subrounded quartzite and shale with fragments of asphalt and concrete. MADE GROUND.		
					0.20			
					(0.25)	Soft red brown very sandy slightly gravelly clay. Gravel is fine to coarse subrounded quartzite and fragments of coal. MADE GROUND.		
					0.45			
					(0.15)	Light brown gravelly fine to coarse grained sand. Gravel is fine to coarse subrounded quartzite with fragments of rare brick and rootlets. MADE GROUND.		
					0.60			
					(0.50)	Orange brown gravelly fine to coarse grained sand with pockets of red brown silty clay. Gravel is fine to coarse subrounded quartzite. MADE GROUND.		
					1.10			
					(0.60)	Orange brown slightly cobbly slightly gravelly sand. Gravel is fine to coarse subrounded quartzite with fragments of rare brick. Cobbles of quartzite. MADE GROUND.		
					1.70			
					(1.10)	Light brown gravelly fine to coarse grained SAND. Gravel is fine to coarse subrounded quartzite. (River Terrace Deposits).		
					2.80			
					(0.10)	Stiff red brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded to subangular quartzite and mudstone. (River Terrace Deposits)		
					2.90			
					(0.20)	Light brown gravelly fine to coarse grained SAND. Gravel is fine to coarse subrounded quartzite. (River Terrace Deposits).		
					3.10	Complete at 3.10m		

Plan 	Remarks		
	Trial pit was dry and stable during excavation		
	Trial pit was backfilled upon completion		
Scale (approx)		Logged By	Figure No.
1:25		JD	20040.TP233

APPENDIX 5

Geotechnical Test Results

GROUND INVESTIGATION & PILING LIMITED

TEST REPORT FOR PARTICLE SIZE DISTRIBUTION



Job No:- L/9798 Site:- Drakelow, Rugeley.
 Received:- 22.06.20 Customer:- Travis Baker Geo-Environmental Ltd.
 Tested:- 22.06.20
 Report:- 09.07.20

TP:- D
 Depth:- Stockpile

Page 1 of 5

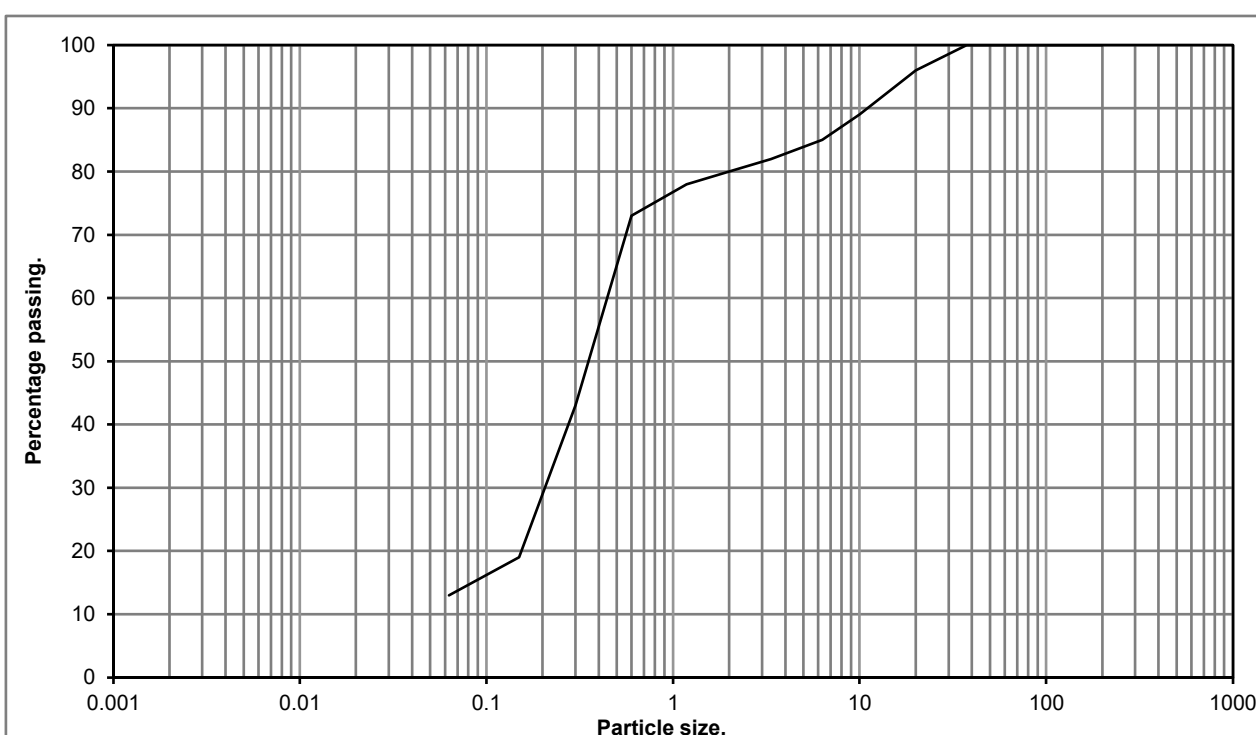
TEST METHODS:-
 Particle Size Distribution:-
 BS 1377: Part 2: 1990
 Clause 9.2 & 9.3

 Sedimentation:-
 BS 1377: Part 2: 1990
 Clause 9.4

Sample Description: Brown slightly gravelly SAND.

TEST METHODS:-
 Sample Preparation:
 BS1377:Part1:2016:
 Clause 8.3.4, 8.3.5, 8.4.5
 Authorized by P.R.Smart
 Laboratory Manager

Description provided by Travis Baker.



	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS

Sieve Size	%	Sieve Size	%
mm	Passing	mm	Passing
200	100	3.35	82
150	100	2	80
125	100	1.18	78
90	100	0.6	73
75	100	0.3	43
63	100	0.15	19
37.5	100	0.063	13
20	96		
10	89		
6.3	85		

% Clay & Silt 13
 % Sand 67
 % Gravel 20
 % Cobbles 0



1897

The reported results relate only to samples received

GROUND INVESTIGATION & PILING LIMITED

TEST REPORT FOR PARTICLE SIZE DISTRIBUTION



Job No:- L/9798 Site:- Drakelow, Rugeley.
 Received:- 22.06.20 Customer:- Travis Baker Geo-Environmental Ltd.
 Tested:- 22.06.20
 Report:- 09.07.20

TP:- J
 Depth:- Stockpile

Page 2 of 5

TEST METHODS:-
 Particle Size Distribution:-
 BS 1377: Part 2: 1990
 Clause 9.2 & 9.3

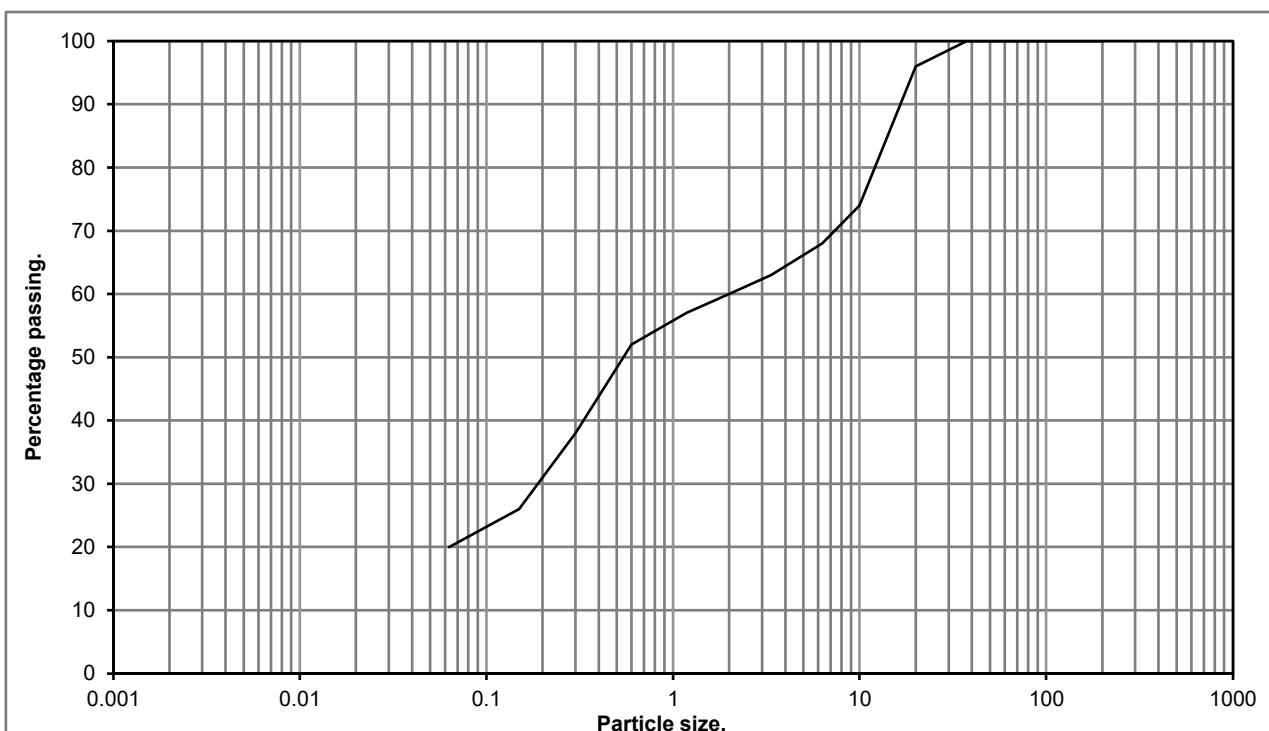
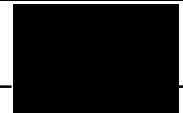
Sample Description: Dark brown SAND and GRAVEL.

TEST METHODS:-
 Sample Preparation:
 BS1377:Part1:2016:
 Clause 8.3.4, 8.3.5, 8.4.5

Authorized by P.R.Smart
 Laboratory Manager

Sedimentation:-
 BS 1377: Part 2: 1990
 Clause 9.4

Description provided by Travis Baker.



	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS

Sieve Size	%	Sieve Size	%
mm	Passing	mm	Passing
200	100	3.35	63
150	100	2	60
125	100	1.18	57
90	100	0.6	52
75	100	0.3	38
63	100	0.15	26
37.5	100	0.063	20
20	96		
10	74		
6.3	68		

% Clay & Silt	20
% Sand	40
% Gravel	40
% Cobbles	0



1897

The reported results relate only to samples received

GROUND INVESTIGATION & PILING LIMITED

TEST REPORT FOR PARTICLE SIZE DISTRIBUTION



Job No:- L/9798 Site:- Drakelow, Rugeley.
 Received:- 22.06.20 Customer:- Travis Baker Geo-Environmental Ltd.
 Tested:- 22.06.20
 Report:- 09.07.20

TP:- SS5
 Depth:- Surface

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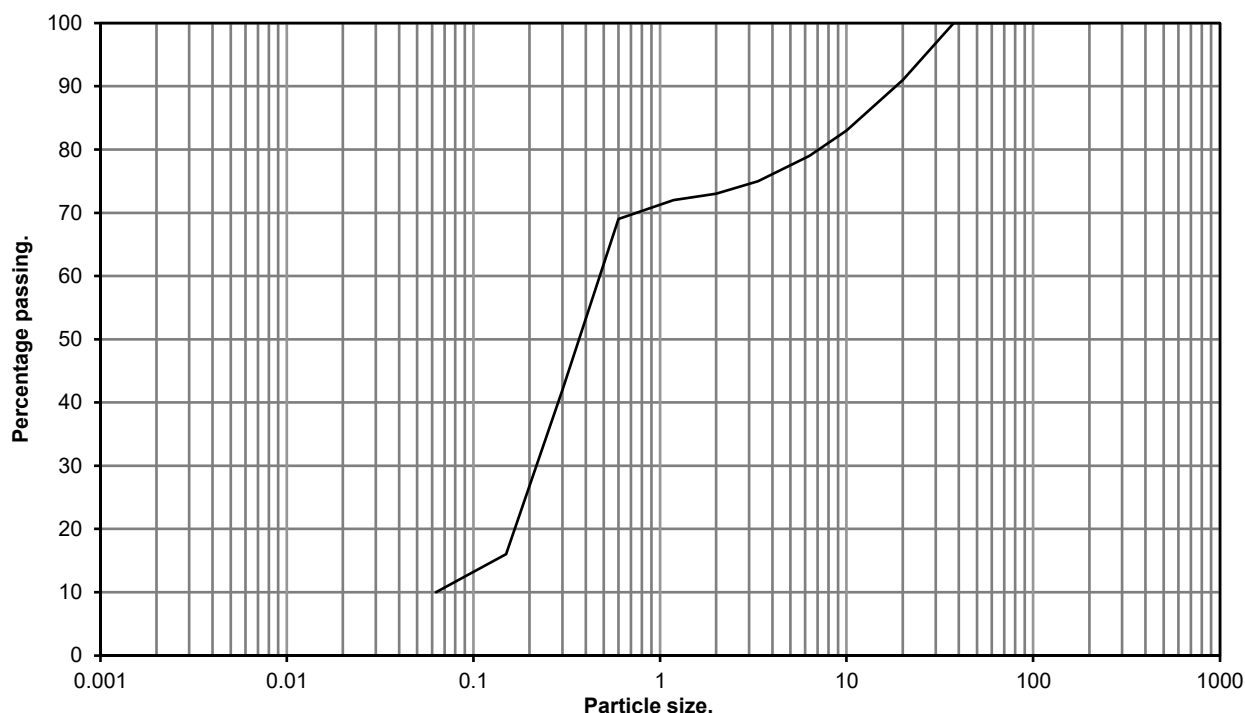
TEST METHODS:-
 Particle Size Distribution:-
 BS 1377: Part 2: 1990
 Clause 9.2 & 9.3

 Sedimentation:-
 BS 1377: Part 2: 1990
 Clause 9.4

Sample Description: Orange brown very gravelly SAND.

TEST METHODS:-
 Sample Preparation:
 BS1377:Part1:2016:
 Clause 8.3.4, 8.3.5, 8.4.5
 Authorized by P.R.Smart
 Laboratory Manager

Description provided by Travis Baker.



	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS

Sieve Size	%	Sieve Size	%
mm	Passing	mm	Passing
200	100	3.35	75
150	100	2	73
125	100	1.18	72
90	100	0.6	69
75	100	0.3	42
63	100	0.15	16
37.5	100	0.063	10
20	91		
10	83		
6.3	79		

% Clay & Silt 10
 % Sand 63
 % Gravel 27
 % Cobbles 0



1897

The reported results relate only to samples received

GROUND INVESTIGATION & PILING LIMITED

TEST REPORT FOR PARTICLE SIZE DISTRIBUTION



Job No:- L/9798 Site:- Drakelow, Rugeley.
 Received:- 22.06.20 Customer:- Travis Baker Geo-Environmental Ltd.
 Tested:- 22.06.20
 Report:- 09.07.20

TP:- SS8
 Depth:- Surface

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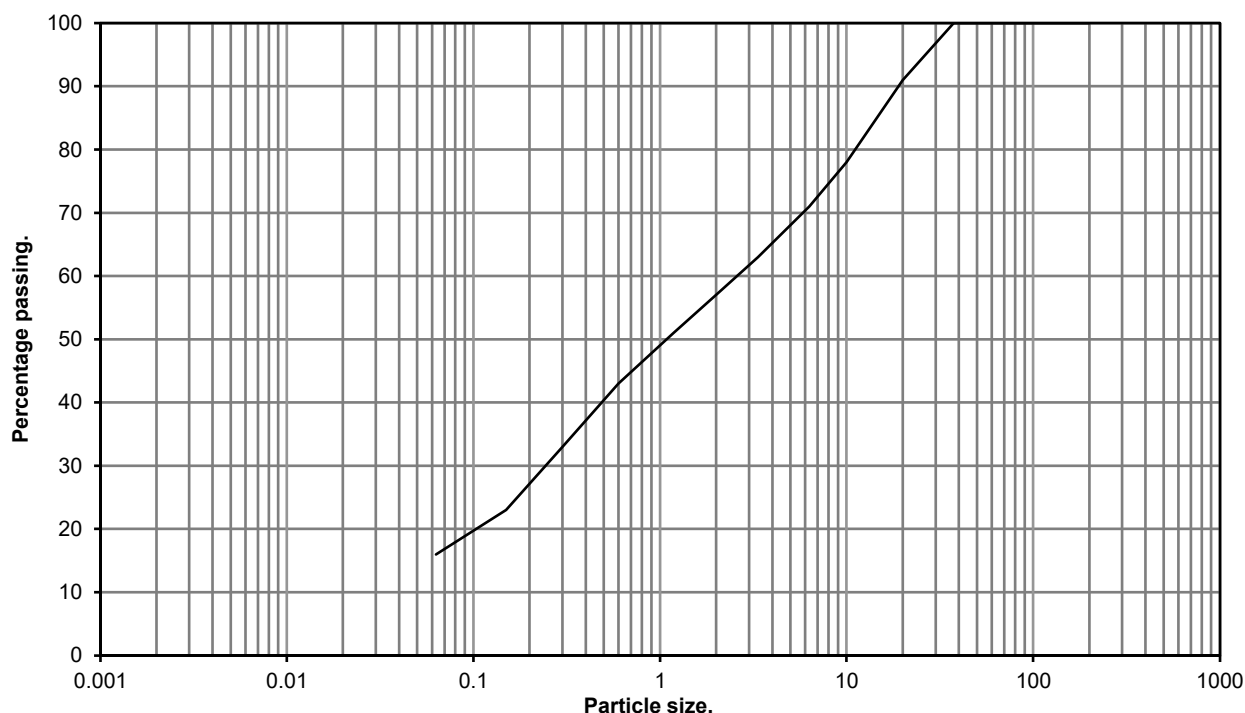
TEST METHODS:-
 Particle Size Distribution:-
 BS 1377: Part 2: 1990
 Clause 9.2 & 9.3

 Sedimentation:-
 BS 1377: Part 2: 1990
 Clause 9.4

Sample Description: Black slightly clayey SAND and GRAVEL.

TEST METHODS:-
 Sample Preparation:
 BS1377:Part1:2016:
 Clause 8.3.4, 8.3.5, 8.4.5
 Authorized by P.R.Smart
 Laboratory Manager

Description provided by Travis Baker.



	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS

Sieve Size	%	Sieve Size	%
mm	Passing	mm	Passing
200	100	3.35	63
150	100	2	57
125	100	1.18	51
90	100	0.6	43
75	100	0.3	33
63	100	0.15	23
37.5	100	0.063	16
20	91		
10	78		
6.3	71		

% Clay & Silt 16
 % Sand 41
 % Gravel 43
 % Cobbles 0



1897

The reported results relate only to samples received

GROUND INVESTIGATION & PILING LIMITED

TEST REPORT FOR PARTICLE SIZE DISTRIBUTION



Job No:- L/9798 Site:- Drakelow, Rugeley.
 Received:- 22.06.20 Customer:- Travis Baker Geo-Environmental Ltd.
 Tested:- 22.06.20
 Report:- 09.07.20

TP:- 220
 Depth:- 0.8-1.0m

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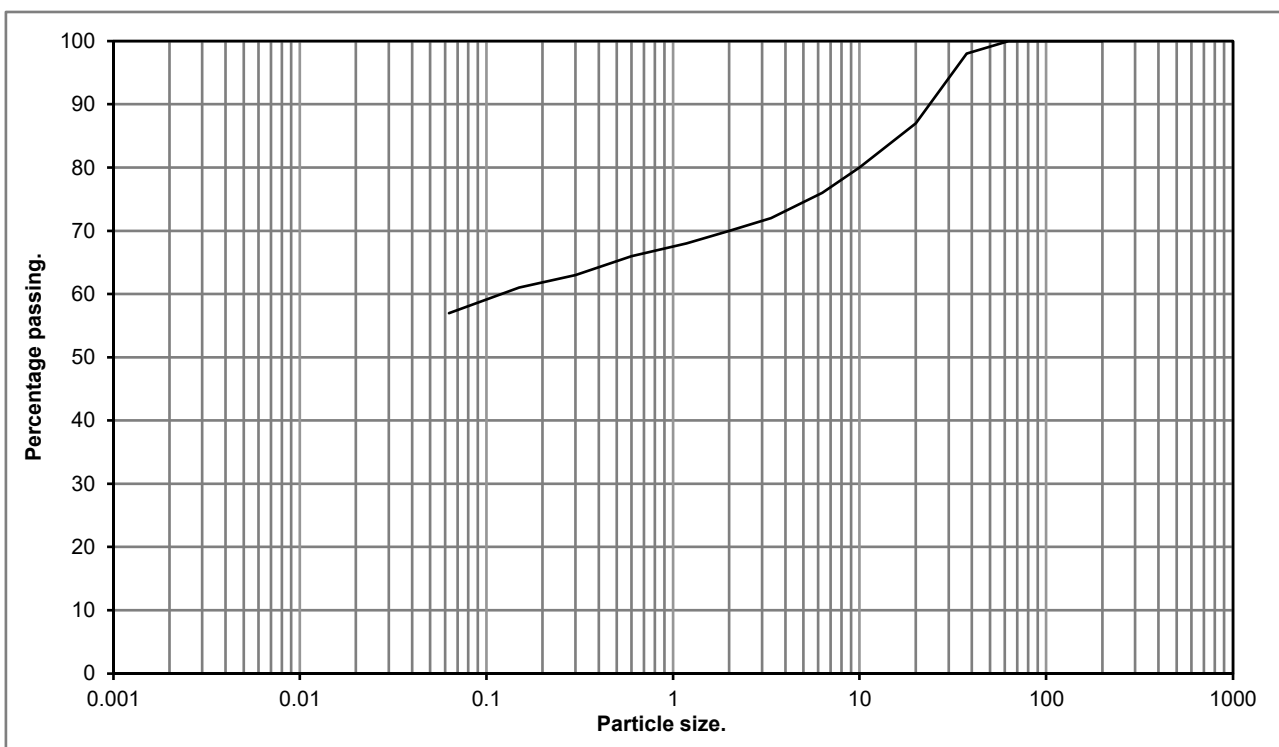
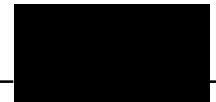
TEST METHODS:-
 Particle Size Distribution:-
 BS 1377: Part 2: 1990
 Clause 9.2 & 9.3

Sedimentation:-
 BS 1377: Part 2: 1990
 Clause 9.4

Sample Description: Grey/orange brown silty gravelly CLAY.

Description provided by Travis Baker.

TEST METHODS:-
 Sample Preparation:
 BS1377:Part1:2016:
 Clause 8.3.4, 8.3.5, 8.4.5
 Authorized by P.R.Smart
 Laboratory Manager



	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS

Sieve Size	%	Sieve Size	%
mm	Passing	mm	Passing
200	100	3.35	72
150	100	2	70
125	100	1.18	68
90	100	0.6	66
75	100	0.3	63
63	100	0.15	61
37.5	98	0.063	57
20	87		
10	80		
6.3	76		

% Clay & Silt 57
 % Sand 13
 % Gravel 30
 % Cobbles 0

Sample mass < BS1377 requirements

The reported results relate only to samples received



1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

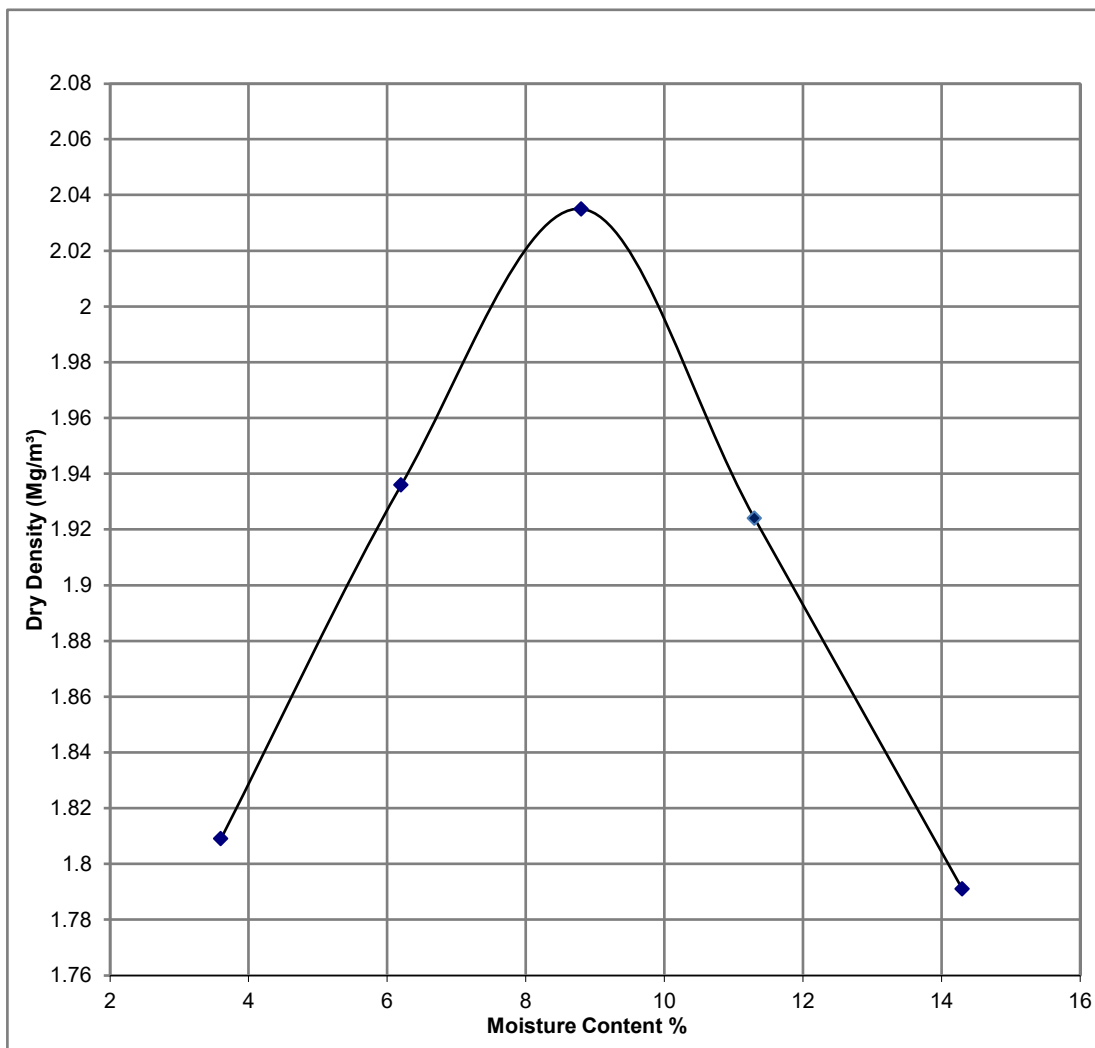


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 07.07.20
 Report:- 10.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- A
 Depth: Stockpile
 1 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.6 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: Brown gravelly SAND. <i>Description provided by Travis Baker.</i>	8.6 % 2.03 Mg/m ³ 12 % N/A Mg/m ³ 13 % 4 % 20 mm 4.5 kg Single Authorized by P.R Smart Laboratory Manager 
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Initial sample mass < BS1377 requirements



The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

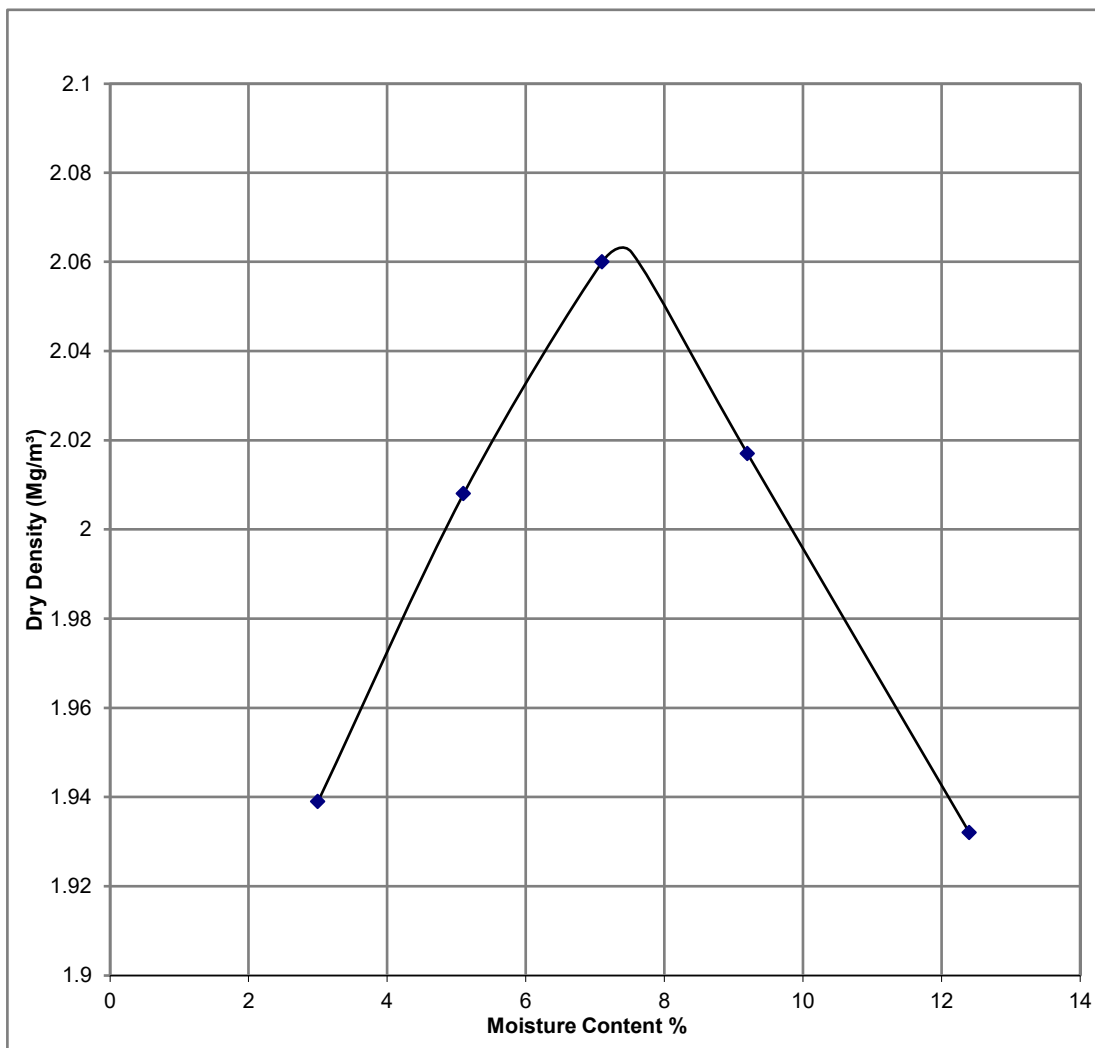


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 02.07.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- D
 Depth: Stockpile
 2 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.5 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: See PSD Report.	7.5 % 2.06 Mg/m ³ 5.2 % N/A Mg/m ³ 4 % 0 % 20 mm 4.5 kg Single Authorized by P.R Smart Laboratory Manager
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The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

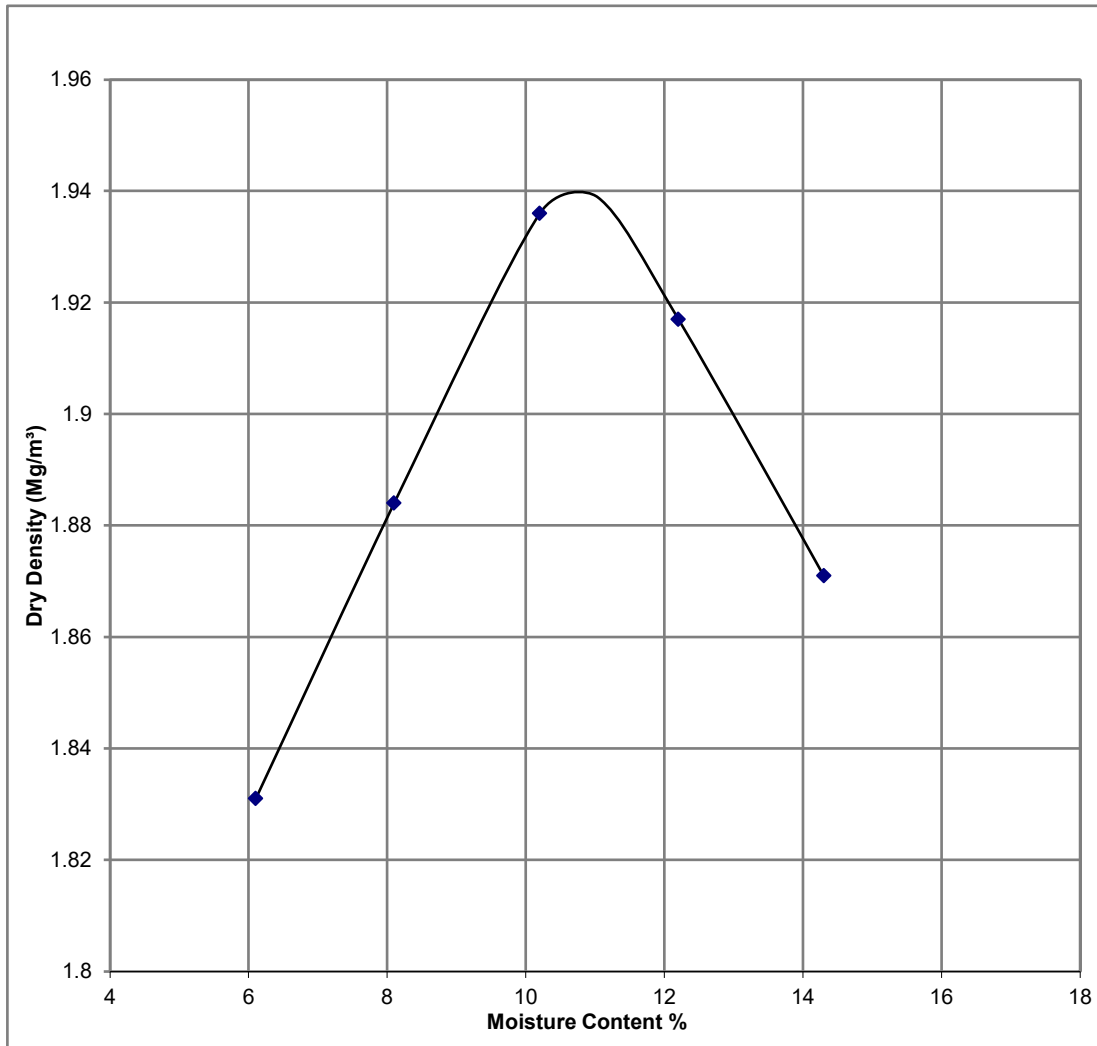


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 01.07.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- H
 Depth: Stockpile
 3 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.5 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: Brown slightly silty gravelly SAND. <i>Description provided by Travis Baker.</i>	11 % 1.94 Mg/m³ 11 % N/A Mg/m³ 3 % 0 % 20 mm 4.5 kg Separate Authorized by P.R Smart Laboratory Manager
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The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

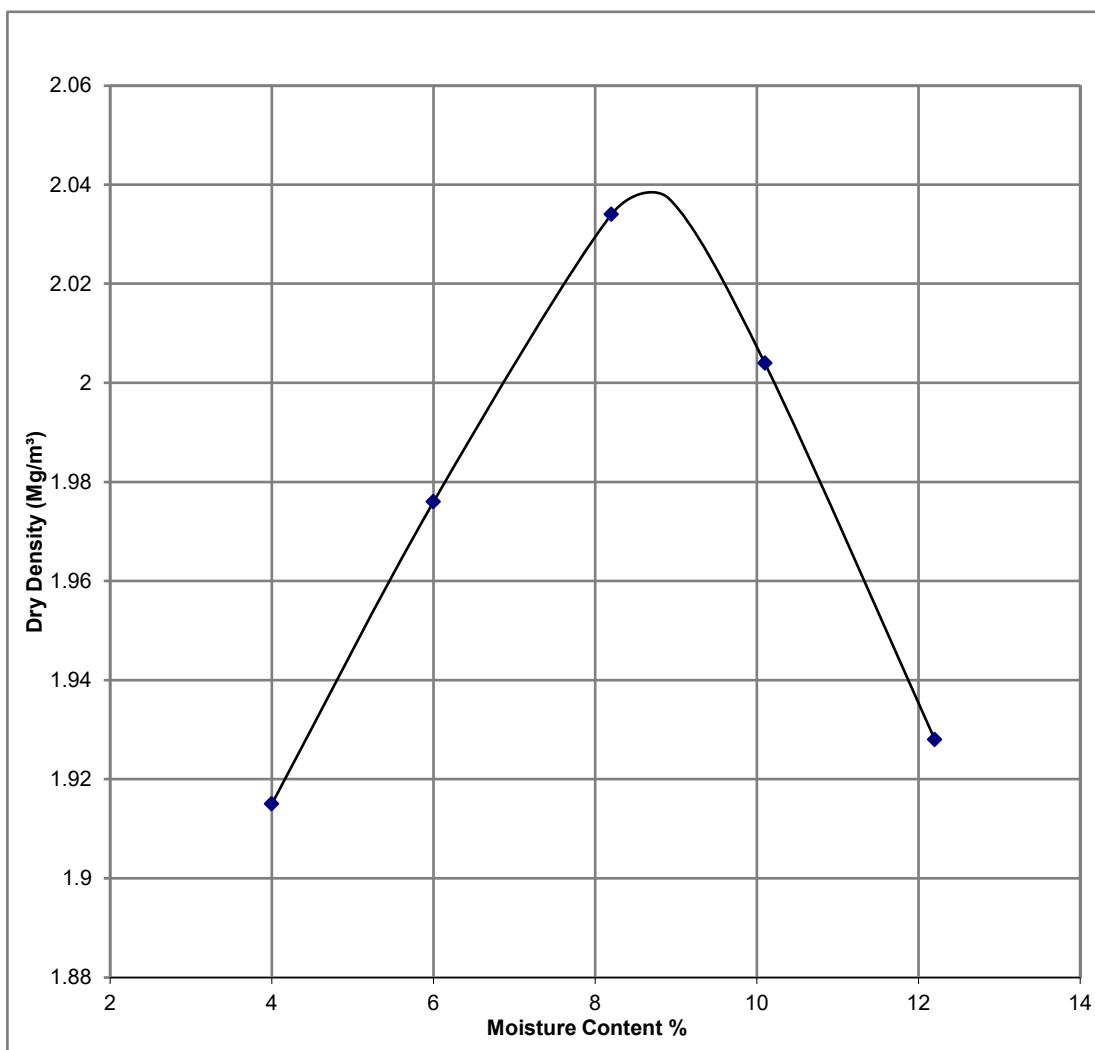


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 06.07.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- J
 Depth: Stockpile
 4 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.5 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: See PSD Report.	8.9 % 2.04 Mg/m ³ 9.6 % N/A Mg/m ³ 4 % 0 % 20 mm 4.5 kg Single Authorized by P.R Smart Laboratory Manager
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The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

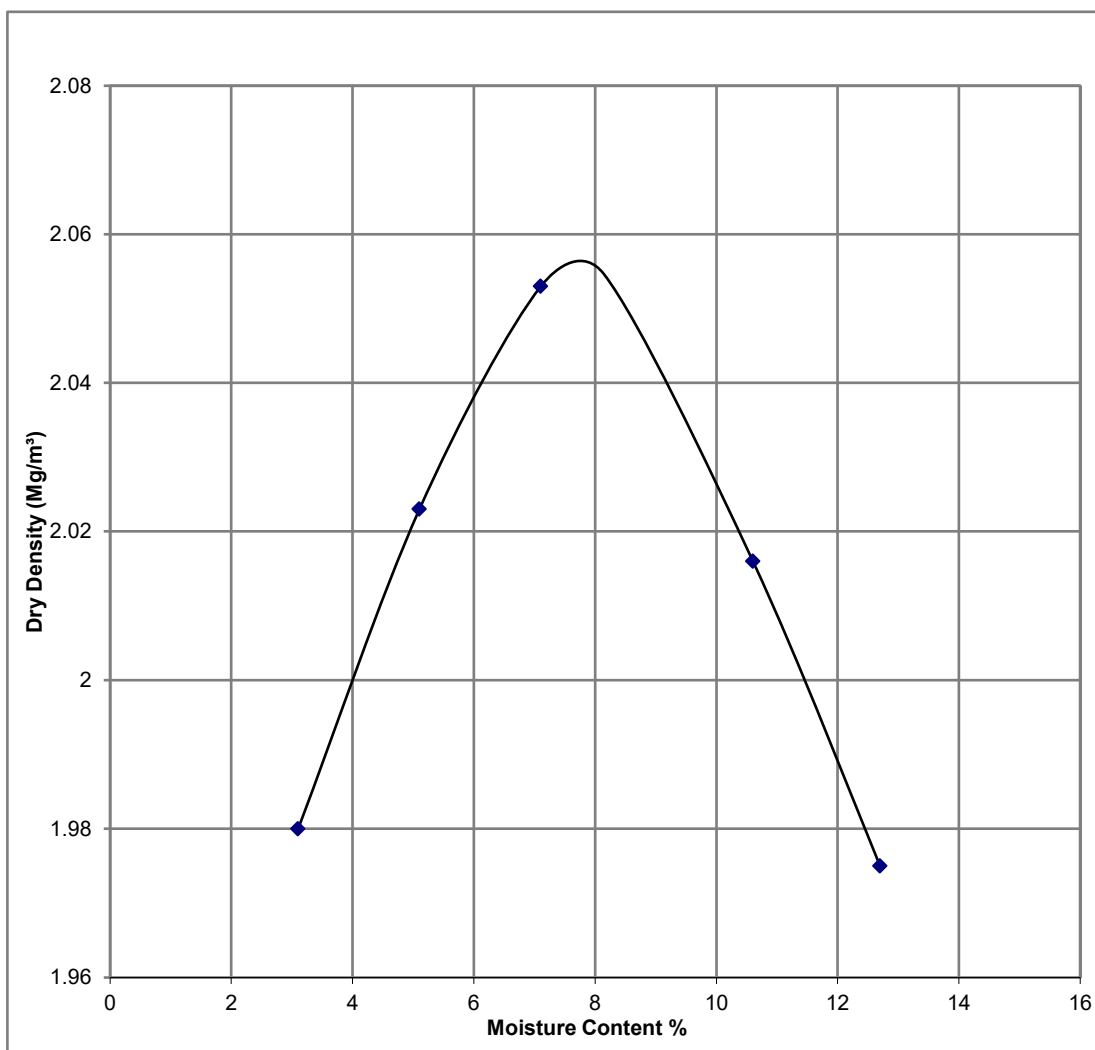


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 24.06.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- SS5
 Depth: Surface
 5 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.6 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: See PSD Report.	7.8 % 2.05 Mg/m ³ 3.5 % N/A Mg/m ³ 9 % 0 % 20 mm 4.5 kg Single Authorized by P.R Smart Laboratory Manager 
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Initial sample mass < BS1377 requirements



The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

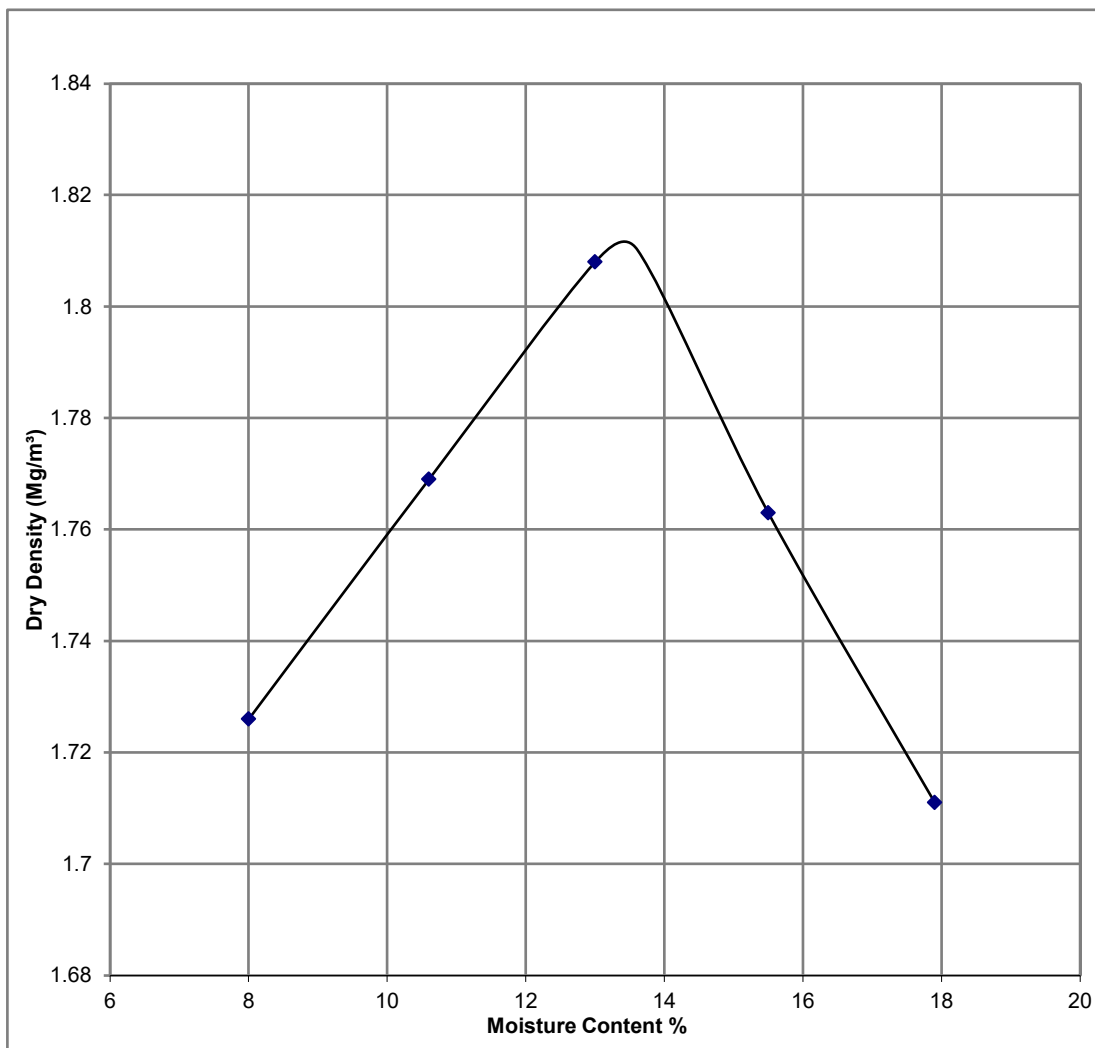


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 29.06.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- SS7
 Depth: Surface
 6 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.5 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: Orange brown/black gravelly SAND. <i>Description provided by Travis Baker.</i>	13 % 1.81 Mg/m³ 11 % N/A Mg/m ³ 2 % 0 % 20 mm 4.5 kg Separate Authorized by P.R Smart Laboratory Manager
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The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT



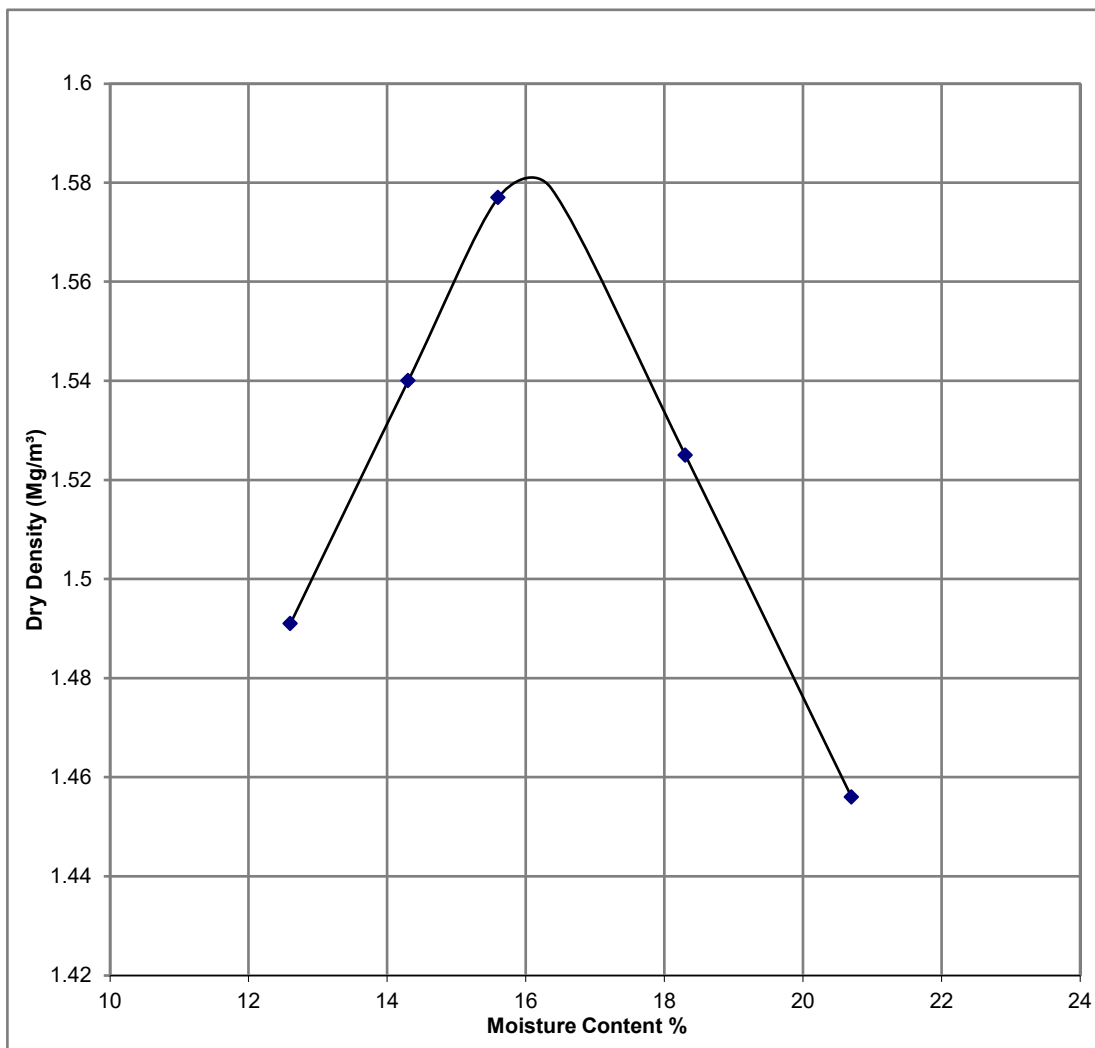
Job No:- L/9798
 Received:- 22.06.20
 Tested:- 07.07.20
 Report:- 10.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- SS8
 Depth: Surface

7 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.6 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: See PSD Report.	16 % 1.58 Mg/m³ 17 % N/A Mg/m³ 9 % 0 % 20 mm 4.5 kg Single Authorized by P.R Smart Laboratory Manager 
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Initial sample mass < BS1377 requirements



The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

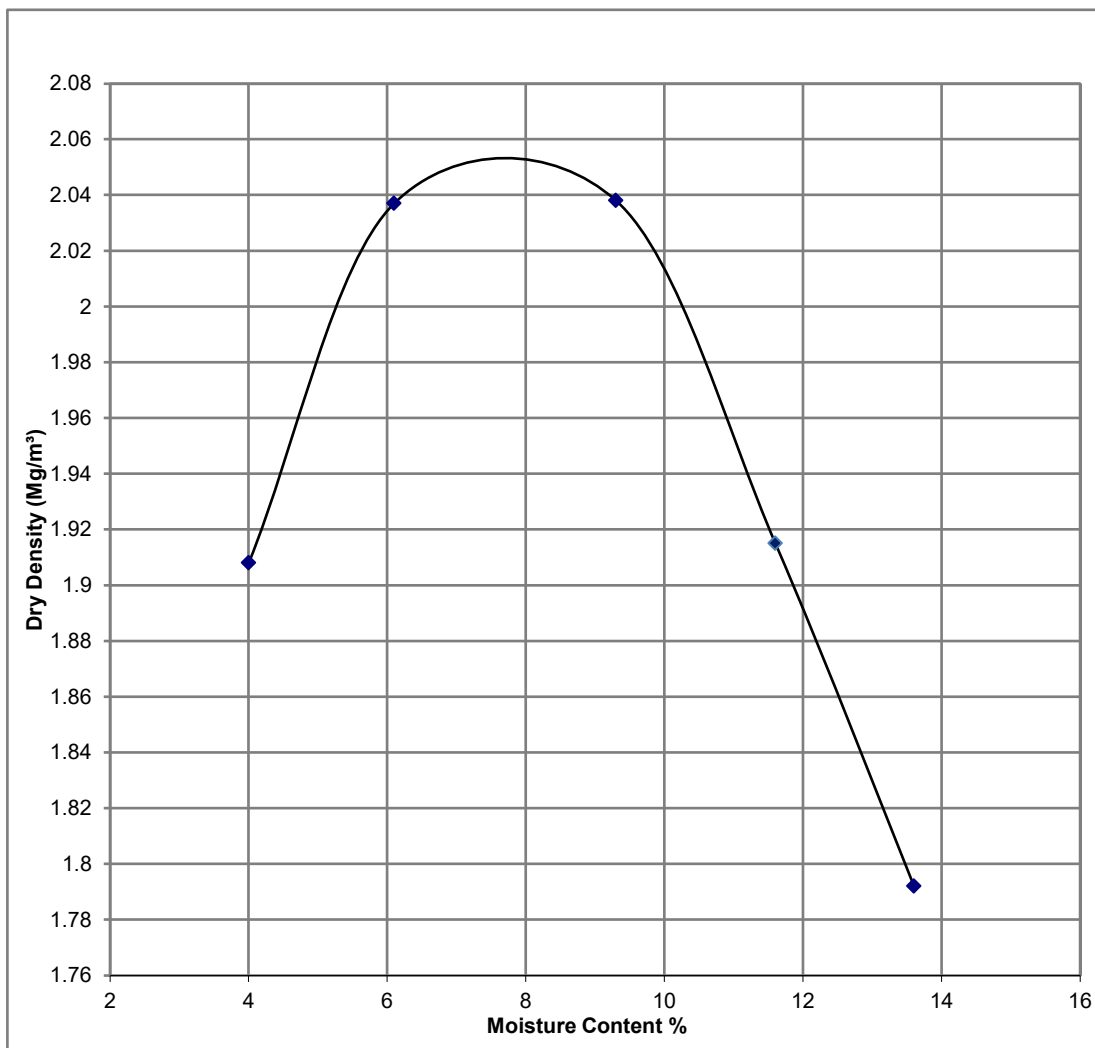


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 06.07.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- SS9
 Depth: Surface
 8 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.6 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: Black/dark brown very gravelly SAND. <i>Description provided by Travis Baker.</i>	8.0 % 2.05 Mg/m³ 12 % N/A Mg/m³ 9 % 0 % 20 mm 4.5 kg Separate Authorized by P.R Smart Laboratory Manager
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Initial sample mass < BS1377 requirements



The reported results relate only to samples received

1897

GROUND INVESTIGATION & PILING LIMITED

COMPACTION TEST REPORT

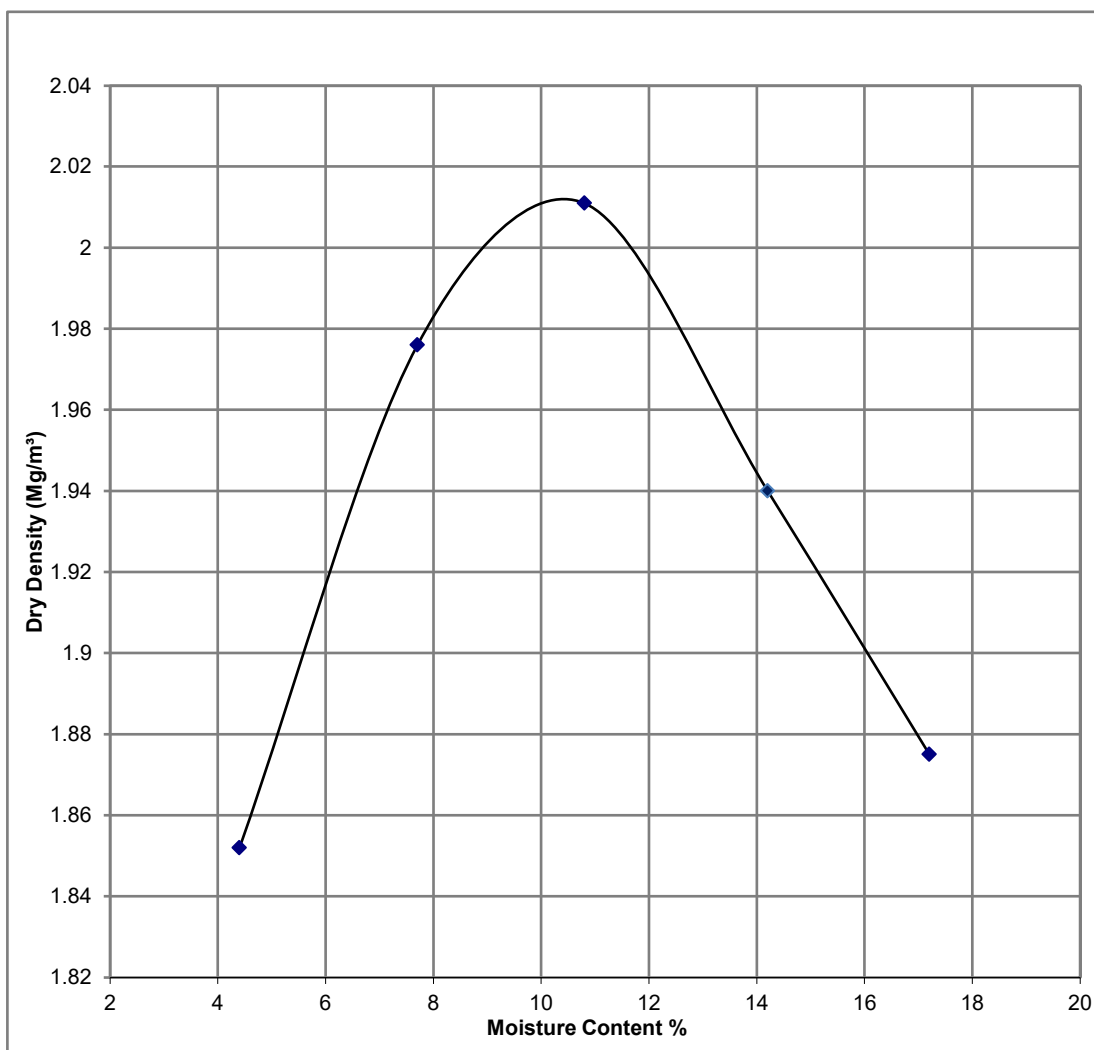


Job No:- L/9798
 Received:- 22.06.20
 Tested:- 24.06.20
 Report:- 09.07.20

Site:- Drakelow, Rugeley.
 Customer:- Travis Baker Geo-Environmental Ltd.

TP:- 220
 Depth: 0.8-1.0m
 9 of 9

TEST METHODS:- Compactions: BS1377:Part4:1990: Clause 3.6 Particle Density: BS1377:Part2:1990: Clause 8.2 Sample Preparation: BS1377:Part1:2016: Clause 8.6	Optimum Moisture Content: Maximum Dry Density: Natural Moisture Content: Assumed Particle Density: Material > 20.0mm: Material > 37.5mm: If material is cohesive then broken down to pass sieve size: Type of Compaction Rammer: Single or Separate Sample: Sample Description: See PSD Report.	10 % 2.01 Mg/m³ 15 % N/A Mg/m³ 13 % 2 % 20 mm 4.5 kg Separate Authorized by P.R Smart Laboratory Manager
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Initial sample mass < BS1377 requirements



The reported results relate only to samples received

1897

APPENDIX 6
Chemical Test Results

**Jonathan Diviney**

Travis Baker Geo-Environmental Limited
Trinity Point
New Road
Halesowen
West Midlands
B63 3HY

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: Jonathan.Diviney@travisbaker.co.uk

Analytical Report Number : 20-15630

Project / Site name:	Drakelow, Rugeley	Samples received on:	19/06/2020
Your job number:	20040	Sample instructed/ Analysis started on:	19/06/2020
Your order number:	1644G	Analysis completed by:	01/07/2020
Report Issue Number:	1	Report issued on:	01/07/2020
Samples Analysed:	53 soil samples		

Signed:

Karolina Marek
PL Head of Reporting Team

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-15630-1 Drakelow, Rugeley 20040

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 1 of 41

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541507	1541508	1541509	1541510	1541511
Sample Reference				DS211	DS211	DS210	DS209	DS204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.30	1.10-1.20	0.40-0.60	0.50-0.70	0.50-0.60
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.7	10	16	19	12
Total mass of sample received	kg	0.001	NONE	1.1	0.50	1.1	0.90	0.70

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.5	8.1	9.0	10.8	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	2400	-	1100	16000	420
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.055	0.28	0.37	0.038
Sulphide	mg/kg	1	MCERTS	7.4	-	11	< 1.0	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	17	-	73	< 5.0	< 5.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	-	-	1.0	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	-	-	< 0.80
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number	1541507	1541508	1541509	1541510	1541511
Sample Reference	DS211	DS211	DS210	DS209	DS204
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20-0.30	1.10-1.20	0.40-0.60	0.50-0.70	0.50-0.60
Date Sampled	04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	5.0	6.1	58	4.4
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	-	1.1	4.3	1.4
Boron (water soluble)	mg/kg	0.2	MCERTS	3.7	1.5	3.0	40	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	1.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	34	40	52	53
Copper (aqua regia extractable)	mg/kg	1	MCERTS	58	12	16	72	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	82	9.8	36	73	4.7
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	27	32	39	50	44
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.6	< 1.0	< 1.0	3.5	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	30	-	32	84	43
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	72	51	69	140	66

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	9.2	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	92	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	250	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	1800	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	2100	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	6.2	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	48	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	110	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	660	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	820	< 10

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541507	1541508	1541509	1541510	1541511
Sample Reference				DS211	DS211	DS210	DS209	DS204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.30	1.10-1.20	0.40-0.60	0.50-0.70	0.50-0.60
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
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Miscellaneous Organics

Toluene Extractable Matter	mg/kg	100	NONE	1400	-	< 100	2600	< 100
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541512	1541513	1541514	1541515	1541516
Sample Reference				DS204	DS208	DS208	DS203	DS207
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.50-0.60	1.90-2.00	0.40-0.50	0.10-0.50
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	-	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	-	13	12	11	6.7
Total mass of sample received	kg	0.001	NONE	-	1.2	0.90	1.1	1.1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	< 0.001

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.3	-	9.3	10.6
Total Cyanide	mg/kg	1	MCERTS	-	< 1	-	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	-	< 1	-	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	790	-	160	8200
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.27	-	0.031	0.58
Sulphide	mg/kg	1	MCERTS	-	8.9	-	< 1.0	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	-	32	-	< 5.0	< 5.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	0.4	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.21
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.90
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	1.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.80
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.60
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.76
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.39
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.49
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.30
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.43

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	< 0.80	-	< 0.80	6.04
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541512	1541513	1541514	1541515	1541516
Sample Reference				DS204	DS208	DS208	DS203	DS207
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.50-0.60	1.90-2.00	0.40-0.50	0.10-0.50
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	4.7	-	5.1	8.5
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1.2	-	0.40	0.70
Boron (water soluble)	mg/kg	0.2	MCERTS	-	3.7	-	0.5	2.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	0.4
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	50	-	8.5	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	18	-	9.8	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	8.7	-	16	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	44	-	11	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	2.4
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	43	-	14	26
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	64	-	49	83

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	32	50	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	72	220	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	240	370	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	340	640	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	5.3	2.4	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	11	77	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	33	190	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	220	390	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	270	660	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541512	1541513	1541514	1541515	1541516
Sample Reference				DS204	DS208	DS208	DS203	DS207
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.50-0.60	1.90-2.00	0.40-0.50	0.10-0.50
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	-	< 100	-	< 100	1200

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541517	1541518	1541519	1541520	1541521
Sample Reference				DS206	DS205	DS205	DS212	TPH
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.80	0.70-0.80	2.80-2.90	0.10-0.20	None Supplied
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	6.1	17	15	7.6	6.4
Total mass of sample received	kg	0.001	NONE	1.1	1.2	1.1	1.1	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	9.6	6.7	10.7	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	-
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	210	4700	-	2800	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.061	0.44	0.33	0.23	0.25
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	-	7.4	-
Elemental Sulphur	mg/kg	5	MCERTS	9.0	< 5.0	-	< 5.0	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	1.3

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.55	0.22
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.70	0.49
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.67	0.47
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.50	0.42
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.39	0.36
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.44	0.51
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.24	0.21
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.30	0.30
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	0.25
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	0.31

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	-	3.79	3.54
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541517	1541518	1541519	1541520	1541521
Sample Reference				DS206	DS205	DS205	DS212	TPH
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.80	0.70-0.80	2.80-2.90	0.10-0.20	None Supplied
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.7	78	9.1	14	12
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.47	5.5	-	2.4	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.4	73	16	1.9	4.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.0	0.5	0.6	0.7
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.4	48	20	19	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	77	28	51	59
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	55	48	64	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	72	21	36	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	3.6	< 1.0	2.4	2.1
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	88	-	33	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	50	130	90	94	150

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541517	1541518	1541519	1541520	1541521
Sample Reference				DS206	DS205	DS205	DS212	TPH
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.80	0.70-0.80	2.80-2.90	0.10-0.20	None Supplied
Date Sampled				04/06/2020	04/06/2020	04/06/2020	04/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	< 100	< 100	-	1100	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541522	1541523	1541524	1541525	1541526
Sample Reference				TPI	TPJ	TP231	TP231	TP228
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	0.40-0.50	1.30-1.40	0.25-0.30
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	-	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	-	7.8	7.8	15	22
Total mass of sample received	kg	0.001	NONE	-	1.2	1.2	1.2	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.2	8.0	-	8.5
Total Cyanide	mg/kg	1	MCERTS	-	-	< 1	-	< 1
Free Cyanide	mg/kg	1	MCERTS	-	-	< 1	-	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	1800	-	2100
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.43	0.60	-	0.44
Sulphide	mg/kg	1	MCERTS	-	-	1.4	-	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	-	-	20	-	< 5.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	2.1	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	0.40	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	0.65	0.50	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	0.64	0.44	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.48	0.40	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	0.33	0.27	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.51	0.41	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.23	0.25	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.34	0.27	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.21	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.30	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	3.69	2.94	-	< 0.80
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541522	1541523	1541524	1541525	1541526
Sample Reference				TPI	TPJ	TP231	TP231	TP228
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	0.40-0.50	1.30-1.40	0.25-0.30
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	13	12	-	120
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	1.0	-	4.6
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.6	5.3	-	18
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.6	0.8	-	1.0
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	23	59	-	49
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	49	47	-	93
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	72	72	-	74
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	26	39	-	72
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	6.9
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	29	-	130
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	130	120	-	160

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	13	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	53	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	120	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	190	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	12	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	62	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	76	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541522	1541523	1541524	1541525	1541526
Sample Reference				TPI	TPJ	TP231	TP231	TP228
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	0.40-0.50	1.30-1.40	0.25-0.30
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	< 0.001	0.006	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	< 0.001	0.005	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	< 0.001	0.005	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	< 0.001	0.005	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	< 0.001	0.006	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	< 0.001	0.005	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	< 0.001	0.006	< 0.001
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	< 0.007	0.038	< 0.007
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	-	-	< 100	-	< 100

Analytical Report Number: 20-15630
Project / Site name: Drakelow, Rugeley
Your Order No: 1644G

Lab Sample Number				1541527	1541528	1541529	1541530	1541531
Sample Reference				TP232	TP232	TP232	TP230	TP230
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.80-0.90	1.70-1.80	0.35-0.45	0.60-0.70
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.5	25	16	11	12
Total mass of sample received	kg	0.001	NONE	1.2	0.90	0.50	1.2	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	Not-detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	8.8	-
Total Cyanide	mg/kg	1	MCERTS	-	-	-	< 1	-
Free Cyanide	mg/kg	1	MCERTS	-	-	-	< 1	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	1100	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	0.35	-
Sulphide	mg/kg	1	MCERTS	-	-	-	< 1.0	-
Elemental Sulphur	mg/kg	5	MCERTS	-	-	-	< 5.0	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	1.0	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	< 0.80	-	< 0.80	-
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541527	1541528	1541529	1541530	1541531
Sample Reference				TP232	TP232	TP232	TP230	TP230
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.80-0.90	1.70-1.80	0.35-0.45	0.60-0.70
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	38	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	2.0	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	27	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	0.4	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	31	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	43	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	52	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	41	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	5.2	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	65	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	87	-

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541527	1541528	1541529	1541530	1541531
Sample Reference				TP232	TP232	TP232	TP230	TP230
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.80-0.90	1.70-1.80	0.35-0.45	0.60-0.70
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	03/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	0.005	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	0.004	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	0.005	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	0.004	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	0.009	-	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	0.006	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	0.005	-	< 0.001
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	0.039	-	< 0.007
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	-	-	-	< 100	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541532	1541533	1541534	1541535	1541536
Sample Reference				TP229A	TP220	TP216	TP215	TP214
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	0.30-0.40	0.20-0.30	0.10-0.20	0.60-0.50
Date Sampled				03/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	4.5	8.4	9.3	7.7
Total mass of sample received	kg	0.001	NONE	1.2	0.50	1.2	1.2	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.6	7.5	7.9	10.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	-
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	830	240	-	430	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.033	0.27	0.056	0.24
Sulphide	mg/kg	1	MCERTS	20	< 1.0	-	< 1.0	-
Elemental Sulphur	mg/kg	5	MCERTS	5.0	< 5.0	-	< 5.0	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.7	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.26
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.20
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.6
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.51
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	2.8
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	2.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.2
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.90
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.53
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.85
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.38
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.46

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	13.2
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541532	1541533	1541534	1541535	1541536
Sample Reference				TP229A	TP220	TP216	TP215	TP214
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	0.30-0.40	0.20-0.30	0.10-0.20	0.60-0.50
Date Sampled				03/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	31	6.7	10	11	7.4
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	5.6	0.62	-	1.0	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.8	0.9	4.9	2.2	3.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.3	0.3	0.6	0.4	0.4
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	12	14	18	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	100	17	23	24	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	57	21	35	64	28
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	62	16	16	24	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.6	< 1.0	< 1.0	1.8	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	41	20	-	24	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190	59	67	87	70

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	5.5	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	11	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	18	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	110	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	150	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541532	1541533	1541534	1541535	1541536
Sample Reference				TP229A	TP220	TP216	TP215	TP214
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	0.30-0.40	0.20-0.30	0.10-0.20	0.60-0.50
Date Sampled				03/06/2020	04/06/2020	04/06/2020	04/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	2000	300	-	< 100	-



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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541537	1541538	1541539	1541540	1541541
Sample Reference				TP213	TP209	TP209	TP207	TP233
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.60-0.70	0.30-0.50	0.10-0.20
Date Sampled				04/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	3.7	-	19	11	7.8
Total mass of sample received	kg	0.001	NONE	1.2	-	0.90	0.90	1.0

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.001	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	-	10.2	7.7	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1	-	-	< 1	12
Free Cyanide	mg/kg	1	MCERTS	< 1	-	-	< 1	9
Total Sulphate as SO ₄	mg/kg	50	MCERTS	500	-	-	1600	1600
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	-	0.74	0.28	0.25
Sulphide	mg/kg	1	MCERTS	< 1.0	-	-	1.2	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	< 5.0	-	-	51	85
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.57	2.2
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.16	2.2
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.19	0.25
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.37	1.5
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	4.5	16
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	1.1	6.3
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	5.4	39
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	4.6	34
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	3.3	26
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	3.0	20
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	3.4	27
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	1.6	10
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	2.9	22
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	1.9	11
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.50	3.4
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	1.8	11

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	< 0.80	35.2	230
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541537	1541538	1541539	1541540	1541541
Sample Reference				TP213	TP209	TP209	TP207	TP233
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.60-0.70	0.30-0.50	0.10-0.20
Date Sampled				04/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	-	63	21	50
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.82	-	-	4.6	4.2
Boron (water soluble)	mg/kg	0.2	MCERTS	2.8	-	81	2.3	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	-	0.7	0.6	2.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	-	49	18	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	-	79	84	96
Lead (aqua regia extractable)	mg/kg	1	MCERTS	170	-	52	49	130
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	0.7	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	-	62	52	60
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	14	2.1	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	23	-	-	46	53
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	-	120	170	550

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	-	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	3.8
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	18
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	< 10	-	210
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	< 10	-	400
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	-	630

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541537	1541538	1541539	1541540	1541541
Sample Reference				TP213	TP209	TP209	TP207	TP233
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.60-0.70	0.30-0.50	0.10-0.20
Date Sampled				04/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	< 100	-	-	< 100	1300



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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541542	1541543	1541544	1541545	1541546
Sample Reference				SS5	SS6	SS7	TP208	TP221
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	0.40-0.50	0.30-0.40
Date Sampled				05/06/2020	05/06/2020	05/06/2020	05/06/2020	08/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	3.1	5.3	6.7	6.3	9.0
Total mass of sample received	kg	0.001	NONE	1.2	1.2	0.90	0.50	1.0

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	-	7.3	8.5	11.4
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	190	-	1600	-	1500
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.017	-	0.55	0.094	0.095
Sulphide	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	< 5.0	-	140	-	< 5.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.2	0.4	0.9	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	< 0.80	-	< 0.80
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541542	1541543	1541544	1541545	1541546
Sample Reference				SS5	SS6	SS7	TP208	TP221
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	0.40-0.50	0.30-0.40
Date Sampled				05/06/2020	05/06/2020	05/06/2020	05/06/2020	08/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.7	-	9.0	7.8	21
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.68	-	1.8	-	2.0
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	-	1.9	0.6	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.3	< 0.2	3.1
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.3	-	13	24	36
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	-	31	13	74
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	-	29	7.7	170
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	-	25	22	62
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18	-	26	-	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	59	-	66	36	170

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541542	1541543	1541544	1541545	1541546
Sample Reference				SS5	SS6	SS7	TP208	TP221
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	0.40-0.50	0.30-0.40
Date Sampled				05/06/2020	05/06/2020	05/06/2020	05/06/2020	08/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	< 100	-	< 100	-	< 100

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541547	1541548	1541549	1541550	1541551
Sample Reference				TP223	TP225	TP218	TP217	TP219
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25-0.35	0.00-0.10	0.20-0.30	0.20-0.30	0.10-0.20
Date Sampled				08/06/2020	08/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	9.4	8.7	11	9.3	11
Total mass of sample received	kg	0.001	NONE	1.2	1.2	1.2	1.2	0.90

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	Crocidolite	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	9.6	6.8	7.8	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	910	-	1400	-	240
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.10	0.32	0.56	0.24	0.040
Sulphide	mg/kg	1	MCERTS	7.4	-	< 1.0	-	< 1.0
Elemental Sulphur	mg/kg	5	MCERTS	32	-	120	-	< 5.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.43	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.41	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.35	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.30	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.84	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541547	1541548	1541549	1541550	1541551
Sample Reference				TP223	TP225	TP218	TP217	TP219
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25-0.35	0.00-0.10	0.20-0.30	0.20-0.30	0.10-0.20
Date Sampled				08/06/2020	08/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	14	16	13	8.3
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	7.0	-	0.45	-	1.0
Boron (water soluble)	mg/kg	0.2	MCERTS	2.9	4.7	1.1	9.1	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	0.2	0.3	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	25	13	19	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	72	38	15	25	34
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	50	18	29	28
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	55	22	11	22	33
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	60	-	26	-	27
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	65	85	38	69	110

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	-	-



Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541547	1541548	1541549	1541550	1541551
Sample Reference				TP223	TP225	TP218	TP217	TP219
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25-0.35	0.00-0.10	0.20-0.30	0.20-0.30	0.10-0.20
Date Sampled				08/06/2020	08/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	300	-	250	-	150

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541552	1541553	1541554	1541555	1541556
Sample Reference				TPA	TPB	TPC	TPD	TPE
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				09/06/2020	09/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	-	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	-	-	4.7	11
Total mass of sample received	kg	0.001	NONE	1.2	-	-	0.90	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.0	-	-	-	8.3
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.054	-	-	-	0.26
Sulphide	mg/kg	1	MCERTS	-	-	-	-	-
Elemental Sulphur	mg/kg	5	MCERTS	-	-	-	-	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.8	-	-	1.1	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	-	< 0.80	-
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541552	1541553	1541554	1541555	1541556
Sample Reference				TPA	TPB	TPC	TPD	TPE
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				09/06/2020	09/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4	-	-	-	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.4	-	-	-	4.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	-	-	-	0.4
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	-	-	-	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	-	-	-	36
Lead (aqua regia extractable)	mg/kg	1	MCERTS	27	-	-	-	67
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	-	-	-	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	-	-	-	98

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541552	1541553	1541554	1541555	1541556
Sample Reference				TPA	TPB	TPC	TPD	TPE
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				09/06/2020	09/06/2020	09/06/2020	09/06/2020	09/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-
Miscellaneous Organics								
Toluene Extractable Matter	mg/kg	100	NONE	-	-	-	-	-

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541557	1541558	1541559		
Sample Reference				TPF	TPG	SS8		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				08/06/2020	09/06/2020	09/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	-	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	-	7.4	9.1		
Total mass of sample received	kg	0.001	NONE	-	1.2	1.2		

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-		
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.5	8.3		
Total Cyanide	mg/kg	1	MCERTS	-	-	< 1		
Free Cyanide	mg/kg	1	MCERTS	-	-	< 1		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	3600		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.70	0.27		
Sulphide	mg/kg	1	MCERTS	-	-	< 1.0		
Elemental Sulphur	mg/kg	5	MCERTS	-	-	5.1		
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	1.0	-		

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0		
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	2.7		
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	2.0		
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	-	0.57	2.4		
Pyrene	mg/kg	0.05	MCERTS	-	0.59	1.9		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.51	1.1		
Chrysene	mg/kg	0.05	MCERTS	-	0.32	1.4		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.48	1.0		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.23	0.39		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.40	0.43		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	3.10	13.4		
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Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541557	1541558	1541559		
Sample Reference				TPF	TPG	SS8		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				08/06/2020	09/06/2020	09/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	13	39		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	1.8		
Boron (water soluble)	mg/kg	0.2	MCERTS	-	4.0	1.6		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.5	0.6		
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	21	23		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	38	78		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	61	42		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	23	61		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	2.7		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	36		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	100	130		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-		
Toluene	µg/kg	1	MCERTS	-	-	-		
Ethylbenzene	µg/kg	1	MCERTS	-	-	-		
p & m-xylene	µg/kg	1	MCERTS	-	-	-		
o-xylene	µg/kg	1	MCERTS	-	-	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		

Analytical Report Number: 20-15630

Project / Site name: Drakelow, Rugeley

Your Order No: 1644G

Lab Sample Number				1541557	1541558	1541559		
Sample Reference				TPF	TPG	SS8		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				08/06/2020	09/06/2020	09/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
PCBs by GC-MS								
PCB Congener 28				mg/kg	0.001	MCERTS	-	-
PCB Congener 52				mg/kg	0.001	MCERTS	-	-
PCB Congener 101				mg/kg	0.001	MCERTS	-	-
PCB Congener 118				mg/kg	0.001	MCERTS	-	-
PCB Congener 138				mg/kg	0.001	MCERTS	-	-
PCB Congener 153				mg/kg	0.001	MCERTS	-	-
PCB Congener 180				mg/kg	0.001	MCERTS	-	-
Total PCBs by GC-MS								
Total PCBs				mg/kg	0.007	MCERTS	-	-
Miscellaneous Organics								
Toluene Extractable Matter				mg/kg	100	NONE	-	200



Analytical Report Number: 20-15630
Project / Site name: Drakelow, Rugeley
Your Order No: 1644G

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1541516	DS207	0.10-0.50	148	Loose Fibres	Chrysotile	< 0.001	< 0.001
1541518	DS205	0.70-0.80	125	Loose Fibres	Chrysotile	< 0.001	< 0.001
1541520	DS212	0.10-0.20	155	Loose Fibres	Chrysotile	< 0.001	< 0.001
1541538	TP209	0.20-0.30	136	Loose Fibres	Chrysotile	0.001	0.001
1541548	TP225	0.00-0.10	125	Loose Fibres	Chrysotile	< 0.001	< 0.001
1541550	TP217	0.20-0.30	139	Loose Fibres	Crocidolite	< 0.001	< 0.001

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



Analytical Report Number : 20-15630

Project / Site name: Drakelow, Rugeley

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1541507	DS211	None Supplied	0.20-0.30	Brown loam and clay with gravel.
1541508	DS211	None Supplied	1.10-1.20	Brown loam and clay with gravel.
1541509	DS210	None Supplied	0.40-0.60	Brown loam and clay with gravel.
1541510	DS209	None Supplied	0.50-0.70	Brown loam and clay with gravel.
1541511	DS204	None Supplied	0.50-0.60	Brown loam and clay with gravel.
1541512	DS204	None Supplied	0.40-0.50	-
1541513	DS208	None Supplied	0.50-0.60	Brown loam and clay with gravel.
1541514	DS208	None Supplied	1.90-2.00	Brown loam and clay with gravel and vegetation.
1541515	DS203	None Supplied	0.40-0.50	Brown loam and clay with gravel.
1541516	DS207	None Supplied	0.10-0.50	Brown loam and clay with gravel.
1541517	DS206	None Supplied	0.70-0.80	Brown loam and clay with gravel and vegetation.
1541518	DS205	None Supplied	0.70-0.80	Brown loam and clay with gravel.
1541519	DS205	None Supplied	2.80-2.90	Brown loam and clay with gravel.
1541520	DS212	None Supplied	0.10-0.20	Brown loam and clay with gravel.
1541521	TPH	None Supplied	None Supplied	Brown loam with gravel and vegetation.
1541522	TPI	None Supplied	None Supplied	-
1541523	TPJ	None Supplied	None Supplied	Brown loam with gravel.
1541524	TP231	None Supplied	0.40-0.50	Brown loam with gravel.
1541525	TP231	None Supplied	1.30-1.40	Brown loam and clay with gravel.
1541526	TP228	None Supplied	0.25-0.30	Brown loam and clay with gravel.
1541527	TP232	None Supplied	0.30-0.40	Brown loam and clay with gravel.
1541528	TP232	None Supplied	0.80-0.90	Brown loam and clay with gravel.
1541529	TP232	None Supplied	1.70-1.80	Brown loam and clay with gravel.
1541530	TP230	None Supplied	0.35-0.45	Brown loam and clay with gravel.
1541531	TP230	None Supplied	0.60-0.70	Brown loam and clay with gravel.
1541532	TP229A	None Supplied	0.50-0.60	Brown loam and clay with gravel.
1541533	TP220	None Supplied	0.30-0.40	Brown loam and clay with gravel.
1541534	TP216	None Supplied	0.20-0.30	Brown loam and clay with gravel.
1541535	TP215	None Supplied	0.10-0.20	Brown loam and clay with gravel.
1541536	TP214	None Supplied	0.60-0.50	Brown loam and clay with gravel.
1541537	TP213	None Supplied	0.30-0.40	Brown loam and clay with gravel.
1541538	TP209	None Supplied	0.20-0.30	-
1541539	TP209	None Supplied	0.60-0.70	Brown loam and clay with gravel.
1541540	TP207	None Supplied	0.30-0.50	Brown loam and clay with gravel.
1541541	TP233	None Supplied	0.10-0.20	Brown loam and clay with gravel.
1541542	SS5	None Supplied	None Supplied	Brown loam and clay with gravel.
1541543	SS6	None Supplied	None Supplied	Brown loam and clay with gravel.
1541544	SS7	None Supplied	None Supplied	Brown loam and clay with gravel.
1541545	TP208	None Supplied	0.40-0.50	Brown loam and clay with gravel.
1541546	TP221	None Supplied	0.30-0.40	Brown loam and clay with gravel.
1541547	TP223	None Supplied	0.25-0.35	Brown loam and clay with gravel.
1541548	TP225	None Supplied	0.00-0.10	Brown loam and clay with gravel and vegetation.
1541549	TP218	None Supplied	0.20-0.30	Brown loam and clay with gravel and vegetation.
1541550	TP217	None Supplied	0.20-0.30	Brown loam and clay with gravel.
1541551	TP219	None Supplied	0.10-0.20	Brown loam and clay with gravel and vegetation.
1541552	TPA	None Supplied	None Supplied	Brown loam and clay with gravel.
1541553	TPB	None Supplied	None Supplied	-
1541554	TPC	None Supplied	None Supplied	-
1541555	TPD	None Supplied	None Supplied	Brown loam with gravel and vegetation.
1541556	TPE	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
1541557	TPF	None Supplied	None Supplied	-
1541558	TPG	None Supplied	None Supplied	Brown loam and clay with gravel.
1541559	SS8	None Supplied	None Supplied	Brown loam with gravel and vegetation.

Analytical Report Number : 20-15630

Project / Site name: Drakelow, Rugeley

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS

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The results included within the report relate only to the sample(s) submitted for testing.

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Project / Site name: Drakelow, Rugeley

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Toluene Extractable Matter in soil	Gravimetrically determined through extraction with toluene.	In-house method	L013-PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
DS203		S	20-15630	1541515	c	Free cyanide in soil	L080-PL	c
DS203		S	20-15630	1541515	c	Sulphide in soil	L010-PL	c
DS203		S	20-15630	1541515	c	Toluene Extractable Matter in soil	L013-PL	c
DS203		S	20-15630	1541515	c	Total cyanide in soil	L080-PL	c
DS204		S	20-15630	1541511	c	Free cyanide in soil	L080-PL	c
DS204		S	20-15630	1541511	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
DS204		S	20-15630	1541511	c	Sulphide in soil	L010-PL	c
DS204		S	20-15630	1541511	c	Toluene Extractable Matter in soil	L013-PL	c
DS204		S	20-15630	1541511	c	Total cyanide in soil	L080-PL	c
DS205		S	20-15630	1541518	bc	Free cyanide in soil	L080-PL	c
DS205		S	20-15630	1541518	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
DS205		S	20-15630	1541518	bc	Sulphide in soil	L010-PL	c
DS205		S	20-15630	1541518	bc	TPHCWG (Soil)	L088/76-PL	b
DS205		S	20-15630	1541518	bc	Toluene Extractable Matter in soil	L013-PL	c
DS205		S	20-15630	1541518	bc	Total cyanide in soil	L080-PL	c
DS206		S	20-15630	1541517	c	Free cyanide in soil	L080-PL	c
DS206		S	20-15630	1541517	c	Sulphide in soil	L010-PL	c
DS206		S	20-15630	1541517	c	Toluene Extractable Matter in soil	L013-PL	c
DS206		S	20-15630	1541517	c	Total cyanide in soil	L080-PL	c
DS207		S	20-15630	1541516	c	Free cyanide in soil	L080-PL	c
DS207		S	20-15630	1541516	c	Sulphide in soil	L010-PL	c
DS207		S	20-15630	1541516	c	Toluene Extractable Matter in soil	L013-PL	c
DS207		S	20-15630	1541516	c	Total cyanide in soil	L080-PL	c
DS208		S	20-15630	1541513	c	Free cyanide in soil	L080-PL	c
DS208		S	20-15630	1541513	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
DS208		S	20-15630	1541513	c	Sulphide in soil	L010-PL	c
DS208		S	20-15630	1541513	c	Toluene Extractable Matter in soil	L013-PL	c
DS208		S	20-15630	1541513	c	Total cyanide in soil	L080-PL	c
DS208		S	20-15630	1541514	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
DS208		S	20-15630	1541514	bc	TPHCWG (Soil)	L088/76-PL	b
DS209		S	20-15630	1541510	c	Free cyanide in soil	L080-PL	c
DS209		S	20-15630	1541510	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
DS209		S	20-15630	1541510	c	Sulphide in soil	L010-PL	c
DS209		S	20-15630	1541510	c	Toluene Extractable Matter in soil	L013-PL	c
DS209		S	20-15630	1541510	c	Total cyanide in soil	L080-PL	c
DS210		S	20-15630	1541509	c	Free cyanide in soil	L080-PL	c
DS210		S	20-15630	1541509	c	Sulphide in soil	L010-PL	c
DS210		S	20-15630	1541509	c	Toluene Extractable Matter in soil	L013-PL	c
DS210		S	20-15630	1541509	c	Total cyanide in soil	L080-PL	c
DS211		S	20-15630	1541507	c	Free cyanide in soil	L080-PL	c
DS211		S	20-15630	1541507	c	Sulphide in soil	L010-PL	c
DS211		S	20-15630	1541507	c	Toluene Extractable Matter in soil	L013-PL	c
DS211		S	20-15630	1541507	c	Total cyanide in soil	L080-PL	c
DS212		S	20-15630	1541520	c	Free cyanide in soil	L080-PL	c
DS212		S	20-15630	1541520	c	Sulphide in soil	L010-PL	c
DS212		S	20-15630	1541520	c	Toluene Extractable Matter in soil	L013-PL	c
DS212		S	20-15630	1541520	c	Total cyanide in soil	L080-PL	c
SS5		S	20-15630	1541542	c	Free cyanide in soil	L080-PL	c
SS5		S	20-15630	1541542	c	Sulphide in soil	L010-PL	c
SS5		S	20-15630	1541542	c	Toluene Extractable Matter in soil	L013-PL	c
SS5		S	20-15630	1541542	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

SS7		S	20-15630	1541544	c	Free cyanide in soil	L080-PL	c
SS7		S	20-15630	1541544	c	Sulphide in soil	L010-PL	c
SS7		S	20-15630	1541544	c	Toluene Extractable Matter in soil	L013-PL	c
SS7		S	20-15630	1541544	c	Total cyanide in soil	L080-PL	c
SS8		S	20-15630	1541559	c	Free cyanide in soil	L080-PL	c
SS8		S	20-15630	1541559	c	Sulphide in soil	L010-PL	c
SS8		S	20-15630	1541559	c	Toluene Extractable Matter in soil	L013-PL	c
SS8		S	20-15630	1541559	c	Total cyanide in soil	L080-PL	c
TP207		S	20-15630	1541540	c	Free cyanide in soil	L080-PL	c
TP207		S	20-15630	1541540	c	Sulphide in soil	L010-PL	c
TP207		S	20-15630	1541540	c	Toluene Extractable Matter in soil	L013-PL	c
TP207		S	20-15630	1541540	c	Total cyanide in soil	L080-PL	c
TP209		S	20-15630	1541539	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP213		S	20-15630	1541537	c	Free cyanide in soil	L080-PL	c
TP213		S	20-15630	1541537	c	Sulphide in soil	L010-PL	c
TP213		S	20-15630	1541537	c	Toluene Extractable Matter in soil	L013-PL	c
TP213		S	20-15630	1541537	c	Total cyanide in soil	L080-PL	c
TP215		S	20-15630	1541535	c	Free cyanide in soil	L080-PL	c
TP215		S	20-15630	1541535	c	Sulphide in soil	L010-PL	c
TP215		S	20-15630	1541535	c	Toluene Extractable Matter in soil	L013-PL	c
TP215		S	20-15630	1541535	c	Total cyanide in soil	L080-PL	c
TP218		S	20-15630	1541549	c	Free cyanide in soil	L080-PL	c
TP218		S	20-15630	1541549	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP218		S	20-15630	1541549	c	Sulphide in soil	L010-PL	c
TP218		S	20-15630	1541549	c	Toluene Extractable Matter in soil	L013-PL	c
TP218		S	20-15630	1541549	c	Total cyanide in soil	L080-PL	c
TP219		S	20-15630	1541551	c	Free cyanide in soil	L080-PL	c
TP219		S	20-15630	1541551	c	Sulphide in soil	L010-PL	c
TP219		S	20-15630	1541551	c	Toluene Extractable Matter in soil	L013-PL	c
TP219		S	20-15630	1541551	c	Total cyanide in soil	L080-PL	c
TP220		S	20-15630	1541533	c	Free cyanide in soil	L080-PL	c
TP220		S	20-15630	1541533	c	Sulphide in soil	L010-PL	c
TP220		S	20-15630	1541533	c	Toluene Extractable Matter in soil	L013-PL	c
TP220		S	20-15630	1541533	c	Total cyanide in soil	L080-PL	c
TP221		S	20-15630	1541546	c	Free cyanide in soil	L080-PL	c
TP221		S	20-15630	1541546	c	Sulphide in soil	L010-PL	c
TP221		S	20-15630	1541546	c	Toluene Extractable Matter in soil	L013-PL	c
TP221		S	20-15630	1541546	c	Total cyanide in soil	L080-PL	c
TP223		S	20-15630	1541547	c	Free cyanide in soil	L080-PL	c
TP223		S	20-15630	1541547	c	Sulphide in soil	L010-PL	c
TP223		S	20-15630	1541547	c	Toluene Extractable Matter in soil	L013-PL	c
TP223		S	20-15630	1541547	c	Total cyanide in soil	L080-PL	c
TP228		S	20-15630	1541526	c	Free cyanide in soil	L080-PL	c
TP228		S	20-15630	1541526	c	Sulphide in soil	L010-PL	c
TP228		S	20-15630	1541526	c	Toluene Extractable Matter in soil	L013-PL	c
TP228		S	20-15630	1541526	c	Total cyanide in soil	L080-PL	c
TP229A		S	20-15630	1541532	c	Free cyanide in soil	L080-PL	c
TP229A		S	20-15630	1541532	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP229A		S	20-15630	1541532	c	Sulphide in soil	L010-PL	c
TP229A		S	20-15630	1541532	c	Toluene Extractable Matter in soil	L013-PL	c
TP229A		S	20-15630	1541532	c	Total cyanide in soil	L080-PL	c
TP230		S	20-15630	1541530	c	Free cyanide in soil	L080-PL	c
TP230		S	20-15630	1541530	c	Sulphide in soil	L010-PL	c
TP230		S	20-15630	1541530	c	Toluene Extractable Matter in soil	L013-PL	c

TP230		S	20-15630	1541530	c	Total cyanide in soil	L080-PL	c
TP231		S	20-15630	1541524	c	Free cyanide in soil	L080-PL	c
TP231		S	20-15630	1541524	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP231		S	20-15630	1541524	c	Sulphide in soil	L010-PL	c
TP231		S	20-15630	1541524	c	Toluene Extractable Matter in soil	L013-PL	c
TP231		S	20-15630	1541524	c	Total cyanide in soil	L080-PL	c
TP233		S	20-15630	1541541	c	Free cyanide in soil	L080-PL	c
TP233		S	20-15630	1541541	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP233		S	20-15630	1541541	c	Sulphide in soil	L010-PL	c
TP233		S	20-15630	1541541	c	Toluene Extractable Matter in soil	L013-PL	c
TP233		S	20-15630	1541541	c	Total cyanide in soil	L080-PL	c



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: 01/07/2020

Zone: Area A - PAH

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Dibenzo(ah) anthracene															
		mg/kg															
TP105	0.20	0.05															
TP106	0.30	0.05															
TP107	0.70	0.05															
TP108	0.20	0.05															
TP109	0.80	0.05															
TP110	0.50	0.05															
TP111	0.20	0.05															
TP112	0.20	0.05															
TP113	0.20	0.05															
TP114	0.20	0.3															
TP115	0.20	0.05															
TP116	0.20	0.05															
TP117	0.15	0.05															
Number of samples (N)		13															
Minimum		0.05															
Maximum		0.3															
Standard Deviation		0															
Screening Value (Critical Conc.; Cc)		0.24															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		3.328															
Critical Value (Tcrit)		2.331															
Is there an Outlier (Tn > Tcrit)		YES															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.31															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		0.15															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		YES															
Level of Evidence (p1, %)		98															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Job Name: Drakelow, Burton upon Trent

Assessor: LG

Date: Jul-20

Proposed Land Use: Residential with Home Grown Produce

Zone: Area B - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq Cc$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < Cc$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Lead mg/kg	Zinc mg/kg														
DS210	0.40-0.60	36	69														
DS204	0.50-0.60	4.7	66														
DS203	0.40-0.50	16	49														
CP39	0.50	500	96														
WS27	0.50	31	61														
WS27	1.20	9.7	75														
WS29	0.40	1100	5700														
WS30	0.30	160	140														
Number of samples (N)		8	8														
Minimum		4.7	49														
Maximum		1100	5700														
Standard Deviation		389	1987														
Screening Value (Critical Conc.; Cc)		200	3700														
Source of Screening Value		C4SL	S4UL														
Outlier Identification																	
Standardised Value (Tn)		1.562	2.424														
Critical Value (Tcrit)		2.032	2.032														
Is there an Outlier (Tn > Tcrit)		NO	YES														
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	NO														
Shapiro-Wilk statistic (W)		0.67	0.43														
Shapiro-Wilk Test (is W > Sig(0.05))		NO	NO														
Mean Concentration (95% UCL)		n/a	n/a														
Is there significant evidence that the mean concentration is less than the screening value ($\mu < Cc$)?		n/a	n/a														
Level of Evidence (p1, %)		n/a	n/a														
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	YES														
Mean Concentration (95% UCL)		831	3846														
Is there significant evidence that the mean concentration is less than the screening value ($\mu < Cc$)?		NO	NO														
Level of Evidence (p1, %)		<51	94														

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Area B - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Lead mg/kg	Zinc mg/kg														
DS210	0.40-0.60	36	69														
DS204	0.50-0.60	4.7	66														
DS203	0.40-0.50	16	49														
CP39	0.50	500	96														
WS27	0.50	31	61														
WS27	1.20	9.7	75														
WS30	0.30	160	140														
Number of samples (N)		7	7														
Minimum		4.7	49														
Maximum		500	140														
Standard Deviation		181	30														
Screening Value (Critical Conc.; Cc)		200	3700														
Source of Screening Value		C4SL	S4UL														
Outlier Identification																	
Standardised Value (Tn)		1.644	1.819														
Critical Value (Tcrit)		1.938	1.938														
Is there an Outlier (Tn > Tcrit)		NO	NO														
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	YES														
Shapiro-Wilk statistic (W)		0.65	0.85														
Shapiro-Wilk Test (is W > Sig(0.05))		NO	YES														
Mean Concentration (95% UCL)		n/a	102														
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	YES														
Level of Evidence (p1, %)		n/a	100														
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	NO														
Mean Concentration (95% UCL)		406	n/a														
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO	n/a														
Level of Evidence (p1, %)		64	n/a														

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Job Name: Drakelow, Burton upon Trent

Assessor: LG

Date: Jul-20

Proposed Land Use: Residential with Home Grown Produce

Zone: Area C - Arsenic - all samples

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As) mg/kg															
DS205	0.70-0.80	78															
DS205	2.80-2.90	9.1															
DS206	0.70-0.80	4.7															
DS207	0.10-0.50	8.5															
DS208	0.50-0.60	4.7															
DS209	0.50-0.70	58															
DS211	0.20-0.30	14															
DS211	1.10-1.20	5															
DS212	0.10-0.20	14															
TP209	0.60-0.70	63															
CP38	0.50	4.8															
CP38	1.00	3.6															
WS26	0.50	4.3															
WS28	0.40	14															
WS28	0.70	43															
WS25	0.60	21															
Number of samples (N)		16															
Minimum		3.6															
Maximum		78															
Standard Deviation		24															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		1.718															
Critical Value (Tcrit)		2.443															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.74															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		48															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		86															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Job Name: Drakelow, Burton upon Trent

Assessor: LG

Date: Jul-20

Proposed Land Use: Residential with Home Grown Produce

Zone: Area C - Arsenic - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As)															
		mg/kg															
DS205	0.70-0.80	78															
DS205	2.80-2.90	9.1															
DS206	0.70-0.80	4.7															
DS207	0.10-0.50	8.5															
DS208	0.50-0.60	4.7															
DS209	0.50-0.70	58															
DS211	0.20-0.30	14															
DS212	0.10-0.20	14															
TP209	0.60-0.70	63															
WS26	0.50	4.3															
WS28	0.40	14															
WS28	0.70	43															
WS25	0.60	21															
Number of samples (N)		13															
Minimum		4.3															
Maximum		78															
Standard Deviation		26															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		1.536															
Critical Value (Tcrit)		2.331															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.80															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		57															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		71															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Area C - Beryllium

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Beryllium mg/kg															
DS205	0.70-0.80	5.5															
DS206	0.70-0.80	0.47															
DS207	0.10-0.50	0.7															
DS208	0.50-0.60	1.2															
DS209	0.50-0.70	4.3															
DS211	0.20-0.30	1.3															
DS212	0.10-0.20	2.4															
Number of samples (N)		7															
Minimum		0.47															
Maximum		5.5															
Standard Deviation		2															
Screening Value (Critical Conc.; Cc)		1.7															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		1.343															
Critical Value (Tcrit)		1.938															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		YES															
Shapiro-Wilk statistic (W)		0.86															
Shapiro-Wilk Test (is W > Sig(0.05))		YES															
Mean Concentration (95% UCL)		3.7															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		<51															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Job Name: Drakelow, Burton upon Trent

Assessor: LG

Date: Jul-20

Proposed Land Use: Residential with Home Grown Produce

Zone: Areas H & I - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic mg/kg															
TP003	0.5	7.9															
TP014	0.6	67															
TP028	0.2	28															
TP015	0.4	1.3															
TP017	0.5	15															
TP005	0.7	19															
TP007	0.2	17															
TP008	0.5	16															
TP009	1.8	17															
TP011	0.4	7.1															
TP011	2.8	4.9															
TP012	2	11															
TP013	0.6	23															
TP019	0.5	16															
TP020	0.8	15															
TP021	1	12															
Number of samples (N)		16															
Minimum		1.3															
Maximum		67															
Standard Deviation		15															
Screening Value (Critical Conc.; C _c)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (T _n)		1.924															
Critical Value (T _{crit})		2.443															
Is there an Outlier (T _n > T _{crit})		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.71															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p ₁ , %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		34															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		YES															
Level of Evidence (p ₁ , %)		96															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Areas H & I - MG only - Dibenzo(ah)anthracene

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Dibenzo(ah)anthracene															
		mg/kg															
TP003	0.50	0.05															
TP014	0.60	0.05															
TP028	0.20	0.05															
TP015	0.40	0.05															
TP017	0.50	0.05															
TP005	0.70	0.05															
TP007	0.20	0.05															
TP008	0.50	0.05															
TP009	1.80	0.28															
TP011	0.40	0.05															
TP011	2.80	0.05															
TP012	2.00	0.05															
TP013	0.60	0.05															
TP019	0.50	0.05															
TP020	0.80	0.05															
TP021	1.00	0.05															
Number of samples (N)		16															
Minimum		0.05															
Maximum		0.28															
Standard Deviation		0															
Screening Value (Critical Conc.; C _c)		0.24															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (T _n)		3.750															
Critical Value (T _{crit})		2.443															
Is there an Outlier (T _n > T _{crit})		YES															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.27															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p ₁ , %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		0.13															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		YES															
Level of Evidence (p ₁ , %)		99															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Areas J&K - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As)															
		mg/kg															
TP207	0.3-0.5	21															
TP233	0.1-0.2	50															
SS5	0.00	6.7															
SS7	0.00	9															
TP208	0.4-0.5	7.8															
SS8	0.00	39															
TP022	1.00	8.1															
TP022	2.50	4.3															
TP023	3.00	6.4															
TP029	1.20	9.6															
TP030	0.50	87															
TP030	2.20	15															
TP033	0.40	5.3															
TP035	0.50	6.3															
TP035	2.00	7.2															
BH01	0.50	1															
BH01	1.00	4.4															
BH02	0.60	7.9															
BH04	1.00	14															
Number of samples (N)		19															
Minimum		1															
Maximum		87															
Standard Deviation		21															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		2.195															
Critical Value (Tcrit)		2.531															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.63															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		37															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		94															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Areas J&K - MG only - PAH w/o outlier

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Naphthalene mg/kg	Benzo(a) anthracene mg/kg	Chrysene mg/kg	Benzo(b) fluoranthene mg/kg	Benzo(a) pyrene mg/kg	Dibenzo(ah) anthracene mg/kg										
TP207	0.3-0.5	0.57	3.3	3.0	3.4	2.9	0.5										
SS5	0.00	0.05	0.05	0.05	0.05	0.05	0.05										
SS7	0.00	0.05	0.05	0.05	0.05	0.05	0.05										
SS8	0.00	2.70	1.10	1.40	1.00	0.43	0.05										
TP022	1.00	0.05	0.05	0.05	0.05	0.05	0.05										
TP022	2.50	0.05	0.05	0.05	0.05	0.05	0.05										
TP023	3.00	0.05	0.05	0.05	0.05	0.05	0.05										
TP029	1.20	0.05	0.05	0.05	0.05	0.05	0.05										
TP030	0.50	0.41	0.05	0.05	0.05	0.05	0.05										
TP030	2.20	0.05	0.05	0.05	0.05	0.05	0.05										
TP033	0.40	0.05	0.05	0.05	0.05	0.05	0.05										
TP035	0.50	0.05	0.05	0.05	0.05	0.05	0.05										
TP035	2.00	0.05	0.05	0.05	0.05	0.05	0.05										
BH01	0.50	0.05	0.05	0.05	0.05	0.05	0.05										
BH01	1.00	0.05	0.05	0.05	0.05	0.05	0.05										
BH02	0.60	0.05	0.05	0.05	0.05	0.05	0.05										
BH04	1.00	0.05	0.05	0.05	0.05	0.05	0.05										
Number of samples (N)		17	17	17	17	17	17										
Minimum		0.05	0.05	0.05	0.05	0.05	0.05										
Maximum		2.7	3.3	3.0	3.4	2.9	0.5										
Standard Deviation		1	1	1	1	1	0										
Screening Value (Critical Conc.; Cc)		2.3	7.2	15	2.6	2.2	0.24										
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL										
Outlier Identification																	
Standardised Value (Tn)		2.975	3.072	2.948	3.117	3.405	3.881										
Critical Value (Tcrit)		2.475	2.475	2.475	2.475	2.475	2.475										
Is there an Outlier (Tn > Tcrit)		YES	YES	YES	YES	YES	YES										
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	NO	NO	NO	NO	NO										
Shapiro-Wilk statistic (W)		0.37	0.36	0.39	0.35	0.31	0.26										
Shapiro-Wilk Test (is W > Sig(0.05))		NO	NO	NO	NO	NO	NO										
Mean Concentration (95% UCL)		n/a	n/a	n/a	n/a	n/a	n/a										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	n/a	n/a	n/a	n/a	n/a										
Level of Evidence (p_1 , %)		n/a	n/a	n/a	n/a	n/a	n/a										
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	YES	YES	YES	YES	YES										
Mean Concentration (95% UCL)		0.94	1.16	1.12	1.18	0.97	0.19										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		YES	YES	YES	YES	YES	YES										
Level of Evidence (p_1 , %)		99	99	99	99	99	97										

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Area L - MG only

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As)															
		mg/kg															
TP220	0.30-0.40	6.7															
TP216	0.20-0.30	10															
TP215	0.10-0.20	11															
TP218	0.20-0.30	16															
TP217	0.20-0.30	13															
TP219	0.10-0.20	8.3															
CP21	0.20	14															
TP081	1.00	12															
TP081	4.00	130															
TP059	0.50	7.5															
TP061	0.40	13															
TP063	0.60	7.4															
TP064	0.20	13															
TP065	1.10	5.9															
TP065	3.00	4.6															
TP068	0.40	11															
TP073	0.90	85															
TP061	0.40	11															
TP065	1.10	4															
CP15	4.60	24															
CP17	0.5	9.5															
CP17	1	29															
CP16	0.50	11															
CP16	1.00	12															
CP16	2.70	18															
Number of samples (N)		25															
Minimum		4															
Maximum		130															
Standard Deviation		28															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		2.970															
Critical Value (Tcrit)		2.663															
Is there an Outlier (Tn > Tcrit)		YES															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.49															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		44															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		90															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Areas M & N - made ground

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As)	Boron	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc						
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
TP230	0.35-0.45	38															
TP229A	0.50-0.60	31															
TP223	0.25-0.35	18															
TP225	0.00-0.10	14															
TP096	0.40	80															
TP099	0.20	7.7															
TP100	0.40	12															
TP101	0.30	12															
TP102	0.60	91															
TP120	0.30	69															
TP082	0.70	21															
TP082	3.80	7.8															
TP083	0.50	24															
TP084	0.5	28															
TP084	2.5	97															
TP085	0.5	21															
TP086	2.5	110															
CP13	0.3	81															
CP13	2.5	55															
Number of samples (N)		19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum		7.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum		110	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation		34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Screening Value (Critical Conc.; Cc)		37	290	11	910	2400	200	1.2	180	250	3,700						
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	C4SL	S4UL	S4UL	S4UL	S4UL						
Outlier Identification																	
Standardised Value (Tn)		1.455	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Critical Value (Tcrit)		2.531	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Is there an Outlier (Tn > Tcrit)		NO	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Shapiro-Wilk statistic (W)		0.86	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Shapiro-Wilk Test (is W > Sig(0.05))		NO	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Mean Concentration (95% UCL)		n/a	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Level of Evidence (p ₁ , %)		n/a	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Mean Concentration (95% UCL)		77	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	n/a	n/a	n/a	n/a	n/a	n/a
Level of Evidence (p ₁ , %)		<51	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	n/a	n/a	n/a	n/a	n/a	n/a

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton upon Trent

Date: Jul-20

Zone: Area O - made ground

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As)	Boron	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc						
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
TPH	None Supplied	12															
TPJ	None Supplied	13															
TP231	0.40-0.50	12															
TP228	0.25-0.30	120															
BH22	2.50	18															
WS17	0.4	14															
WS17	1.8	150															
WS18	1.3	27															
WS19	0.2	11															
Number of samples (N)		9															
Minimum		11															
Maximum		150															
Standard Deviation		54															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		1.806															
Critical Value (Tcrit)		2.110															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probablility plot)		NO															
Shapiro-Wilk statistic (W)		0.63															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		120															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		<51															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of dectection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: 20040

Assessor: LG

Proposed Land Use: Residential with Home Grown Produce

Job Name: Drakelow, Burton up Trent

Date: Jul-20

Zone: Areas P & S

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Arsenic (As) mg/kg															
TP037	0.50	60															
TP037	1.90	17															
TP038	0.40	24															
TP039	1.00	58															
TP041	0.20	8.4															
TP041	1.00	29															
TP042	0.50	7.8															
TP043	0.40	20															
TP045	0.50	17															
TP045	1.20	37															
TP045	3.00	70															
TP046	0.90	58															
TP047	0.40	7.1															
TP047	1.20	12															
TP047	2.00	10															
TP048	1.00	11															
TP049	1.00	44															
TP050	0.50	23															
TP050	1.50	160															
CP07	1.00	45															
CP08	2	75															
CP08	5	88															
CP10	1.00	6.7															
Number of samples (N)		23															
Minimum		6.7															
Maximum		160															
Standard Deviation		36															
Screening Value (Critical Conc.; Cc)		37															
Source of Screening Value		S4UL															
Outlier Identification																	
Standardised Value (Tn)		1.971															
Critical Value (Tcrit)		2.624															
Is there an Outlier (Tn > Tcrit)		NO															
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO															
Shapiro-Wilk statistic (W)		0.81															
Shapiro-Wilk Test (is W > Sig(0.05))		NO															
Mean Concentration (95% UCL)		n/a															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a															
Level of Evidence (p1, %)		n/a															
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES															
Mean Concentration (95% UCL)		71															
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO															
Level of Evidence (p1, %)		<51															

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.

APPENDIX 7

Target Values Used in Human Health Risk Assessment

DRAKELOW, BURTON-UPON-TRENT
Appendix 7 - Target Values Used to in Human Health Risk Assessment

Substance	Source	Target Value (mg/kg)
Inorganic Mercury	CIEH/LQM – S4UL	40
Elemental Mercury	CIEH/LQM – S4UL	1.2
Selenium	CIEH/LQM – S4UL	250
Arsenic	CIEH/LQM – S4UL	37
Nickel	CIEH/LQM – S4UL	180
Cadmium	CIEH/LQM – S4UL	11
Beryllium	CIEH/LQM – S4UL	1.7
Boron	CIEH/LQM – S4UL	290
Chromium (III)	CIEH/LQM – S4UL	910
Chromium (VI)	CIEH/LQM – S4UL	6
Copper	CIEH/LQM – S4UL	2,400
Lead	C4SL	200
Vanadium	CIEH/LQM – S4UL	410
Zinc	CIEH/LQM – S4UL	3,700
Benzene	CIEH/LQM – S4UL	0.087
Toluene	CIEH/LQM – S4UL	130
Ethylbenzene	CIEH/LQM – S4UL	47
o-xylene	CIEH/LQM – S4UL	60
m-xylene	CIEH/LQM – S4UL	59
p-xylene	CIEH/LQM – S4UL	56
Asbestos	In House	0.001%
Aliphatic EC 5-6	CIEH/LQM – S4UL	42
Aliphatic EC >6-8	CIEH/LQM – S4UL	100
Aliphatic EC >8-10	CIEH/LQM – S4UL	27
Aliphatic EC >10-12	CIEH/LQM – S4UL	130
Aliphatic EC >12-16	CIEH/LQM – S4UL	1,100
Aliphatic EC >16-35	CIEH/LQM – S4UL	65,000
Aliphatic EC >35-44	CIEH/LQM – S4UL	65,000
Aromatic EC >5-7 (benzene)	CIEH/LQM – S4UL	70
Aromatic EC >7-8 (toluene)	CIEH/LQM – S4UL	130
Aromatic EC >8-10	CIEH/LQM – S4UL	34
Aromatic EC >10-12	CIEH/LQM – S4UL	74
Aromatic EC >12-16	CIEH/LQM – S4UL	140
Aromatic EC >16-21	CIEH/LQM – S4UL	260
Aromatic EC >21-35	CIEH/LQM – S4UL	1,100
Aromatic EC >35-44	CIEH/LQM – S4UL	1,100
Acenaphthene	CIEH/LQM – S4UL	210
Acenaphthylene	CIEH/LQM – S4UL	170
Anthracene	CIEH/LQM – S4UL	2,400
Benzo(a)anthracene	CIEH/LQM – S4UL	7.2
Benzo(a)pyrene	CIEH/LQM – S4UL	2.2
Benzo(b)fluoranthene	CIEH/LQM – S4UL	2.6
Benzo(ghi)perylene	CIEH/LQM – S4UL	320
Benzo(k)fluoranthene	CIEH/LQM – S4UL	77
Chrysene	CIEH/LQM – S4UL	15
Dibenzo(ah)anthracene	CIEH/LQM – S4UL	0.24
Fluoranthene	CIEH/LQM – S4UL	280
Fluorene	CIEH/LQM – S4UL	170
Indeno(123-cd)pyrene	CIEH/LQM – S4UL	27
Naphthalene	CIEH/LQM – S4UL	2.3
Phenanthrene	CIEH/LQM – S4UL	95
Pyrene	CIEH/LQM – S4UL	620

Notes

CIEH/LQM* - Suitable for Use Level (S4UL) published by the Chartered Institute of Environmental Health (CIEH) and Land Quality Management (LQM) dated January 2015. Based on 1.0% SOM

C4SL - Category 4 Screening Levels published by DEFRA in 2014

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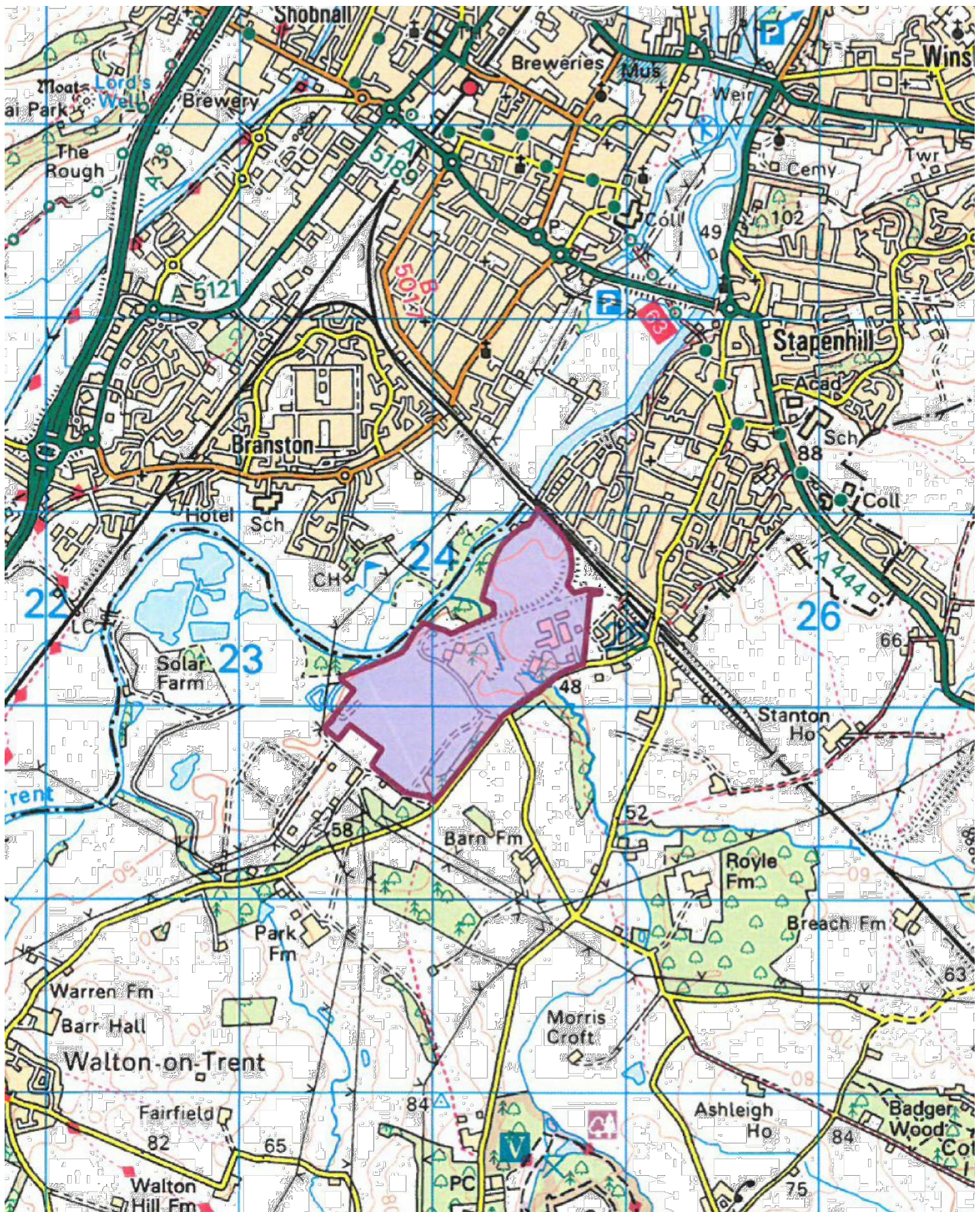
APPENDIX 8

Target Values for Imported Clean Top Soil and Sub Soil Materials

APPENDIX 8 – DRAKELOW, BURTON-UPON-TRENT
Target Values for Imported Top Soil / Sub Soil (if Required)

Substance	Target Value (mg/kg)
Inorganic Mercury	10
Elemental Mercury	0.5
Selenium	25
Arsenic	15
Nickel	100
Cadmium	5
Beryllium	1
Boron	100
Chromium (III)	100
Chromium (VI)	3
Copper	500
Lead	100
Vanadium	150
Zinc	500
Benzene	0.087
Toluene	130
Ethylbenzene	47
o-xylene	60
m-xylene	59
p-xylene	56
Phenol	420
Asbestos	Not detected
Aliphatic EC 5-6	42
Aliphatic EC >6-8	100
Aliphatic EC >8-10	27
Aliphatic EC >10-12	130
Aliphatic EC >12-16	500
Aliphatic EC >16-35	500
Aliphatic EC >35-44	500
Aromatic EC >5-7 (benzene)	70
Aromatic EC >7-8 (toluene)	130
Aromatic EC >8-10	34
Aromatic EC >10-12	74
Aromatic EC >12-16	140
Aromatic EC >16-21	260
Aromatic EC >21-35	500
Aromatic EC >35-44	500
Total TPH	1,000
Acenaphthene	0.1
Acenaphthylene	0.1
Anthracene	0.1
Benzo(a)anthracene	0.1
Benzo(a)pyrene	0.1
Benzo(b)fluoranthene	0.1
Benzo(ghi)perylene	0.1
Benzo(k)fluoranthene	0.1
Chrysene	0.1
Dibenzo(ah)anthracene	0.1
Fluoranthene	0.1
Fluorene	0.1
Indeno(123-cd)pyrene	0.1
Naphthalene	0.1
Phenanthrene	0.1
Pyrene	0.1
Total PAH	50

DRAWINGS



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CLIENT
COUNTRYSIDE PROPERTIES

PROJECT
**DRAKELOW,
BURTON-UPON-TRENT**

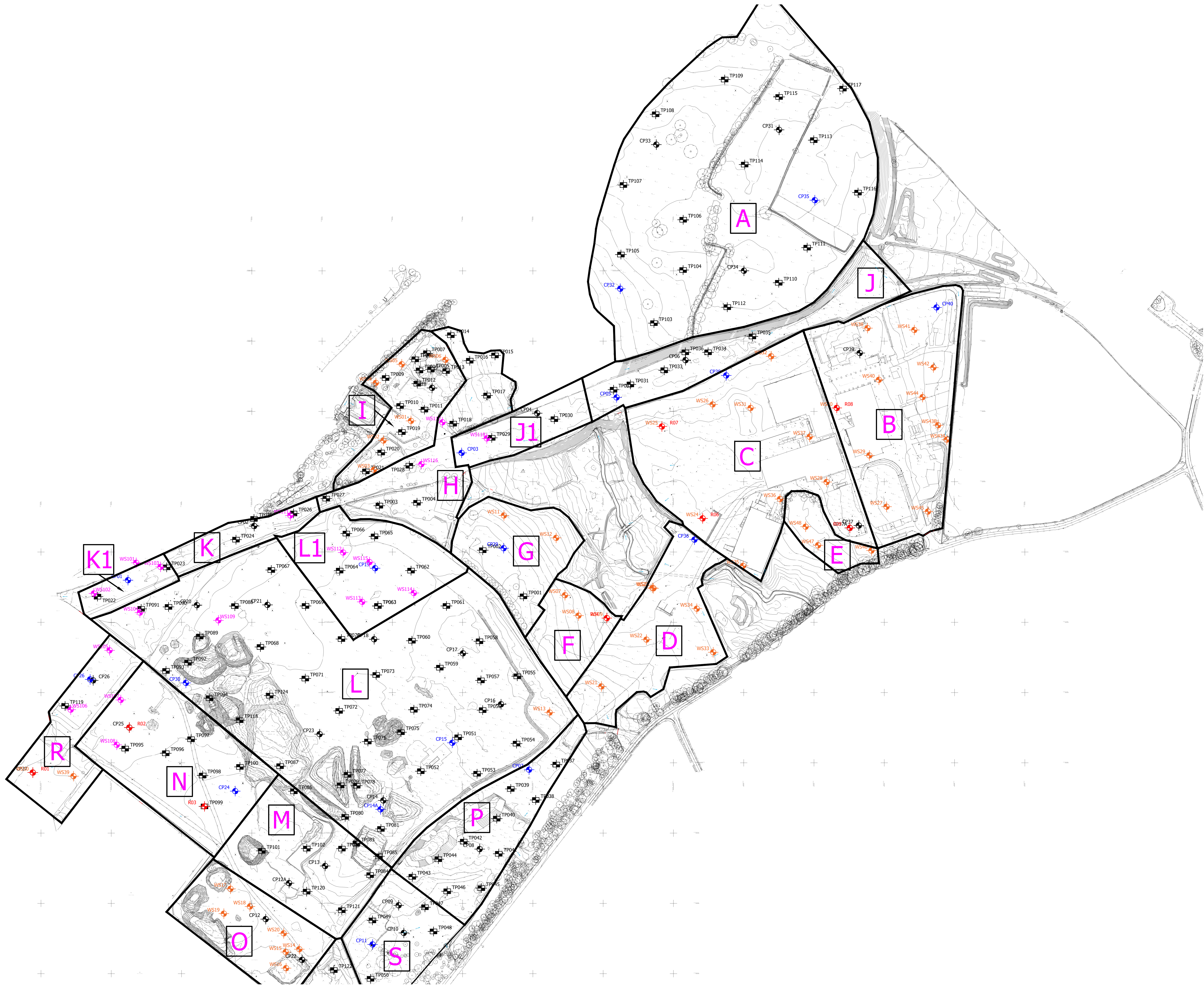
TITLE
SITE LOCATION PLAN

DRAWN BC	AUTHORISED LG	SCALE NTS@A4	DATE 21.07.20
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PROJECT NO. 20040	DRAWING NO. GE01	REV -
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STATUS. -

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KEY:

TRIAL PIT

STOCKPILE SAMPLE

DYNAMIC SAMPLE BOREHOLE

SOIL SAMPLE LOCATION

REV	DESCRIPTION	DATE	BY	AUTH

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CLIENT COUNTRYSIDE PROPERTIES			
PROJECT DRAKELOW, RUGELEY			
TITLE EXPLORATORY HOLE LOCATION PLAN			
DRAWN TD	AUTHORISED DJ	SCALE 1:2500-@A1	DATE 09.03.20
PROJECT NO. 20040		DRAWING NO. GE04	REV -
STATUS. -			

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KEY:

 TRIAL PIT

 STOCKPILE SAMPLE

 DYNAMIC SAMPLE BOREHOLE

 SOIL SAMPLE LOCATION

 PATRICK PARSONS PARCELS OF LAND

A	REMOVED POSITIONS DUE TO NO ACCESS.	21.07.20	BC	JD
REV	DESCRIPTION	DATE	BY	AUTH



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COUNTRYSIDE PROPERTIES

PROJECT

DRAKELOW,
BURTON-UPON-TRENT

TITLE

EXPLORATORY HOLE
LOCATION PLAN

DRAWN	AUTHORISED	SCALE	DATE
TD	DJ	1:2500-@A1	09.03.20

PROJECT NO.	DRAWING NO.	REV
20040	GE04	A

STATUS.

-



KEY:
SITE BOUNDARY

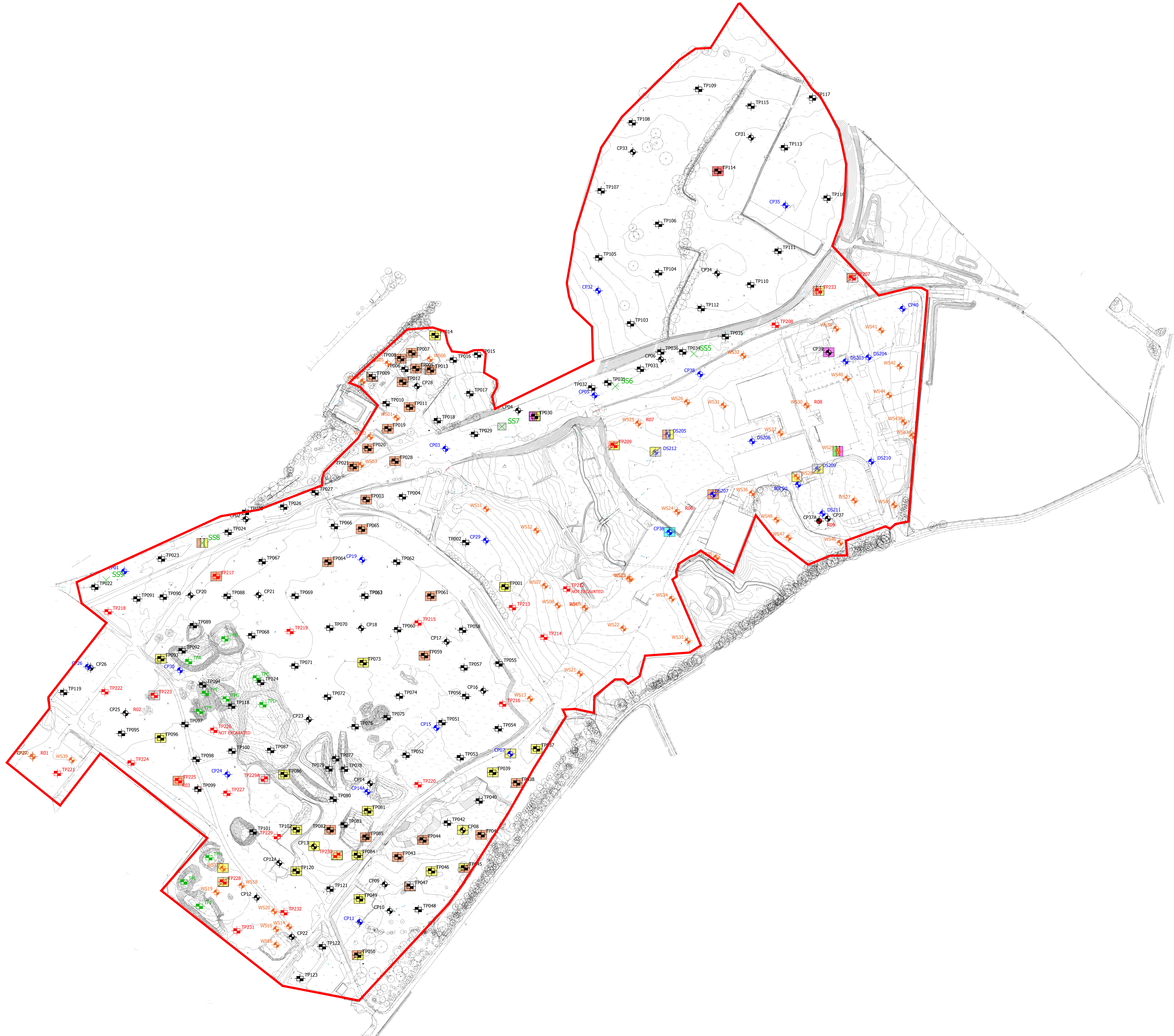


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CLIENT			
COUNTRYSIDE PROPERTIES			
PROJECT			
DRAKELOW, BURTON-ON-TRENT			
TITLE			
SITE FEATURES PLAN			
DRAWN	AUTHORISED	SCALE	DATE
BC	LG	1:2000@A0	30.07.20
PROJECT NO.	DRAWING NO.	REV	
20040	GE05	-	
STATUS			
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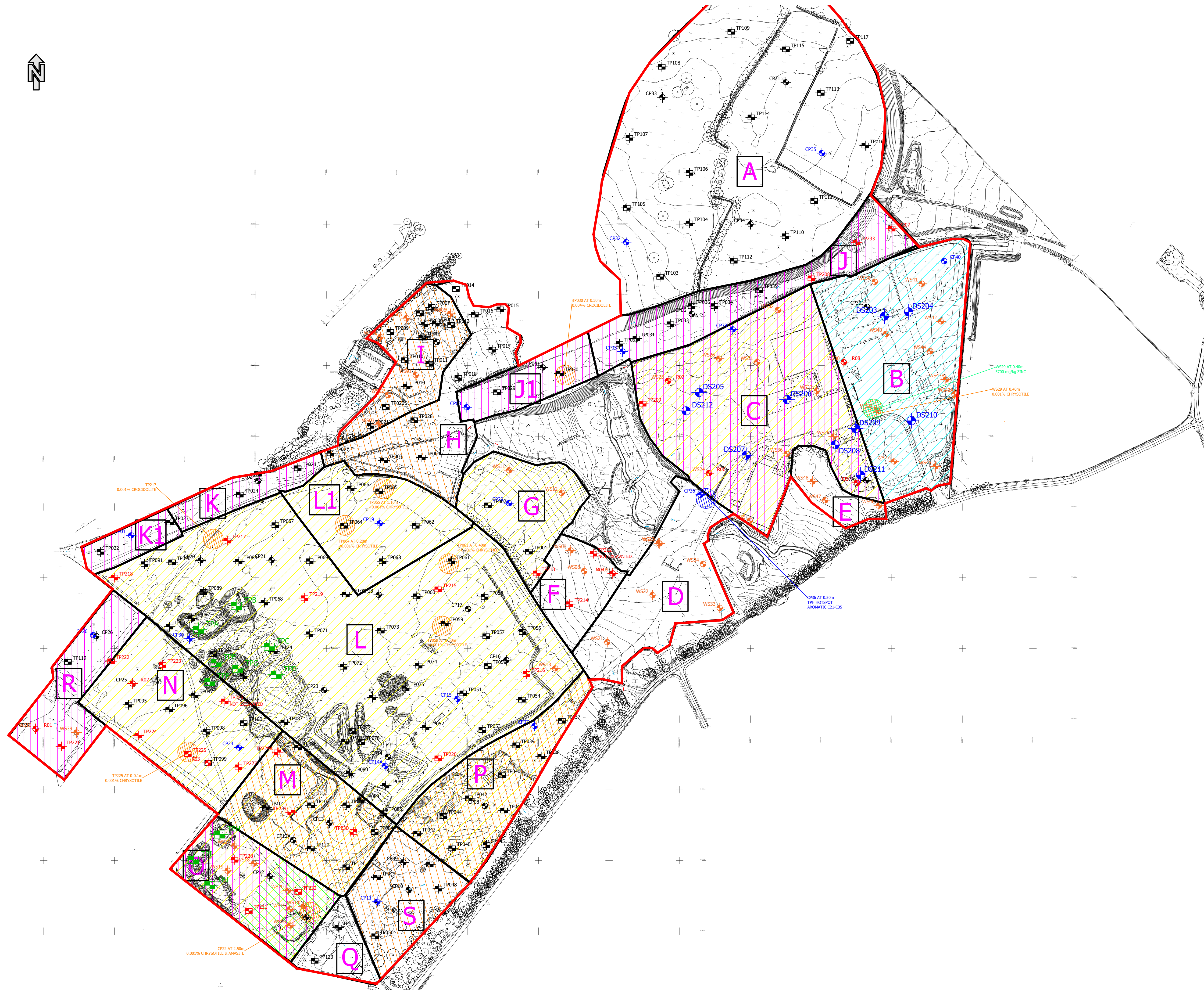
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- EXPLORATORY HOLES WITH CONTAMINATION THAT EXCEEDS THE S4UL/C4SL FOR A RESIDENTIAL END USE WITH GARDENS
- ELEVATED ARSENIC (S4UL)
 - ELEVATED LEAD (C4UL)
 - ASBESTOS PRESENT/DETECTED
 - ELEVATED TPH (S4UL)
 - ELEVATED ZINC (S4UL)
 - ELEVATED PAH (S4UL)
 - ELEVATED BERYLLIUM

THIS ASSESSMENT IS BASED ON A 'RESIDENTIAL WITH PLANT UPTAKE' SCENARIO AS THE MOST CONSERVATIVE PROPOSED END USE. EXCEEDANCE OF GUIDANCE VALUES TO BE REASSESSED UPON RECEIPT OF FINAL LAYOUTS.

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COUNTRYSIDE PROPERTIES				
PROJECT				
DRAKELOW, BURTON-UPON-TRENT				
TITLE				
SUMMARY OF IDENTIFIED CONTAMINATION				
DRAWN	AUTHORISED	SCALE	DATE	
BC	DJ	1:2000@A0	27.07.20	
PROJECT NO.	DRAWING NO.		REV	
20040	GE06		-	
STATUS				



AREAS CONTAINING ELEVATED LEVELS OF CONTAMINATION FOLLOWING STATISTICAL ANALYSIS COMPARED WITH 'RESIDENTIAL WITH PLANT UPTAKE' GUIDANCE VALUES

- ARSENIC
- LEAD
- ASBESTOS
- TPH
- ZINC
- PCB
- BERYLLIUM
- PAH
- SITE BOUNDARY

THIS ASSESSMENT IS BASED ON A 'RESIDENTIAL WITH PLANT UPTAKE' SCENARIO AS THE MOST CONSERVATIVE PROPOSED END USE. TO BE REASSESSED UPON RECEIPT OF FINAL LAYOUTS.

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PROJECT
**DRAKELOW,
BURTON-UPON-TRENT**

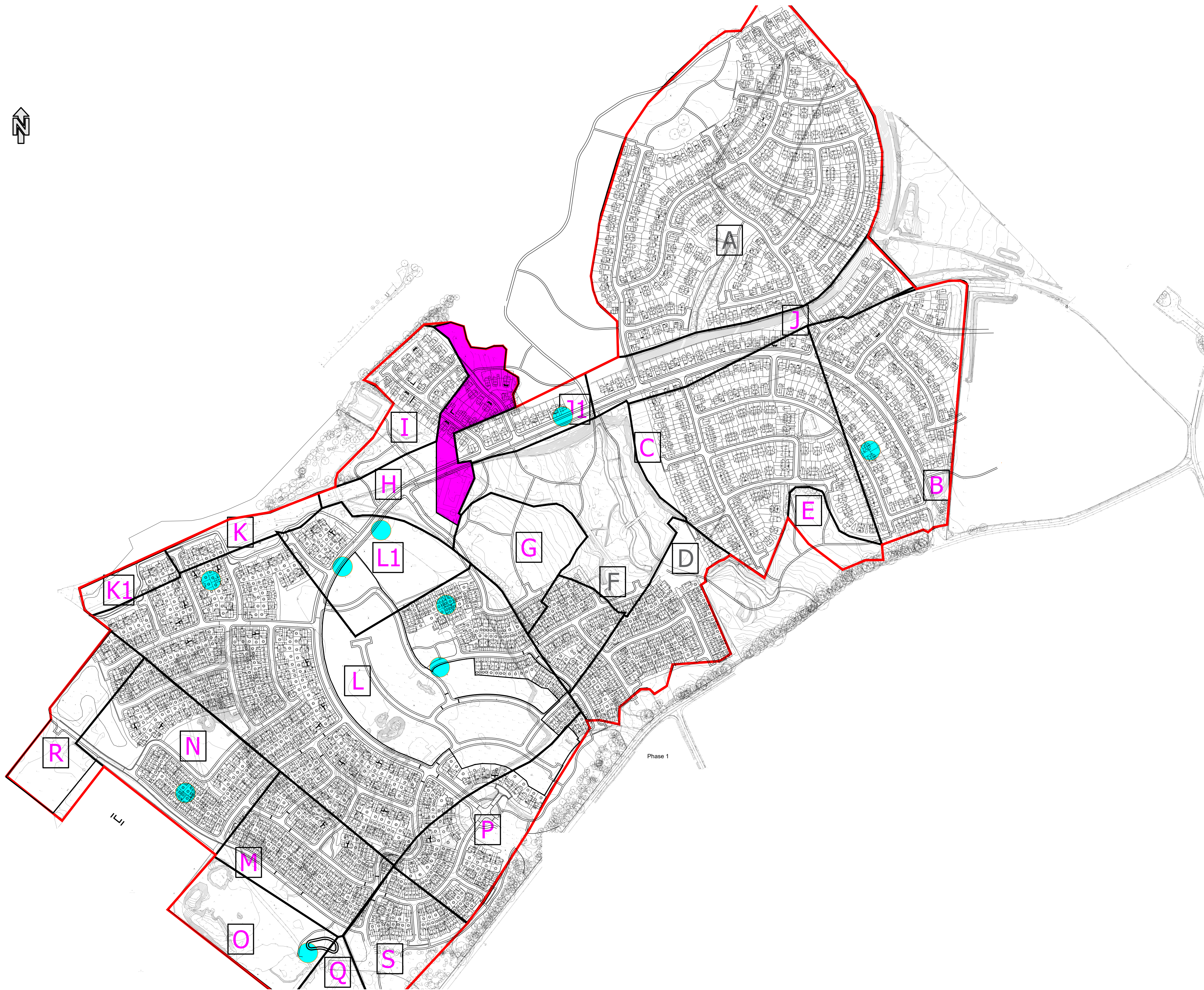
TITLE
**RESULTS OF STATISTICAL
ANALYSIS**

DRAWN TD	AUTHORISED DJ	SCALE 1:2500-@A1	DATE 30.07.20
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PROJECT NO. 20040	DRAWING NO. GE07	REV -
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STATUS:
-

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KEY:	
	UP TO 600mm CLEAN COVER REQUIRED
	ENHANCED CLEAN COVER REQUIRED DUE TO PRESENCE OF ASBESTOS. UP TO 1000mm OF CLEAN COVER
	NO CLEAN COVER REQUIRED
	POTENTIAL AREA OF ENHANCED CLEAN COVER SUBJECT TO FURTHER SI

B	ADDED LATEST PLANNING LAYOUT.	18/08/21	BC	DJ
A	FEASIBILITY PLAN ADDED.	13/08/20	BC	DJ
REV	DESCRIPTION	DATE	BY	AUTH

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PROJECT
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BURTON-UPON-TRENT

TITLE
CLEAN COVER PLAN

DRAWN	AUTHORISED	SCALE	DATE
TD	DJ	1:2500-@A1	30.07.20

PROJECT NO.	DRAWING NO.	REV
20040	GE08	B

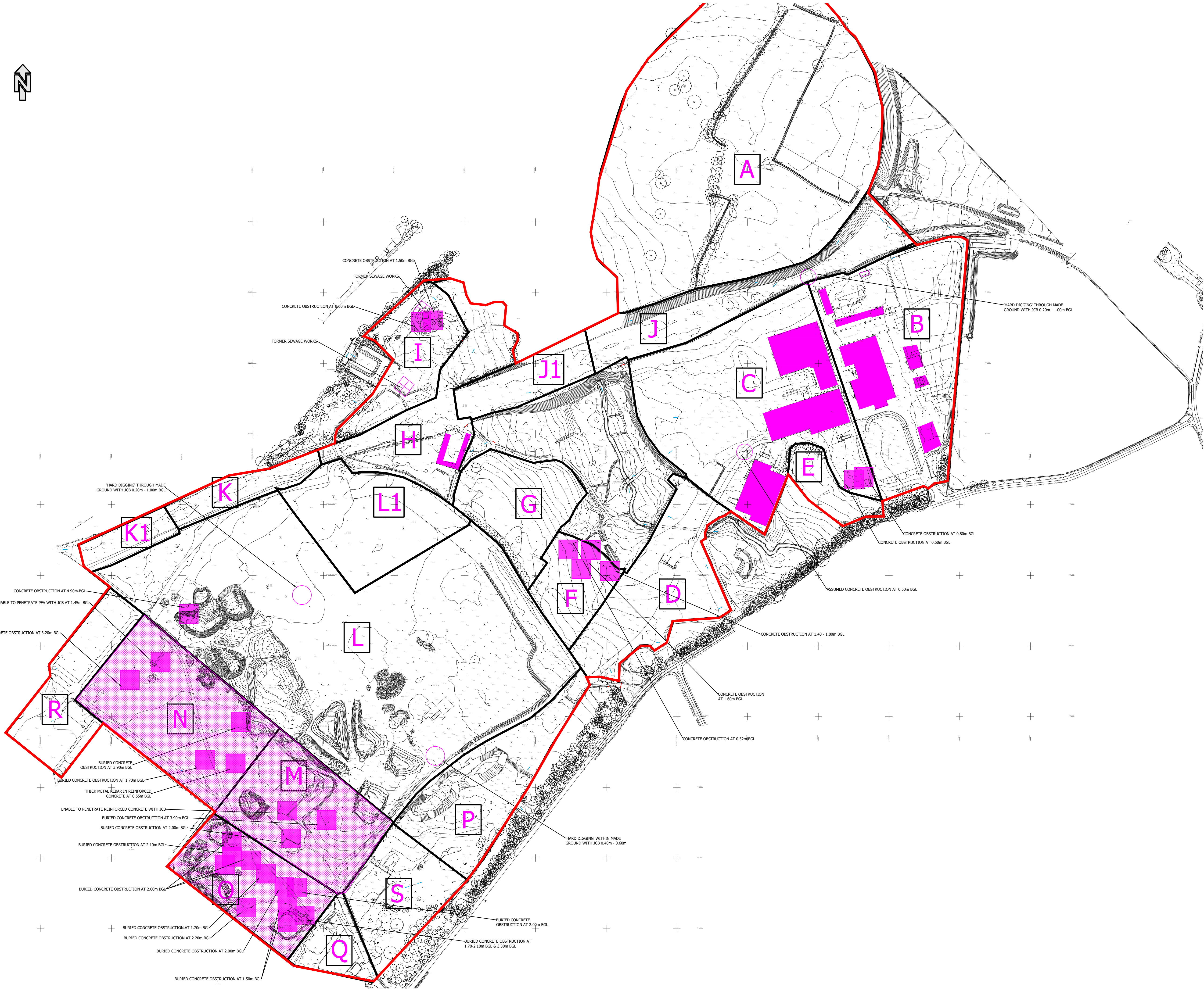
STATUS:
-



KEY:

OBSTRUCTIONS LIKELY DUE TO HISTORIC BUILDINGS / INFRASTRUCTURE

RECORDED OBSTRUCTIONS / CURRENT BUILDINGS



REV	DESCRIPTION	DATE	BY	AUTH

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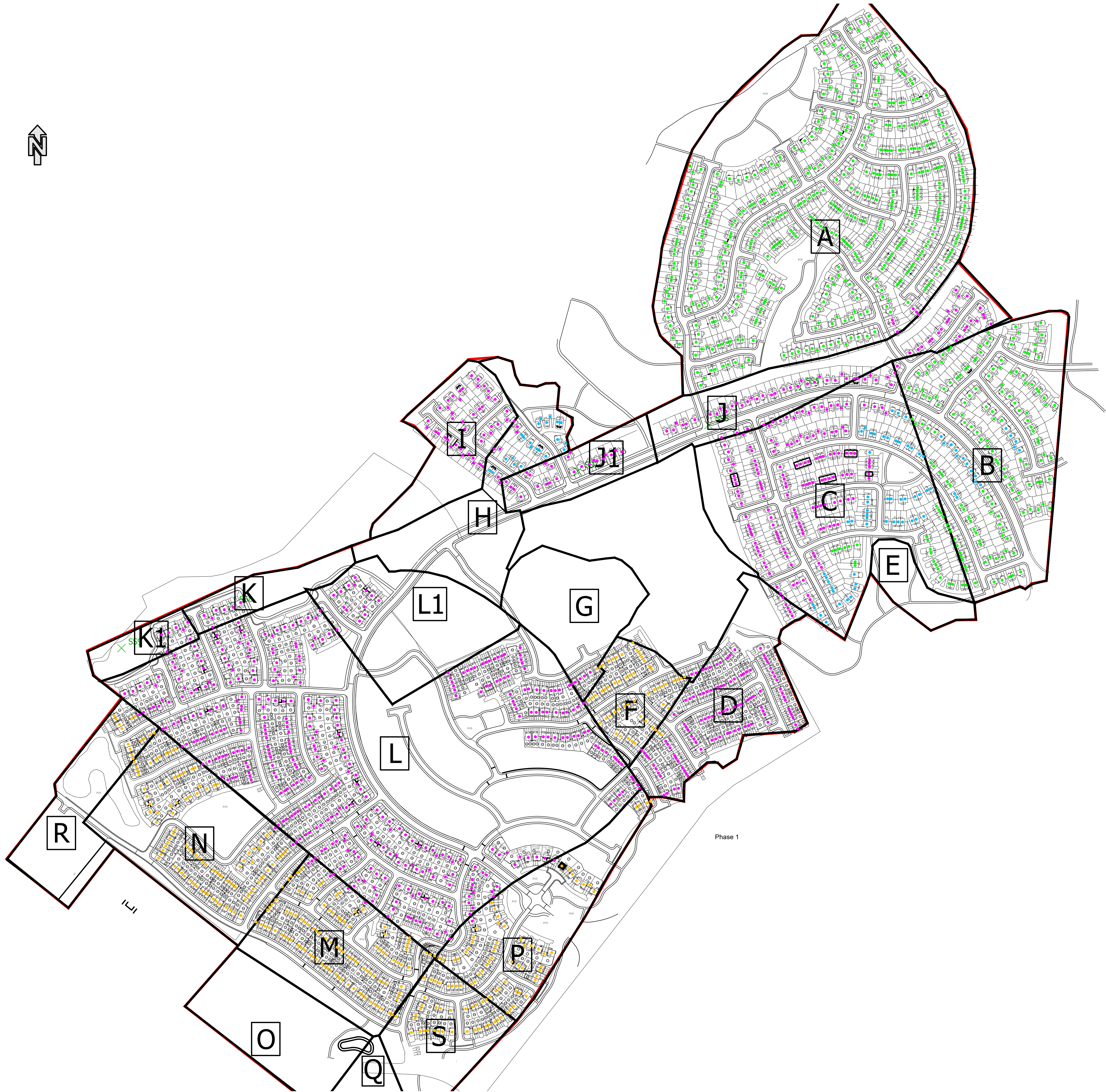
PROJECT
DRAKELOW,
BURTON-UPON-TRENT

TITLE
OBSTRUCTIONS PLAN

DRAWN	AUTHORISED	SCALE	DATE
BC	DJ	1:2500-@A1	30.07.20

PROJECT NO.	DRAWING NO.	REV
20040	GE09	-

STATUS:
-



KEY:

STRIP/TRENCHFILL

DEEP TRENCHFILL

PILED DUE TO DEEP MADE GROUND

PILED DUE TO DEEP BURIED CONCRETE

SITE BOUNDARY

NOTES:

MEDIUM VOLUME CHANGE CLAYS.

ASSUMED DEEP TRENCH FILL IN AREAS OF EXISTING STRUCTURES.

STRIP + TRENCHFILL FOUNDATIONS TO BE EXTENDED THROUGH ANY SOFT CLAY/LOOSE SANDS INTO THE UNDERLYING COMPETENT MATERIALS.

PILES DUE TO TREES TO INCLUDE STEEL TUBE, CFA OR PRECAST CONCRETE DESIGNED TO WITHSTAND LATERAL HEAVE.

PILES DUE TO DEEP BURIED OBSTRUCTIONS FOLLOWING GRUBBING OUT OF SUB-SURFACE OBSTRUCTIONS. MAY INCLUDE DRIVEN PILES.

PILED DUE TO DEEP MADE GROUND PILE DESIGN + LENGTHS TO BE DISCUSSED WITH PILING CONTRACTOR.

SI RESULTS TO BE PROVIDED TO A SUITABLE PILING CONTRACTOR TO ADVISE SUITABILITY TO PILING TECHNIQUES ACROSS SITE.

ALL FOUNDATIONS BASED ON EXISTING GROUND LEVELS.

TO BE UPDATED FOLLOWING RECIPT OF LEVELS AND LAYOUT.

NOT FOR CONSTRUCTION.

C	AMENDED TO SUIT LATEST PLANNING LAYOUT.	18/08/21	BC	DW
B	INDIVIDUAL PLOTS HATCHED TO SUIT THEIR RESPECTIVE FOUNDATION TYPES.	28/08/20	BC	DW
A	FEASIBILITY PLAN ADDED.	13/08/20	BC	DJ
REV	DESCRIPTION	DATE	BY	AUTH

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PROJECT

DRAKELOW,
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TITLE

PRELIMINARY FOUNDATION
ZONING PLAN

DRAWN

BC

AUTHORISED

DJ

SCALE

1:2500-@A1

DATE

30.07.20

PROJECT NO.

20040

DRAWING NO.

GE10

REV

C

STATUS.

PRELIMINARY

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