

Taylor Wimpey

Ground Investigation Report

for

Phase 3, Whiston

March 2025

REPORT NO: 24TAY072/GI

- *Desk Studies and Site Walkovers*
- *Intrusive Contaminated Land Investigations*
- *Geotechnical Appraisals and Ground Investigations*
- *Landfill Gas Assessments and Remedial Design*
- *Remediation Design and Implementation*
- *Remediation Project Management and Supervision*
- *Site Abnormal Assessments (Foundations and Contaminated Land)*

GEOTECHNICAL - CONTAMINATED LAND - FLOOD RISK

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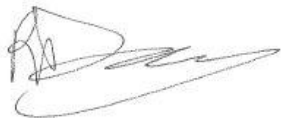
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1 EXECUTIVE SUMMARY

Note – The following summary is not exhaustive and is to be used for guidance purposes only. The full report should be consulted for full details.

1. Site Location

The site is located south of Lake View and north of the M62, Halsnead Park, Whiston, the nearest postcode is L35 3SS.. The coordinates for the site on National Grid are 347236, 389888. The site area is approximately 2.81 hectares in size.

2. Site Description On Site

Site comprises one irregular elongated field immediately south of the existing Halsnead static caravan park. There is no southern boundary with the field continuing on to the south section of the phase 3 area and is rough grass land, underfoot conditions were noted as very soft and wet. A large pile of fly tipped rubble and hedge trimmings/branches is located in the north-east of site. The west boundary abuts the neighbouring lake called Big Water with the east boundary a hedges fence with the active Taylor Wimpey construction site beyond (access through the active phase 1 development). Site levels are higher in the east of site at around circa 45mAOD gradually dropping in the west of site to around 35mAOD. There appears to be some limited encroachment of the static caravan gardens onto site along the north boundary.

3. Proposed Development

The proposed construction of a mixture of residential dwellings and associated gardens, possible public open spaces, new road and associated infrastructure.

4. Site History On Site

The earliest available map of the site is the 1850 1:10,560 map which shows the site as undeveloped. No changes are shown to occur on site until circa 1891, where the site is now shown to be split across two (2 No.) different field boundaries. No further significant changes are shown to occur on site until circa 1959 where two (2 No.) tracks are shown on site – one in the very north-eastern area of site and one in the western area of site. Some sort of structure is also noted in the south-western area of site. Circa 1980 – 1985, the track in the western area of site is no longer shown and has been relocated along the very western boundary edge and leads straight to the structure mentioned above.

Circa 1981 – 1986, neither of the tracks previously located on site are now shown. Circa 1989 – 2023, the structure in the south-western area of the site is still present. This structure is only shown on the larger scale 1:2,500 & 1:1,250 mapping (which ends in 2003) and not the smaller scale 1:10,000 mapping therefore it cannot be determined when this structure disappeared from site.

5. Published Geology

No recorded made ground/artificial ground.

Superficial – Till Devensian – Sandy gravelly Clay.

Bedrock Deposits – Majority of Site – Pennine Middle Coal Measures – Mudstone, Siltstone and Sandstone.

6. Hydrogeology and Hydrology

- The superficial deposits are classed as a Secondary Undifferentiated Aquifer.
- The bedrock deposits are classed as a Secondary A Aquifer.
- A Zone 3 Source Protection Zone is located along the very eastern site boundary/immediately offsite where the bedrock is documented as sandstone.
- There are no licensed water abstractions within 800m of the site
- The nearest surface water feature is located 36m W of the site.

7. Summary of Environmental Data

Possible Contamination Sources

- Current Land Use – On Site – **Possible (Localised).**
- Historical Land Use – Coal Mining – On Site/Surrounding Area – **Yes.**
- Historic Site Use – Change in Field Boundaries/Tracks – On Site – **Possible (Localised).**

- Historic Site Use – Tank – **Possible (Localised)**.
- Pond – 5m W – **Possible (Localised)**.
- Surrounding Areas – Nurseries – Within 1000m – **Unlikely**.

Pathways and Receptors

- Surface Water Course – Immediately W – **Unlikely**.
- Aquifer – Below Site – **Unlikely**.
- Site End Users/Construction Workers – **Unlikely**.
- Surrounding Site Users – **No**.

In this qualitative risk assessment, a generally **Low / Low – Moderate** risk for contamination and ground gas implies that remedial action may be necessary at the site but is unlikely, this cannot be confirmed until the geotechnical and contamination ground investigation has been completed.

8. Scope of Investigation

The fieldwork was carried out between the 21st January to 5th February 2025 and the works comprised the following;

- Twenty (20 No.) trial pits to a maximum depth of 3.40mbgl (TP18).
- Five (5 No.) window sample boreholes drilled to a maximum depth of 3.0mbgl.
- Nine (9 No.) rotary open hole boreholes drilled to a maximum depth of 30.0mbgl.
- Chemical analysis (Metals, PAH's, TPH's) of nineteen (19 No) samples.
- Plasticity testing on eight (8 No.) samples.

The exploratory hole positions were selected and set out by Betts Geo to target the areas of site proposed for new development and to avoid existing services as shown on the Exploratory Hole Location Plan in Appendix B.

Services are present onsite. Prior to any intrusive works, each location was checked for services using a cable avoidance tool (CAT) and review of statutory and client provided service plans.

9. Ground Conditions Encountered

Ground conditions were relatively consistent across the area investigated and were generally described as grass over dark brown sandy clay TOPSOIL to a typical depth of 0.4mbgl over GLACIAL TILL generally described as firm orange brown very sandy CLAY to depths ranging from 1.2 - >3.3mbgl over PENNINE MIDDLE COAL MEASURES generally described as weak blue grey brown silty fissured MUDSTONE encountered to >30.0mbgl.

10. Contamination Encountered

Soils

All results have been screened against residential with homegrown produce guidance and no samples have returned elevated results for topsoil and natural strata.

11. Remedial Actions

Soils

Of the samples collected from topsoil and natural strata none have returned elevated results therefore the risk to site from contamination from the materials tested is deemed to be low.

Groundwater, Surface water and Aquifer Risk

No significant risk to groundwaters and surface waters is anticipated due to the lack of contamination encountered onsite.

12. Off-Site Disposal of Surplus Soil

If in the event of surplus soil on site, it is recommended that the results of the contamination testing (including the history of the site) be presented to the proposed landfills, to obtain their acceptance of the information to date and to determine the actual WAC limits used by them.

Segregation of made ground and natural should be possible given the chemical analysis and very different visual identification.

13. Specialist Ground Gas Measures

The below client provided site specific radon report was provided to Betts Geo and is summarised below, the full report can be seen in Appendix D.

The site-specific radon report shows that the development area of site is classed as 0-1% of homes above the action level therefore no radon protective measures are required.

Ground gas monitoring is complete with six of six (6/6) visits completed, no elevated flow rates, ground gas concentrations or gas screening values have been identified, therefore the site can be classified as CS1 – no specialist ground gas protection measures required.

Whilst the results show CS1 it is advised that a ventilated void is provided due to coal geology. Additional assessment may be required post additional coal probing works.

14. Foundations

Due to shallow bedrock and firm to stiff clays across site shallow strip / trench foundations should be possible across site (subject to cut and fill / finished levels assessment).

The following allowable bearing pressures are recommended for traditional foundations:

- Firm CLAY – 100kN/m².
- Stiff CLAY – 125kN/m².
- Medium dense SAND – 100kN/m².
- Bedrock – 150kN/m².

Caution should be applied in areas of shallow groundwater or areas of running sands. Care is required during the planning stage to ensure site levels are kept high and foundation excavation depths kept to a minimum to prevent encountering groundwater. It is advised that roadways and drainage is installed first to lower the groundwater potential.

As previously mentioned in section 15 in the area of shallow coal for pricing purposes raft foundations and grouting under plots should be allowed for. Piling in this locality should be avoided until additional investigation due to the shallow coal seams (best practice).

15. Rotary Investigation Summary/Coal Mining Risk Assessment

Whilst the seams are of workable thickness no evidence of workings are noted. The depth of seam / rockhead cover is such that only the below area is at higher risk (able it lesser due to drilling evidence).

Possibility of unrecorded shafts and bell pits / working at surface can't be discounted however not identified on site. Vigilance during site strip is advised.

Due to the complication of the faulting further 'proving holes' are advised under plots as shown below where the coal is shallow and has insufficient rock cover. It is deemed unlikely to have been worked given the complications of the fault line however a small risk does still exist.

For pricing purposes raft foundations and grouting under plots should be allowed for. Piling in this locality should be avoided until additional investigation due to the shallow coal seams (best practice).

16. Highway

According to the criteria of Highways Agency HD 25/95 Volume 7 Section 2 Part 2 HD 25/94, a CBR value of 3% on the made ground and 3-5% on the clay/sand is anticipated, however in-situ CBR's should be undertaken during construction to confirm. A capping layer of the crushed layers is to be places on road areas and will require testing post placement. A CBR value of 5% is anticipated on the capping layer in road areas. Placement of geotextiles within the areas of roads / parking could also be designed to minimise the subgrade thickness.

Where the CBR is found to be less than 2.5%, the sub-grade may be unsuitable for both the trafficking of site plant and as support for a permanent foundation, without improvement works being undertaken. Improvement works should be carried out in accordance with DMRB IAN 73/06 Rev 1 Chapter 5. In summary, consideration may be given to the following potential remedial techniques:

- Excavation and re-engineering or replacement of weaker soils;
 - The inclusion of geosynthetic reinforcement within the unbound layers of the capping and sub-grade; and
- Where granular soils are present, de-watering and re-engineering the formation.

17. Heave / Shrinkage Potential

LOW – MEDIUM plasticity is evident across the materials tested during the Betts Geo investigation.

18. Ground Floor Construction

Suspended floor construction e.g. either in-situ RC slabs or block and beam flooring is recommended as per NHBC guidance.

19. Control of Groundwater

Shallow groundwater was encountered onsite and so shuttering/pumping/dewatering should be allowed for in excavations. It is good practice to have such equipment on standby in case of seasonal / abnormal weather conditions.

20. Concrete Design

It is considered for concrete design purposes that a greenfield site and static groundwater conditions are applicable onsite, and the results are summarised below.

Concrete Classification	
Design Sulphate Class	DS-1
ACEC Class	AC-1

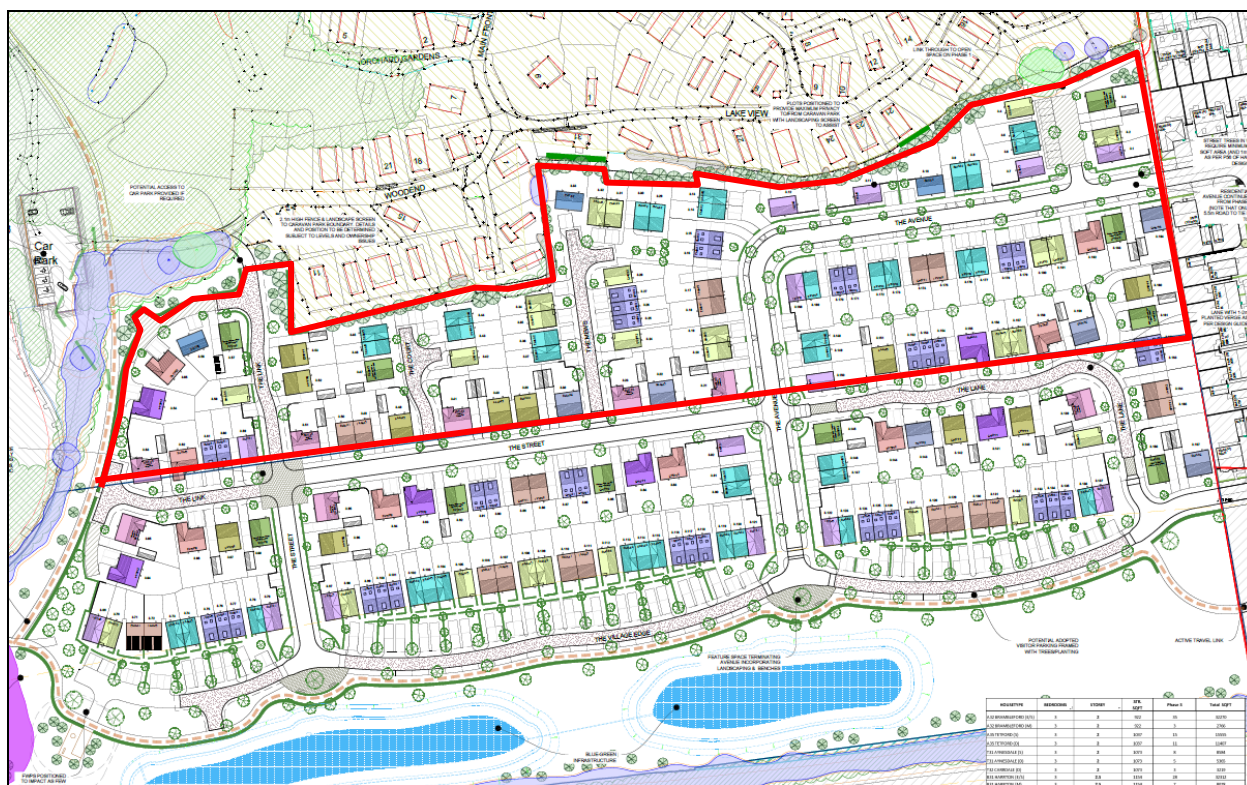
21. Site Preparation and Excavation

Excavations of shallow soils should not present any difficulty for conventional plant and equipment except for where bedrock is very close to surface. Allowance for breaker and/or rock roller for excavating rock is required and advise contractor to undertake site trials.

2 SITE DESCRIPTION

2.1 Introduction

This investigation was carried out on the instruction of Taylor Wimpey. The purpose of the work was to and undertake ground investigation works to provide geotechnical and contamination risk information to support a planning application for a new housing estate. A proposed site layout can be seen below;

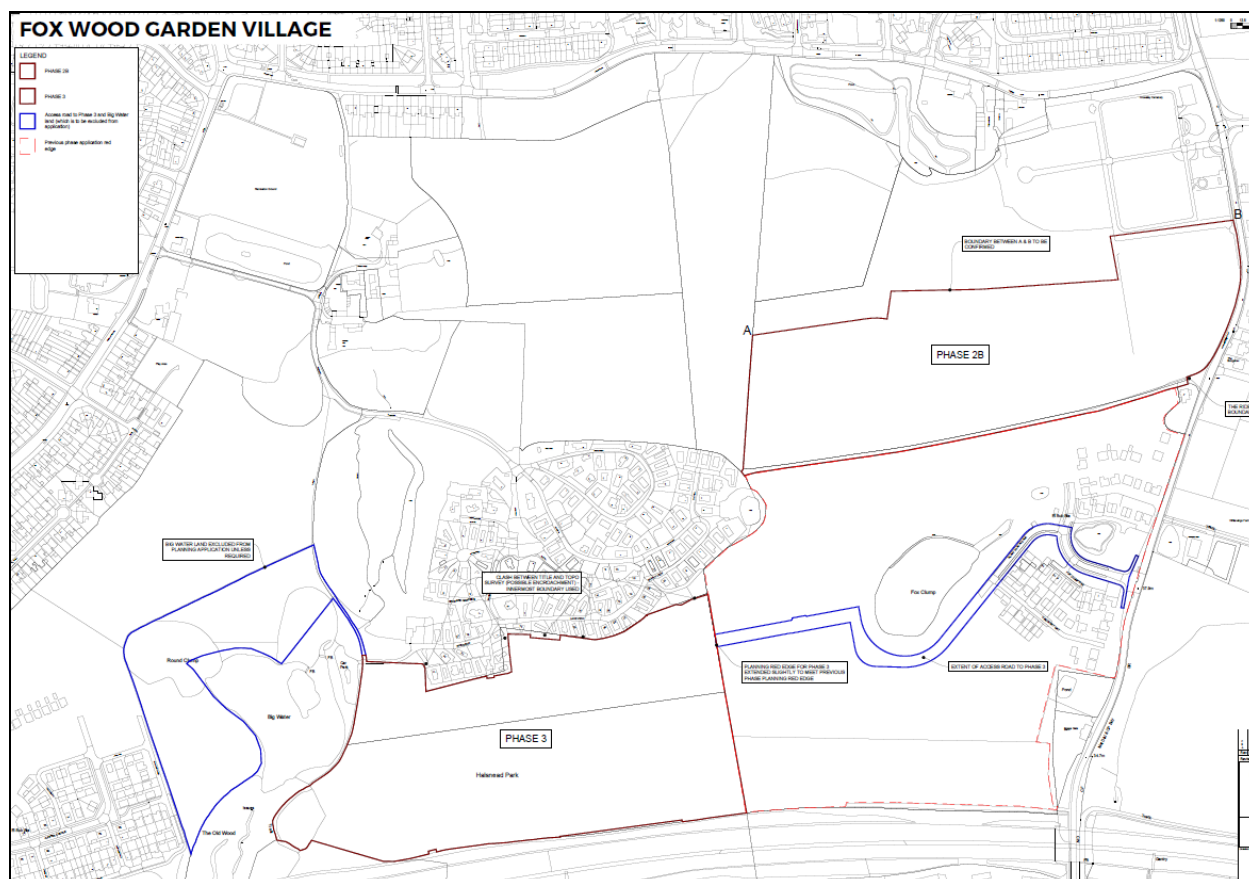


Extract from Dwg; Fox Wood Garden Village Phase 3 Sketch Layout, Ref; 1474SK02J, Dated; November 2022, By; Taylor Wimpey North West.

Betts Note; This report pertains to the northern portion of the wider phase 3 area as shown with the red edge above, the southern portion was previous investigated by Betts Geo in 2020 as detailed in reports;

- Rpt; Desk Study Report for Whiston Phase 3 (Northern Parcel), Foxes Bank, Widnes, Ref; 24TAY072/DS, Dated; January 2025, By; Betts Geo, For; Taylor Wimpey (UK) Ltd.
- Rpt; Ground Investigation Report for Fox's Bank, Halsnead Garden Village, Ref; 19TAY055/GI, Dated; May 2020, By; Betts Geo, For; Taylor Wimpey (UK) Ltd.

This phase also forms part of the wider Taylor Wimpey development of the former Halsnead Park (with Phase 1 already under construction) marketed as Fox Wood Garden Village as shown below;



The phase 1 area of site (already under construction) was previously investigated by E3P in 2017 and Betts Geo in 2018 and is covered within the below reports;

- Rpt; Phase 1 Geo-Environmental Site Assessment for Fox's Bank Lane, Whiston, Ref; 12-141r1, Dated; November 2017, By; E3P, For; Reynard Land Whiston Ltd.
- Rpt; Geo-Environmental Summary Assessment for Fox's Bank Lane, Whiston, Ref; 12-141-l1, Dated; November 2017, By; E3P, For; Reynard Land Whiston Ltd.
- Rpt; Ground Investigation Report, Ref; 18TAY042/GI, Dated; Feb 2019, By; Betts Geo, For; Taylor Wimpey UK Limited, Reynard Land Whiston Limited, Gino Frederick Fantin & Dawn Sara Fantin.

2.2 Site Location

The site is located south of Lake View and north of the M62, Halsnead Park, Whiston, the nearest postcode is L35 3SS.. The coordinates for the site on National Grid are 347236, 389888. The site area is approximately 2.81 hectares in size. See Site Location Plan in Appendix A.

2.3 Site Description

2.3.1 On Site

Site was visited by a Geo-environmental engineer in January 2025 as part of the site investigation works and the following description outlines the main features of site. Photographs can be seen in Appendix A.

Site comprises one irregular elongated field immediately south of the existing Halsnead static caravan park. There is no southern boundary with the field continuing on to the south section of the phase 3 area and is rough grass land, underfoot conditions were noted as very soft and wet. A large pile of fly tipped rubble and hedge trimmings/branches is located in the north-east of site. The west boundary abuts the neighbouring lake called Big Water with the east boundary a herras fence with the active Taylor Wimpey construction site beyond (access through the active phase 1 development). Site levels are higher in the east of site at around circa 45mAOD gradually dropping in the west of site to around 35mAOD. There appears to be some limited encroachment of the static caravan gardens onto site along the north boundary.

2.3.2 Surrounding Area

Surrounding land uses for the site are as follows:

- **North** – 0m – 210m N is a static caravan park, beyond is agricultural land.
- **East** – 0m – 230m E is agricultural land with a neighbouring phase of the Taylor Wimpey residential development beyond.
- **South** – 0m – 140m S is another parcel of land belonging to the phase 3 area (covered in the SI report referenced in Section 2.1 above). Beyond is the M62 and agricultural land.
- **West** – 0m – 210m W is woodland and a pond with a new residential development beyond.

3 ENVIRONMENTAL SETTING AND DATA

3.1 Previously Undertaken Reports

Betts Geo have previously undertaken a Desk Study report for the site as previously referenced.

Where necessary the above report has been used throughout this report and referenced accordingly. The following 'Site History Summary', 'Geology' and 'Environmental Data' has been summarised from the report.

This report should be referred to in full.

3.2 Summary of Site History

3.2.1 On Site & Surrounding Area

The earliest available map of the site is the 1850 1:10,560 map which shows the site as undeveloped. No changes are shown to occur on site until circa 1891, where the site is now shown to be split across two (2 No.) different field boundaries. No further significant changes are shown to occur on site until circa 1959 where two (2 No.) tracks are shown on site – one in the very north-eastern area of site and one in the western area of site. Some sort of structure is also noted in the south-western area of site. Circa 1980 – 1985, the track in the western area of site is no longer shown and has been relocated along the very western boundary edge and leads straight to the structure mentioned above.

Circa 1981 – 1986, neither of the tracks previously located on site are now shown. Circa 1989 – 2023, the structure in the south-western area of the site is still present. This structure is only shown on the larger scale 1:2,500 & 1:1,250 mapping (which ends in 2003) and not the smaller scale 1:10,000 mapping therefore it cannot be determined when this structure disappeared from site.

4 GEOLOGY

The following section details have been taken from the report referenced in section 3.1 above.

4.1 Published Geology

The BGS map shows the geology (1:10,000) beneath the site as the following:

- Artificial Ground – None recorded.
- Superficial – Till Devensian – Sandy gravelly Clay.
- Bedrock Deposits – Majority of Site – Pennine Middle Coal Measures – Mudstone, Siltstone and Sandstone.

4.1.1 Coal Mining

The site is located within a Coal Mining High Risk Area therefore a Consultants Coal Mining Report was obtained for the site with a summary below.

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	RAMS	Coal	3033	109	Beneath Property	12.7	South-West	180	1957
unnamed	RAMS	Coal	3032	110	North-West	11.3	South-West	180	1866
unnamed	HIGHER FLORIDA	Coal	3036	126	Beneath Property	12.3	South-West	180	1924
unnamed	HIGHER FLORIDA	Coal	3034	129	North	11.3	South	180	1869
unnamed	ST. HELENS YARD	Coal	302X	138	South	11.3	South-West	90	1930
unnamed	WIGAN FOUR FEET	Coal	3040	229	North	11.2	South	160	1902
unnamed	WIGAN FIVE FEET	Coal	303U	265	South-West	11.8	South-West	110	1945
unnamed	HAIGH YARD	Coal	304F	355	South	13.7	South-West	120	1949
unnamed	RUSHY PARK	Coal	304M	400	Beneath Property	10.9	South-West	130	1932
unnamed	RUSHY PARK	Coal	304K	415	Beneath Property	12.0	South	130	1896
unnamed	RUSHY PARK	Coal	304J	422	West	12.0	South	130	1889
unnamed	RUSHY PARK	Coal	304L	441	North-East	13.4	South-West	130	1896
unnamed	RUSHY PARK	Coal	304I	441	North	9.5	South	130	1886

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

NW836	14235	NW638
11564	NW535	10958
NW727	PO0	16820

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
CROMBOUKE	Coal	Yes	35.1	North-East	125
LONDON DELPH (BIN)	Coal	Yes	Within	N/A	302

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

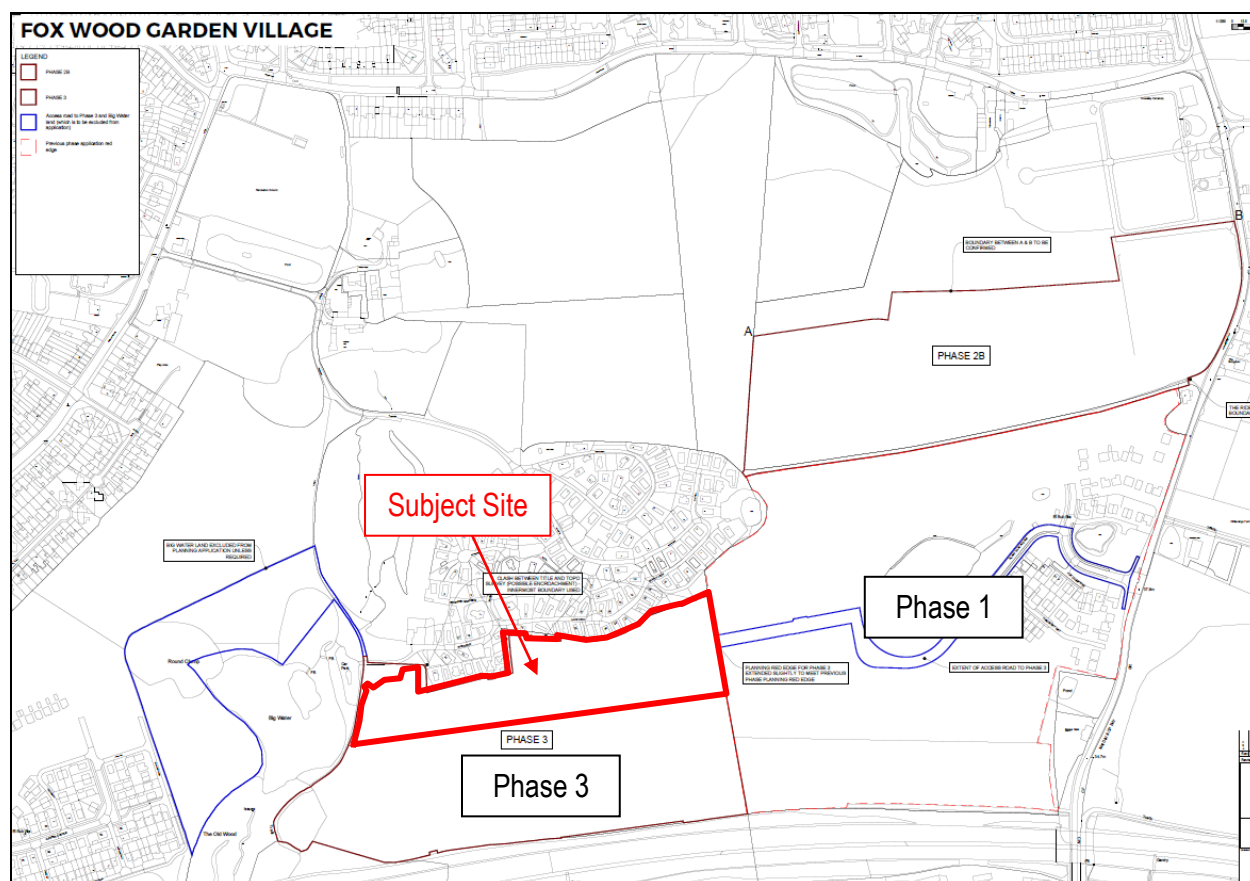
Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

From the information within The Coal Authority Report there are recorded coal outcrops, worked seams and probable unrecorded shallow workings beneath site therefor the risk to site is deemed to be **HIGH** and will require further investigation.

Betts Geo have also undertaken the site investigations detailed on the adjacent sites (Phase 3 to the South and Phase 1 to the East) and the findings can be seen below.

The below plan is included to aid spatial placement of findings;



Phase 3 (Immediately South of subject Site)

Betts Geo undertook sixteen (16 No.) rotary boreholes across the site area in October 2019 to depth of between 15.00mbgl – 30.00mbgl under a Coal Authority permit. Several shallow holes were also drilled to prove the precise position of the Eccleston West Fault, these were not logged as they were for location purposes only.

“whilst no coal thicker than 1.0m was encountered in the drilling on the majority of the site, a small area of shallow coal 1.0m thick was proved to be present in the close proximity of the Eccleston West Fault. This coal is within a faulted block dipping east at 1 in 10, close to the western wall of the fault and presumed to have been displaced downwards from higher in the Coal Measure succession. If this is the origin of the faulted block then the only known coal seam of a similar recorded thickness is the unworked Three Foot Coal, encountered close to outcrop in the Cronton Colliery No. 2 Shaft and inferred to outcrop in the extreme west of the site dipping to the south-west at 1 in 6.

BH16 in the west of the site was drilled to locate the Three-Foot Coal but the seam was proved to outcrop south-west of the site boundary.

The previous 2018 investigation north of the site also encountered minor faulting associated, and probably parallel, to the Eccleston West Fault. There was no evidence of any mining activity in any of the boreholes, the strata being consistently firm and hard with no soft drilling or loss of water flush. There is no evidence of any past shallow mining activity under the site."

Phase 1 (Immediately East of Subject Site)

Betts Geo undertook sixteen (16 No.) rotary boreholes across the site area in September 2018 to depths of 30.00mbgl under a Coal Authority permit.

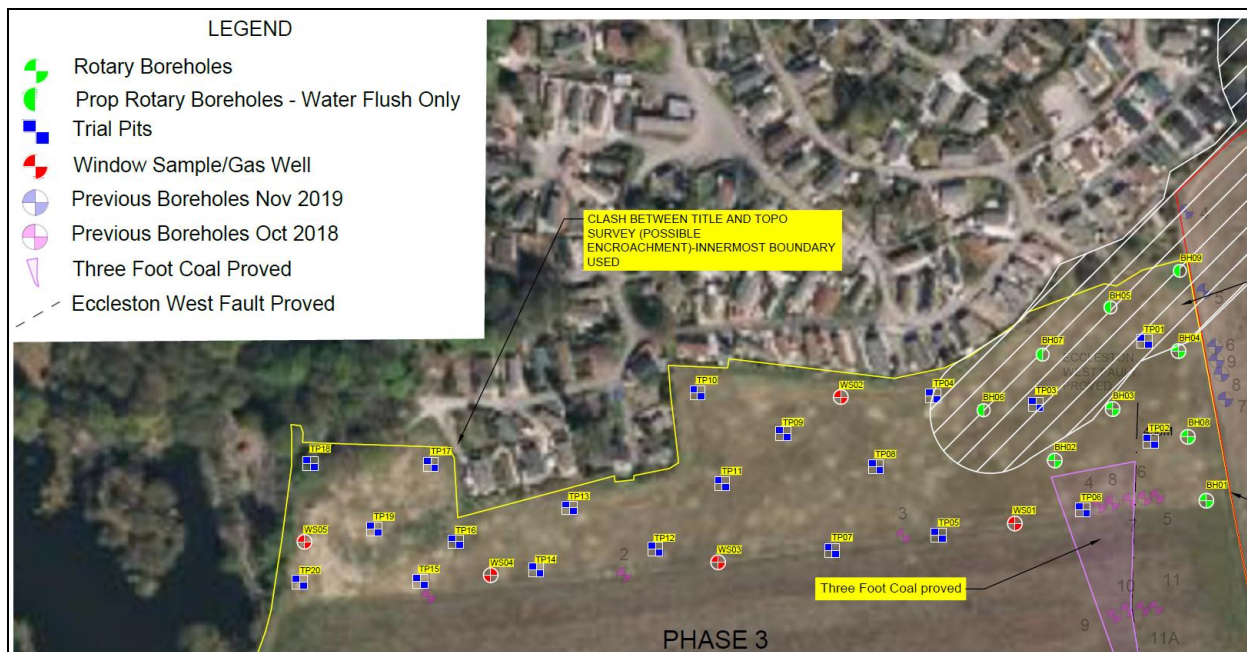
"No coal thicker than 1.20m was encountered in the drilling. There was no evidence of any mining activity in any of the coal seams, with the strata being consistently firm and hard with no soft drilling or loss of water flush.

The seams are of good quality and extensively mined elsewhere in Whiston and Prescot. The lack of mining under the site is most likely due to the proximity and effect of the Eccleston East Fault. There are records of three shafts 50m north of the site, however there are no mine plans of workings from the shafts with the shaft positions being derived solely from the First Edition Ordnance Survey.

There is no evidence of any past shallow mining activity under the site and the presence of the Eccleston East Fault and associated minor faulting would have deterred any early shallow mining.

As with any former coal mining area, despite no evidence to suggest worked coal seams at shallow depth, site vigilance is advised during development/site strip to ensure no evidence of shallow excavations are evident."

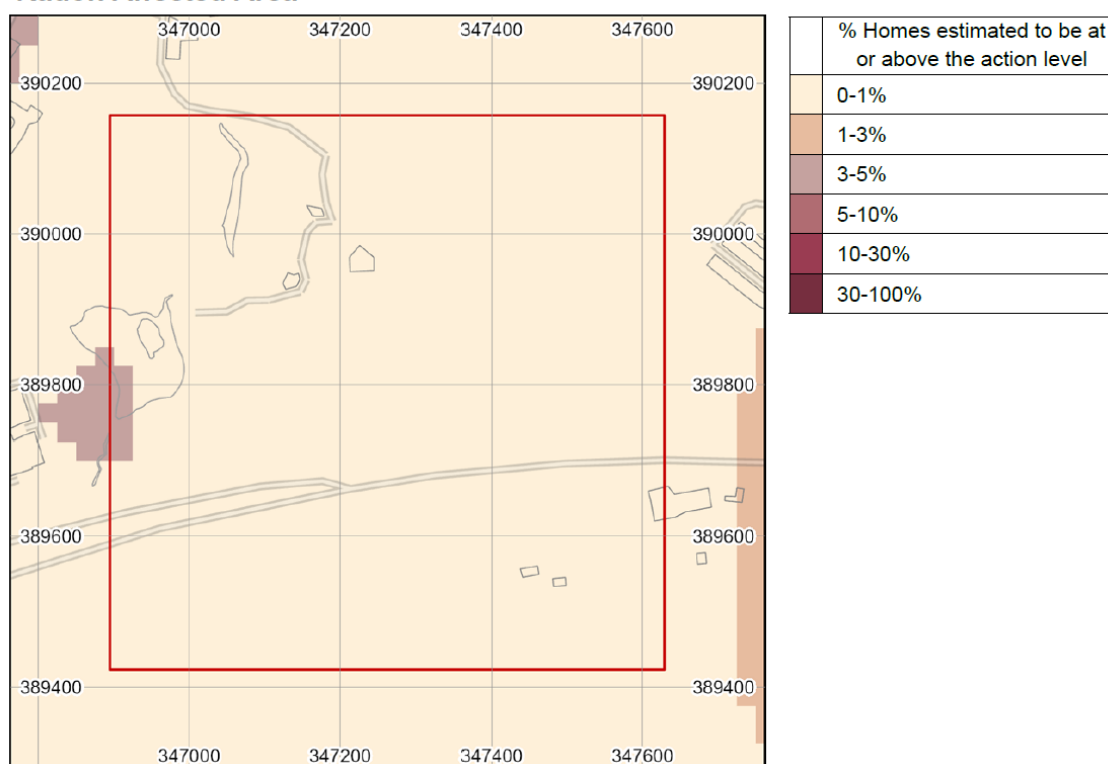
Based on the above, the risk of any shallow coal mining on site is lowered, however rotary drilling is advised to confirm given the shallow coal present across site. Additional rotary holes were undertaken as shown in green on the below plan and the finding of these is discussed further on in this report.



4.1.2 Radon

The below client provided site specific radon report was provided to Betts Geo and is summarised below, the full report can be seen in Appendix D.

Radon Affected Area



The site specific radon report shows that the development area of site is classed as 0-1% of homes above

the action level therefore no radon protective measures are required.

4.2 Hydrogeological and Hydrological Features

- The superficial deposits are classed as a Secondary Undifferentiated Aquifer.
- The bedrock deposits are classed as a Secondary A Aquifer.
- A Zone 3 Source Protection Zone is located along the very eastern site boundary/immediately offsite where the bedrock is documented as sandstone.
- There are no licensed water abstractions within 800m of the site
- The nearest surface water feature is located 36m W of the site.

5 SUMMARY OF ENVIRONMENTAL SENSITIVITY

The following section is a review of the environmental sensitivity of the site as discussed in Sections 2 – 4. Significant potential risks are discussed in the following subsections and will then be evaluated as part of the Site Conceptual Model in Section 6.

Sources are defined as where pollution comes from, pathways are a route in which the pollution travels and receptors are anything affected by a pollutant. Further details on Source-Pathway-Receptor methodology can be found in Appendix F.

The table below focuses on significant site specific sources, pathways and receptors. More 'generic' pathways and receptors (such as site end uses) will be covered as part of the full Site Conceptual Model in Section 13.

5.1 Sources

Source	Distance/ Direction	Details	Significant Risk
Current Site Use	On Site	Site is currently used as agricultural land. Site currently has a waste exemption for burning waste in the open. Depending on the type of waste burnt there is a potential for localised contamination hotspots. Fly tipped waste also noted in the north eastern area of site which could be a possible contamination source. Ground investigation to confirm.	Possible – Localised
Historic Site Use – Coal Mining	On Site & Surrounding Area	Potential for shallow coal working on site given the underlying geology and details with the Coal Authority Report. Possible source of ground gas and contamination. Previous SI on surrounding land parcels identified shallow coal but no shallow workings which lowers the risk slightly however ground investigation and rotary boreholes are required to confirm.	Yes
Historic Site Use – Change in Field Boundaries/Tracks	On Site	Field boundaries are shown to change on site circa 1891 and two tracks are shown on the very north eastern corner and south western corner of site. Possible made ground in the vicinity of these features which could give risk to localised contamination and ground gas depending on composition of made ground. Ground investigation to confirm.	Possible - Localised
Historic Site Use – Tank	On Site	Tank shown along southern boundary circa 1959 – 2003, Unknown what materials the tank stored. Possible risk of contamination and ground gas if tank was used for fuels etc. Lower risk if used for water. Cohesive superficial deposits should limit any migration pathways. Ground investigation to target and confirm.	Possible - Localised
Pond	5m W	Large pond shown immediately W of the site and has changes in footprint over the course of the historic maps with known surface ground workings in the area. Possible pond workings could have extended onto site. Ground investigation to confirm.	Possible - Localised
Surrounding Area - Nurseries	Within 100m	A number of nurseries are noted in the surrounding area – the closest being recorded as 47m E in the Groundsure report. Possible source of pesticides, heavy metals and fuels. Previous SI on neighbouring land parcels identified limited contamination as a result of this historic land use. Anticipated cohesive superficial geology should limit any migration onto site.	Unlikely

5.2 Pathways and Receptors

Pathways and Receptors	Distance/ Direction	Details	Significant Risk
Aquifers	Below Site	Superficial deposits classed as a Secondary Undifferentiated Aquifer. Pathway into the underlying bedrock aquifer (which is classed as a Secondary A Aquifer) are therefore unlikely unless shallow coal mining has created voids underneath the site. Some possible sources of localised contamination identified on site. Zone 3 SPZ located immediately E of the site. Ground investigation to confirm.	Unlikely
Site End Users/ Construction Workers	On Site	Proposed site end use is residential. PPE to protect construction workers and remedial measures recommended for site end users if significant contamination is identified during SI.	Unlikely
Surface Water Courses	Immediately W	Nearest surface water feature is pond located immediately W of site. Due to anticipated cohesive superficial geology, the risk of any contamination pathway to this receptor is deemed low. Ground investigation to confirm.	Unlikely
Surround Site Users	Adjacent to Site	Surrounding site is mainly agricultural with some areas of residential >250m away. Due to anticipated cohesive superficial geology, the risk of any contamination pathway to this receptor is deemed low.	No

6 INITIAL CONCEPTUAL SITE MODEL

For details on how the conceptual model is evaluated please refer to Appendix F

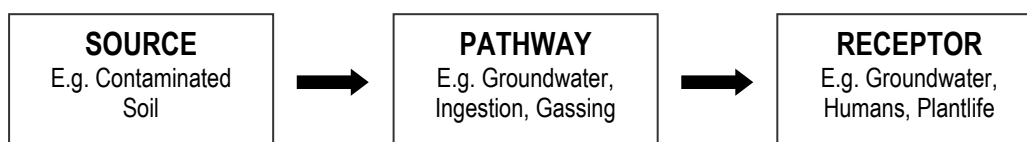
This section of the report aims to identify land which could potentially be affected by contamination, such that it could affect the value or re-use of the land, or such that mitigation would be required for certain proposed end uses of the land.

Potential contamination sources and environmentally sensitive receptors have been discussed in Section 6. Potentially significant risks are evaluated as part of the subsequent sub-sections.

6.1 Source-Pathway-Receptor Linkages

The risk assessment uses a 'Source-Pathway-Receptor' methodology for assessing whether a source of contamination could potentially lead to harmful consequences. This means that there needs to be a pollutant linkage from source to receptor for harm to be caused, this linkage consisting of: a source of pollution; a pathway for the pollutant to move along; a receptor that is affected by the pollutant.

The current potential risks to site arising from various source-pathway-receptor linkages are assessed below. A risk may be considered significant if all three of the stages are present and therefore providing a pollution linkage. The various sources, pathways and receptors are considered separately. The assessment is based on the future use, which is understood to be residential with homegrown produce.



Type of Contamination	Potential Sources	Potential Pathway	Potential Receptors	Pollution Linkage	Comment	Estimated Level of Risk
Ground Gas	Current Site Use	Inhalation of Vapours	Construction/ Maintenance Workers	Active	Possible localised sources of ground gas identified on site – made ground and former tank area. Also possible risk from pond immediately W & coal mining under site (if present). Cohesive superficial deposits should limit any migration pathways. PPE to protect to construction workers.	Low – Low / Moderate
	Coal Mining Under Site					
	Historic Site Use – Tank/ Tracks	Vapours Penetrating Unprotected Buildings	Future Site Users	Active	Possible localised sources of ground gas identified on site – made ground and former tank area. Also possible risk from pond immediately W & coal mining under site (if present). Cohesive superficial deposits should limit any migration pathways. Future buildings to be designed with adequate protection to minimise risk.	Moderate
	Pond 5m W					
Surface and Near Surface Contaminants Within Soils	Current Site Use Coal Mining Under Site Historic Site Use – Tank/ Tracks Pond 5m W	Ingestion, Inhalation, Dermal Contact	Current Site Users	Potentially Active	Some localised contamination sources identified on site and in the immediate area due to the sites historic uses. Current site use is vacant which lowers any risk.	Low
			Construction Workers	Active	Some localised contamination sources identified on site and in the immediate area due to the sites historic uses. Suitable PPE to protect workers during groundbreaking works.	Low
			Future Site Users	Active	Some localised contamination sources identified on site and in the immediate area due to the sites historic uses. Future site use is residential with homegrown produce (high sensitivity)	Low – Low / Moderate
			Adjacent Land Users	Potentially Active	Adjacent land use is mainly agricultural. Some localised contamination sources identified on site and in the immediate area due to the sites historic uses however anticipated cohesive superficial geology should limit any potential migration pathways.	Low
		Direct Contact	Structures	Potentially Active	Possible high sulphates and pH's in any Made Ground (locally anticipated).	Low – Low / Moderate
		Absorption in Root Zone	Plants	Potentially Active	Some localised contamination sources identified on site and in the immediate area due to the sites historic uses. Future site use is residential with homegrown produce (high sensitivity)	Low – Low / Moderate
Mobile Contaminants, Leachables e.g. from Pollution Sources Adjacent to Site/On Site	Current Site Use	Leaching into Groundwater	Groundwater	Potentially Active	Some localised contamination sources identified on site and in the immediate area due to the sites historic uses. Potential migration pathways into underlying aquifer if shallow coal mining has occurred on site and voids are present below the site. SPZ located immediately E of the site. Ground investigation to confirm.	Low – Low / Moderate
	Coal Mining Under Site					
	Historic Site Use – Tank/ Tracks	Off-site Migration in Groundwater	Abstractions	Potentially Active	No groundwater or surface water abstractions recorded within 250m of site.	Low
	Pond 5m W		Controlled Waters	Potentially Active	Nearest surface watercourse is located immediately W of the site, Some localised contamination anticipated on site however cohesive superficial deposits should limit any migration pathways.	Low – Low / Moderate

Type of Contamination	Potential Sources	Potential Pathway	Potential Receptors	Pollution Linkage	Comment	Estimated Level of Risk
Organic and Inorganic Contaminants Within Soils / Groundwater	Current Site Use Coal Mining Under Site Historic Site Use – Tank/ Tracks Pond 5m W	Potable Water Supply Pipes	Utilities Workers	Potentially Active	Potential for localised TPH contamination onsite given the sites historic uses especially around the former tank. SI required to confirm. UU Assessment will be required once waterpipe line route known if new pipeline is to be laid as part of the proposed development.	Moderate (Localised)

6.2 Summary

In this qualitative risk assessment, a generally **Low / Low – Moderate** risk for contamination and ground gas implies that remedial action may be necessary at the site but is unlikely, this cannot be confirmed until the geotechnical and contamination ground investigation has been completed.

6.3 Geotechnical Risks

- Existing and/or redundant services across site.
- Tree heave should cohesive strata be encountered (anticipated).
- Possible shallow coal workings under site/shallow bedrock
- Possible obstructions in former tank area to south of site.

7 FIELDWORK

7.1 Fieldwork Objectives

The objectives of the intrusive ground investigation will be to:

- Clarify the ground conditions.
- Provide contamination and geotechnical information for the site.
- Provide data for the design of any remedial works that may be required.
- Provide geotechnical information to be used for the design and specification of foundations and substructure requirements.

7.2 Fieldwork Scope

The fieldwork was carried out between the 21st January to 5th February 2025 and the works comprised the following;

- Twenty (20 No.) trial pits to a maximum depth of 3.40mbgl (TP18).
- Five (5 No) window sample boreholes drilled to a maximum depth of 3.0mbgl.
- Nine (9 No.) rotary open hole boreholes drilled to a maximum depth of 30.0mbgl.
- Chemical analysis (Metals, PAH's, TPH's) of nineteen (19 No) samples.
- Plasticity testing on eight (8 No.) samples.

The exploratory hole positions were selected and set out by Betts Geo to target the areas of site proposed for new development and to avoid existing services as shown on the Exploratory Hole Location Plan in Appendix B.

Services are present onsite. Prior to any intrusive works, each location was checked for services using a cable avoidance tool (CAT) and review of statutory and client provided service plans.

7.3 Targeted Investigation

The exploratory holes were positioned to achieve general site spread within the area of the proposed development.

Rotary open boreholes were located to both sides of the Eccleston fault and areas where shallow working were anticipated from outcrops/dips/faulting etc.

8 GROUND CONDITIONS

8.1 General

The exploratory holes were logged by a Betts Engineer in general accordance with the recommendations of BS5930:1999+A2:2010. Detailed descriptions, together with relevant comments, are given in the exploratory hole logs included in Appendix C.

Ground conditions were relatively consistent across the area investigated and were generally described as grass over dark brown sandy clay TOPSOIL to a typical depth of 0.4mbgl over GLACIAL TILL generally described as firm orange brown very sandy CLAY to depths ranging from 1.2 - >3.3mbgl over PENNINE MIDDLE COAL MEASURES generally described as weak blue grey brown silty fissured MUDSTONE encountered to >30.0mbgl.

TOPSOIL

Topsoil was encountered within all exploratory holes and was described as grass over dark brown sandy clay with rootlets. This topsoil was encountered to a typical depth of 0.4mbgl.

GLACIOFLUVIAL DEPOSITS

Granular glaciofluvial deposits were encountered within some exploratory holes generally underlying the topsoil and was described as medium dense brown clayey fine to medium SAND to a typical depth of 0.7 – 1.0mbgl. An SPT 'N' value of 11 was recorded in this strata.

GLACIAL TILL

Glacial was encountered within most exploratory holes generally beneath the glaciofluvial deposits and topsoil and was generally described as firm orange brown very sandy CLAY. SPT 'N' values ranged from 8 to 19.

PENNINE MIDDLE COAL MEASURES

Pennine middle coal measures were recorded in most exploratory holes as either weak mudstone or sandstone with window sample boreholes and trial pits refusing/terminated at shallow depth in the east of site where rockhead is up to 0.3mbgl below surface. Rotary boreholes recorded variable layer of hard/soft micaceous sandstone and mudstone.

COAL

Coal and shaley coal was only encountered within RBH02 at 4.9 – 5.2mbgl and 23.0 – 23.6mbgl, RBH03 at 2.5 – 2.6mbgl and 3.0 – 3.2mbgl and RBH05 at 7.5 – 7.8mbgl.

8.2 Visual and Olfactory Contamination

No visual and/or olfactory contamination was encountered during the site investigation works.

8.3 Obstructions

Other than shallow bedrock in the east of site no obstructions were encountered during the site investigation works.

8.4 Groundwater – Fieldwork

The following exploratory holes encountered groundwater during the fieldwork:

Exploratory Hole	Depth (mbgl)	Strata	Remark
TP1	1.9	Mudstone	Upwelling seepage from rock
TP5	1.4	Mudstone	Slight seepage from base
TP7	0.8 – 2.1	Clay	Wet sand lenses
TP11	0.5 2.8	Sand Sandstone	Slight seepage from clay land drain Slight seepage from bedrock
TP12	1.0 – 3.2	Clay	Occasional seepages of perched water
TP13	0.7 – 3.3	Clay	Rare running sand lenses
TP15	2.4 – 3.1	Sand	Wet
TP18	3.0 – 3.4	Silt	Wet and running strata
TP19	2.5 – 3.3	Silt	Wet and running strata

8.5 Groundwater – Post Fieldwork Work Monitoring

The following groundwater was encountered during the post fieldwork monitoring:

Exploratory Hole	Water Depth (mbgl)	Borehole Depth (mbgl)	No. of Visits
WS01	0.30 – 0.70	1.91 – 2.02	6/6
WS02	0.81 – 1.33	1.49 – 1.63	6/6
WS03	0.45 – 0.70	2.91 – 3.01	6/6
WS04	1.98 – 2.40	2.99 – 3.05	6/6
WS05	0.91 – 1.58	2.81 – 2.97	6/6

9 LABORATORY TESTING

9.1 General

An assessment of potential determinants associated with the former land uses and those identified during the desk study has been undertaken.

Determinants originating from the current/former site uses include metals, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs) and asbestos.

9.2 Scheduled Chemical Testing: Soils

Soil was sent to a UKAS accredited laboratory and were generally analysed in accordance with ISO 17025 and/or MCERTS accreditation. The results are summarised in tabular and/or graphical form in Appendix D.

Chemical Test	No. of Samples	Comment/Method
pH Values	27	Determination of pH (using Cyberscan pH meter).
Sulphate - Soluble 2:1 Extract	27	Dionex.
Arsenic, Cadmium, Chromium VI, Chromium III, Total Chromium, Lead, Mercury, Selenium, Copper, Nickel, Complex and Free Cyanide and Zinc.	19	Soil samples were analysed in accordance with UKAS/MCERTS standards Inductively coupled plasma atomic emission spectroscopy (ICP-OES)
Speciated Polycyclic Aromatic Hydrocarbons (PAH),	19	Determination of Polycyclic Aromatic Hydrocarbons by GC-MS. End/end extraction using DCM on as received sample. In house method modified USEPA 8270. Include coronene if required.
TPH CWG	19	TPH CWG (Aliphatics C5-6,>6-8,>8-10,>10-12,>12-16,>16-21,>2-35) (aromatics >C5-7,>7-8,>8-10,>10-12,>12-16,>16-21,>21-35) C5-8 fractions by Headspace GC-MS (003S). C8-35 fractions on as received sample extracted with hexane/acetone, aliphatic/aromatic splits run by GC-FID (005S), banded as listed above.
GRO/BTEX/MTBE by GC-FID (C5-10; C10-C12)	19	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12).
Organic Matter	19	Determination of Organic Matter by combustion.
Asbestos Screen	19	Visual Screening for Fibres and PLM
Asbestos Quantification	-	Microscopy
Total Organic Carbon	-	A-T-032s Combustion IR
Atterburg Limits	8	BS1377 Part 2. 1990, 4.3,5.3,5.4
Moisture Content	8	BS1377 Part 2. 1990, 3.2

10 CONTAMINATION ASSESSMENT

10.1 General

Contaminants of concern recorded at concentrations above relevant screening values are summarised below. For ease of description, the identification of contaminant sources and possible re-use of material, Topsoil, Made Ground, Natural Strata and Groundwater will be dealt with in separate sub-headings in this section of the report where required.

Our assessment is based on the following assumptions:

- The proposed site end use is of a high-risk rating. For analysis purposes, **residential with home grown produce** is deemed the most appropriate end use.
- The superficial deposits of the glacial till deposits are classified as a Secondary Undifferentiated Aquifer
- The recorded bedrock of the Pennine Middle Coal Measures and Etruria Formation are classified as a Secondary A aquifer.
- It is deemed that some statistical analysis is appropriate. Where sample data numbers are low and/or targeted, each determinant result is however reviewed further as an individual result as opposed to an average across the site.
- Site history has indicated a generally **Low – Moderate** risk of contamination and ground gas.
- Statistical analysis of the chemical test results has been undertaken in general accordance with Environment Agency 2009 SGV Guidance and AtRisk 2017 using the combined assessment criterion given by CLEA (Note: all SSVs for EA derivation are for a SOM of 6% in line with Environment Agency Report SC050021/SR4 – this figure is deemed representative as an average value for sandy loam soil). AtRisk 2017 are used to the nearest SOM percentage deemed appropriate.
- No free product was encountered during the additional ground investigation.
- Following the withdrawal of CLR7-10 Guidance documents by the Environment Agency, statistical analysis has been undertaken in accordance with the CIEH/CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' (May 2008). As such, the use of the mean value test alone is not considered.

A full risk assessment is detailed within Section 13 of this report.

10.2 Soils Contamination Summary

All results have been screened against residential with homegrown produce guidance and no samples have returned elevated results for topsoil and natural strata.

11 ENVIRONMENTAL RISK ASSESSMENT

11.1 General

This section assesses likely risks to the identified receptors, arising from potential contamination sources. It provides a final qualitative assessment of the risks involved, indicating whether (where appropriate) any immediate action is required to mitigate certain risks.

In assessing the risk qualitatively, it is appropriate to use the methods outlined in the CIRIA document C552, "Contaminated Land Risk Assessment a Guide to Good Practice". It uses a classification of risk based on the magnitude of the potential consequence or severity of risk occurring, compared with the magnitude of the probability or likelihood of the risk occurring. These are indicated on the attached tables in Appendix F.

The superficial deposits are classified as a secondary undifferentiated aquifer with the bedrock deposits are classed as a secondary A aquifer. With respect to human health, the proposed end use (residential with home grown produce) is of high sensitivity. Therefore the site's environmental setting is considered to be a low to moderate environmental sensitivity. Transient risks to construction workers can be addressed by the adoption of appropriate health and safety measures (see Section 15.2), therefore, the primary residual risks that require assessment are Site End Users. The following sections are split into soils and groundwater for clarity.

11.2 Assessment of Contamination Analytical Results

Soils

Of the samples collected from topsoil and natural strata none have returned elevated results therefore the risk to site from contamination from the materials tested is deemed to be low.

Groundwater, Surface Water and Aquifer Risk

No significant risk to groundwaters and surface waters is anticipated due to the lack of contamination encountered onsite.

12 GROUND GAS ASSESSMENT

12.1 Ground Gas Requirements – Radon

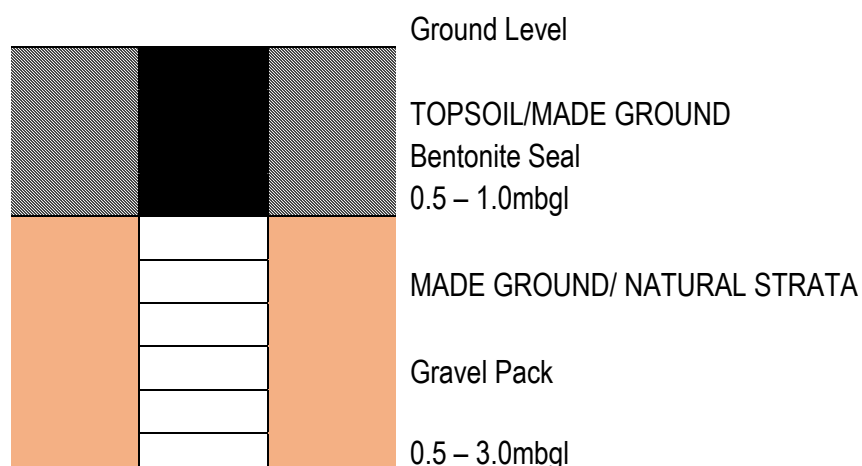
The below client provided site specific radon report was provided to Betts Geo and is summarised below, the full report can be seen in Appendix D.

The site-specific radon report shows that the development area of site is classed as 0-1% of homes above the action level therefore no radon protective measures are required.

12.2 Ground Gas Assessment

12.2.1 Ground Gas Boreholes Installations

The five (5 No.) window sample boreholes were installed to between 1.5 – 3.0mbgl with 0.5 – 1.0mbgl of plain pipe and between 1.0 – 2.0mbgl of slotted pipe. A typical installation is shown below;



12.2.2 Summary of Results

Six of six (6/6) ground gas monitoring visits have been undertaken to date and the results are summarised below (see Appendix E for full details).

Hole No	Peak Gas Flow (l/h)	Atmospheric Pressure Range (mb)		Peak CH ₄ (%)	Peak CO ₂ (%)	Minimum O ₂ (%)	Gas Screening Value (GSV) (l/h)		No. of Visits
		Min	Max				CH ₄	CO ₂	
WS01	*	*	*	*	*	*	*	*	6/6
WS02	0.3	998	1033	0.0	4.6	16.8	0.000	0.014	6/6
WS03	*	*	*	*	*	*	*	*	6/6
WS04	0.1	998	1033	0.0	0.4	20.0	0.000	0.000	6/6

WS05	0.1	998	1033	0.0	1.1	19.6	0.000	0.001	6/6
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* - Well flooded.

12.2.3 Guidance

The following publications are used for ground gas risk assessment:

- CIRIA C665 'Assessing risks posed by hazardous ground gases for buildings' 2007 - for high rise residential / flats.
- BS8485:2015 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

Further details / accompanying notes for the following gas risk assessment are enclosed in Appendix G. The proposed development at the site is residential.

12.2.4 Gas Recommendations

Ground gas monitoring is complete with six of six (6/6) visits completed, no elevated flow rates, ground gas concentrations or gas screening values have been identified, therefore the site can be classified as CS1 – no specialist ground gas protection measures required.

Site Area	Site Classification	Recommended Ground Gas Protection Measures
All of Site	CS1	No specialist ground gas measures anticipated.

Whilst the results show CS1 it is advised that a ventilated void is provided due to coal geology. Additional assessment may be required post additional coal probing works.

13 REVISED CONCEPTUAL SITE MODEL

13.1 General

The Initial Conceptual Site Model has been amended in light of data obtained during the ground investigation.

13.2 Final Conceptual Site Model

This section reassesses likely risks to the identified receptors, arising from potential contamination sources. It provides a final qualitative assessment of the risks involved, indicating whether (where appropriate) any immediate action is required to mitigate certain risks. It also discusses (where appropriate) what longer term measures or remedial works may be required in the future if the site were to be developed. It is considered that the site has not been assessed by the Local Authority as a contaminated site under the terms of the Environmental Protection Act 1990 Part IIa.

Target (Receptor)	Potential Source-Pathway Linkage	Remedial Action Required (where appropriate)	Est. Degree of Risk to Target Following Remedial Action Where Necessary
Site End Users	Inhalation of soil gases, odours or dust.	No radon protection required. Ground gas monitoring complete – CS1 – no protection required.	Low
Site End Users	Ingestion of, and skin contact with, contaminated soil.	No elevated contamination identified from sampling.	Low
Site End Users	Ingestion of contaminants in vegetables etc. or in soils adhering to vegetables, etc	No elevated contamination identified from sampling.	Low
Construction/ Maintenance Workers	Inhalation of soil gases, odours or dust.	PPE	Low (assumed basic PPE is used)
Construction/ Maintenance Workers	Ingestion of, and skin contact with, contaminated soil	PPE	Low (assumed basic PPE is used)
Plants	Adverse effects on growth caused by presence of contaminants in soil	No elevated contamination identified from sampling.	Low
Buildings and Structures	Flow of ground gas into buildings. Asphyxiation, toxicity, explosion and fire hazards	No radon protection required. Ground gas monitoring complete – CS1 – no protection required.	Low
Foundations	Sulphate attack of foundations	Foundations to be designed as per section 17.4.	Low
Water Supplies	Hydrocarbons penetrating plastic water supply pipes.	No elevated contamination identified from sampling.	Low
Groundwater	Migration of soluble contaminants into groundwater on or off site	No elevated contamination identified from sampling.	Low
Surface Water	Migration of soluble contaminants and/or direct run-off of contaminants	No significant risk to surface waters is anticipated due to lack of contamination	Low

		encountered.	
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14 OUTLINE STRATEGY FOR RISK REDUCTION / REMEDIATION STRATEGY

14.1 General

The following section details any recommendations and to reduce risk on site and recommended remedial actions (as per the previous sections of this report). For clarity, the section is split into sub-sections as per the conceptual site model (Section 15).

14.2 Construction/Maintenance Workers

No contamination was encountered on site from the sampling undertaken, however in the interests of good practice the following recommendations should be adhered to during site works:

- Site workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided. Adoption of dust monitoring for any remediation and demolition works.
- It is recommended that during all excavations adequate ventilation should be maintained. If man entry is required, gas monitoring should be carried out as a precaution.
- If areas of suspected contamination are found then a suitably qualified person should undertake appropriate sampling, testing and further risk assessment.
- Asbestos was not encountered during the chemical testing however vigilance should be adhered, and any suspected asbestos should be notified, and a suitably qualified person appointed to inspect.

14.3 Site-End Users

Of the samples collected from topsoil and natural strata none have returned elevated results therefore the risk to site end users from contamination from the materials tested is deemed to be low.

14.4 Controlled Waters

No significant risk to groundwaters and surface waters is anticipated due to the lack of contamination encountered onsite.

14.5 Ground Gas Protection Measures

The below client provided site specific radon report was provided to Betts Geo and is summarised below, the full report can be seen in Appendix D.

The site-specific radon report shows that the development area of site is classed as 0-1% of homes above the action level therefore no radon protective measures are required.

Ground gas monitoring is complete with six of six (6/6) visits completed, no elevated flow rates, ground gas

concentrations or gas screening values have been identified, therefore the site can be classified as CS1 – no specialist ground gas protection measures required.

Whilst the results show CS1 it is advised that a ventilated void is provided due to coal geology. Additional assessment may be required post additional coal probing works.

14.6 Piped Drinking Water Supplies

Due to no elevated contamination being encountered from the sampling, it is not anticipated that a protect-a-line pipeline will be required however a United Utilities pipeline risk assessment maybe required to confirm.

14.7 Off-Site Disposal of Surplus Soil

The handling, re-use or disposal of waste is regulated by the Environment Agency. Any material excavated on-site may be classified as waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. One of the ways this can be achieved is set out in the Development Industry Code of Practice (CoP; Ref. 13). This builds on the Environment Agency guidance document Definition of waste: developing greenfield and brownfield sites (2006). The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste. If materials are dealt with in accordance with the CoP, the Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development.

All material proposed for off-site disposal (e.g. during future construction works) should be given a proper description and waste classification assessment as required by the Environmental Protection Duty of Care Regulations (Ref. 14), and in accordance with WM3 and the Environment Agency Technical Guidance on the assessment and classification of Hazardous Waste.

It is recommended that the results of the contamination testing (including the history of the site) be presented to the proposed landfills to obtain their acceptance of the information to date. However, further testing maybe required to fully assess the waste classification of the soils requiring offsite disposal.

Segregation of the Made Ground, Topsoil and Natural Strata should be possible given the chemical analysis and very different visual identification. If moved to other sites for use, it is proposed to use the results of the contamination testing to determine if it is deemed suitable for re-use as topsoil or subsoil.

If there is the need to remove soil / Made Ground off-site it is recommended that the number of results required may not have been met using the sampling density requirements given in the Environment Agency (EA) *Waste Sampling and Testing for Disposal to Landfill 2013*. Additional samples of segregated soils whilst in stockpiles may be required before waste classification assessment can be carried out. A minimum of five (5 No.) samples of heterogenous material are required for offsite disposal.

Once an adequate number of samples have been analysed then the results of the chemical analysis will

need to be assessed in order to classify the materials as non-hazardous or hazardous. The waste classification of soils is carried out in line with the *Guidance on the classification and assessment of waste (1st edition v1.1)*, *Technical Guidance WM3*, published by the EA, SEPA, NIEA and NRW. Betts Geo can provide a cost for the testing of any additional samples and a waste classification report, if materials will be disposed of offsite.

If the materials are classified as non-hazardous then the materials will not require any further assessment, unless there is possibility of disposal at an inert landfill. In order to dispose of material at an inert landfill the material must meet certain criteria physically and the leachable contamination must be below the inert Waste Acceptance Criteria (WAC) thresholds. WAC (single stage leachate, unless requested otherwise) analysis will therefore need to be carried out on the material. Due to time constraints or the availability of storage on site it may be advised to dispose of the material at a non-hazardous landfill, to allow materials to be removed from site quickly.

If the waste classification determines that there is hazardous material to be disposed of then hazardous WAC testing must be carried out on the material before it can be removed from site. This will determine whether the material requires treatment before being disposed at a hazardous landfill. Any exceedances of the hazardous WAC thresholds will need to be discussed with the receiving landfill.

The hazardous waste threshold for asbestos is 0.1% or any materials which contain visible asbestos containing materials. Possible asbestos sheeting was visually identified on site in the farm yard area. Materials which are chemically non-hazardous but hazardous with respect to asbestos can potentially be disposed of at a non-hazardous landfill within a Stable Non-Reactive Hazardous (SNRW) cell.

Further information about disposal of soils offsite is provided in Appendix L.

15 ROTARY COAL MINING INVESTIGATION FINDINGS SUMMARY

From the results of the rotary boreholes, no workings, voids, soft drilling or loss of flush was encountered during the nine rotary boreholes drilled to 30.0mbgl. Coal and shaley coal was encountered within RBH02 at 4.9 – 5.2mbgl (0.3m thick) and 23.0 – 23.6mbgl (0.6m thick), RBH03 at 2.5 – 2.6mbgl (0.1m thick) and 3.0 – 3.2mbgl (0.2m thick) and RBH05 at 7.5 – 7.8mbgl (0.3m thick). Due to the thin thicknesses and the minor faulting associated to the Ecclestone east fault it appears these coal deposits are not worked. As such when review alongside the previous phases of rotary coal mining investigations to the south and east it is deemed the risk to site from shallow coal mining is low.

Coal Mining Risk Assessment

A large displacement fault has been known to be present under the site since the First Edition of the Geological Survey in 1882, although the drilling in previous phases of drilling now proves the true location of the fault to be 100m west of what was recorded on the Geological Survey location. These drilling results also confirm the fault position during the 2018 investigation in the field immediately north of the current site.

The geological succession proved by the drilling work confirms the Geological Survey of the area with the 450m Ecclestone West Fault trending north across the site. This fault throws coal bearing Carboniferous Coal Measures of Westphalian B age in the west against Triassic Lower Mottled Sandstone to the east.

There are no shallow coal seams east of the fault although mining at 700m depth did take place from Cronton Colliery in the Felcroft Mine 2km south-east of the site in 1977. There are records of mining under the fault from Halsnead Colliery in the Rushy Park Mine at a depth of 400m, 200m north of the site, and abandoned in 1896. Cronton Colliery, opened in 1915, worked the Rushy Park under the site in 1932 and left a substantial barrier of solid coal against the old Halsnead workings north and west of the site.

The workings in the Higher Florida Mine from Cronton Colliery encountered a 40m fault under the site with a downthrow east.

The Coal Authority show one coal seam possibly present at very shallow depth west of the fault. This is the Felcroft Mine at an estimated depth of 25m in the north-east of the site. In descending order the coal seams at Halsnead have the following local names and succession:

- Felcroft Mine 1.5m thick - perhaps 9m measures
- Pasture Mine (formerly known as Pastures) 2.4m thick - 9m measures
- Discovery Mine (formerly known as Discoverer) 2.0m thick - 16m measures
- Yard Mine (also incorrectly identified as Earthy Delf) 1.0m thick

The Coal Measures dip south-west at approximately 1 in 6, although there are variations in this nominal dip due to the influence of the fault. Whilst no coal thicker than 1.0m was encountered in the drilling on the

majority of the site, a small area of shallow coal 0.2-0.3 and 1.0m thick was proved to be present in the close proximity of the Eccleston West Fault. This coal is within a faulted block dipping east at 1 in 10, close to the western wall of the fault and presumed to have been displaced downwards from higher in the Coal Measure succession. If this is the origin of the faulted block then the only known coal seam of a similar recorded thickness of the thicker of the two is the unworked Three Foot Coal encountered close to outcrop in the Cronton Colliery No 2 Shaft and inferred to outcrop in the extreme west of the site dipping to the south-west at 1 in 6. This is very different than published geology which proves problematic when trying to interpret the coal geology.

BH16 in the west of the site was drilled to locate the Three Foot Coal but the seam was proved to outcrop south-west of the site boundary.

It is evident that the 3 Foot Coal is proven in the east of site (as per previous GI) and extends to additional holes within this GI to the north of previously encountered. No voids or loss of flush were noted only firm drilling.

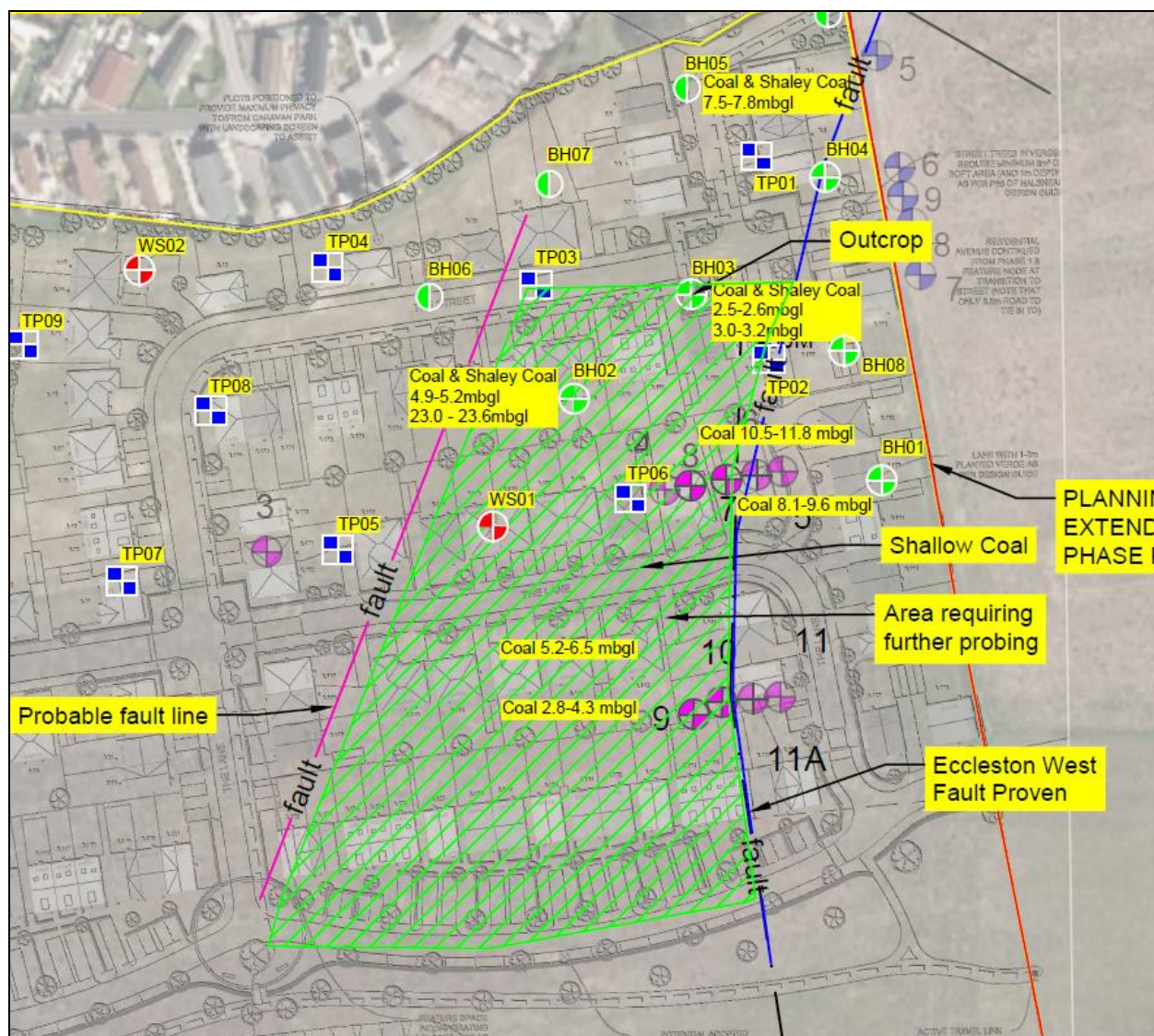
The unnamed 0.2 – 0.3m thick seam is of workable thickness near surface however No voids or loss of flush were noted only firm drilling.

Whilst the seams are of workable thickness no evidence of workings are noted. The depth of seam / rockhead cover is such that only the below area is at higher risk (able it lesser due to drilling evidence).

Possibility of unrecorded shafts and bell pits / working at surface can't be discounted however not identified on site. Vigilance during site strip is advised.

Due to the complication of the faulting further 'proving holes' are advised under plots as shown below where the coal is shallow and has insufficient rock cover. It is deemed unlikely to have been worked given the complications of the fault line however a small risk does still exist.

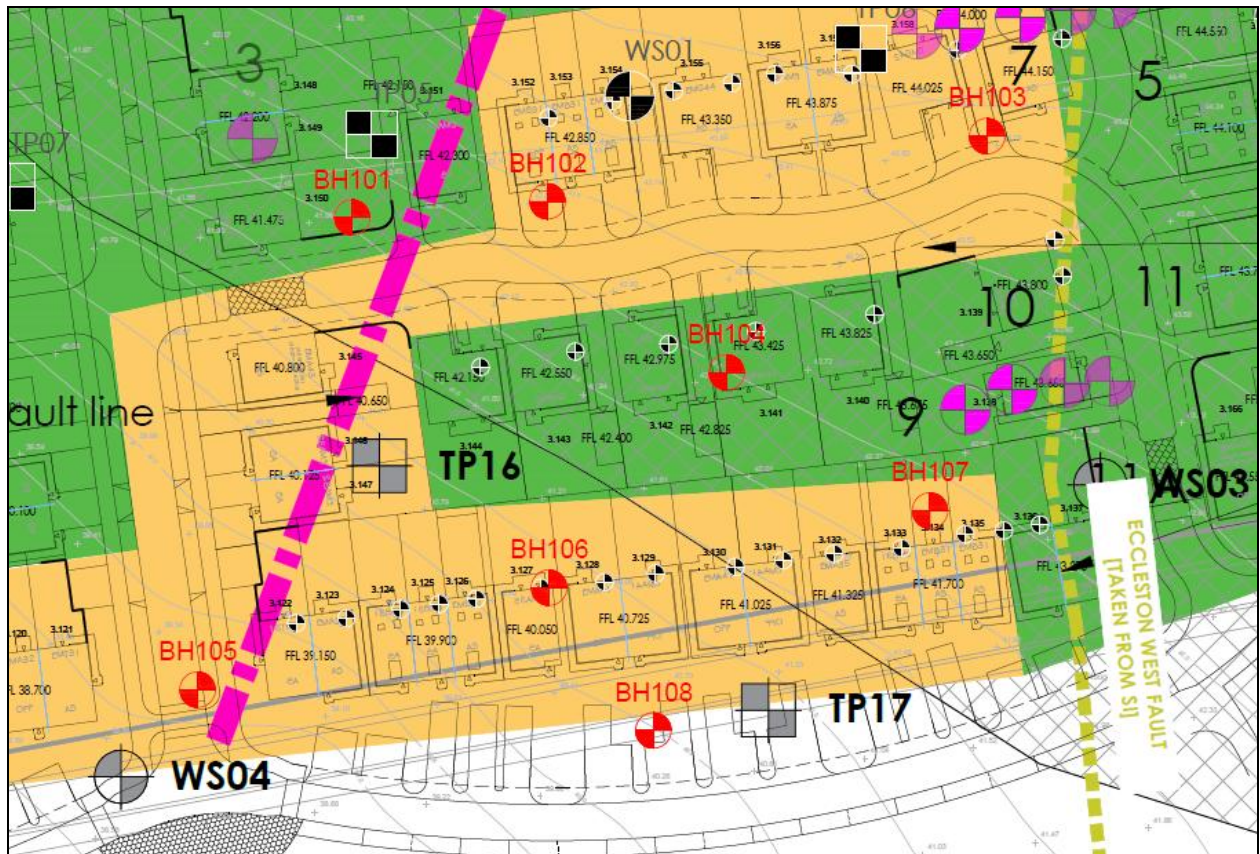
For pricing purposes raft foundations and grouting under plots should be allowed for. Piling in this locality should be avoided until additional investigation due to the shallow coal seams (best practice) – green hatch below.



Additional Rotary Borehole Coal Investigation – January 2026

As part of the previous investigation / foundations assessment recommendations additional rotary boreholes were undertaken by Betts Geo under MRA Permit to further explore the potential for coal seams and evidence of workings.

An additional eight (8 No.) rotary open boreholes (BH101 – 108) were undertaken (under MRA permit) in the areas above hatched green to better assess the risk to site by shallow coal previously discussed.



No evidence of mining related disturbance was identified and as such no precautions for shallow unrecorded working are deemed necessary.

As with any coal mining area site vigilance is advised during site strip to ensure no unrecorded shafts / trial shafts exist.

16 GEOTECHNICAL ASSESSMENT

16.1 Introduction

It is understood that the proposed development will consist of the construction of low risk residential houses.

16.2 Site Preparation and Excavation

Excavation in close proximity to any existing services will need to ensure that the excavation walls are stable or appropriately battered to a safe angle, temporary slope stability works may be required in any deep excavations.

All excavations should be planned, and due consideration should be given to providing temporary support or suitable battering. Excavations should be regularly inspected by a competent person to ensure continued safety. Further advice on the safety of excavations is given in *Health and Safety in Construction*. Shallow (<1.20mbgl) excavations for service trenches could be complicated by collapsing sands, silts/clays, and care should be taken.

Topsoil and any unsuitable Made Ground should be removed from beneath all proposed buildings and hard standing areas.

Suitable arisings generated by the grubbing of any obstructions can be processed to produce a product graded as 6F2, suitable for re-use on-site as a granular running surface or as capping materials beneath adoptable or private highways.

Excavations of shallow soils should not present any difficulty for conventional plant and equipment except for where/when groundwater is close to surface. Allowance for sump and water pump is required due to shallow/tidal groundwater.

16.3 Control of Groundwater/Surface Water

Shallow groundwater was encountered onsite and so shuttering/pumping/dewatering should be allowed for in excavations. It is good practice to have such equipment on standby in case of seasonal / abnormal weather conditions.

16.4 Foundations

Due to shallow bedrock and firm to stiff clays across site shallow strip / trench foundations should be possible across site (subject to cut and fill / finished levels assessment)

The following allowable bearing pressures are recommended for traditional foundations:

- Firm CLAY – 100kN/m².

- Stiff CLAY – 125kN/m².
- Medium dense SAND – 100kN/m².
- Bedrock – 150kN/m².

Caution should be applied in areas of shallow groundwater or areas of running sands. Care is required during the planning stage to ensure site levels are kept high and foundation excavation depths kept to a minimum to prevent encountering groundwater. It is advised that roadways and drainage is installed first to lower the groundwater potential.

As previously mentioned in section 15 in the area of shallow coal for pricing purposes raft foundations and grouting under plots should be allowed for. Piling in this locality should be avoided until additional investigation due to the shallow coal seams (best practice).

16.5 Ground Floor Construction

Due to shrinkable soils being present at shallow depth suspended floor slabs should be adopted across site in accordance with NHBC guidance.

16.6 Soakaways

Soakaway tests were not undertaken as part of the Betts Geo fieldwork. Given the impermeable glacial till and mudstone soakaways are unlikely to provide a suitable drainage option.

16.7 Heave / Shrinkage Potential

The results of Atterberg tests are given below:

Exploratory Position ID	Depth (m)	% <425um	% Plasticity Index	Modified Plasticity Index %	NHBC Modified Plasticity Level
TP10	0.7	97	25	24.25	Medium
TP12	1.2	98	13	12.74	Low
TP13	0.8	99	14	13.86	Low
TP17	1.2	100	14	14.00	Low
TP18	1.0	89	15	13.35	Low
TP2	0.6	100	32	32.00	Medium
TP9	1.0	100	36	36.00	Medium
WS3	1.0	87	12	10.44	Low

LOW – MEDIUM plasticity is evident across the materials tested during the Betts Geo investigation.

16.8 Highway

According to the criteria of Highways Agency HD 25/95 Volume 7 Section 2 Part 2 HD 25/94, a CBR value of 3% on the made ground and 3-5% on the clay/sand is anticipated, however in-situ CBR's should be

undertaken during construction to confirm. A capping layer of the crushed layers is to be placed on road areas and will require testing post placement. A CBR value of 5% is anticipated on the capping layer in road areas. Placement of geotextiles within the areas of roads / parking could also be designed to minimise the subgrade thickness.

Proof rolling of the formation level will be required and any loose or soft spots to be removed and replaced with an engineered fill, in accordance with a suitable specification. The formation level will also need to be protected during inclement weather from deterioration; all slopes shall be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

Prior to the placement of the founding materials and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. Insitu testing should be undertaken to confirm that the ground conditions at time of construction are consistent with the previous design parameters.

Where the CBR is found to be less than 2.5%, the sub-grade may be unsuitable for both the trafficking of site plant and as support for a permanent foundation, without improvement works being undertaken. Improvement works should be carried out in accordance with DMRB IAN 73/06 Rev 1 Chapter 5. In summary, consideration may be given to the following potential remedial techniques:

Excavation and re-engineering or replacement of weaker soils;

The inclusion of geosynthetic reinforcement within the unbound layers of the capping and sub-grade; and

Where granular soils are present, de-watering and re-engineering the formation.

16.9 Protection of Buried Concrete

It is considered for concrete design purposes that a greenfield site and static groundwater conditions are applicable onsite, and the results are summarised below.

Concrete Classification	
Design Sulphate Class	DS-1
ACEC Class	AC-1

16.10 Further Works

- Cut and fill assessment.
- Arboricultural survey for tree heave potential assessment.
- Detailed structural and foundation design.
- Plot specific rotary probing in SE corner of site due to unpredictable coal geology in this location due to faulting.

17 REFERENCES

- 17.1 *BS 5930:2015 Code of Practice for Site Investigation.*
- 17.2 *BS1377: 2016 Methods of Test for Soils for Civil Engineering Purposes.*
- 17.3 *Assessment of risks to human health from land contamination: an overview of the development of guideline values and related research. EA, 2002.*
- 17.4 *Contaminated Land Risk Assessment; A Guide to Good Practice; CIRIA C552: 2001.*
- 17.5 *Health and Safety in Construction, HSG150, HSE, 1996.*
- 17.6 *Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Waste, Environment Agency, WM2 Version 1.0, June 2003.*
- 17.7 *DoE (1991), The Building Regulations Approved Document C, Site Preparation and Resistance to Moisture, HMSO.*
- 17.8 *Baker W (1987), Investigation Strategy - lecture at City of Birmingham Development Department Symposium on Methane Generating Sites, 9 December 1987, Industrial Research Laboratories, Birmingham.*
- 17.9 *NHBC Standards, Chapter 4.2, 2017 Building Near Trees.*
- 17.10 *Highways Agency HD 25/95 volume 7 section 2 Part 2 HD 25/94.*
- 17.11 *Water Regulations Advisory Scheme (2002) The selection of materials for water supply pipes to be laid in contaminated land.*
- 17.12 *Anon (1997) Dutch in Policy Retreat on Contaminated Land ENDS (Environmental Data Services), 269, 46.*
- 17.13 *Water Regulations Advisory Scheme (2002) The selection of materials for water supply pipes to be laid in contaminated land.*
- 17.14 *Piling In Layered Ground: Risks to Groundwater and Archaeology Science Report SC020074/SR Environment Agency October 2006.*
- 17.15 *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater & Contaminated Land Centre report NC/99/73 F J Westcott, C M B Lean & M L Cunningham May 2001.*
- 17.16 *'Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present', Report Edition No.04 March 2007 NHBC – designed for use with low rise residential properties.*
- 17.17 *CIRIA C665 'Assessing risks posed by hazardous ground gases for buildings' 2007 - for high rise residential / flats*

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- 17.18** *BS8485:2015 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.*
- 17.19** *BRE 414 'Protective measures for housing on gas-contaminated land' Roger Johnson, Parkman Environment 2001.*
- 17.20** *BS 8500- 1:2006 'Concrete – Complementary British Standard to BS EN 206-1 – Part 1: Method of specifying and guidance for the specifier' November 2006.*
- 17.21** *'Planning Policy 23:Planning and Pollution Control' Office of the Deputy Prime Minister 2004.*
- 17.22** *CLR11 'Model Procedures for the Management of Land Contamination' DEFRA 2004.*
- 17.23** *BRE 465 'Cover Systems for Land Regeneration' 2004.*
- 17.24** *'The UK Approach for Evaluating the Human Health Risks from Petroleum Hydrocarbons in Soils, Environment Agency Science Report P5-080/TR3', Environment Agency (May 2005).*
- 17.25** *TOX12- Contaminants in Soil: Collation of Toxicological Data and Intake Values for Humans. Dioxins, Furans and Dioxin-like PCBs' Environment Agency 2003.*
- 17.26** *Atkins 2017 AtRisksoil.co.uk SSV's derived using CLEA for 1 or 6% SOM. Residential with homegrown produce.*
- 17.27** *Phase 1 Geo-Environmental Desk Study for the Proposed Development of Land to the West of Whalley Road, Barrow, Lancashire by Capita Symonds – January 2012 (Doc reference: 18394-DS02).*
- 17.28** *Atkins 2017 AtRisksoil.co.uk SSV's derived using CLEA for 1 or 6% SOM. Residential with homegrown produce.*

(i) Site Location Plan



The site is located south of Lake View and north of the M62, Halsnead Park, Whiston, the nearest postcode is L35 3SS.. The coordinates for the site on National Grid are 347236, 389888. The site area is approximately 2.81 hectares in size.

APPENDIX B

- (i) Betts Exploratory Hole Location Plan

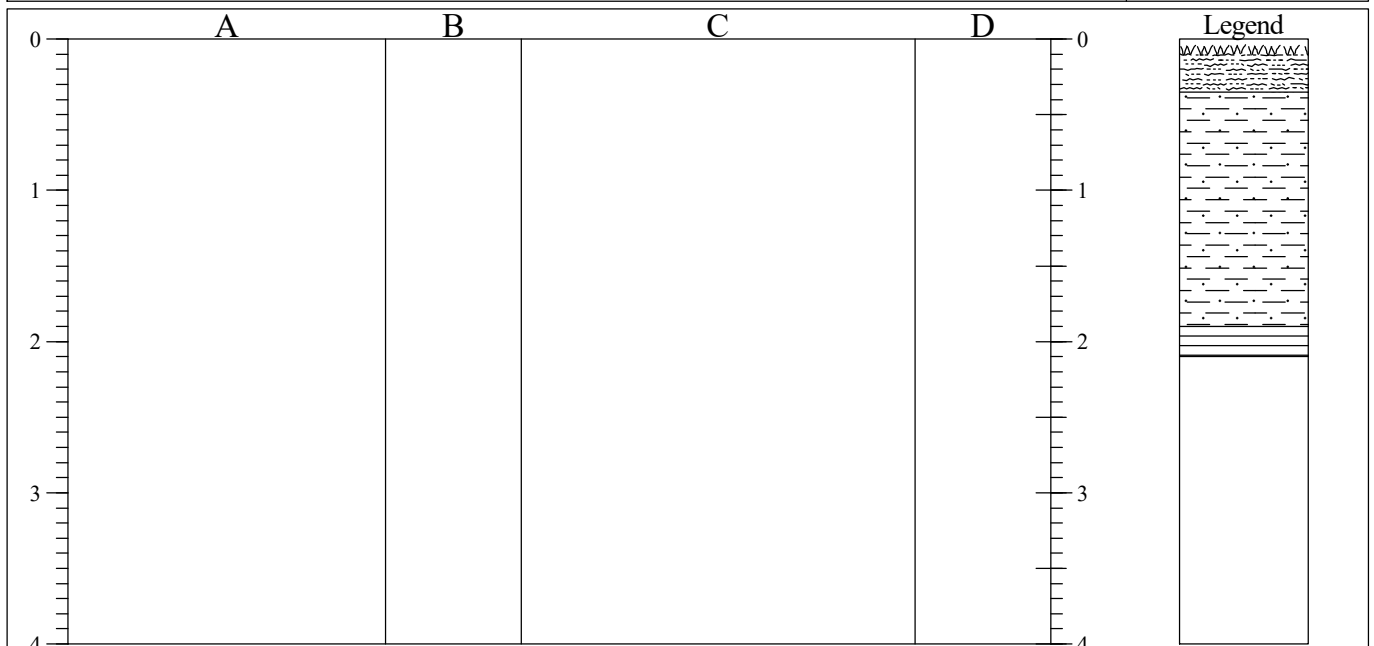


APPENDIX C

(i) Betts Exploratory Hole Logs

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP1
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1

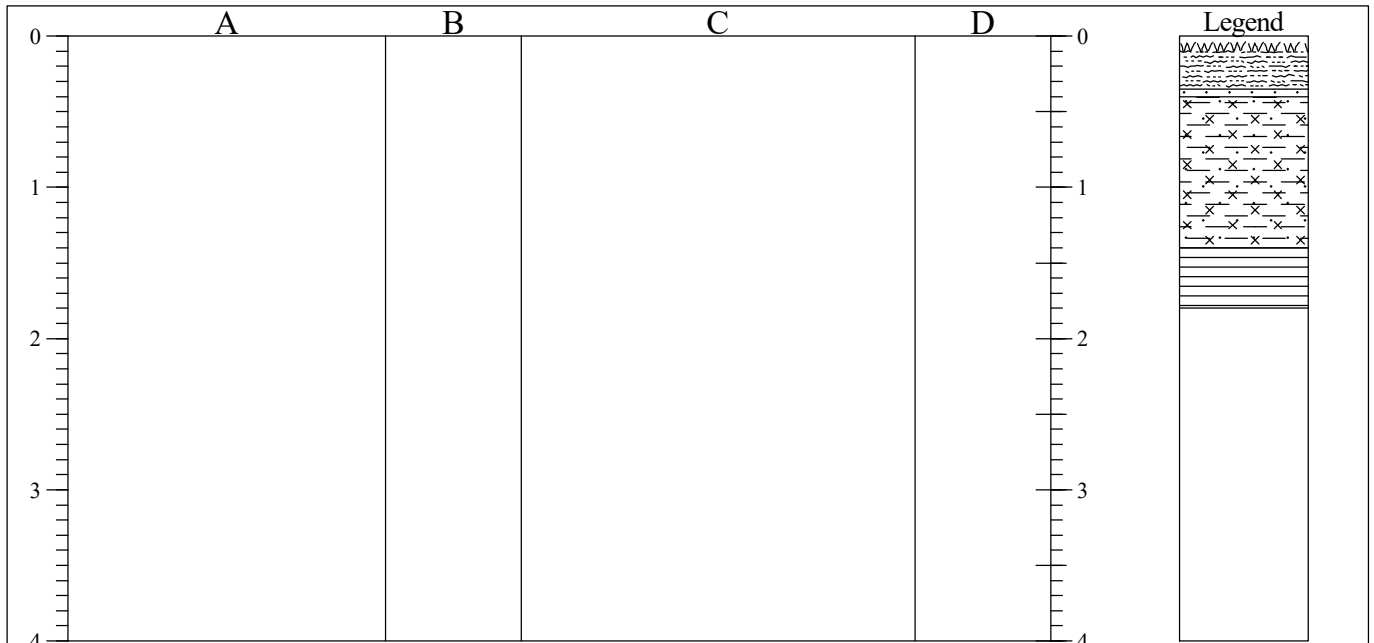


STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]				
0.35-1.90		Firm orange brown very sandy CLAY. [GLACIAL TILL]				
1.90-2.10		Weak blue grey brown fissured MUDSTONE. [PENNINE MIDDLE COAL MEASURES]				

Shoring/Support: None. Stability: Stable.			GENERAL REMARKS
All dimensions in metres Scale 1:50			Stable, upwelling seepage from rock. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.
Client	Taylor Wimpey	Method/ Plant Used	CAT308 CR 8t TRACKED EXCAVATOR
		Logged By	RD

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP2
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1

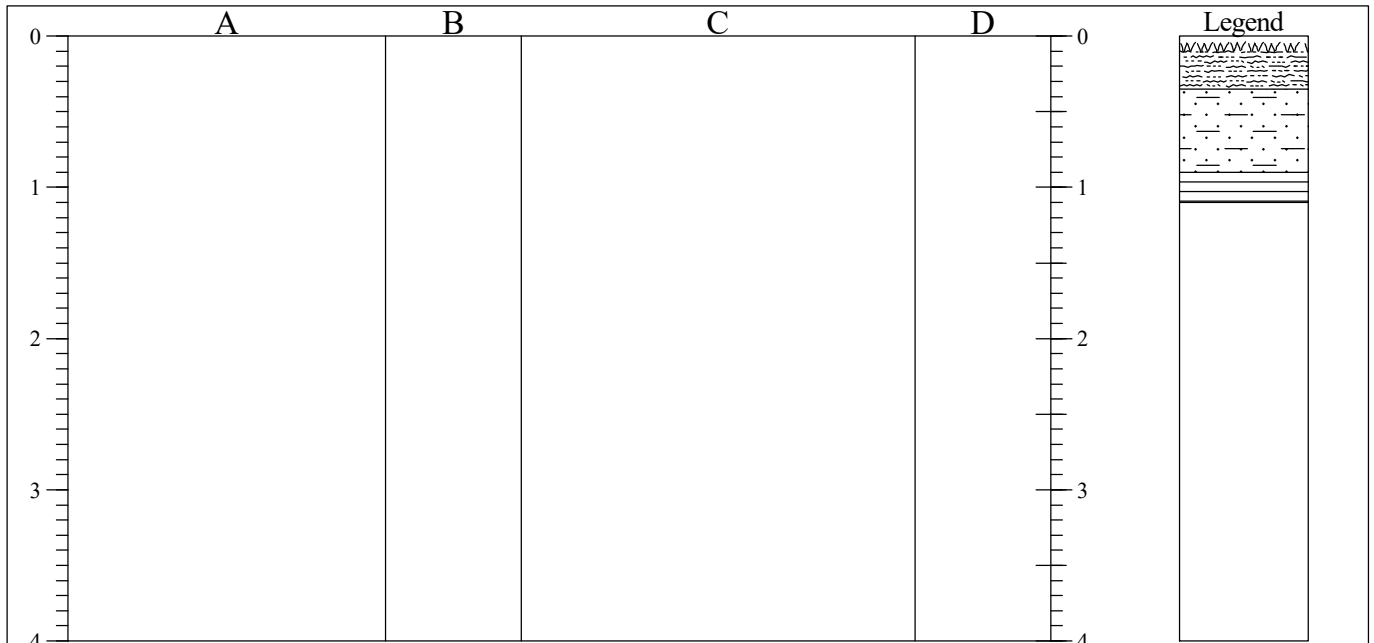


STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.20	ES		
0.35-0.40		Medium dense grey brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]	0.60	D		
0.40-1.40		Firm to stiff cream orange brown slightly silty slightly sandy CLAY. [GLACIAL TILL]				
1.40-1.80		Weak blue grey brown silty fissured MUDSTONE. [PENNINE MIDDLE COAL MEASURES]				

Shoring/Support: None. Stability: Stable. 				GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.	
All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD		

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP3
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



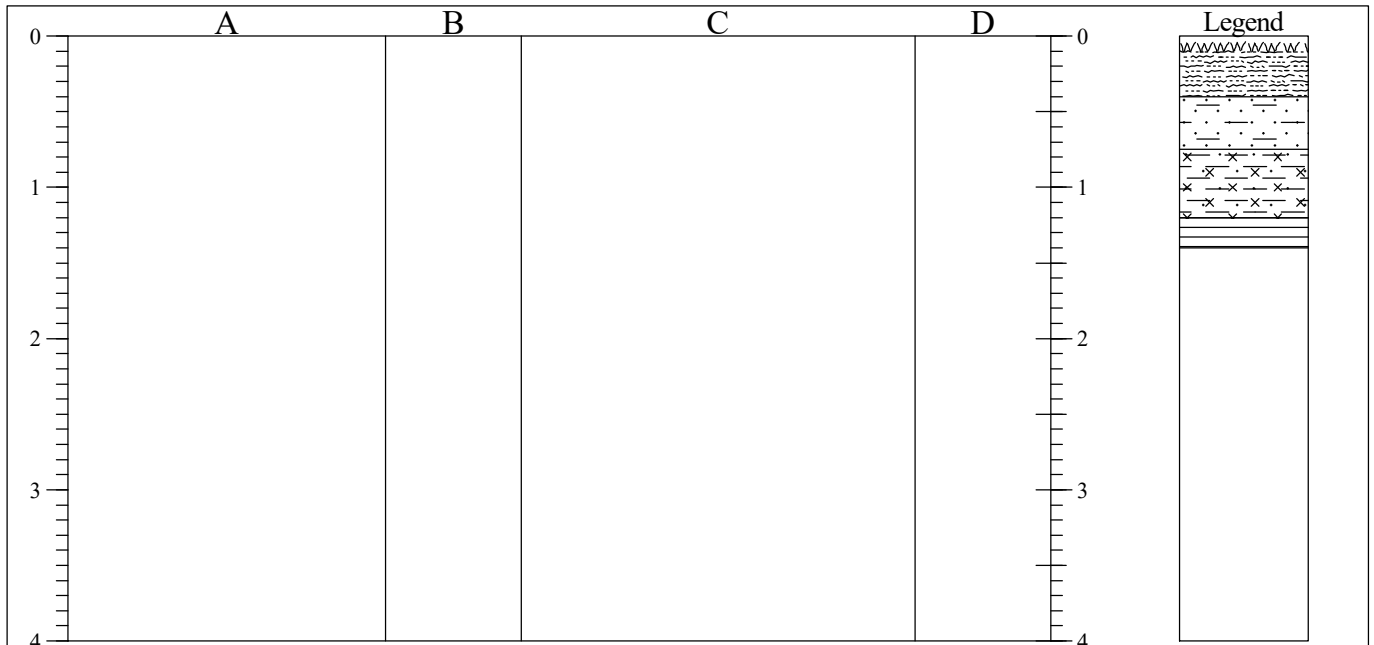
STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]				
0.35-0.90		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]				
0.90-1.10		Weak blue grey brown silty fissured MUDSTONE. [PENNINE MIDDLE COAL MEASURES]				

Shoring/Support: None. Stability: Stable.	GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP4
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



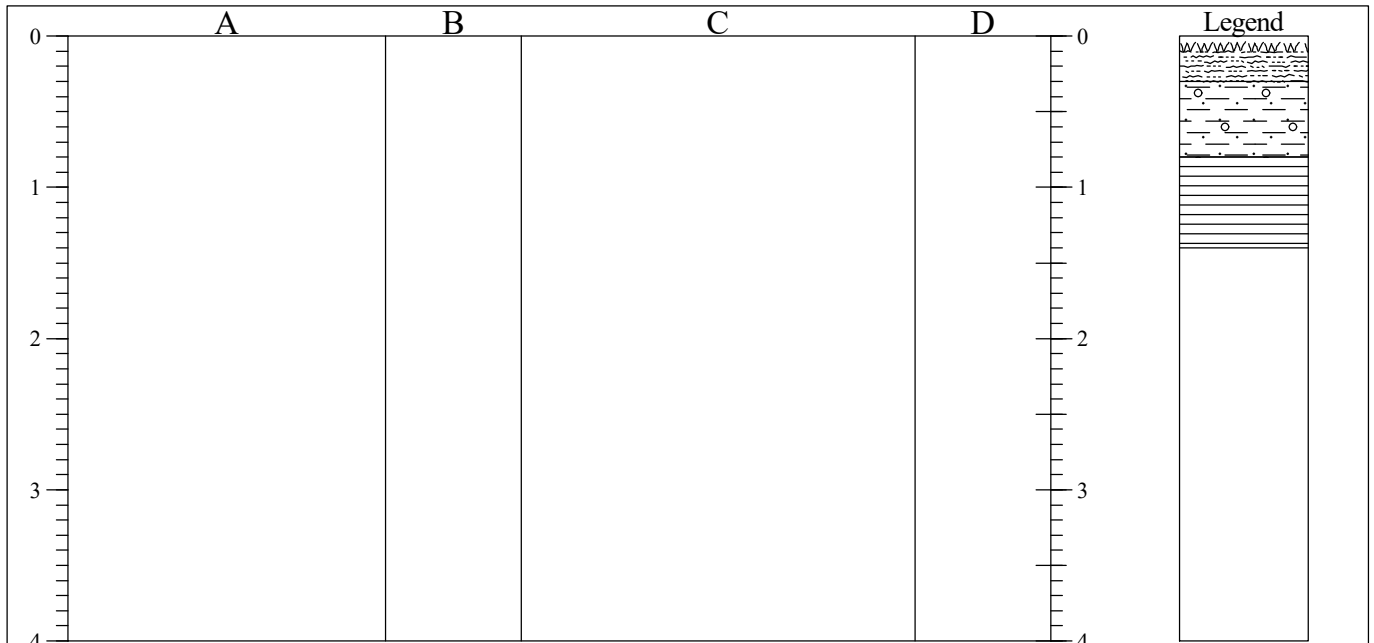
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.50	ES	
0.40-0.75		Medium dense brown clayey fine to medium SAND with rare cobble of fine subangular mixed lithologies. [GLACIOFLUVIAL DEPOSITS]			
0.75-1.20		Firm to stiff blue grey brown slightly silty slightly sandy CLAY. [GLACIAL TILL]			
1.20-1.40		Weak blue grey brown silty fissured MUDSTONE. [PENNINE MIDDLE COAL MEASURES]			

Shoring/Support: None. Stability: Stable. 				GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP5
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



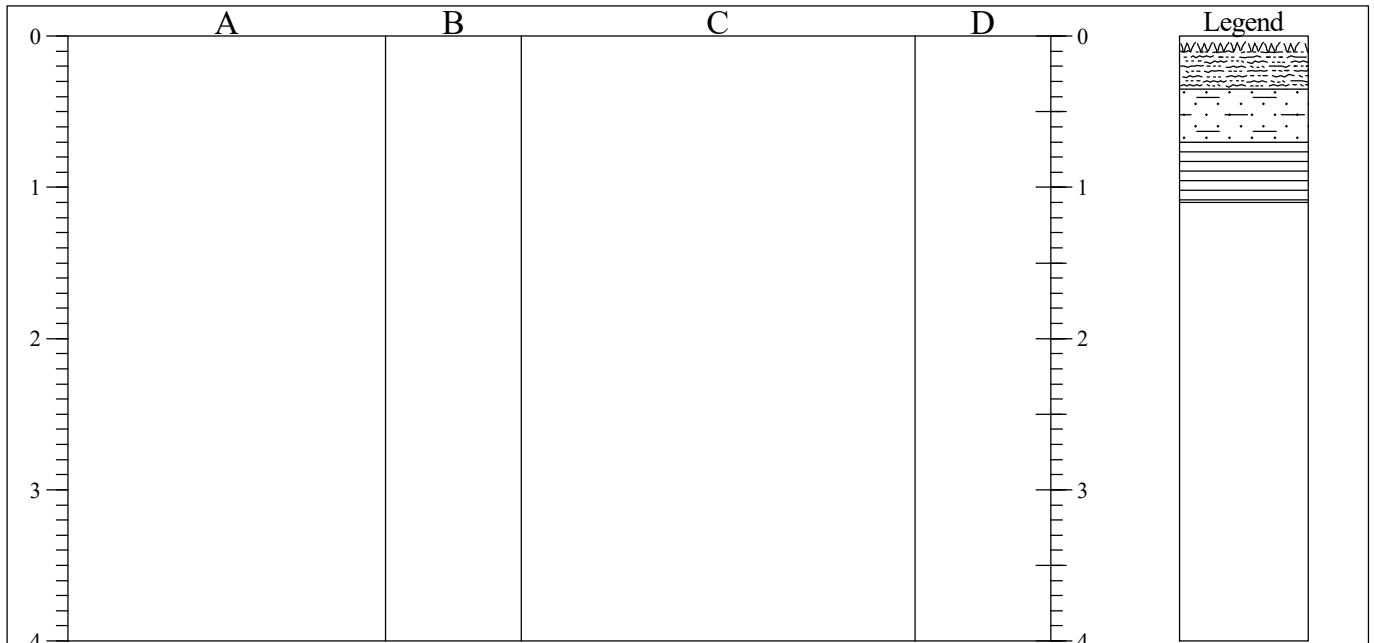
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.20	ES	
0.30-0.80		Firm orange very sandy CLAY with occassional gravel of fine to medium subrounded mixed lithologies. [GLACIAL TILL]			
0.80-1.40		Weak blue grey brown silty fissured MUDSTONE. [PENNINE MIDDLE COAL MEASURES]			

Shoring/Support: None. Stability: Stable.	GENERAL REMARKS Slight seepage from base, stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP6
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



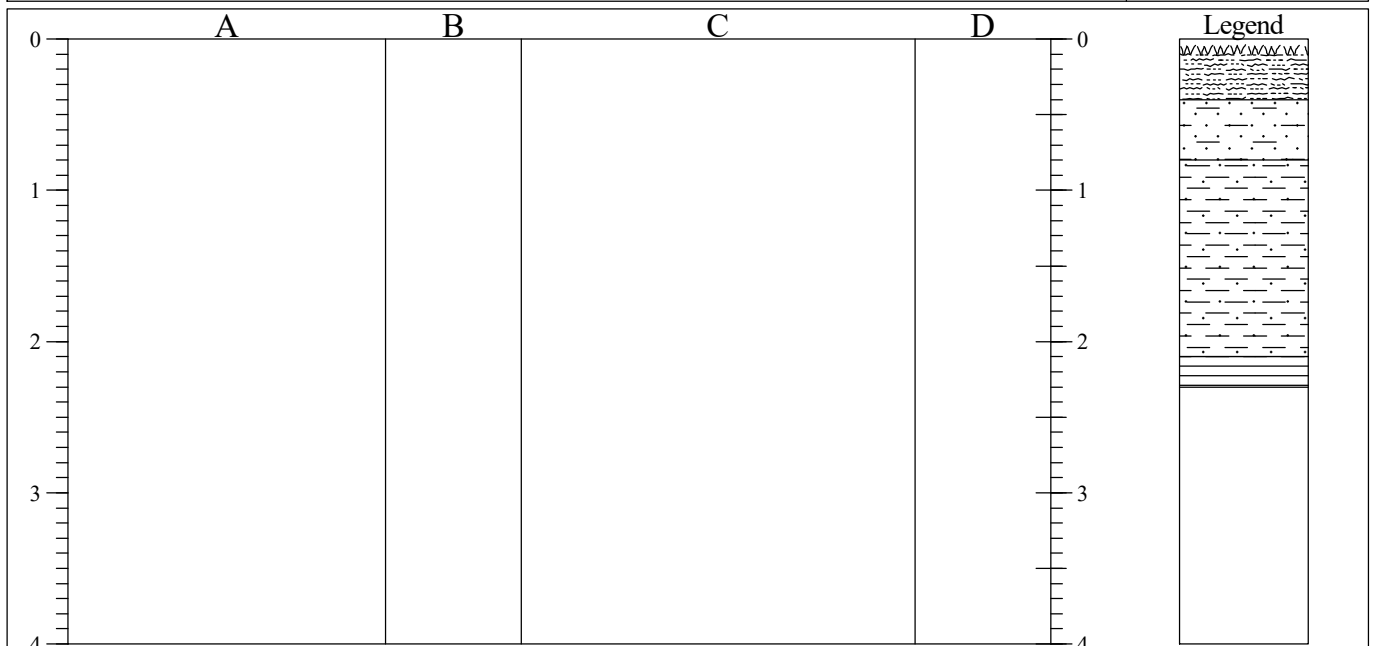
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	1.00	ES	
0.35-0.70		Medium dense orange brown very clayey fine to medium SAND with rare cobble of fine subangular mixed lithologies. [GLACIOFLUVIAL DEPOSITS]			
0.70-1.10		Weak blue grey brown silty fissured MUDSTONE with frequent iron staining. [PENNINE MIDDLE COAL MEASURES]			

Shoring/Support: None. Stability: Stable. 				GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP7
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



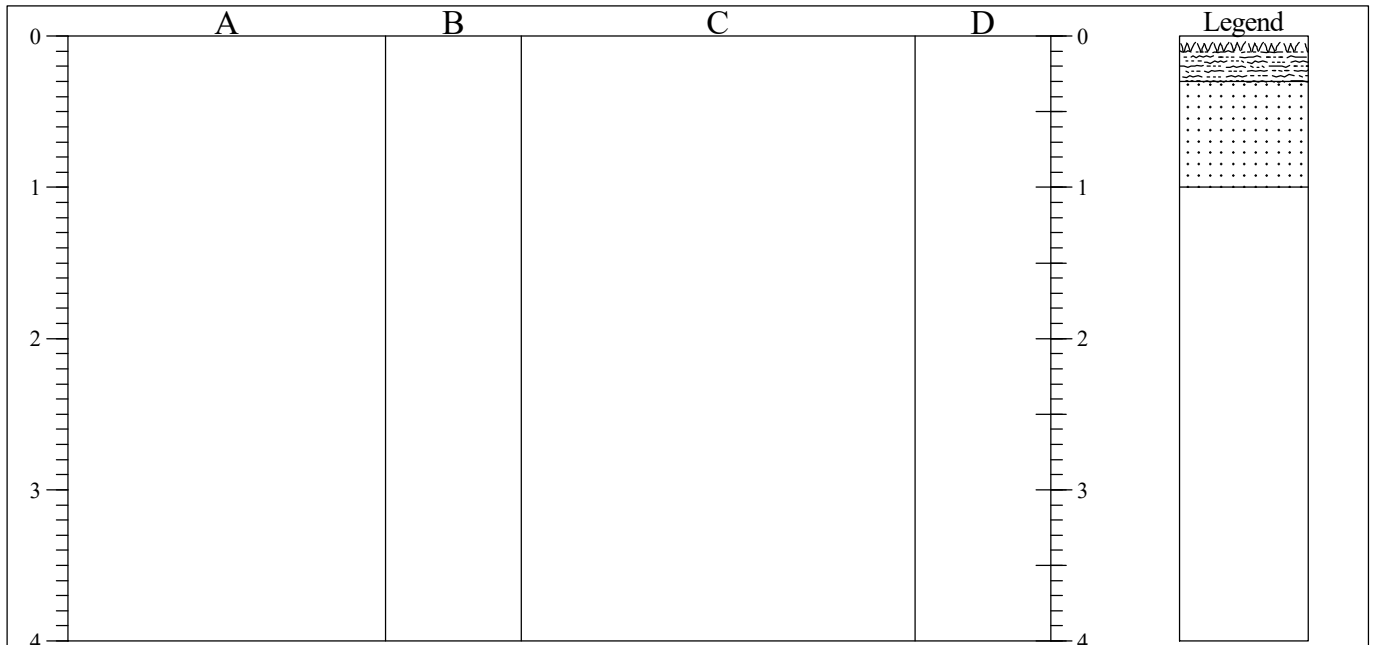
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]			
0.40-0.80		Medium dense grey brown clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]			
0.80-2.10		Stiff red brown mottled blue grey sandy CLAY with occasional gravel of fine angular coal. [GLACIAL TILL]			
2.10-2.30		Weak blue grey brown silty fissured MUDSTONE with frequent iron staining. [PENNINE MIDDLE COAL MEASURES]			

Shoring/Support: None. Stability: Stable. 			GENERAL REMARKS Wet sand lenses at 0.8 - 2.1mbgl, stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP8
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]				
0.30-1.00		Weak grey brown bedded fine grained SANDSTONE. [PENNINE MIDDLE COAL MEASURES]				

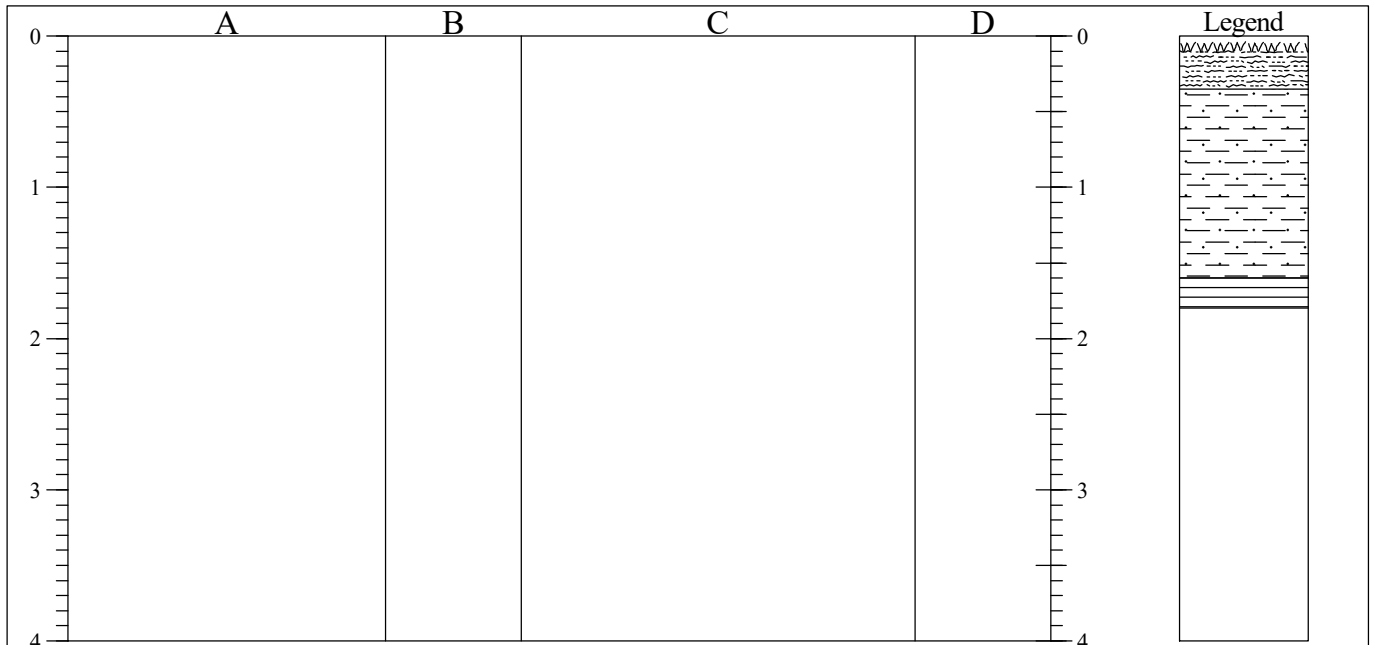
Shoring/Support: None. Stability: Stable.	GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP9
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



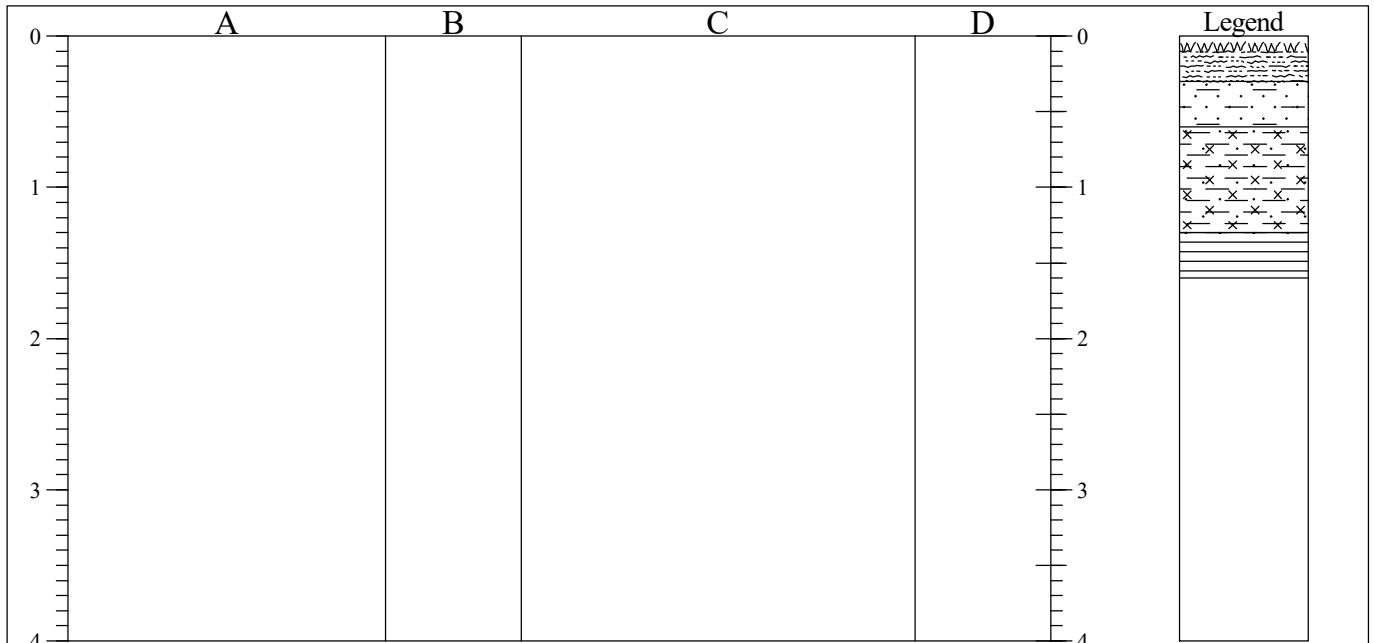
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.30 		

Shoring/Support: None. Stability: Stable.	GENERAL REMARKS
	Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP10
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



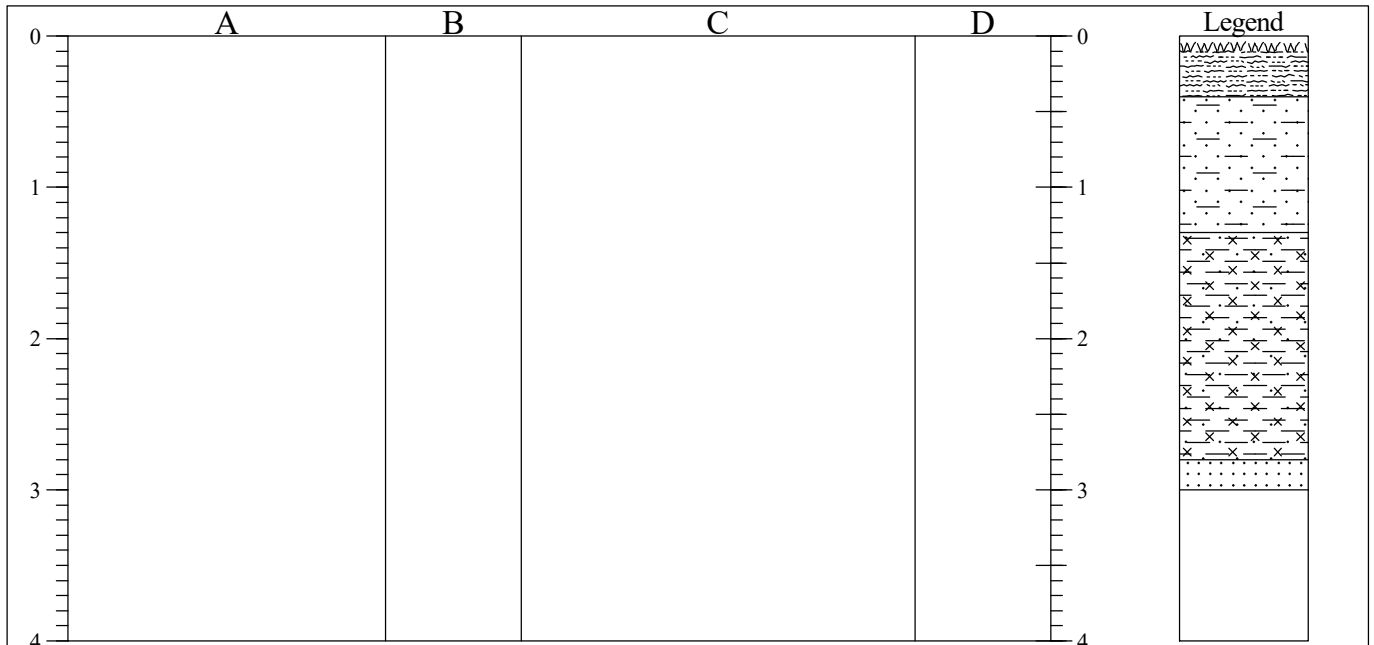
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.40	ES	
0.30-0.60		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]			
0.60-1.30		Stiff orange brown and blue grey slightly silty slightly sandy CLAY. [GLACIAL TILL]	0.70	D	
1.30-1.60		Weak blue grey brown silty fissured MUDSTONE with layers of coal. [PENNINE MIDDLE COAL MEASURES]			

Shoring/Support: None. Stability: Stable. 				GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP11
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.20	ES	
0.40-1.30		Medium dense grey and brown very clayey fine to medium SAND with rare cobble of fine subrounded mixed lithologies. [GLACIOFLUVIAL DEPOSITS]			
1.30-2.80		Stiff red brown mottled grey slightly sandy slightly silty CLAY. [GLACIAL TILL]			
2.80-3.00		Strong brown fine to medium grained SANDSTONE. [PENNINE MIDDLE COAL MEASURES FORMATION]			

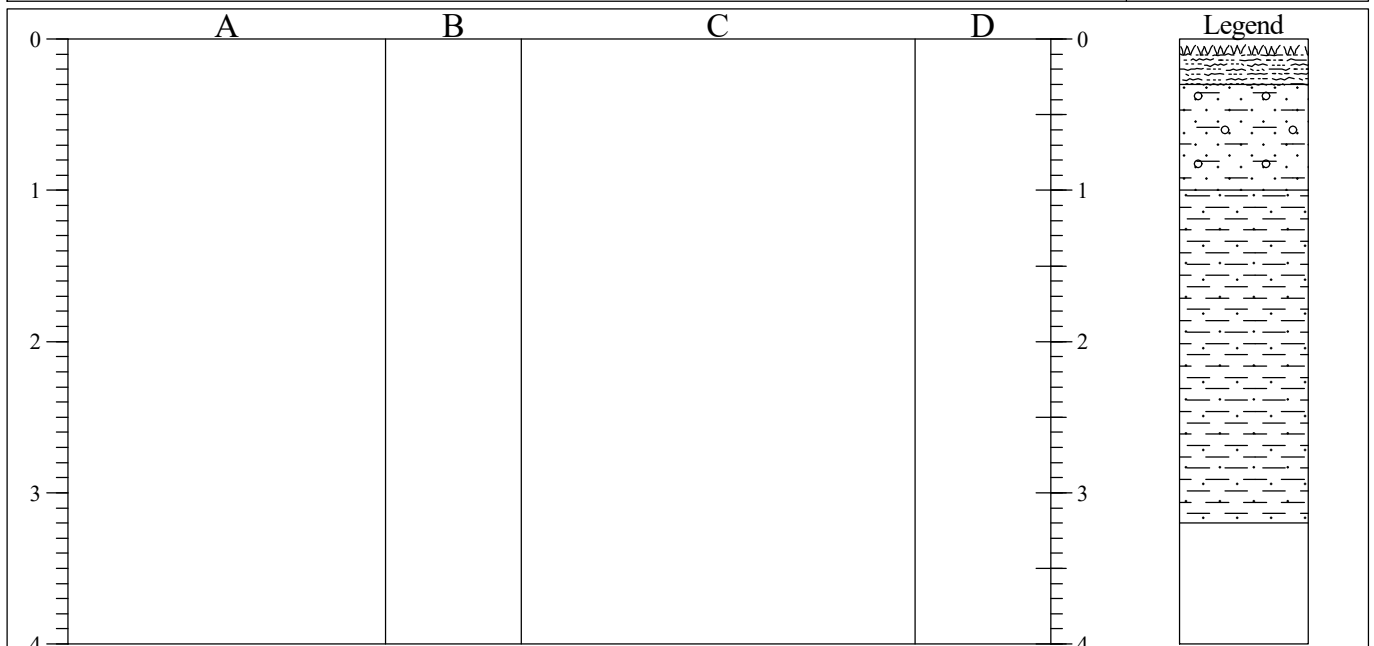
Shoring/Support: None. Stability: Stable.		
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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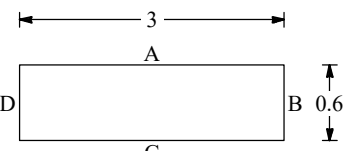
AGS3 UK TP 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3_1.GDT 27/1/25

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP12
Job No 24TAY072	Date 22-01-25 22-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1

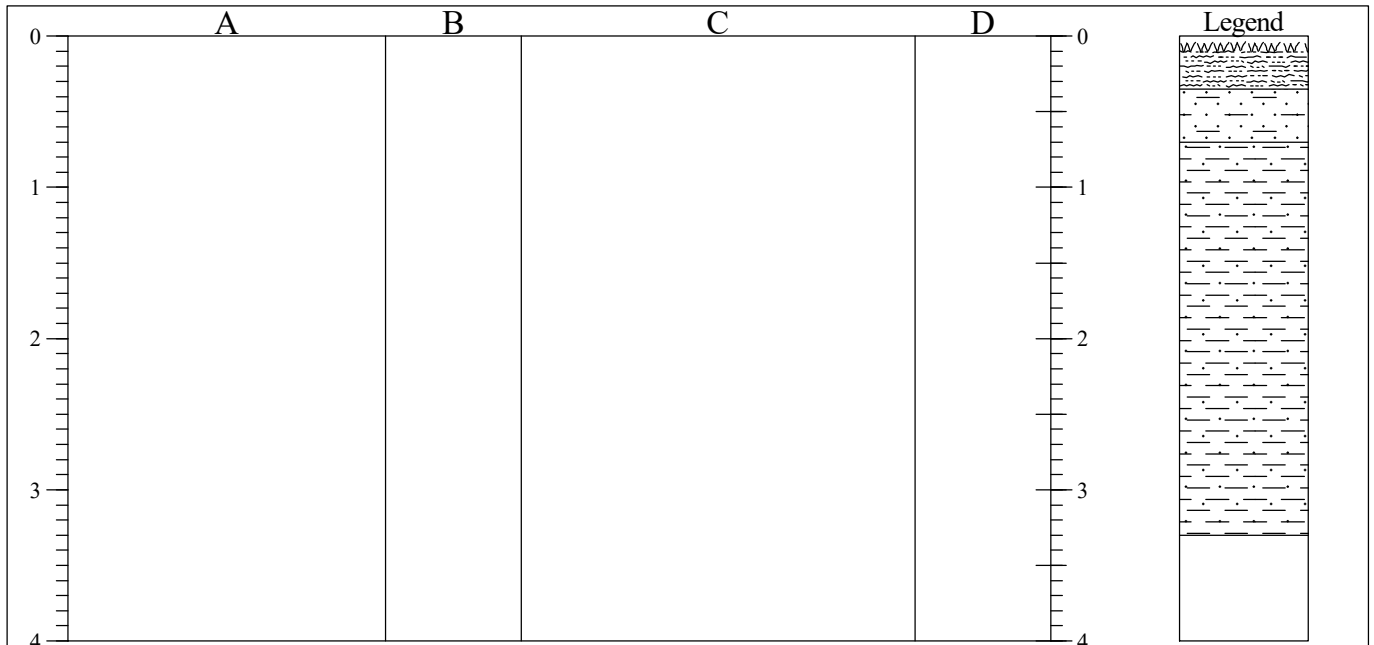


STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	1.20	D	
0.30-1.00		Medium dense grey brown slightly gravelly clayey fine to medium SAND. Gravel of fine to coarse rounded to subangular mixed lithologies. [GLACIOFLUVIAL DEPOSITS]			
1.00-3.20		Firm to stiff brown very sandy CLAY. [GLACIAL TILL]			

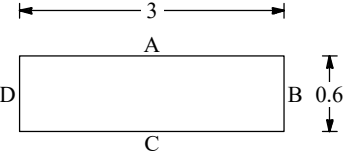
Shoring/Support: None. Stability: Stable. 			GENERAL REMARKS Occassional seepages of perched water at 1.0 - 3.2mbgl, stable. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.	
All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD	

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP13
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



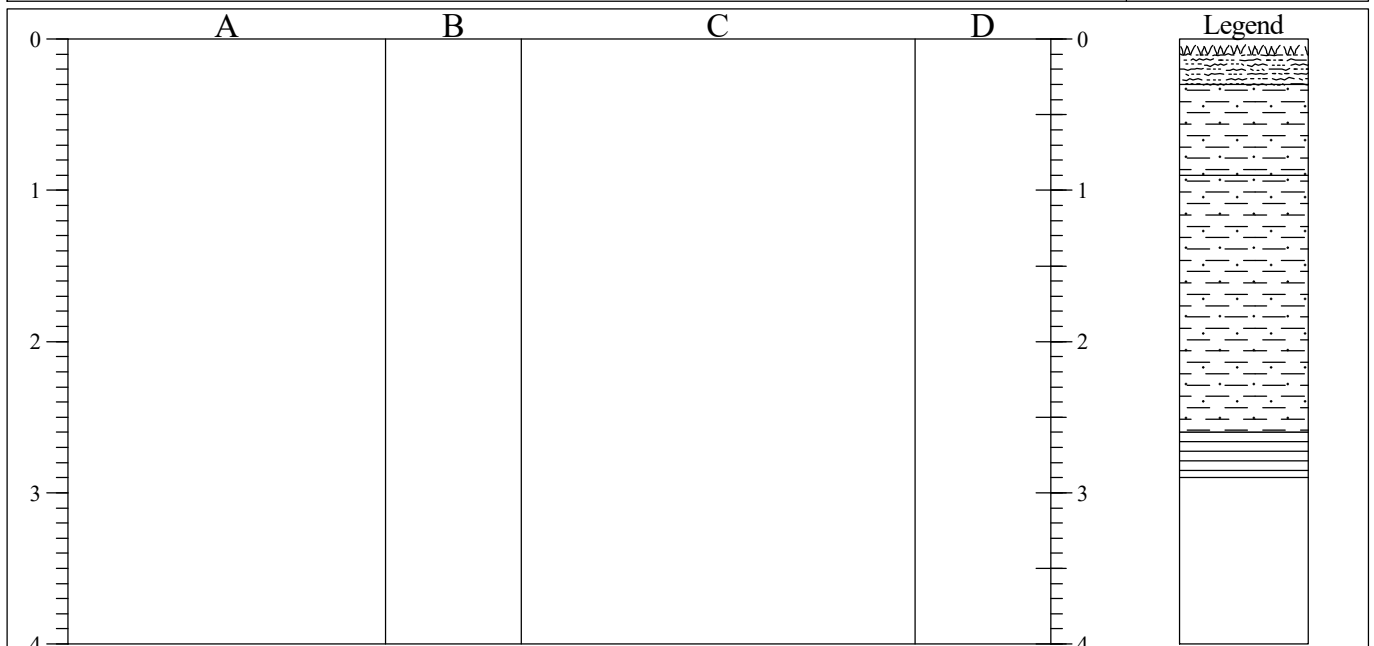
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.10	ES	
0.35-0.70		Medium dense grey brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]			
0.70-3.30		Stiff red brown mottled blue grey slightly sandy CLAY with rare gravel of fine subangular mixed lithologies. [GLACIAL TILL]	0.80	D	

Shoring/Support: None. Stability: Stable.				GENERAL REMARKS Rare running sand lenses at 0.7 - 3.3mbgl, stable. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP14
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.50	ES		
0.30-0.90		Firm red brown very sandy CLAY. [GLACIAL TILL]				
0.90-2.60		Stiff red brown mottled blue grey slightly sandy CLAY. [GLACIAL TILL]				
2.60-2.90		Weak brown bedded silty MUDSTONE. [PENNINE MIDDLE COAL MEASURES]				

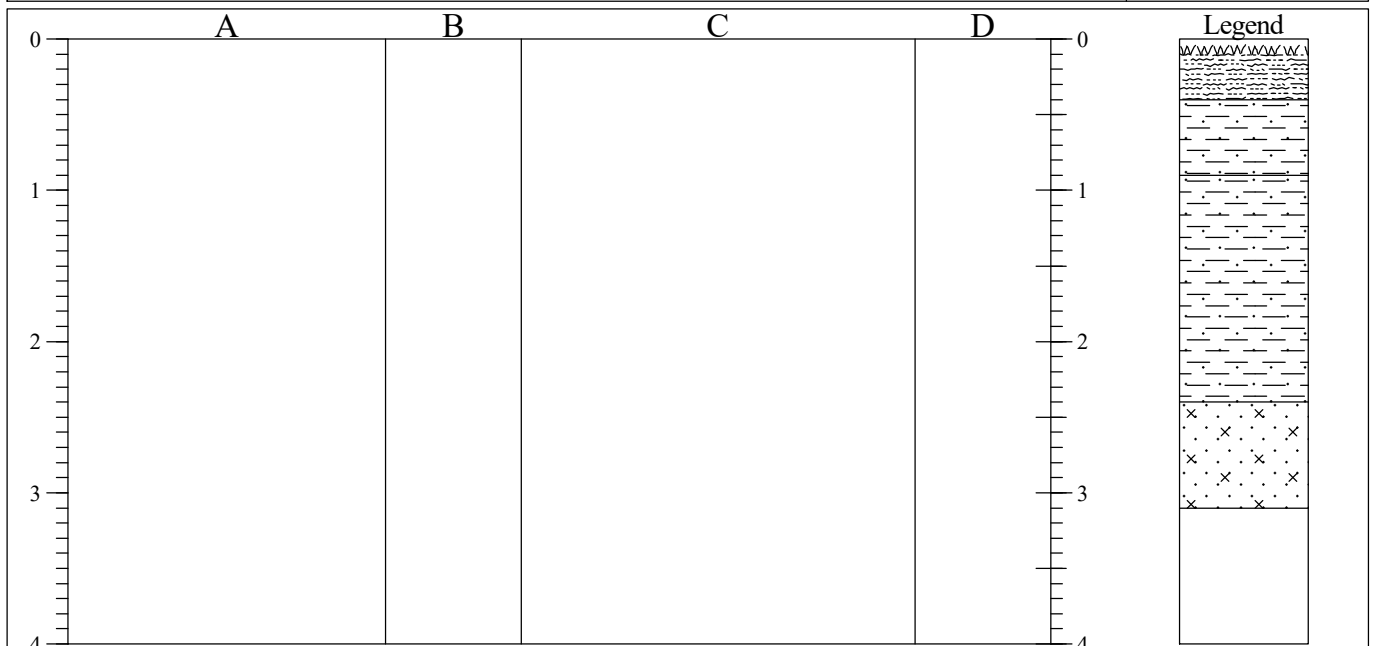
Shoring/Support: None. Stability: Stable.			GENERAL REMARKS
			Dry and stable. No visual or olfactory evidence of contamination. Terminated in bedrock. Backfilled with arisings on completion.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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AGS3 UK TP 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3_1.GDT 27/1/25

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP15
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



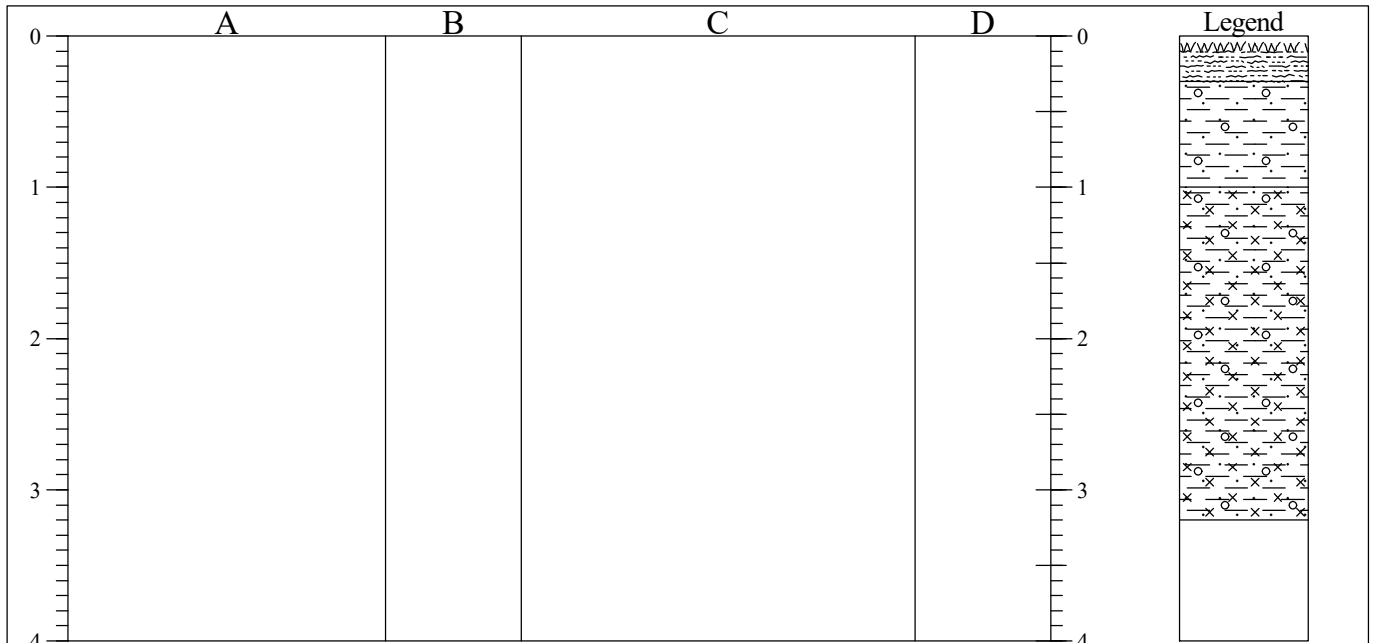
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.30	ES	
0.40-0.90		Firm red brown very sandy CLAY. [GLACIAL TILL]			
0.90-2.40		Stiff red brown mottled blue grey slightly sandy CLAY. [GLACIAL TILL]			
2.40-3.10		Medium dense grey brown slightly silty fine to coarse SAND. [GLACIOFLUVIAL DEPOSITS]			

Shoring/Support: None. Stability: Stable. 				GENERAL REMARKS Wet at 2.4 - 3.1mbgl, stable. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP16
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



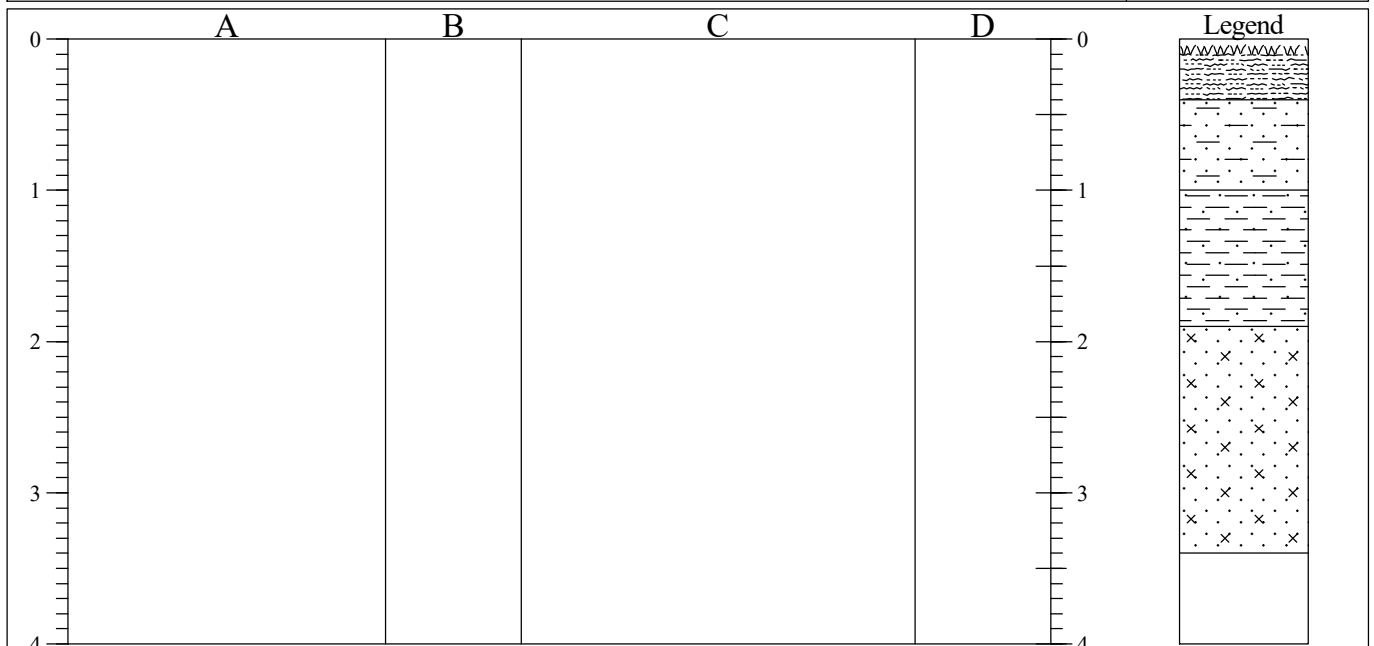
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	1.50	ES	
0.30-1.00		Firm to stiff grey brown slightly sandy slightly gravelly CLAY. Gravel of fine to coarse rounded to subangular mixed lithologies. [GLACIAL TILL]			
1.00-3.20		Stiff to hard red brown slightly silty slightly sandy slightly gravelly CLAY. [GLACIAL TILL]			

Shoring/Support: None. Stability: Stable.	GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP17
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



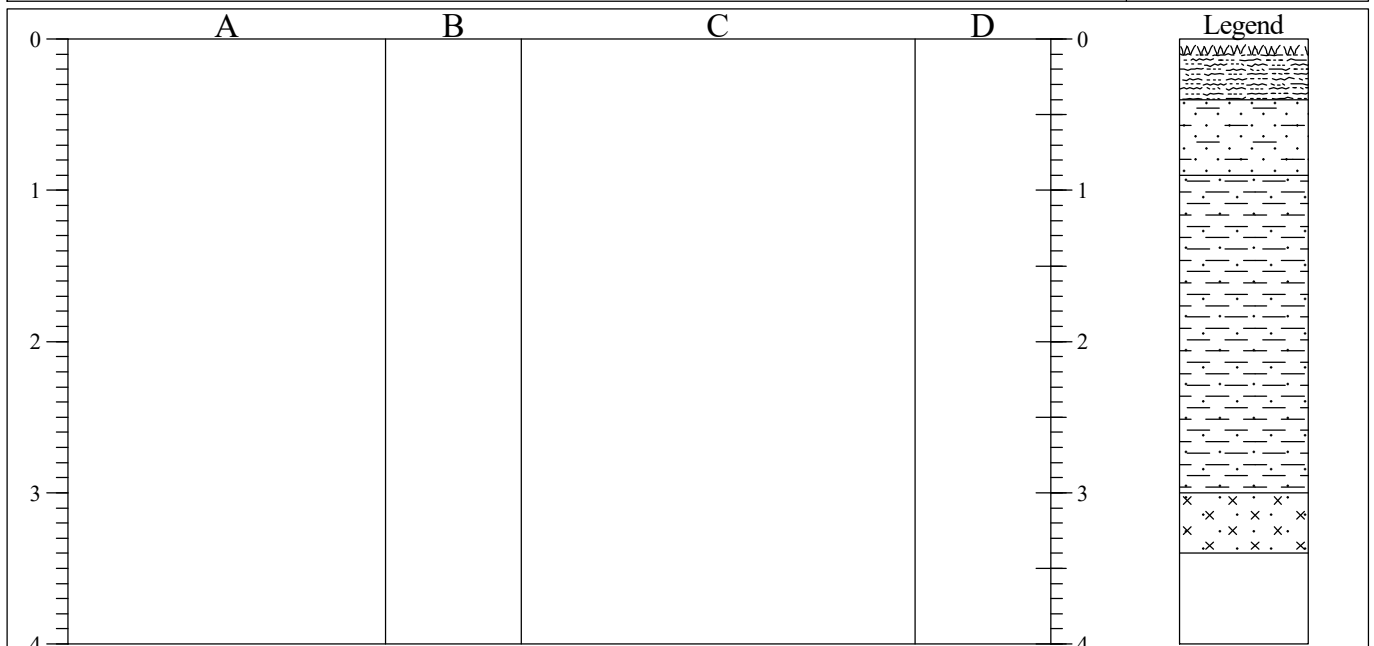
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.20	ES	
0.40-1.00		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]			
1.00-1.90		Stiff red brown mottled blue grey slightly sandy CLAY. [GLACIAL TILL]	1.20	D	
1.90-3.40		Medium dense grey brown slightly silty fine to coarse SAND. [GLACIOFLUVIAL DEPOSITS]			

Shoring/Support: None. Stability: Unstable at 1.9 - 3.4mbgl. 			GENERAL REMARKS Dry, unstable at 1.9 - 3.4mbgl. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP18
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



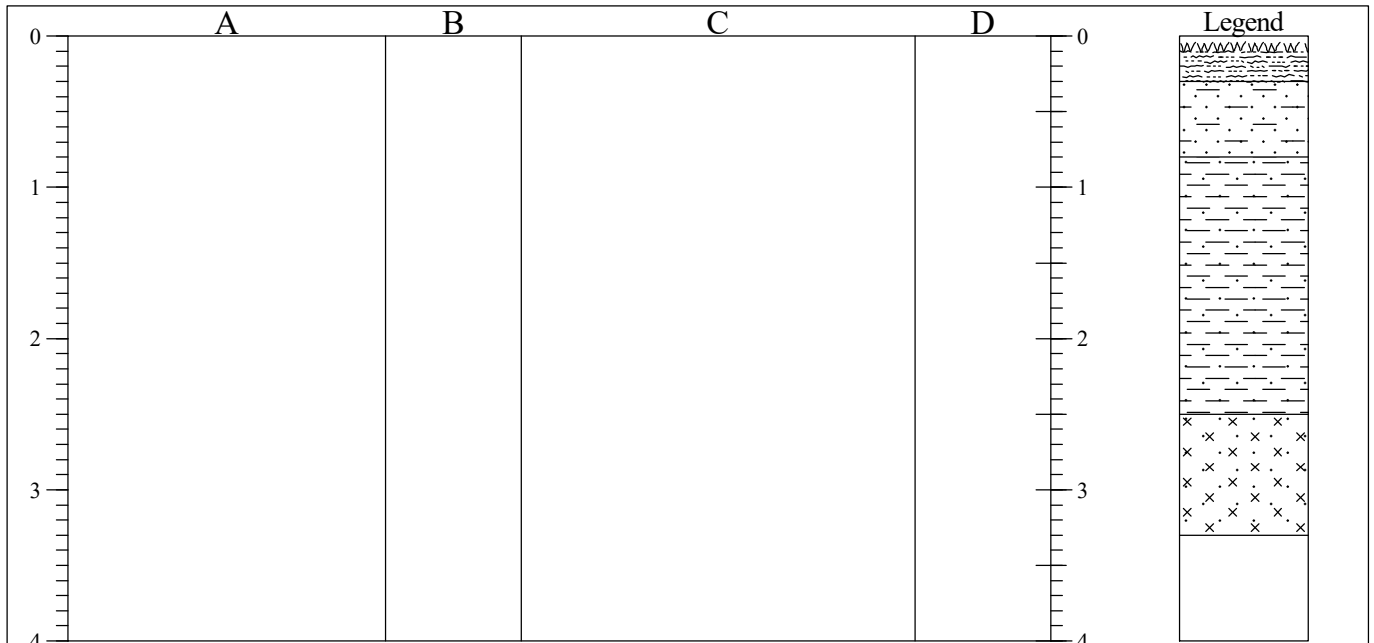
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Grass over dark brown sandy clay with rootlets. [TOPSOIL]			
0.40-0.90		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]	0.50	ES	
0.90-3.00		Stiff red brown mottled blue grey slightly sandy CLAY. [GLACIAL TILL]	1.00	D	
3.00-3.40		Loose brown sandy SILT. [GLACIAL TILL]			

Shoring/Support: None. Stability: Strata running at 3.0 - 3.4mbgl. 			GENERAL REMARKS Wet and running strata at 3.0 - 3.4mbgl. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.	
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP19
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1

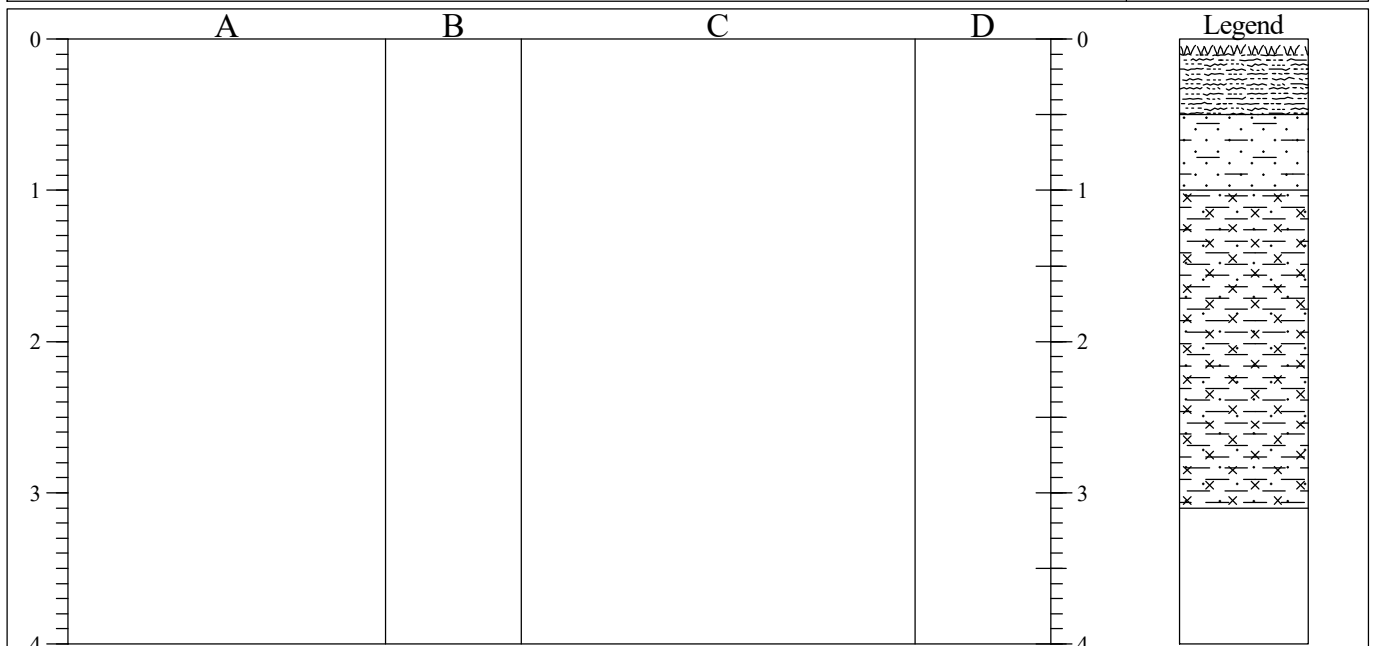


STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.30		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.10	ES		
0.30-0.80		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]				
0.80-2.50		Stiff red brown mottled blue grey slightly sandy CLAY. [GLACIAL TILL]				
2.50-3.30		Loose brown sandy SILT. [GLACIAL TILL]				

Shoring/Support: None. Stability: Strata running at 2.5 - 3.3mbgl.			GENERAL REMARKS Wet and running strata at 2.5 - 3.3mbgl. Dry clay land drain at 0.9mbgl. No visual or olfactory evidence of contamination. Backfilled with arisings on completion.
All dimensions in metres Scale 1:50	Client Taylor Wimpey		Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR

TRIAL PIT LOG

Project Phase 3, Whiston				TRIAL PIT No TP20
Job No 24TAY072	Date 23-01-25 23-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1



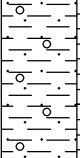
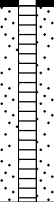
STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.50		Grass over dark brown sandy clay with rootlets. [TOPSOIL]	0.60	ES		
0.50-1.00		Medium dense orange brown very clayey fine to medium SAND. [GLACIOFLUVIAL DEPOSITS]				
1.00-3.10		Stiff red brown slightly sandy slightly silty CLAY with occasional gravel of fine to medium subangular mixed lithologies. [GLACIAL TILL]				

Shoring/Support: None. Stability: Stable.	GENERAL REMARKS Dry and stable. No visual or olfactory evidence of contamination. Terminated at target depth. Backfilled with arisings on completion.
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All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used CAT308 CR 8t TRACKED EXCAVATOR	Logged By RD
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BOREHOLE LOG

Project Phase 3, Whiston				BOREHOLE No WS1	
Job No 24TAY072	Date 21-01-25 21-01-25	Ground Level (m)	Co-Ordinates ()		
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	ES	N19				0.30	Grass over dark brown sandy clay with rootlets. [TOPSOIL]		
1.00						(1.20)	Stiff orange brown and blue grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse rounded to subangular mixed lithologies. [GLACIAL TILL]		
1.50									
1.80		N50/ 155 mm				1.80	Weak olive green silty MUDSTONE with frequent dark red iron staining in bedding planes. [PENNINE MIDDLE COAL MEASURES FORMATION]		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Dry and stable. No visual or olfactory evidence of contamination. Terminated due to refusal. Installed with monitoring well to full depth.
All dimensions in metres Scale 1:50			Client Taylor Wimpey			Method/ Plant Used Archway Competitor Rig				Logged By RD	

AGS3 UK BH 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3.1.GDT 27/1/25

BOREHOLE LOG

Project Phase 3, Whiston				BOREHOLE No WS2	
Job No 24TAY072	Date 21-01-25 21-01-25	Ground Level (m)	Co-Ordinates ()		
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.30	ES	N50/ 295 mm				(0.40) 0.40	Grass over dark brown sandy clay with rootlets. [TOPSOIL]		
1.00						(0.70) 1.10	Stiff orange brown and blue grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse rounded to subangular mixed lithologies. [GLACIAL TILL]		
						(0.40) 1.50	Weak olive green silty MUDSTONE. [PENNINE MIDDLE COAL MEASURES FORMATION]		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Dry and stable. No visual or olfactory evidence of contamination. Terminated due to refusal. Installed with monitoring well to full depth.
All dimensions in metres Scale 1:50			Client Taylor Wimpey			Method/ Plant Used Archway Competitor Rig				Logged By RD	

AGS3 UK BH 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3.1.GDT 27/1/25

BOREHOLE LOG

Project Phase 3, Whiston				BOREHOLE No WS3	
Job No 24TAY072	Date 21-01-25 21-01-25	Ground Level (m)	Co-Ordinates ()		
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
1.00 1.00	D	N9				(0.45) 0.45	Grass over dark brown sandy clay with rootlets. [TOPSOIL]		
						0.80	Firm to stiff orange brown and blue grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse rounded to subangular mixed lithologies. [GLACIAL TILL]		
						(2.20)	Stiff brown slightly sandy slightly gravelly CLAY. Gravel of fine subangular mixed lithologies. [GLACIAL TILL]		
2.00		N14							
3.00		N15				3.00			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Dry and stable. No visual or olfactory evidence of contamination. Terminated at target depth. Installed with monitoring well to full depth.

All dimensions in metres Scale 1:50	Client Taylor Wimpey	Method/ Plant Used Archway Competitor Rig	Logged By RD
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AGS3 UK BH 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3.1.GDT 27/1/25

BOREHOLE LOG

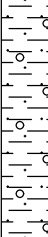
Project Phase 3, Whiston				BOREHOLE No WS4
Job No 24TAY072	Date 21-01-25 21-01-25	Ground Level (m)	Co-Ordinates ()	
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10	ES	N8				(0.40) 0.40	Grass over dark brown sandy clay with rootlets. [TOPSOIL]		
						(0.80) 1.20	Firm to stiff orange brown slightly sandy CLAY. [GLACIAL TILL]		
1.00						(1.80) 3.00	Stiff brown slightly sandy slightly gravelly CLAY. Gravel of fine subangular mixed lithologies. [GLACIAL TILL]		
2.00	N14								
3.00	N16								
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											Dry and stable. No visual or olfactory evidence of contamination. Terminated at target depth. Installed with monitoring ell to full depth.

BOREHOLE LOG

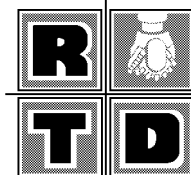
Project Phase 3, Whiston				BOREHOLE No WS5	
Job No 24TAY072	Date 21-01-25 21-01-25	Ground Level (m)	Co-Ordinates ()		
Contractor Clive Hurt (Plant Hire) Ltd & Boreworx Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.60	ES	N11			(0.40) 0.40	Grass over dark brown sandy clay with rootlets. [TOPSOIL]			
1.00					(0.50) 0.90	Firm orange brown sandy CLAY. [GLACIAL TILL]			
2.00					1.20	Medium dense grey medium SAND. [GLACIOFLUVIAL DEPOSITS]			
3.00		N12			(1.80) 3.00	Stiff brown slightly sandy slightly gravelly CLAY. Gravel of fine to medium subangular to subrounded mixed lithologies. [GLACIAL TILL]			
	N14								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Dry and stable. No visual or olfactory evidence of contamination. Terminated at target depth. Installed with monitoring well to full depth.
All dimensions in metres Scale 1:50			Client Taylor Wimpey			Method/ Plant Used Archway Competitor Rig				Logged By RD	

AGS3 UK BH 24TAY072 - PHASE 3, WHISTON.GPJ GINT STD AGS 3.1.GDT 27/1/25

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, Phase 3					Job No. 01/25		
					Client Betts Geo					Borehole RBH01 Page 1 of 1		
					Date 21/01/25 - 22/01/25			O.D. Level				
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %	
	3.1M	G.L. 0.40	Grass over TOPSOIL (0.40)									
		1.90	Yellow/brown CLAYS (1.50)									
			Weathered becoming strong red SANDSTONE, MARL bands (11.60)									
		13.50	Grey/dark grey MUDSTONE (3.00)									
		16.50 17.10	Light grey SANDSTONE & quartzite, very hard/slow drilling (0.60) Grey MUDSTONE bands of SANDSTONE (12.90)									
		30.00	Base of Drillhole									
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION												
Drilling Methods Air mist												
Remarks Await access/induction, start setting up 10.30am Gas = Normal/100% Flush Backfill BH												



ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, Phase 3					Job No. 01/25		
					Client Betts Geo					Borehole RBH02 Page 1 of 1		
					Date 22/01/25		O.D. Level					

Day	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3.1M	G.L. 0.40	Grass over TOPSOIL (0.40)								
			Grey/brown CLAYS (1.50)								
		1.90	Grey MUDSTONE (3.00)								
		4.90	COAL (0.30)								
		5.20	Grey MUDSTONE & SANDSTONE (3.80)								
		9.00	Very hard grey/light grey SANDSTONE & QUARTZITE, slow drilling (1.60)								
		10.60	Grey MUDSTONE, bands of sandstone (12.40)								
		23.00	Black MUDSTONE & shaley COAL (0.60)								
		23.60	Grey SANDSTONE & MUDSTONE (6.40)								
			30.00	Base of Drillhole							

Symbols

TCR - TOTAL ROCK RECOVERY

SCR - SOLID ROCK RECOVERY

RQD - ROCK QUALITY DESIGNATION

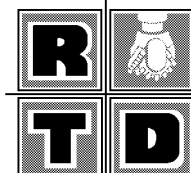
Drilling Methods

Air mist

Remarks

Move air power with 8t excavator/unable to tow with rig, bogging
 Gas = Normal/100% flush throughout
 Backfill BH

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, Phase 3				Job No. 01/25		
					Client Betts Geo				Borehole		
					Date 22/01/25 - 23/01/25		O.D. Level		RBH03 Page 1 of 1		
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3.1M	G.L. 0.40	Grass over TOPSOIL (0.40)								
			Yellow/brown CLAYS (1.70)								
		2.10	Clayey MUDSTONE (0.40)								
		2.50	COAL (0.10)								
		2.60	Grey MUDSTONE (0.40)								
		3.00	COAL (0.20)								
		3.20	Grey MUDSTONE bands of hard quartzite rich SANDSTONE, hard/slow drilling in sandstone bands (26.80)								
		30.00	Base of Drillhole								
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods Air mist											
Remarks Very slow moving/bogging all plant inc. tracked dumper & rig Gas = Normal/100% flush Backfill BH											



ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, Phase 3 ClientBetts Geo Date23/01/25 - 24/01/25 O.D. Level				Job No. 01/25 Borehole RBH04 Page 1 of 1			
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3.1M	G.L. 0.40	Grass over TOPSOIL (0.40)								
			Brown CLAYS (1.50)								
		1.90	Weathered yellow SANDSTONE (1.00)								
		2.90	Grey MUDSTONE, bands of quartzite rich SANDSTONE upto 1.0m in thickness, slow progress in sandstone bands (27.10)								
		30.00	Base of Drillhole								
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods Air mist											
Remarks Take delivery of Bentonite 100% flush/Gas = normal 1.5Hrs moving/all plant bogging Backfill BH											

[illegible]

Marshes Farm, Coach Road, off Wigan Road,
Hart Common, West Houghton, Bolton BL5 2BT
Tel: 01942 - 810348 Fax: 01942 - 840543

O.D. Level

Page 1 of 1

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, Phase 3					Job No. 01/25		
					Client Betts Geo					Borehole RBH07 Page 1 of 1		
					Date 29/01/25 - 30/01/25			O.D. Level				

Day	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
		G.L. 0.40 0.90	Grass over TOPSOIL (0.40)								
			Yellow/brow CLAYS (0.50)								
			Orange SANDSTONE with IRONSTONE (2.00)								
	3M	2.90	Grey MUDSTONE bands of very hard light grey quartz rich SANDSTONE (9.20)								
		12.10	Dark grey and black MUDSTONE (5.90)								
		18.00	Grey MUDSTONE bands of SANDSTONE (12.00)								
		30.00	Base of Drillhole								

Symbols

TCR - TOTAL ROCK RECOVERY

SCR - SOLID ROCK RECOVERY

RQD - ROCK QUALITY DESIGNATION

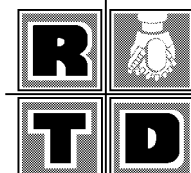
Drilling Methods

Water flush

Remarks

Gas = normal/100% flush
2.5Hrs moving plant/rig
Backfill BH

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, Phase 3				Job No. 01/25			
				Client Betts Geo				Borehole			
				Date 31/01/25 - 04/02/25		O.D. Level		RBH08 Page 1 of 1			
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3M	G.L. 0.45	Grass over TOPSOIL (0.45)								
			Grey/brown CLAYS (1.45)								
		1.90	Yellow ad grey SANDSTONE, quartzite bands (3.10)								
		5.00	Grey MUDSTONE bands of light grey SANDSTONE (4.00)								
		9.00	Grey SANDSTONE very hard light grey/white quartzite rich bands (2.50)								
		11.50	Dark grey & black MUDSTONE (3.50)								
		15.00	Grey MUDSTONE bands of SANDSTONE (15.00)								
		30.00	Base of Drillhole								
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods Air mist											
Remarks 100% flush/gas = normal throughout 3.5Hrs moving plant/rig, drilling rig bogging											



ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, Phase 3 ClientBetts Geo Date04/02/25 - 05/02/25 O.D. Level				Job No. 01/25 Borehole RBH09 Page 1 of 1			
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3M	G.L.	Grass over TOPSOIL (0.50)								
		0.50	Brown/grey CLAYS (1.30)								
		1.80	Orange/yellow SANDSTONE & IRONSTONE (1.70)								
		3.50	Grey MUDSTONE bands of light grey quartzite rich SANDSTONE, slow progress in SANDSTONE (18.00)								
		21.50	Dark grey & black MUDSTONE (5.50)								
		27.00	Grey MUDSTONE & SANDSTONE (3.00)								
		30.00	Base of Drillhole								
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods Water flush											
Remarks 100% Flush/Gas = Normal Backfill BH De-mob plant from field, 3.5Hrs, rig bogging Wash down all plant ready for transport 1.5Hr											

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, TW				Job No. 01/26			
				Client Betts geo				Borehole BH105			
				Date 12/01/26 - 13/01/26		O.D. Level		Page 1 of 1			

Day	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	4.5M	G.L.	Grass/vegetation over topsoil over brown/grey CLAY (2.60)								
		2.60	Grey GRAVEL/broken rock? (1.00)								
		3.60	Grey MUDSTONE (3.40)								
		7.00	Very hard grey/white quartz rich SANDSTONE, bands of grey MUDSTONE (23.60)								
		30.60	Base of Drillhole								

Symbols

TCR - TOTAL ROCK RECOVERY

SCR - SOLID ROCK RECOVERY

RQD - ROCK QUALITY DESIGNATION

Drilling Methods

Water flush

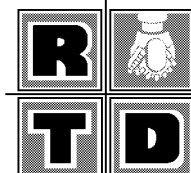
Remarks

2.5Hrs moving/100% flush. Gas = normal throughout

Backfill BH

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, TW				Job No. 01/26			
				Client Betts geo				Borehole BH104 Page 1 of 1			
				Date 13/01/26 - 14/01/26		O.D. Level					
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3.1M	G.L.	Grass/vegetation over topsoil over brown CLAY/Gravel (2.30)	_____							
		2.30	Grey/brown MUDSTONE (12.70)	_____							

		15.00	Hard grey SANDSTONE, slow progress (11.00)	_____							
		26.00	Grey MUDSTONE, bands of SANDSTONE (4.60)	_____							
		30.60	Base of Drillhole	_____							
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods water flush											
Remarks 2.0Hrs moving/collecting water Gas = normal, 100% flush throughout Backfill BH											



ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, TW				Job No. 01/26		
					Client Betts geo				Borehole BH101 Page 1 of 1		
					Date 15/01/26 - 16/01/26		O.D. Level				

Day	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
		G.L.	Grass/vegetation over topsoil over brown gravelly CLAY (2.30)								
	3.1M	2.30	Brown very shalet CLAY/clayey MUDSTONE (0.70) Grey MUDSTONE (3.10)								
		3.00									
		6.10	Very hard grey quartz rich SANDSTONE bands of MUDSTONE, slow progress (6.90)								
		13.00	Grey MUDSTONE (1.00)								
		14.00	Bright COAL, intact (0.40) Grey MUDSTONE & SANDSTONE (16.20)								
		14.40									
		30.60	Base of Drillhole								

Symbols

TCR - TOTAL ROCK RECOVERY

SCR - SOLID ROCK RECOVERY

RQD - ROCK QUALITY DESIGNATION

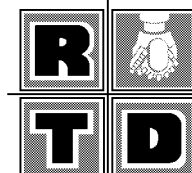
Drilling Methods

Water flush

Remarks

2.0Hrs moving/collecting water
Gas = Normal, 100% flush throughout
Backfill BH

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Whiston, TW					Job No. 01/26		
					Client Betts geo					Borehole BH102		
					Date 16/01/26 - 19/01/26			O.D. Level		Page 1 of 1		
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %	
	3.1M	G.L.	Grass/vegetation over TOPSOIL, over brown/grey CLAY, GRAVEL (2.30)									
		2.30										
		3.10	Grey/brown very clayey MUDSTONE/shaley CLAY (0.80) Grey MUDSTONE, bands of very hard SANDSTONE (27.50)									
		30.60	Base of Drillhole									
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION												
Drilling Methods Water flush												
Remarks 100% Flush/Gas = normal throughout 2.5Hr moving/collecting water, backfill BH												



Marshes Farm, Coach Road, off Wigan Road,
Hart Common, West Houghton, Bolton BL5 2BT
Tel: 01942 - 810348 Fax: 01942 - 840543

Date	19/01/26 - 20/01/26
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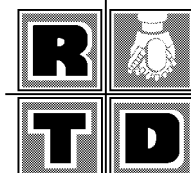
Marshes Farm, Coach Road, off Wigan Road,
Hart Common, West Houghton, Bolton BL5 2BT
Tel: 01942 - 810348 Fax: 01942 - 840543

Date	07/01/26 - 08/01/26
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ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543				Site Whiston, TW				Job No. 01/26			
				Client Betts geo				Borehole BH108 Page 1 of 1			
				Date 06/01/26 - 07/02/26		O.D. Level					
Day	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Flush Returns	Core Depths	TCR %	SCR %	RQD %
	3.1M	G.L.	Grass/vegetation over TOPSOIL over brown/grey shaley CLAY (2.10)	_____							
		2.10	Grey very shaley CLAY/very clayey MUDSTONE (0.80) Grey MUDSTONE, bands of dark grey MUDSTONE (23.60)	_____							
		2.90		_____							

		26.50	Hard drilling grey quartz rich SANDSTONE & MUDSTONE (3.10)	_____							
		29.60	Fast broken drilling, 100% flush, broken SANDSTONE/MUDSTONE (0.50) Grey MUDSTONE & SANDSTONE (1.50) Base of Drillhole	_____							
	30.10	_____									
	31.60	_____									
Symbols TCR - TOTAL ROCK RECOVERY SCR - SOLID ROCK RECOVERY RQD - ROCK QUALITY DESIGNATION											
Drilling Methods Water flush											
Remarks Collect water/de-frosting flush hoses 2.5Hr 100% flush/Gas = normal throughout Backfill BH											



APPENDIX D

- (i) Contamination Test Results
- (ii) Geotechnical Results
- (iii) Radon Report

SUMMARY OF CONTAMINATION ANALYSIS: SOIL

SUMMARY OF CONTAMINATION ANALYSIS: METALS

Project Name Phase 3 Whiston
Project No 24TAY072
Date 21.01.25 - 23.01.25

SOIL TYPE	N	TS	TS	N	TS	N	TS	N	TS	N	TS	TS	N	TS	N	TS	N	TS	N
SAMPLE LOCATION	WS1	WS2	WS4	WS5	TP2	TP4	TP5	TP6	TP9	TP10	TP11	TP13	TP14	TP15	TP16	TP17	TP18	TP19	TP20
DEPTH (m)	0.50	0.30	0.10	0.60	0.20	0.50	0.20	1.00	0.30	0.40	0.20	0.10	0.50	0.30	1.50	0.20	0.50	0.10	0.60
pH	7.14	6.44	7.22	6.99	6.79	7.31	6.34	6	6.71	7.09	6.35	6.26	7.46	7.27	8.34	6.32	7.29	6.16	7.47
Sulphate (water sol 2:1)	0.05	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	0.01	<0.01	<0.01
Organic matter	0.82	8.34	5.71	0.32	3.08	2.42	4.28	0.35	5.34	1.66	3.96	5.99	0.59	5.32	2.01	5.87	1.02	6.92	1.37
Arsenic	3	9	5	13	11	4	10	5	11	5	9	8	6	10	<1	10	5	14	2
Cadmium	<0.5	0.9	<0.5	<0.5	0.7	<0.5	1	<0.5	0.9	<0.5	0.7	0.6	<0.5	0.7	<0.5	0.6	<0.5	0.8	<0.5
Copper	27	43	15	8	44	19	50	66	47	12	40	41	9	52	16	44	19	50	11
Chromium (hexavalent)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead	5	52	7	5	50	25	58	3	66	26	57	56	6	54	7	54	7	58	15
Mercury	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Nickel	29	16	30	19	13	19	15	64	15	12	14	15	23	15	26	15	49	19	8
Selenium	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	43	71	34	16	61	52	71	61	71	28	61	60	22	71	33	61	34	78	23
Asbestos in Soil	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix	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	N/A	N/A	N/A	N/A
Quantification	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Organic matter	0.82	8.34	5.71	0.32	3.08	2.42	4.28	0.35	5.34	1.66	3.96	5.99	0.59	5.32	2.01	5.87	1.02	6.92	1.37

Metals	Mean Value Test *	Range		LQM 2009	DEFRA C4SL 2017
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	With Homegrown Produce (1% SOM)	
pH	7.13	8.34	6.00		-
Sulphate (water sol 2:1)	0.02	0.08	<0.01		-
Organic matter	4.44	8.34	0.32		
Arsenic	8.91	14.00	<1	37	37
Cadmium	0.69	1.00	<0.5	11	22.1
Copper	39.43	66.00	8.00	2400	-
Chromium (hexavalent)	1.00	<1	<1	6	20.5
Lead	41.82	66.00	3.00		200
Mercury	0.17	<0.17	<0.17	11	-
Nickel	27.34	64.00	8.00	130	
Selenium	1.14	2.00	<1	250	-
Zinc	57.98	78.00	16.00	3700	-

NOTE:

Any individual results and mean value tests above SGVs are shown RED highlighted.

Any outlier values which exceed relevant SGVs are shown in red

* - The calculations for the mean value test include outliers

** - Results for this determinand are assessed with no background levels taken into account

Results are expressed as mg/kg unless otherwise stated

ALL RESULTS PRESENTED ARE ASSESSED UNDER THE COMBINED CLEA ASSESSMENT CRITERION AS OUTLINED WITHIN SR4 ASSUMING NO FREE PRODUCT WAS OBSERVED DURING FIELDWORK- SEE 'GUIDANCE NOTES ON CONTAMINATION'.

LQM CIEH 2009 (+Nickel update 2105) guidance levels used. C4SL levels also referred to where necessary. LQM profiling tool should be used in order for

Benzo(a)Pyrene to be used as a surrogate marker..

NAD - NO ASBESTOS DETECTED

TS - Topsoil, MG - Made Ground and N - Natural Ground

Methyl Mercury used for guidance purposes

SUMMARY OF CONTAMINATION ANALYSIS: SOIL

SUMMARY OF CONTAMINATION ANALYSIS: TPH

Project Name Phase 3 Whiston
Project No 24TAY072
Date 21.01.25 - 23.01.25

SOIL TYPE	N	TS	TS	N	TS	N	TS	N	TS	N	TS	TS	N	TS	N	TS	N	TS	N
SAMPLE LOCATION	WS1	WS2	WS4	WS5	TP2	TP4	TP5	TP6	TP9	TP10	TP11	TP13	TP14	TP15	TP16	TP17	TP18	TP19	TP20
DEPTH (m)	0.50	0.30	0.10	0.60	0.20	0.50	0.20	1.00	0.30	0.40	0.20	0.10	0.50	0.30	1.50	0.20	0.50	0.10	0.60
Ali >C5-C6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C10-C12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C12-C16	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C16-C21	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C21-C35	<1	5	5	<1	2	<1	3	<1	2	<1	4	4	<1	16	2	3	1	4	<1
Total Aliphatics	<1	5	5	<1	2	<1	3	<1	2	<1	4	4	<1	16	2	3	1	4	<1
Aro >C5-C7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aro >C10-C12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aro >C12-C16	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	<1
Aro >C16-C21	<1	6	2	<1	<1	<1	<1	<1	1	<1	2	1	<1	2	<1	1	1	3	<1
Aro >C21-C35	<1	28	4	<1	2	<1	3	<1	4	<1	5	4	<1	5	3	4	2	5	1
Total Aromatics	<1	35	6	<1	2	<1	3	<1	5	<1	8	5	<1	9	3	5	4	8	1
TPH (Ali & Aro)	<1	40	11	<1	5	<1	5	<1	7	<1	12	8	<1	24	5	8	5	11	1
BTEX - Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Organic Matter	0.82	8.34	2.6	0.32	6	2.42	4.28	0.35	5.34	1.66	3.96	5.99	0.59	5.32	2.01	5.87	1.02	6.92	1.37

TPH	Mean Value Test *	Range		LQM S4UL 2009			UU Drinking Water Guidelines	
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	1% SOM	2.5% SOM	6% SOM		
Ali >C5-C6	0.01	<0.01	<0.01	42	78	160	Total BTEX & MTBE	0.1
Ali >C6-C8	0.01	<0.01	<0.01	100	230	530		
Ali >C8-C10	1.00	<1	<1	27	35	150	EC5-EC10 Ali-Aro	2
Ali >C10-C12	1.00	<1	<1	130	330	760	EC10-EC16 Ali-Aro	10
Ali >C12-C16	1.00	<1	<1	1100	2400	4300		
Ali >C16-C21	1.00	<1	<1	65000	92000	110000	EC16-EC40 Ali-Aro	500
Ali >C21-C35	4.43	16.00	<1					
Total Aliphatics	4.43	16.00	<1					
Aro >C5-C7	0.01	<0.01	<0.01	70	140	300		
Aro >C7-C8	0.01	<0.01	<0.01	130	290	660		
Aro >C8-C10	1.00	<1	<1	34	83	190		
Aro >C10-C12	1.00	<1	<1	74	180	380		
Aro >C12-C16	1.00	1.00	<1	140	330	660		
Aro >C16-C21	2.01	6.00	<1	260	540	930		
Aro >C21-C35	6.39	28.00	<1	1100	1500	1700		
Total Aromatics	8.32	35.00	<1					
TPH (Ali & Aro)	11.65	40.00	<1					
BTEX - Benzene	0.01	<0.01	<0.01	0.087	0.17	0.37		
BTEX - Toluene	0.01	<0.01	<0.01	130	290	660		
BTEX - m & p Xylene	0.01	<0.01	<0.01	115	370	890		
BTEX - o Xylene	0.01	<0.01	<0.01	60	140	330		
MTBE (Ethylbenzene)	0.01	<0.01	<0.01	47	110	260		

Results expressed as mg/kg air dried unless otherwise stated.

* - The calculations for the mean value test include outliers

NOTES:

LQM CIEH 2009 (+Nickel update 2105) guidance levels used. CASL levels also referred to where necessary. LQM profiling tool should be used in order for Benzo(a)Pyrene to be used as a surrogate marker..

NAD - NO ASBESTOS DETECTED

SEE 'GUIDANCE NOTES ON CONTAMINATION'.

SUMMARY OF CONTAMINATION ANALYSIS: PAH

Project Name Phase 3 Whiston
Project No 24TAY072
Date 21.01.25 - 23.01.25

SOIL TYPE	N	TS	TS	N	TS	N	TS	N	TS	N	TS	TS	N	TS	N	TS	N	TS	N
SAMPLE LOCATION	WS1	WS2	WS4	WS5	TP2	TP4	TP5	TP6	TP9	TP10	TP11	TP13	TP14	TP15	TP16	TP17	TP18	TP19	TP20
DEPTH (m)	0.50	0.30	0.10	0.60	0.20	0.50	0.20	1.00	0.30	0.40	0.20	0.10	0.50	0.30	1.50	0.20	0.50	0.10	0.60
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Benzo(a)pyrene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(ghi)perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Chrysene	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(ah)anthracene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Fluoranthene	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)pyrene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Naphthalene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Phenanthrene	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Pyrene	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Organic Matter	0.82	8.34	5.71	0.32	3.08	2.42	4.28	0.35	5.34	1.66	3.96	5.99	0.59	5.32	2.01	5.87	1.02	6.92	1.37

PAH	Mean Value Test *	Range		LQM S4UL 2009			DEFRA's C4SL 2017
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	1% SOM	2.5% SOM	6% SOM	6% SOM
Acenaphthene	0.01	<0.01	<0.01	210	510	1100	-
Acenaphthylene	0.01	<0.01	<0.01	170	420	920	-
Anthracene	0.02	<0.02	<0.02	2400	5400	11000	-
Benzo(a)anthracene	0.04	<0.04	<0.04	7.2	11	13	-
Benzo(a)pyrene	0.04	<0.04	<0.04	2.2	2.7	3	4.95
Benzo(b)fluoranthene	0.05	<0.05	<0.05	2.6	3.3	3.7	-
Benzo(ghi)perylene	0.05	<0.05	<0.05	320	340	350	-
Benzo(k)fluoranthene	0.07	<0.07	<0.07	77	93	100	-
Chrysene	0.06	<0.06	<0.06	15	22	27	-
Dibenzo(ah)anthracene	0.04	<0.04	<0.04	0.24	0.28	0.3	-
Fluoranthene	0.08	<0.08	<0.08	280	560	890	-
Fluorene	0.01	<0.01	<0.01	170	400	860	-
Indeno(123-cd)pyrene	0.03	<0.03	<0.03	27	36	41	-
Naphthalene	0.03	<0.03	<0.03	2.3	5.6	13	-
Phenanthrene	0.03	0.05	<0.03	95	220	440	-
Pyrene	0.07	<0.07	<0.07	620	1200	2000	-

Results expressed as mg/kg air dried unless otherwise stated.

* - The calculations for the mean value test include outliers

NOTES:

LQM CIEH 2009 (+Nickel update 2105) guidance levels used. C4SL levels also referred to where necessary. LQM profiling tool should be used in order for Benzo(a)Pyrene to be used as a surrogate marker.
 NAD - NO ASBESTOS DETECTED

SEE 'GUIDANCE NOTES ON CONTAMINATION'.

FINAL ANALYTICAL TEST REPORT

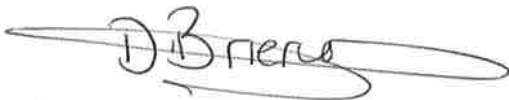
Envirolab Job Number: 25/00627
Issue Number: 1

Date: 04 February, 2025

Client: Betts Geo Environmental
Old Marsh Farm Barns
Welsh Road
Sealand
Flintshire
UK
CH5 2LY

Project Manager: Betts Geolab/Robert Davies
Project Name: Phase 3 Whiston
Project Ref: 24TAY072
Order No: BG5672
Date Samples Received: 24/01/25
Date Instructions Received: 27/01/25
Date Analysis Completed: 04/02/25

Approved by:



Danielle Brierley
Client Services Supervisor

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/1	25/00627/2	25/00627/3	25/00627/4	25/00627/5	25/00627/6	25/00627/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3	WS4	WS5	TP2	TP2			
Depth to Top	0.50	0.30	1.00	0.10	0.60	0.20	0.60			
Depth To Bottom										
Date Sampled	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	5A	6AE	6A			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	7.14	6.44	8.54	7.22	6.99	6.79	5.29	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.05	<0.01	0.01	<0.01	0.01	<0.01	0.07	g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	0.82	8.34	-	5.71	0.32	3.08	-	% w/w	0.14	A-T-032s
Arsenic _D ^{M#}	3	9	-	5	13	11	-	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5	0.9	-	<0.5	<0.5	0.7	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	27	43	-	15	8	44	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-040s
Lead _D ^{M#}	5	52	-	7	5	50	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	-	<0.17	<0.17	<0.17	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	29	16	-	30	19	13	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	43	71	-	34	16	61	-	mg/kg	1	A-T-024s
VPH total (>C5-C10)	<1.00	<1.00	-	<1.00	<1.00	<1.00	-	mg/kg	1	Calc-stone+mols
(1.01) Item 1a Moisture Content of Soil (Oven Dried Method) _A [#]	-	-	Appended	-	-	-	Appended			Subcon IFA
(1.02) Item 2.4 4 Point Liquid & Plastic Limit by Cone Penetrometer _A [#]	-	-	Appended	-	-	-	Appended			Subcon IFA

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/1	25/00627/2	25/00627/3	25/00627/4	25/00627/5	25/00627/6	25/00627/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3	WS4	WS5	TP2	TP2			
Depth to Top	0.50	0.30	1.00	0.10	0.60	0.20	0.60			
Depth To Bottom										
Date Sampled	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	5A	6AE	6A			
Asbestos in Soil (inc. matrix)^										
Asbestos in soil _D [#]	NAD	NAD	-	NAD	NAD	NAD	-			A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	-	N/A	N/A	N/A	-			A-T-045

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/1	25/00627/2	25/00627/3	25/00627/4	25/00627/5	25/00627/6	25/00627/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3	WS4	WS5	TP2	TP2			
Depth to Top	0.50	0.30	1.00	0.10	0.60	0.20	0.60			
Depth To Bottom										
Date Sampled	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	5A	6AE	6A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	-	<0.02	<0.02	<0.02	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	-	<0.07	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	-	<0.06	<0.06	<0.06	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	-	<0.08	<0.08	<0.08	-	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	-	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	-	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.05	-	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	-	<0.07	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	<0.08	-	<0.08	<0.08	<0.08	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/1	25/00627/2	25/00627/3	25/00627/4	25/00627/5	25/00627/6	25/00627/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3	WS4	WS5	TP2	TP2			
Depth to Top	0.50	0.30	1.00	0.10	0.60	0.20	0.60			
Depth To Bottom										
Date Sampled	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	21-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	5A	6AE	6A			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	<1	5	-	5	<1	2	-	mg/kg	1	A-T-055s
Total Aliphatics _A	<1	5	-	5	<1	2	-	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	1	-	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	6	-	2	<1	<1	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	<1	28	-	4	<1	2	-	mg/kg	1	A-T-055s
Total Aromatics _A	<1	35	-	6	<1	2	-	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	<1	40	-	11	<1	5	-	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	-	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/8	25/00627/9	25/00627/10	25/00627/11	25/00627/12	25/00627/13	25/00627/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP6	TP9	TP9	TP10	TP10			
Depth to Top	0.50	0.20	1.00	0.30	1.00	0.40	0.70			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	6A	6A	6			
% Stones >10mm _A	<0.1	<0.1	<0.1	3.0	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	7.31	6.34	6.00	6.71	6.06	7.09	7.11	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	<0.01	0.08	<0.01	0.07	<0.01	<0.01	g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	2.42	4.28	0.35	5.34	-	1.66	-	% w/w	0.14	A-T-032s
Arsenic _D ^{M#}	4	10	5	11	-	5	-	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5	1.0	<0.5	0.9	-	<0.5	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	19	50	66	47	-	12	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-040s
Lead _D ^{M#}	25	58	3	66	-	26	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	-	<0.17	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	19	15	64	15	-	12	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	2	<1	-	<1	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	52	71	61	71	-	28	-	mg/kg	1	A-T-024s
VPH total (>C5-C10)	<1.00	<1.00	<1.00	<1.00	-	<1.00	-	mg/kg	1	Calc-stone+mols
(1.01) Item 1a Moisture Content of Soil (Oven Dried Method) _A [#]	-	-	-	-	Appended	-	Appended			Subcon IFA
(1.02) Item 2.4 4 Point Liquid & Plastic Limit by Cone Penetrometer _A [#]	-	-	-	-	Appended	-	Appended			Subcon IFA

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/8	25/00627/9	25/00627/10	25/00627/11	25/00627/12	25/00627/13	25/00627/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP6	TP9	TP9	TP10	TP10			
Depth to Top	0.50	0.20	1.00	0.30	1.00	0.40	0.70			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	6A	6A	6			
Asbestos in Soil (inc. matrix)^										
Asbestos in soil _D [#]	NAD	NAD	NAD	NAD	-	NAD	-			A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	-	N/A	-			A-T-045

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/8	25/00627/9	25/00627/10	25/00627/11	25/00627/12	25/00627/13	25/00627/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP6	TP9	TP9	TP10	TP10			
Depth to Top	0.50	0.20	1.00	0.30	1.00	0.40	0.70			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	6A	6A	6			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	-	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	-	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	-	<0.07	-	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06	<0.06	-	<0.06	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	-	<0.04	-	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	<0.08	-	<0.08	-	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	-	<0.03	-	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	-	<0.03	-	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	-	<0.03	-	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	-	<0.07	-	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	<0.08	<0.08	<0.08	-	<0.08	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/8	25/00627/9	25/00627/10	25/00627/11	25/00627/12	25/00627/13	25/00627/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP6	TP9	TP9	TP10	TP10			
Depth to Top	0.50	0.20	1.00	0.30	1.00	0.40	0.70			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25	22-Jan-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D			
Sample Matrix Code	6A	6AE	6A	6AE	6A	6A	6			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	<1	3	<1	2	-	<1	-	mg/kg	1	A-T-055s
Total Aliphatics _A	<1	3	<1	2	-	<1	-	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	<1	<1	<1	-	<1	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	<1	<1	1	-	<1	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	<1	3	<1	4	-	<1	-	mg/kg	1	A-T-055s
Total Aromatics _A	<1	3	<1	5	-	<1	-	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	<1	5	<1	7	-	<1	-	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	mg/kg	0.01	A-T-022s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/15	25/00627/16	25/00627/17	25/00627/18	25/00627/19	25/00627/20	25/00627/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP11	TP12	TP13	TP13	TP14	TP15	TP16			
Depth to Top	0.20	1.20	0.10	0.80	0.50	0.30	1.50			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25			
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6AE	6A	6AE	6A	6AE	6AE	6A			
% Stones >10mm _A	<0.1	1.8	2.2	<0.1	<0.1	<0.1	6.4	% w/w	0.1	A-T-044
pH _D ^{M#}	6.35	8.45	6.26	8.53	7.46	7.27	8.34	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	<0.01	<0.01	0.01	0.02	<0.01	0.02	g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	3.96	-	5.99	-	0.59	5.32	2.01	% w/w	0.14	A-T-032s
Arsenic _D ^{M#}	9	-	8	-	6	10	<1	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.7	-	0.6	-	<0.5	0.7	<0.5	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	40	-	41	-	9	52	16	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	57	-	56	-	6	54	7	mg/kg	1	A-T-024s
Mercury _D	<0.17	-	<0.17	-	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	14	-	15	-	23	15	26	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	61	-	60	-	22	71	33	mg/kg	1	A-T-024s
VPH total (>C5-C10)	<1.00	-	<1.00	-	<1.00	<1.00	<1.00	mg/kg	1	Calc-stone+mols
(1.01) Item 1a Moisture Content of Soil (Oven Dried Method) _A [#]	-	Appended	-	Appended	-	-	-			Subcon IFA
(1.02) Item 2.4 4 Point Liquid & Plastic Limit by Cone Penetrometer _A [#]	-	Appended	-	Appended	-	-	-			Subcon IFA

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/15	25/00627/16	25/00627/17	25/00627/18	25/00627/19	25/00627/20	25/00627/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP11	TP12	TP13	TP13	TP14	TP15	TP16			
Depth to Top	0.20	1.20	0.10	0.80	0.50	0.30	1.50			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25			
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6AE	6A	6AE	6A	6AE	6AE	6A			
Asbestos in Soil (inc. matrix)^										
Asbestos in soil [#]	NAD	-	NAD	-	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual) _o	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _o	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _o	N/A	-	N/A	-	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/15	25/00627/16	25/00627/17	25/00627/18	25/00627/19	25/00627/20	25/00627/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP11	TP12	TP13	TP13	TP14	TP15	TP16			
Depth to Top	0.20	1.20	0.10	0.80	0.50	0.30	1.50			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25			
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6AE	6A	6AE	6A	6AE	6AE	6A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	-	<0.07	-	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	-	<0.06	-	<0.06	<0.06	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	-	<0.08	-	<0.08	<0.08	<0.08	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	-	<0.03	-	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	-	<0.03	-	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.04	-	<0.03	-	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	-	<0.07	-	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	-	<0.08	-	<0.08	<0.08	<0.08	mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/15	25/00627/16	25/00627/17	25/00627/18	25/00627/19	25/00627/20	25/00627/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP11	TP12	TP13	TP13	TP14	TP15	TP16			
Depth to Top	0.20	1.20	0.10	0.80	0.50	0.30	1.50			
Depth To Bottom										
Date Sampled	22-Jan-25	22-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25			
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6AE	6A	6AE	6A	6AE	6AE	6A			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	4	-	4	-	<1	16	2	mg/kg	1	A-T-055s
Total Aliphatics _A	4	-	4	-	<1	16	2	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	-	<1	-	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	1	-	<1	-	<1	1	<1	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	2	-	1	-	<1	2	<1	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	5	-	4	-	<1	5	3	mg/kg	1	A-T-055s
Total Aromatics _A	8	-	5	-	<1	9	3	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	12	-	8	-	<1	24	5	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/22	25/00627/23	25/00627/24	25/00627/25	25/00627/26	25/00627/27		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP17	TP17	TP18	TP18	TP19	TP20				
Depth to Top	0.20	1.20	0.50	1.00	0.10	0.60				
Depth To Bottom										
Date Sampled	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25				
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES				
Sample Matrix Code	6AE	6A	6A	6A	6AE	4A				
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	1.1		% w/w	0.1	A-T-044
pH _D ^{M#}	6.32	7.54	7.29	8.14	6.16	7.47		pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	<0.01	0.01	<0.01	<0.01	<0.01		g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	5.87	-	1.02	-	6.92	1.37		% w/w	0.14	A-T-032s
Arsenic _D ^{M#}	10	-	5	-	14	2		mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.6	-	<0.5	-	0.8	<0.5		mg/kg	0.5	A-T-024s
Copper _D ^{M#}	44	-	19	-	50	11		mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	-	<1	-	<1	<1		mg/kg	1	A-T-040s
Lead _D ^{M#}	54	-	7	-	58	15		mg/kg	1	A-T-024s
Mercury _D	<0.17	-	<0.17	-	<0.17	<0.17		mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	15	-	49	-	19	8		mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	-	<1	-	<1	<1		mg/kg	1	A-T-024s
Zinc _D ^{M#}	61	-	34	-	78	23		mg/kg	1	A-T-024s
VPH total (>C5-C10)	<1.00	-	<1.00	-	<1.00	<1.00		mg/kg	1	Calc-stone+mols
(1.01) Item 1a Moisture Content of Soil (Oven Dried Method) _A [#]	-	Appended	-	Appended	-	-				Subcon IFA
(1.02) Item 2.4 4 Point Liquid & Plastic Limit by Cone Penetrometer _A [#]	-	Appended	-	Appended	-	-				Subcon IFA

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/22	25/00627/23	25/00627/24	25/00627/25	25/00627/26	25/00627/27		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP17	TP17	TP18	TP18	TP19	TP20				
Depth to Top	0.20	1.20	0.50	1.00	0.10	0.60				
Depth To Bottom										
Date Sampled	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25				
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES				
Sample Matrix Code	6AE	6A	6A	6A	6AE	4A				
Asbestos in Soil (inc. matrix)^										
Asbestos in soil _D [#]	NAD	-	NAD	-	NAD	NAD				A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-				A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-	-				A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	-	N/A	-	N/A	N/A				A-T-045

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/22	25/00627/23	25/00627/24	25/00627/25	25/00627/26	25/00627/27		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP17	TP17	TP18	TP18	TP19	TP20				
Depth to Top	0.20	1.20	0.50	1.00	0.10	0.60				
Depth To Bottom										
Date Sampled	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25				
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES				
Sample Matrix Code	6AE	6A	6A	6A	6AE	4A				
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	-	<0.02	-	<0.02	<0.02		mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04		mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04		mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	-	<0.05	-	<0.05	<0.05		mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	-	<0.05	-	<0.05	<0.05		mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	-	<0.07	-	<0.07	<0.07		mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	-	<0.06	-	<0.06	<0.06		mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	<0.04		mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	-	<0.08	-	<0.08	<0.08		mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	-	<0.03	-	<0.03	<0.03		mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	-	<0.03	-	<0.03	<0.03		mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	-	<0.03	-	<0.03	<0.03		mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	-	<0.07	-	<0.07	<0.07		mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	-	<0.08	-	<0.08	<0.08		mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/00627

Client Project Name: Phase 3 Whiston

Client Project Ref: 24TAY072

Lab Sample ID	25/00627/22	25/00627/23	25/00627/24	25/00627/25	25/00627/26	25/00627/27		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP17	TP17	TP18	TP18	TP19	TP20				
Depth to Top	0.20	1.20	0.50	1.00	0.10	0.60				
Depth To Bottom										
Date Sampled	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25	23-Jan-25				
Sample Type	SOIL - ES	SOIL - D	SOIL - ES	SOIL - D	SOIL - ES	SOIL - ES				
Sample Matrix Code	6AE	6A	6A	6A	6AE	4A				
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	3	-	1	-	4	<1		mg/kg	1	A-T-055s
Total Aliphatics _A	3	-	1	-	4	<1		mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	-	<1	-	<1	<1		mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	1	-	1	-	3	<1		mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	4	-	2	-	5	1		mg/kg	1	A-T-055s
Total Aromatics _A	5	-	4	-	8	1		mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	8	-	5	-	11	1		mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	-	<0.01	-	<0.01	<0.01		mg/kg	0.01	A-T-022s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- The results reported herein relate only to the material supplied to the laboratory.
- The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
- Analytical results reflect the quality of the sample at the time of analysis only.
- Opinions and Interpretations expressed are outside our scope of accreditation.
- A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript “#”	Accredited to ISO 17025
Superscript “M”	Accredited to MCertS
Superscript “U”	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript “A”	Analysis performed on as-received Sample
Subscript “D”	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript “D” on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript “A”	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis

“Trace Asbestos Identified” will be reported if there is not enough present to verify the type.

Quantification: Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to ‘HSG264, Asbestos: The survey guide’ and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). “TRACE” will be reported as a quantification result.

PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as ‘% stones >10mm’.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any “D” subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only. Results “with Clean up” indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from “TPH CWG with clean up” please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Betts Geo Environmental, Old Marsh Farm Barns, Welsh Road, Sealand,
Flintshire, UK, CH5 2LY

Project: Phase 3 Whiston

Clients Project No: 24TAY072

Project No: 25/00627

Date Received: 27/01/2025 (am)

Cool Box Temperatures (°C): 5.7-6.2

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	25/00627/1	25/00627/2	25/00627/3	25/00627/4	25/00627/5	25/00627/6	25/00627/7	25/00627/8	25/00627/9	25/00627/10	25/00627/11	25/00627/12
Client Sample No												
Client Sample ID/Depth	WS1 0.50m	WS2 0.30m	WS3 1.00m	WS4 0.10m	WS5 0.60m	TP2 0.20m	TP2 0.60m	TP4 0.50m	TP5 0.20m	TP6 1.00m	TP9 0.30m	TP9 1.00m
Date Sampled	21/01/25	21/01/25	21/01/25	21/01/25	21/01/25	22/01/25	22/01/25	22/01/25	22/01/25	22/01/25	22/01/25	22/01/25
A-T-019s	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025	
A-T-022s	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025	
A-T-024s	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025	
A-T-026s	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
A-T-031s	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
A-T-032s	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025	
A-T-040s	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025	
A-T-044	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025
A-T-045	28/01/2025	28/01/2025		28/01/2025	28/01/2025	28/01/2025		28/01/2025	28/01/2025	28/01/2025	28/01/2025	
A-T-055s	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025	
Calc-As Recd	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025	
Calc-stone+mois	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025	

Lab Sample ID	25/00627/13	25/00627/14	25/00627/15	25/00627/16	25/00627/17	25/00627/18	25/00627/19	25/00627/20	25/00627/21	25/00627/22	25/00627/23	25/00627/24
Client Sample No												
Client Sample ID/Depth	TP10 0.40m	TP10 0.70m	TP11 0.20m	TP12 1.20m	TP13 0.10m	TP13 0.80m	TP14 0.50m	TP15 0.30m	TP16 1.50m	TP17 0.20m	TP17 1.20m	TP18 0.50m
Date Sampled	22/01/25	22/01/25	22/01/25	22/01/25	23/01/25	23/01/25	23/01/25	23/01/25	23/01/25	23/01/25	23/01/25	23/01/25
A-T-019s	30/01/2025		30/01/2025		30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025		30/01/2025
A-T-022s	29/01/2025		29/01/2025		29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025		29/01/2025
A-T-024s	30/01/2025		30/01/2025		30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025		30/01/2025
A-T-026s	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
A-T-031s	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
A-T-032s	30/01/2025		30/01/2025		30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025		30/01/2025
A-T-040s	30/01/2025		30/01/2025		30/01/2025		30/01/2025	30/01/2025	30/01/2025	30/01/2025		30/01/2025
A-T-044	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025	29/01/2025
A-T-045	28/01/2025		28/01/2025		28/01/2025		28/01/2025	28/01/2025	28/01/2025	28/01/2025		28/01/2025
A-T-055s	29/01/2025		29/01/2025		29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025		29/01/2025
Calc-As Recd	29/01/2025		29/01/2025		29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025		29/01/2025
Calc-stone+mois	29/01/2025		29/01/2025		29/01/2025		29/01/2025	29/01/2025	29/01/2025	29/01/2025		29/01/2025

Lab Sample ID	25/00627/25	25/00627/26	25/00627/27
Client Sample No			
Client Sample ID/Depth	TP18 1.00m	TP19 0.10m	TP20 0.60m
Date Sampled	23/01/25	23/01/25	23/01/25
A-T-019s		30/01/2025	30/01/2025
A-T-022s		29/01/2025	29/01/2025
A-T-024s		30/01/2025	30/01/2025
A-T-026s	30/01/2025	30/01/2025	30/01/2025
A-T-031s	30/01/2025	30/01/2025	30/01/2025
A-T-032s		30/01/2025	30/01/2025
A-T-040s		30/01/2025	30/01/2025
A-T-044	29/01/2025	29/01/2025	29/01/2025
A-T-045		28/01/2025	28/01/2025
A-T-055s		29/01/2025	29/01/2025
Calc-As Recd		29/01/2025	29/01/2025
Calc-stone+mois		29/01/2025	29/01/2025

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Envirolab
Housesteads,
Off Stockport Road,
Hattersley,
SK14 3QU

F.A.O.

Final Test Report - 2282365 / 1

Site: 24TAY072
Job Number: 2282365
Originating Client: Envirolab
Originating Reference: 25/00627
Date Sampled: Not Given
Date Scheduled: 29/01/2025
Date Testing Started: 30/01/2025
Date Testing Finished: 03/02/2025

Previous Reports		Amendments	Date Issued

Amendments:

Authorised By:



Tim Robinson
Quality Supervisor

Report Issue Date: 03/02/2025

Page: 2



Final Test Report - 2282365 / 1

Site: 24TAY072

Job Number: 2282365

Originating Client: Envirolab

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

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Samples will be retained for 28 days from date of issue of the final test report before being disposed of, unless we receive written instruction to the contrary.

Report End

Report Issue Date: 03/02/2025

Simon Devine
Taylor Wimpey
12 Danescourt Road
Liverpool
L12 8RB

Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: *BGS_342189/59579*

Client reference: *Whiton PH3*

Search location



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Search location indicated in red

*This report describes a site located at National Grid Reference 347262, 389790.
Note that for sites of irregular shape, this point may lie outside the site boundary.
Where the client has submitted a site plan the assessment will be based on the area given.*

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2023 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2023 edition) Radon: Guidance on protective measures for new buildings?

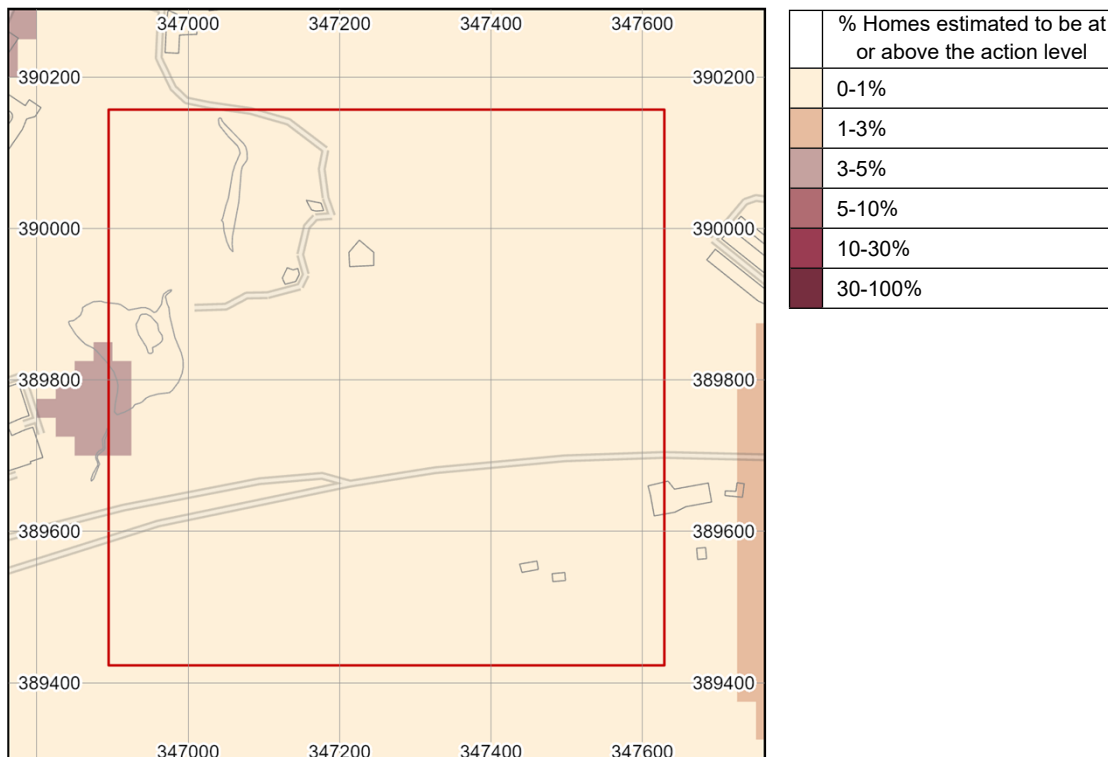
BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2023 Edition)*.

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon Affected Area



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Scale: 1:10 000 (1cm = 100 m)

Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be at or above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 3 TO 5% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to be at or above the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a high radon level within the property; the only way to determine the radon level is to carry out a radon measurement.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels at or above the Action Level (200 Bq m⁻³) should be remediated. Householders with levels between the Target Level (100 Bq m⁻³) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were at or above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level is at or above the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations 2017 require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.uk website: www.brebookshop.com

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**Report issued by
BGS Enquiry Service**

APPENDIX E

(i) Gas Monitoring Data

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 06/02/2025



Ground Gas Monitoring Round 1

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mB)	Methane CH ₄ (%v/v)		Carbon Dioxide CO ₂ (% v/v)		Oxygen (%v/v)		Other Gases			Depth to Water	
			Peak	Steady	Peak	Steady	Min	Steady	PID	H ₂ S	CO	(mbgl)	BH depth
WS01												0.30	1.91
WS02	0.2	1033	0.0	0.0	1.6	1.6	19.3	19.3	-	-	0	0.81	1.54
WS03												0.45	2.96
WS04	0.0	1033	0.0	0.0	0.2	0.2	21.2	21.2	-	-	0	2.11	3.05
WS05	0.1	1033	0.0	0.0	0.5	0.5	20.6	20.6	-	-	0	0.91	2.97

Notes:

Monitoring order is left to right across the table

Monitoring should be for not less than 3 minutes. However, if high concentrations of gases are initially recorded, monitoring should be for up to 10 minutes

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Sunny, cold, damp, moderate breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 18/02/2025



Ground Gas Monitoring Round 2

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mB)	Methane CH ₄ (%v/v)		Carbon Dioxide CO ₂ (% v/v)		Oxygen (%v/v)		Other Gases			Depth to Water	
			Peak	Steady	Peak	Steady	Min	Steady	PID	H ₂ S	CO	(mbgl)	BH depth
WS01												0.40	1.95
WS02	0.2	1008	0.0	0.0	2.2	2.2	18.9	18.9	-	-	0	0.98	1.49
WS03												0.52	3.01
WS04	0.1	1008	0.0	0.0	0.4	0.4	21.1	21.1	-	-	0	2.25	2.99
WS05	0.1	1008	0.0	0.0	0.5	0.5	20.3	20.3	-	-	0	1.03	2.94

Notes:

Monitoring order is left to right across the table

Monitoring should be for not less than 3 minutes. However, if high concentrations of gases are initially recorded, monitoring should be for up to 10 minutes

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Sunny intervals, cold, dry, strong breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 04/03/2025



Ground Gas Monitoring Round 3

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mB)	Methane CH ₄ (%v/v)		Carbon Dioxide CO ₂ (% v/v)		Oxygen (%v/v)		Other Gases			Depth to Water	
			Peak	Steady	Peak	Steady	Min	Steady	PID	H ₂ S	CO	(mbgl)	BH depth
WS01												0.35	2.00
WS02	0.1	999	0.0	0.0	2.7	2.7	18.3	18.3	-	-	0	1.02	1.53
WS03												0.70	2.97
WS04	0.1	999	0.0	0.0	0.2	0.2	21.3	21.3	-	-	0	2.11	3.04
WS05	0.0	999	0.0	0.0	0.4	0.4	20.9	20.9	-	-	0	0.95	2.88

Notes:
Monitoring order is left to right across the table
Monitoring should be for not less than 3 minutes. However, if high concentrations of gases are initially recorded, monitoring should be for up to 10 minutes

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Sunny, dry, cold, slight breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 20/03/2025



Ground Gas Monitoring Round 4

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mB)	Methane CH ₄ (%v/v)		Carbon Dioxide CO ₂ (% v/v)		Oxygen (%v/v)		Other Gases			Depth to Water	
			Peak	Steady	Peak	Steady	Min	Steady	PID	H ₂ S	CO	(mbgl)	BH depth
WS01			Well Flooded									0.40	1.97
WS02	0.1	1002	0.0	0.0	3.2	3.2	17.9	17.9	-	-	0	0.95	1.60
WS03			Well Flooded									0.63	2.91
WS04	0.1	1002	0.0	0.0	0.1	0.1	21.4	21.4	-	-	0	1.98	2.99
WS05	0.1	1002	0.0	0.0	0.6	0.6	20.5	20.5	-	-	0	0.99	2.85

Notes:

Monitoring order is left to right across the table

Monitoring should be for not less than 3 minutes. However, if high concentrations of gases are initially recorded, monitoring should be for up to 10 minutes

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Sunny intervals, dry, warm, moderate breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 31/03/2025



Ground Gas Monitoring Round 5

[illegible]

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Overcast, dry, warm, moderate breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

Site: Whiston Phase 3
Job Number: 24TAY072
Date of Monitoring: 22/04/2025



Ground Gas Monitoring Round 6

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mB)	Methane CH ₄ (%v/v)		Carbon Dioxide CO ₂ (% v/v)		Oxygen (%v/v)		Other Gases			Depth to Water	
			Peak	Steady	Peak	Steady	Min	Steady	PID	H ₂ S	CO	(mbgl)	BH depth
WS01	Well Flooded											0.70	1.98
WS02	0.1	998	0.0	0.0	4.6	4.6	16.8	16.8	-	-	0	1.33	1.63
WS03	Well Flooded											0.65	3.01
WS04	0.0	998	0.0	0.0	0.2	0.2	20.0	20.0	-	-	0	2.40	3.05
WS05	0.1	998	0.0	0.0	1.1	1.1	19.6	19.6	-	-	0	1.58	2.82

Notes:

Monitoring order is left to right across the table

Monitoring should be for not less than 3 minutes. However, if high concentrations of gases are initially recorded, monitoring should be for up to 10 minutes

Relevant Information at the Time of Monitoring	
Monitored by:	GC
Weather:	Sunny, dry, warm, slight breeze
Equipment Used:	GA5000
	Solinst Mini Interface Meter
Visible signs of damage/stress:	None
Other Comments/Observations:	None

APPENDIX F

(i) Conceptual Model

The report aims to identify land which could potentially be affected by contamination, such that it could affect the value or re-use of the land, or such that mitigation would be required for certain proposed end uses of the land.

The assessment also aims to identify land which would be regarded as 'contaminated land' under the terms of the Environmental Protection Act 1990, Part IIa. This act includes a stricter test for contaminated land than that outlined above. Land is considered to be contaminated if either:

- the land is causing significant harm to people, ecosystems or infrastructure; or
- there is a significant possibility that such harm could be caused; or
- Pollution of controlled waters is being, or is likely to be, caused.

The following situations are defined as being where harm is to be regarded as significant:

- chronic or quite toxic effect, serious injury or death to humans;
- irreversible or other adverse harm to the ecological system;
- substantial damage to or failure of buildings;
- death of, or disease or other physical damage affecting, livestock or crops;
- Pollution of controlled waters.

The risk assessment uses a 'Source-Pathway-Receptor' methodology for assessing whether a source of contamination could potentially lead to harmful consequences. This means that there needs to be a pollutant linkage from source to receptor for harm to be caused, this linkage consisting of:

- a source of pollution;
- a pathway for the pollutant to move along;
- A receptor that is affected by the pollutant.

As an example, the pollutant source could be an identified leak of oil or an area of dumped waste.



The pathways could include transport of the contaminant by groundwater, surface water, windblown dust, or vapours, and for human receptors will include the means, by which contaminants enter the body, for example skin contact, ingestion and inhalation.

Receptors include people, other living organisms, the built environment and groundwater and surface waters (these latter two also being contaminant pathways).

The source-pathway-receptor methodology relationship allows an assessment of the environmental risk to be determined, based on the nature of the source, the degree of exposure of the receptor to the source and the sensitivity of the receptor.

This section of the report is based on the information set out in the previous sections of the report and should not be read independently of such sections.

Initial Conceptual Model

From the available information the preliminary conceptual model is visualised as follows:

Target (Receptor)	POTENTIAL SOURCE-PATHWAY LINKAGE
Site users / residents	Inhalation of soil gas, odours or dust.
	Ingestion of, and skin contact with, contaminated soil.
	Ingestion of contaminants in vegetables etc. or in soils adhering to vegetables, etc.
Construction/ maintenance workers.	Inhalation of soil gas, odours or dust
	Ingestion of, and skin contact with, contaminated soil
Plants	Adverse effects on growth caused by presence of contaminants in soil
Buildings and Structures	Flow of ground gas into buildings. Asphyxiation, toxicity, explosion and fire hazards
	Sulphate attack of foundations
	Hydrocarbons penetrating plastic water supply pipes
Groundwater	Migration of soluble contaminants into groundwater on or off site. Migration of oils into groundwater on or off site.
Surface water	Migration of soluble contaminants and/or direct run-off of contaminants. Migration of oils into groundwater on or off site.

Initial Environmental Risk Assessment

General

It is accepted that an environmental risk assessment can be based on a source-pathway-target model. An examination is carried out as to whether a target will be at risk from a contamination source, that a source exists, and whether there are any pathways (routes of exposure) which might actually link the source to the target.

Environmental risk assessments rely heavily on numerical trigger concentrations or guidelines because exposure of targets to contamination is difficult to quantify directly. Quantification of risk is therefore mainly undertaken for general scenarios in order to derive trigger levels. These are derived for various contaminants for particular targets and routes of exposure. An example of a sensitive target would be users of a domestic back garden, where routes of exposure might be skin contact, dust inhalation, direct ingestion and indirect ingestion via cultivation and consumption of fruit and vegetables.

In March 2002, the first parts of the new CLEA risk assessment guidance were released by DEFRA/Environment Agency.

The risk assessment approach is an extension of the 'fit for use' concept whereby land is cleaned up to a standard fit for the proposed use, that is, so all remaining risks are acceptable. However, as well as being 'fit for use', the environmental risk assessment approach also addresses the soil and water environment so that these are also safeguarded where necessary. For example if a site was contaminated with heavy metals and the development comprised the proposed construction of hard standings and buildings only, the fit-for-use approach might require no remediation for the site. However, consideration of the wider environment needs to address whether groundwater is being contaminated, and if so whether remediation is required for this reason.

The following classification presented by CIRIA has been used in the assessment of risk:

Estimation of risk from consideration of magnitude, consequences and probabilities				
Probability	Consequences			
	Severe	Moderate	Mild	Minor
High	Very high	High	Moderate	Moderate / Low
Medium	High	Moderate	Moderate / Low	Low
Low	Moderate	Moderate / Low	Low	Very Low
Unlikely	Moderate / Low	Low	Very Low	Very Low

Reference: Contaminated Land Risk Management; A Guide to Good Practice, CIRIA C552:2001

CIRIA C665 Situation A Ground Gas Conceptual Model

The risk table contained in C665 is basically a modified risk assessment from CIRIA 152 1995, by which a conceptual model and semi-quantitative risk assessment can be made.

APPENDIX G

(i) Notes on Ground Gas

Ground Gas

The Building Regulations and BRE Report 212 state that precautions are not mandatory against carbon dioxide unless 5.0% volume is exceeded. These documents do not give a threshold level for methane, but Baker suggests that this level is 0.1% volume. For methane up to 1.0% volume, and carbon dioxide above 5.0% volume, the Building Regulations and BRE Report state that passive measures may be adopted. Above 1.0% methane further specific guidance must be sought.

CIRIA Report 149 gives further guidance on the appropriate precautions for various gas regimes, called characteristic situations in this report. In the DETR Guide for Design by Ove Arup, various types of passive measures are assessed for performance with different gas regimes. The assessments used computational fluid dynamic (CFD) modelling.

A gas regime is essentially defined by two parameters:

- i) The concentration of the gas (e.g. % methane)
- ii) The emission rate of the gas from the ground.

The fact that two parameters are used is problematic if the site is to be classified on the basis of Table 28 in CIRIA Report 149. This is because high gas concentrations are often encountered which fall into an onerous gas regime; whereas the low flow rates which are also frequently encountered fall into less onerous gas regimes.

In order to use the Guide for Design to decide if passive measures are suitable, it is necessary to combine the gas concentration and the emission rate.

Three recent publications are used for ground gas risk assessment:

- CIRIA C665 for high rise residential / flats
- 'Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present' Report Edition No.04 March 2007 NHBC – designed for use with low rise residential properties
- BS8485:2007 'Code of practice for the characterization and remediation from ground gas in affected developments'

These documents improve upon the approach used in previous CIRIA and Wilson /Card Papers, by placing emphasis on gas flow rates, but still retain some reliance on the gas concentrations themselves.

CIRIA C665 Situation A Ground Gas Conceptual Model

The risk table contained in C665 is basically a modified risk assessment from CIRIA 152 1995, by which a conceptual model and semi-quantitative risk assessment can be made.

High Rise / Flats (CIRIA 665 Table 8.5)

Characteristic Situation (CIRIA Report 149)	Risk Classification	Gas Screening Value (CH₄ or CO₂) (l/hr) ¹	Additional factors	Typical source of generation
1	Very low risk	<0.07	Typically methane ≤1%v/v and/or carbon dioxide ≤5%v/v. Otherwise consider increase to Situation 2	Natural soils with low Organic content. "Typical" Made Ground
2	Low risk	<0.7	Borehole flow rate not to exceed 70l/hr. Otherwise consider increase to Situation 3	Natural soil, high peat/organic content. "Typical" Made Ground
3	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	Very high risk	>70		Recent landfill site

Notes:

1. Gas screening value: litres of gas/hour is calculated by multiplying the gas concentration (%) by the measured borehole flow rate (l/hr);
2. Site characterisation should be based on gas monitoring of concentrations and borehole flow rates for the minimum periods as defined within CIRIA Report 665;
3. Source of gas and generation potential/performance must be identified;
4. Soil gas investigation to be in accordance with guidance contained within CIRIA Report 665;
5. If there is no detectable flow, use the limit of detection of the instrument;
6. The boundaries between the Partners in Technology classifications do not fit exactly with the boundaries for the above classification.

Typical scope of protective measures (extract from CIRIA Report 665 Table 8.6)

Characteristic Situation (from Table 8.5)	Number of levels of protection	Typical scope of protective measures for residential building (not low-rise traditional housing) ¹
1	None	No special precautions
2	2	a) Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g DPM and under-floor venting b) Beam and block or pre-cast concrete and 2000 g DPM/reinforced gas membrane and under-floor venting. All joints and penetrations sealed.
3	2	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised under-floor sub-space.
4	3	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated under-floor subspace or positively pressurised under-floor sub-space, over-site capping or blinding and in ground venting layer
5	4	Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and ventilated or positively pressurised under-floor sub-space, over-site capping and in ground venting layer and in ground venting wells or barriers.
6	5	Not suitable unless gas regime is reduced first and quantitative risk assessment carried out to assess design of protection measures in conjunction with foundation design.

Notes:

1. Not suitable for use with low rise traditional housing. (Use the NHBC document instead);
2. Typical scope of protective measures may be rationalised for specific developments on the basis of quantitative risk assessments;
3. Note the type of protection is given for illustration purposes only. Information on the detailing and construction of passive protection measures is given in BR414 (Johnson, 2001). Individual site specific designs should provide the same number of separate protective methods for any given characteristic situation. See CIRIA Report 49;
4. In all cases there should be minimum penetration of ground slabs by services and minimum number of confined spaces such as cupboards above the ground slab. Any confined spaces should be ventilated;
5. Foundation design must minimise differential settlement particularly between structural elements and ground-bearing slabs;
6. Commercial buildings with basement car parks, provided with ventilation in accordance with the Building Regulations, may not require gas protection for Characteristic Situations 3 and 4;
7. Floor slabs should provide an acceptable formation on which to lay the gas membrane. If a block beam floor is used it should be well detailed so it has no voids in it that membranes have to span, and all holes for service penetrations should be filled. The minimum density of the blocks should be 600kg/m³ and the top surface should have a 4:1 ratio sand to cement grout brushed into all joints before placing any membrane (this is also good practice to stabilise the floor and should be carried out regardless of the need for ground gas membranes);
8. The ground gas-resistant membrane can also act as the damp-proof membrane;
9. Based on Building Regulations Approved Document C (Office of the Deputy Prime Minister, 2004a), which states that "a membrane below the concrete could be formed with a sheet of polyethylene, which should be at least 300µ thick (1200 gauge)". Please note the alteration from 300mm (as stated in the Approved Document C) to 300µ, as 300mm is a typographical error that has been recognised and corrected for within this report and CIRIA Report 665.

Low Rise Residential (NHBC)

Table 14.1: Gas Risk Assessment - Traffic Lights with Typical Maximum Concentrations and Gas Screening Values

Classification	Methane ¹		Carbon Dioxide ¹	
	Typical Maximum Concentration ³ (%v/v)	Gas Screening Value ^{2,4} (l/hr)	Typical Maximum Concentration ³ (%v/v)	Gas Screening Value ^{2,4} (l/hr)
Green				
Amber 1	1	0.13	5	0.78
	5	0.63	10	1.60
Amber 2	20	1.60	30	3.10
Red				

Notes:

1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst case temporal conditions that the site may be expected to encounter will be the decider as to what Traffic Light is allocated;
2. Borehole Gas Volume Flow Rate, in litres per hour as defined in Wilson and Card (1999), is the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered;
3. The Typical Maximum Concentrations can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so;
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Table 14.2: Ground Gas Protection Measures Required for the Traffic Lights

Traffic Light	Ground Gas Protection Measures Required
Green	Ground gas protection measures are not required. (note based on standard NHBC house detail with 150mm void space under suspended floor)
Amber 1	Low-level ground gas protection measures are required, using a membrane and ventilated sub-floor void that creates a permeability contrast to limit the ingress of gas into buildings. Gas protection measures are to be installed as prescribed in BRE 414. Ventilation of the sub-floor void should be designed to provide a minimum of one complete volume change per 24 hours.
Amber 2	High-level ground gas protection measures are required, creating a permeability contrast to prevent ingress of gas into buildings. Gas protection measures are to be installed as prescribed in BRE 414. Membranes used should always be fitted by a specialist contractor and should be fully certified (see Appendix G). As with Amber 1, ventilation of the sub-floor void should be designed to provide a minimum of one complete volume change per 24 hours.
Red	Standard residential housing is not normally acceptable without further Ground Gas Risk Assessment and/or possible remedial mitigation measures to reduce/remove the source of the ground gases. In certain circumstances, active protection methods could be applied, but only when there is a legal agreement assuring the management and maintenance of the system for the life of the property.

BS8485: 2007**Table 2: Required Gas Protection By Characteristic Gas Situation & Type Of Building**

Characteristic gas situation, CS	NHBC traffic light	Required gas protection			
		Non-managed property, e.g. private housing	Public building ^{A)}	Commercial buildings	Industrial buildings ^{B)}
1	Green	0	0	0	0
2	Amber 1	3	3	2	1 ^{C)}
3	Amber 2	4	3	2	2
4	Red	6 ^{D)}	5 ^{D)}	4	3
5			6 ^{E)}	5	4
6				7	6

NOTE Traffic light indications are taken from NHBC Report no.: 10627-R01 (04) [3] and are mainly applicable to low-rise residential housing. These are for comparative purposes but the boundaries between the traffic light indications and CS values do not coincide.

A) Public buildings include, for example, managed apartments, schools and hospitals.

B) Industrial buildings are generally open and well ventilated. However, areas such as office pods might require a separate assessment and may be classified as commercial buildings and require a different scope of gas protection to the main building.

C) Maximum methane concentration 20% otherwise consider an increase to CS3.

D) Residential building on higher traffic light/CS sites is not recommended unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

E) Consideration of issues such as ease of evacuation and how false alarms will be handled are needed when completing the design specification of any protection scheme.

Table 3: Solutions Scores

PROTECTION ELEMENT/SYSTEM		SCORE	COMMENTS
a) Venting/dilution (See Annex A)			
Passive sub floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.) A)	Very good performance	2.5	Ventilation performance in accordance with Annex A.
	Good performance	1	If passive ventilation is poor this is generally unacceptable and some form of active system will be required.
Subfloor ventilation with active abstraction/pressurization (venting layer can be a clear void or formed using gravel,		2.5	There have to be robust management systems in place to ensure the continued maintenance of any ventilation system.

geocomposites, polystyrene void formers, etc.) A)			Active ventilation can always be designed to meet good performance. Mechanically assisted systems come in two main forms: extraction and positive pressurization.
Ventilated car park (basement or undercroft)		4	Assumes car park is vented to deal with car exhaust fumes, designed to Building Regulations Document F [5] and IStructE guidance [6].
b) Barriers			
Floor slabs			It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum. Breaches in floor slabs such as joints have to be effectively sealed against gas ingress in order to maintain these performances.
Block and beam floor slab		0	
Reinforced concrete ground bearing floor slab		0.5	
Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into slab		1.5	
Reinforced concrete cast in situ suspended slab with minimal service penetrations and water bars around all slab penetrations and at joints		1.5	
Fully tanked basement		2	
c) Membranes			
Taped and sealed membrane to reasonable levels of workmanship/in line with current good practice with validation B), C)		0.5	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation, and the integrity of joints
Proprietary gas resistant membrane to reasonable levels of workmanship/in line with current good practice under independent inspection (CQA) B), C)		1	
Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under CQA with integrity testing and independent validation		2	
d) Monitoring and detection (not applicable to non-managed property, or in isolation)			
Intermittent monitoring using hand held equipment		0.5	
Permanent monitoring and alarm system A)	Installed in the underfloor venting/dilution system	2	Where fitted, permanent monitoring systems ought to be installed in the underfloor venting/dilution system in the first instance but can also be provided within the occupied space as a fail safe
	Installed in the building	1	
e) Pathway Intervention			
Pathway intervention		-	This can consist of site protection measures for off-site or on-site sources (see Annex A).

NOTE In practice the choice of materials might well rely on factors such as construction method and the risk of damage after installation. It is important to ensure that the chosen combination gives an appropriate level of protection

A) It is possible to test ventilation systems by installing monitoring probes for post installation validation.

B) If a 1 200 g DPM material is to function as a gas barrier it should be installed according to BRE 212 [8]/BRE 414 [9], being taped and sealed to all penetrations.

C) Polymeric Materials >1 200 g can be used to improve confidence in the barrier. Remember that their gas resistance is robust and resistant to site damage.

APPENDIX H

(i) Off-site Disposal of Surplus Soil Guidance Notes

The disposal of waste (including surplus soils and contaminated soils) to landfill sites is governed by the *Landfill (England & Wales) Regulations 2002*, the *Hazardous Waste Technical Guidance document WM2 (2003)* and associated legislation.

One of the aims of the above legislation is to encourage waste producers (including developers disposing of surplus soils etc) to reduce their waste (and not just discard and disown it). This can be achieved by recycling or reusing the waste. In the case of contaminated sites where leaving contaminated material in-situ poses a risk to a potential receptor such as groundwater resources, further testing and assessment for such risk could reduce the quantities requiring disposal. If there is still unacceptable risk from contaminated soil being left in place, then it may be possible to reduce the risk to an acceptable level (such that the material can be left in place) by in-situ or ex-situ clean-up of the soils.

Before waste can be disposed of, the producer of the waste must undertake a number of steps. '*Initial Waste Testing and Characterisation*' is firstly undertaken to determine whether the waste is non-hazardous or hazardous. The exceptions are that some wastes such as coal tars, 'tank bottom sludge's', etc are immediately classed as hazardous, regardless of any testing or threshold concentrations.

Any inert or hazardous waste destined for landfill must undergo '*Compliance Testing*' using the Waste Acceptance Criteria (WAC). There are different inert and hazardous WAC limits relating to landfill sites that are correspondingly licensed to accept inert or hazardous waste.

If the '*Initial Waste Testing and Characterisation*' shows a waste to be hazardous, then it is a requirement that the material be tested against the WAC-hazardous suite of tests. If it *passes* the WAC-hazardous testing, then it can be taken to a hazardous waste landfill site. If the material *fails* the WAC-hazardous testing, then the material must be treated before undergoing re-characterisation, further WAC-hazardous testing and then potential disposal at a hazardous waste disposal site.

If the '*Initial Waste Testing and Characterisation*' shows a waste to be non-hazardous, then it can be taken to a non hazardous waste landfill site, without further testing. The producer may however decide to undertake WAC-inert testing, in an attempt to reclassify the waste as inert, in which case the waste could then go to an inert landfill site.

The volumes of soils associated with potential hotspots on a site (be they hazardous or non-hazardous) which might require off-site disposal, could potentially be reduced by further on-site sampling and subsequent testing.

With regard to the *Compliance Testing*, it should be noted that some landfill sites are permitted to increase the standard WAC-hazardous/inert limit concentrations, such that they might accept waste that would normally fail such limits.

We would recommend that the contamination testing results (including the history of the site) be presented to the proposed landfills, to determine if they will accept waste generated at the site and what classification they would impose.

APPENDIX I

(i) Validation Report Guidance Notes

Unforeseen Hotspots of Contamination

Given the existence of made ground on the site it would be prudent to maintain vigilance during site clearance and construction, in case any further areas of suspected contamination are encountered.

If areas are found then a suitably qualified person should undertake appropriate sampling, testing and further risk assessment.

Any hotspots encountered during site clearance, not previously encountered in the ground investigation, are to be removed to a suitably licensed landfill site.

A validation report (see below) will be produced on completion of these works. This report will serve to confirm that the works were undertaken in accordance with the relevant legislation, the method statement, specification and planning conditions.

Validation Report Recommendations

It is suggested that the following records will be kept on site to provide a basis for the validation report:

- Daily record sheets of the remediation works to include a summary of the day's activities
- Weather conditions
- Plant, personnel and visitors to the remediation site
- Aspects relating to Health & Safety, environmental control or non-compliance with the specification or the Method Statements.
- All in situ and laboratory testing results.

All requirements of the remediation specification should be complied with; on completion of the remediation a validation report should be provided. This report will comprise the relevant site records and act as certification that the remedial and ground preparation works have been carried out in accordance with the specification.

The validation report will include the following:

- A description of the works undertaken.
- Records of any remediation works, including daily diary sheets.
- Progress photographs.
- Any chemical and geotechnical validation test results.
- As built surveys, including base excavations and top and bottom of capping layer.
- A statement that the works have been undertaken in accordance with the agreed specification

APPENDIX J

(i) Notes on Limitations

This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese knotweed). It is recommended that these are considered as part of the assessment of development constraints for the site.

The ground conditions described in the above reports relate only to the points of investigation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions, these cannot be determined with complete certainty. Betts Geo has endeavoured to assess all information provided to them, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The assessment and judgements given in this report are directed by both the finite data on which they are based and the proposed works to which they are addressed. The data essentially comprised a study of available documented information from various sources (including Client Furnished reports) together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information. Actual risks can only be assessed following a physical investigation of the site.

The site investigation has been carried out to provide information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. Betts Geo Environmental Ltd undertake to exercise all reasonable skill, care and due diligence in the exercise of the investigation with respect to sampling techniques, sample storage and report interpretation.

The assessments and judgement given in this report are directed by both the finite data on which they are based and the proposed works to which they are addressed. Data acquisition is subject to the limitations of the methods of investigation used. Exploratory holes undertaken during fieldwork investigate small a small volume of ground in relation to the size of the site and as such can only provide an indication of site conditions. There may be conditions pertaining to the site and the proposed development i.e. localised "hotspots" of contamination, which have not been disclosed by the investigations.

The findings and opinions are relevant to the dates of our site works and should not be relied upon to represent conditions at substantially later dates. Conditions at the site will change over time due to natural variations and anthropogenic activities. Groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations.

The opinions expressed in this report regarding any contamination are based on simple statistical analysis and comparison with available guidance values. No liability can be accepted for the retrospective effects of any changes or amendments to these values.

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