



STAGE 2 GEO-ENVIRONMENTAL REPORT

AT

**LAND AT FALHOUSE LANE
WHITLEY**

ON BEHALF OF

MR SHAUN TRANTER



ARP GEOTECHNICAL LTD

CHARTERED CONSULTING ENGINEERS

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CLIENT: MR SHAUN TRANTER

JOB NUMBER: TRN/01

PROJECT: LAND AT FALHOUSE LANE, WHITLEY

REPORT TYPE: STAGE 2 GEO-ENVIRONMENTAL REPORT

REPORT REFERENCE: TRN/01r1

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1.0 EXECUTIVE SUMMARY

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

Proposed Development	Residential dwelling with private gardens.
Existing Site Description	Occupied by a concrete slab from former barn/shed, and associated hardstanding. Lawns across the rest, and a block paved area.
Site History	Building present in the west of the site from 1982 and recently demolished. Probable helicopter/vehicle storage on the site.
Geology	Pennine Lower Coal Measures (mudstone, siltstone and sandstone). No superficial deposits shown to be present. Fault shown to cross the west of the site, trending approximately north to south.
Coal Mining	An intrusive rotary borehole investigation and investigation of the adits is to be undertaken shortly, and reported separately.
Hazardous Gases	Basic radon protection measures recommended. Monitoring is proposed for mine/landfill gases, and this will be reported separately on completion.
Ground Conditions	Made ground present to depths of up to 1.5m close to proposed building, and to unproven depth elsewhere. Natural strata are mainly firm to stiff clays. Bedrock identified at depths of 2.1m and 2.56m, in TP1 and TP5.
Contamination	No contamination remedial measures required. Control of any imported soils required.
Foundations	Where not underlain by mine adits, strip/trench fill foundations are should be suitable. If foundations are underlain by mine adits, excavation of the adit and tunnel will be required to allow founding on natural stable strata. Piles may be required if depth to base of adits is too deep, subject to the presence of any shallow underground workings.
Excavations	Liable to be stable within natural strata, but instability can be expected with made ground. Any groundwater seepages should be

	controllable from an artificial sump.
Concrete	FND3z designation for unreinforced foundations. For any reinforced concrete, other design-specific mixes will apply.
Soakaways	Due to the presence of mine adits on the site and shallow underground coal workings, soakaways may adversely affect the ground stability of the site and, as such, soakaways are not considered to be a viable drainage option, regardless of infiltration potential.
Road Pavement	Due to deep made ground, a formation on natural strata may be impractical. There are robust potential solutions for this situation. However, the use of the road pavement is likely to be for light private domestic use and parking. Proof rolling and use of an appropriate aggregate thickness for the conditions is likely to provide a more economical solution, although allowance should be made for a possible requirement for intermittent maintenance.

2.0 TERMS OF REFERENCE

- 2.1 Mr Shaun Tranter is considering developing the site at Land at Falhouse Lane in Whitley, with a residential dwelling and private gardens. It was considered appropriate to provide information to aid viability assessment and design of any subsequent development. In December 2020, ARP Geotechnical Ltd issued a Stage 1 Desk Study Report (Reference TRN/01r1, dated 18th December 2020). This involved an assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. In addition to comments and conclusions on a wide range of environmental and geotechnical issues, the report also provided recommendations for intrusive investigation and assessment, of both contamination and ground engineering aspects.
- 2.2 In December 2020, ARP Geotechnical Ltd was appointed by Mr Shaun Tranter to undertake the recommended further works, with the intrusive investigation comprising trial pits to assess the ground conditions. This report is focused on contamination and general engineering aspects, and does not include any intrusive assessment of mining issues, as the Coal Authority permit for the mining investigation was still awaited at the time of writing.
- 2.3 The investigation was implemented generally in accordance with BS 5930:2015 +A1:2020 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality - managing ground conditions", Environment Agency LCRM "Land Contamination Risk Management" and BS10175 : 2011 + A2 : 2017 "Investigation of potentially contaminated sites - Code of practice". This report is limited to the data obtained as part of this investigation. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions, including groundwater levels, after the preparation of this report.
- 2.4 The findings or contents of the Stage 1 Desk Study Report are not reproduced here in full, and it is recommended that this report is read in conjunction with the Stage 1 Report.

- 2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist to undertake a more detailed survey, including for any invasive/harmful weeds.
- 2.6 The assessment of any topsoil is carried out in terms of potential chemical effects on human health only, and no account is taken of aesthetic or horticultural properties. Such considerations should be referred to a horticulturist or landscape architect.
- 2.7 The report has been prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Geotechnical Ltd. For the avoidance of any doubt, where ARP Geotechnical Ltd enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Geotechnical Ltd.'s consent.
- 2.8 Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular the duties and obligation of the Client.
- 2.9 The report refers to, and includes, a copy of an indicative proposed layout. This is only for the purposes of generating a conceptual site model for the contamination risk assessment. Unless the proposed layout changes significantly, such that the conceptual model and risk assessment is affected, there is no requirement to re-issue this report when the layout is revised.

3.0 THE SITE

Site Location

- 3.1 The site, which is centred on Ordnance Survey Grid Reference 421770, 417270, is located off Falhouse Lane, in Whitley.
- 3.2 A site location plan, aerial photograph and proposed site layout, are presented in Appendix A.

Site Description

- 3.3 A basal concrete slab is present at surface in the northwest of the site, from demolition of the former barn/shed. An area of bitmac hardstanding is present beyond the northeastern end of the slab, which aerial photographs show was used as a helipad. Gravel hardstanding leads from the concrete/bitmac area to the site entrance. A circular brick paved area is also present in the south of the site, presumed also be a former helipad. The remaining site is covered by lawns. The site is bounded to the northeast, southeast, and southwest, by undeveloped landscaped land (part of the wider site ownership but not within the site boundary), beyond which are residential properties. Falhouse Lane is present to the northeast of the site, with residential properties and undeveloped land beyond.

Site History

- 3.4 Ordnance Survey archive maps show that there is no evidence of any development on the site prior to the construction of the existing building in the western corner, by 1982. The surrounding area has extensive mining and quarrying, with a quarry present 20m to the southeast from 1893, probably backfilled between 1982 and 1989.

4.0 ENVIRONMENTAL SETTING

- 4.1 The environmental setting for the site was established by the Stage 1 Desk Study Report undertaken by ARP Geotechnical Ltd under reference TRN/01r1 and dated 18th December 2020. The findings of the Desk Study Report, updated and amended where deemed appropriate, are summarised below.

Geology

- 4.2 The geological maps show the site to be underlain by Undifferentiated Strata (mudstone, siltstone and minor sandstone) of the Pennine Lower Coal Measures Formation. No superficial deposits are shown to be present on the site. One fault is shown to cross the west of the site, trending approximately north-northwest to south-southeast. The western side of the fault is estimated to have been downthrown by around 3m.

Coal Mining

- 4.3 A Coal Mining Stability Risk Assessment was undertaken by ARP Geotechnical Ltd (Ref: TRN/01/JR, dated 28th November 2014), for the larger site area, and this concluded that there is the potential for shallow coal mine workings to affect the stability of the site, and a rotary borehole investigation should be undertaken. The mine entries on the site should also be located and appropriately recorded, to allow the safe treatment of the features.

Hydrogeology

- 4.4 The Landmark Envirocheck Report indicates the Bedrock Aquifer Designation to be "Secondary A" aquifer.
- 4.5 There are no groundwater abstractions within 1km of the site.
- 4.6 The site is not within a groundwater Source Protection Zone.

Hydrology

- 4.7 There are no watercourses on or adjacent to the site. The nearest watercourse downslope is Falhouse Beck, at 125m to the southeast. The site is not in an area at risk from river flooding.
- 4.8 There are no surface water abstractions within 1km of the site.

Other Relevant Environmental Data

- 4.9 There are no closed or currently licensed landfills within 250m of the site, however, historical maps have indicated a quarry was once present 20m to the southeast, presumed to have been backfilled.
- 4.10 No radon protective measures are stated to be necessary for new dwellings or extensions on the site. However, the site is in an intermediate probability radon area, as between 1% and 3% of homes are above the action level. In these circumstances of apparent conflict, it may be prudent to assume basic radon protection is required, to prevent conveyancing difficulties. This is normally achieved by incorporating a radon barrier within a solid floor system, and extending the barrier through the cavity wall.

Potential Contamination Sources

- 4.11 The following potential sources of contamination were identified in the Stage 1 Desk Study Report:-
- 4.11.1 Possible made ground, for example ash from mining activities on site: – metals, inorganics, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), phenol, asbestos.
- 4.11.2 Possible minor leaked oils and fuels from storage of vehicles.
- 4.11.3 Possible harmful gases from coal/workings, mine adits and backfilled quarry 20m to the southeast: - methane, carbon dioxide.

5.0 SITE INVESTIGATION

5.1 A site investigation was undertaken by ARP Geotechnical Ltd on 6th January 2021. The purpose of the investigation was to produce an assessment of the site in accordance with BS10175 : 2011 + A2 : 2017 "Investigation of potentially contaminated sites - Code of practice", and to provide geotechnical information to aid design of the development.

5.2 The site was gridded and trial pits were excavated and sampled on the grid, to satisfy the requirements of the British Standard. Six trial pits (TP1 to TP6) were excavated, to depths of between 1.1m (TP2) and 2.6m (TP5). The trial pits were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. Justifications for the trial pit locations are given below.

LOCATION	REASON
TP1 to TP6	Part of grid

5.3 A separate coal mining investigation, including rotary boreholes, will be carried out once the Coal Authority Permit has been received (not received at the time of this report). Gas monitoring wells will also be installed as part of the rotary borehole investigation and reported separately.

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

5.5 Chemical analysis of six soil samples, for metals, inorganics, speciated PAH, TPH, phenols, and asbestos, was undertaken by the UKAS accredited Eurofins Chemtest Laboratory in Cambridge. The test certificates are included in Appendix C.

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

6.0 SUMMARY OF GROUND CONDITIONS

Strata and Groundwater

- 6.1 In all of the trial pits, a cover of brown sandy clayey topsoil was present between 0.1m and 0.2m thick. At locations TP1 and TP4 only (in the east and west of the site), natural strata were present beneath the topsoil, comprising firm grey brown sandy clay in TP1 (to 0.4m depth) and clayey sand in TP4 (to 0.3m depth). At the remaining locations, made ground was present to depths of between 1.2m and 1.5m in the north (TP5 and TP6) and to at least 1.1m in TP2 and 1.4m in TP3 (the base of the made ground was not proven in the latter two pits).
- 6.2 The made ground typically comprised brown sandy clay and clayey sand, with pockets of gravel of mixed lithology, including mudstone and coal. Occasional fragments of black timber, concrete, brick and metal were identified in TP2 and TP3. Cobbles and boulders of sandstone and concrete with recorded dimensions of up to 0.4m by 0.25m were also identified within the made ground.
- 6.3 Beneath the made ground and topsoil/upper natural deposits identified above, typically firm to stiff (medium to high strength) orangish brown and grey sandy clay was present, with occasional angular gravel of coal and sandstone. The clay was interpreted to be residual soils from in situ weathering of the Pennine Lower Coal Measures mudstone, siltstone and sandstone. The depth to the base of the clays ranged from 1.5m (TP4) to 2.56m (TP5). In TP5, underlying the made ground, was dark brown angular gravel and cobbles of mudstone and rare ironstone set in a matrix of firm grey clay from 1.2m to 2.3m, and subsequently underlain by the firm gravelly clay. In TP4 underlying the clay, light grey clayey sandy gravel with cobbles and boulders, of sandstone, was identified to the base of the trial pit.
- 6.4 Solid strata were encountered in two of the trial pits at depths of 2.1m (TP1) and 2.56m (TP5) respectively, and comprised of very weak dark grey mudstone (TP1) and medium strong fine grained sandstone (TP5).

- 6.5 The excavations generally remained stable for the short period of exposure and the pits were backfilled with the arisings on completion. Moderate groundwater seepages occurred from 1.2m in TP3, and the strata in three of the trial pits were moist from depths of 1.1m and 2.3m. No groundwater was encountered in two of the trial pits (TP1 and TP6).

Coal Mining and Gas Monitoring

- 6.6 An intrusive investigation of underground coal mining, and mine entries, will be carried out once the Coal Authority Permit has been received. This investigation work will be reported separately on completion. Gas monitoring wells will also be installed as part of the rotary borehole investigation and reported separately.
- 6.7 Further to the identification of any mine entries by these works, there will be a residual possibility of unrecorded mine entries. A watching brief should be maintained by the contractors during the site strip, and if any suspect features are identified, then a geotechnical engineer should be contacted for advice.

7.0 CONTAMINATION ANALYSIS

Screening Values - Soils

- 7.1 There is presently conflicting opinion with regard to the appropriate generic assessment criteria, or screening values, for soils which should be used in contamination assessment for proposed development. In March 2014, DEFRA published Category 4 Screening Levels (C4SLs) for six contaminants: arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead. The values are based on the toxicological benchmark of a "low level of toxicological concern" (LLTC) rather than the previous regulatory approach of "minimal or tolerable level of risk". As the C4SLs are less protective of health than the previous approach, the Chartered Institute of Environmental Health (CIEH) has advocated an alternative approach based on minimal risk, but with some adjustment of exposure parameters to more realistic scenarios than those previously used. To this end, the CIEH has collaborated with Land Quality Management to publish "Suitable 4 Use Levels" (S4ULs) "The LQM/CIEH S4ULs for Human Health Risk Assessment", November 2014 (LQM/CIEH). However, DEFRA has reiterated its intention that the C4SLs should be used in generic risk assessment for proposed development, and there is indication that other parties will collaborate, in the near future, to extend the range of C4SL determinands beyond the six published so far.
- 7.2 In the absence of a final resolution to the debate, soil contamination test results in this report have been compared first against the more conservative S4UL, and where a C4SL exists for the same determinand, consideration given to the use of the C4SL for any exceedances of the S4UL, within the site specific context (including the use of benzo(a)pyrene as a surrogate marker for genotoxic PAH compounds, where appropriate). Where no S4UL exists for a determinand, for example lead, the C4SL has been used. The LQM/CIEH screening values have been calculated for soil organic matter contents of 1% and 2.5%, as well as 6%, and the appropriate screening value is used for the organic matter content of the soil. All the C4SL values published are for a soil organic matter content of 6%.
- 7.3 A table showing the screening values utilised is included in Appendix C.

Soils Analysis

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

One sample of **Topsoil** from TP1

One sample of **Subsoil** from TP4

Four samples of **Made Ground** from TP2, TP3, TP5 and TP6

- 7.5 Statistical analysis of the results was not possible given the small number of samples obtained, although appropriate for the site circumstances.

Topsoil

- 7.6 No elevated determinands were encountered in the sample of topsoil tested. The topsoil requires no further consideration in the risk assessment.

Subsoil

- 7.7 No elevated determinands were encountered in the sample of subsoil tested. The subsoil requires no further consideration in the risk assessment.

Made Ground

- 7.8 A results summary table for determinands within the made ground found to be above screening values is given on the following page.

Sample Reference	Depth (m)	Arsenic
TP2	0.8-0.9	25
TP3	1.2-1.4	38
TP5	0.4-0.5	28
TP6	1.2	13
Screening Value at 2.5% SOM*		37
Avg. Concentration		26

* Residential With Home-Grown Produce
All units in mg/kg unless indicated otherwise

Exceedance
Acceptable

7.9 It can be seen from the table that overall concentrations within the made ground are below screening values. There is a very slight exceedance of arsenic in TP3 at 38mg/kg with a screening value of 37mg/kg. The exceedance of a screening value does not mean that the future occupants are at significant risk, as other factors will affect the degree of risk, including bio-accessibility and the available area for planting vegetables. The slight exceedance in one sample is not considered to present significant risk to the future occupants of the site and, therefore, the made ground requires no further consideration in the risk assessment.

Updated Risk Assessment and Conceptual Model

7.10 In the light of the above, there are no contamination sources identified within the soils on the site, with respect to the proposed residential use, and no remediation is required for contamination purposes. However, there are sources of ground gases, with the risk/pathways as identified below.

Viable Source - Pathway - Receptor Matrix (Finished Development)

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Infilled quarry and coal mine workings/entries: - methane and carbon dioxide	- Asphyxiation - Explosive risk	- Construction/de-molition workers - Future occupants - Buildings	Severe	Low Likelihood	Moderate

- 7.11 To address the potential ground gas risk, gas wells will be installed into three of the proposed rotary boreholes and monitored, targeting the on-site mine adits and infilled quarry to the southeast. Any gas protection recommendations will be confirmed by separate letter on completion of the monitoring.

Migration to Utilities

- 7.12 Any migration to utilities is unlikely to be significant. However, the local water company are likely to require details of the contaminants present on the site, to make a judgment on any requirement for protection of buried water supply pipes from chemical attack/ingress.

Imported Soils

- 7.13 Any imported soils used on the site will need to be verified as suitable by inspection and testing, in accordance with regulatory guidance. A Method Statement for Assessment of Imported Soils, outlining how compliance with the above may be achieved, is included in Appendix E.

8.0 GEOTECHNICAL TESTING

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

Location	Depth (m)	MC	LL	PL	PI	<425µm	I'p
TP1	0.8-0.9	37	80	35	45	98	44.1
TP6	1.5-1.6	24	52	26	26	98	25.5
	No. of results						
	Min.						
	Max.						

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

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

- 8.2 The plasticity test data shows clays of medium to high plasticity, in accordance with BS 5930:2015 +A1:2020 "Code of Practice for Site Investigations". When the percentage retained on the 425 micron BS sieve is considered, the Modified Plasticity Index, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees" is a maximum of 44.1. In accordance with the Standard, this equates to High Volume Change Potential.
- 8.3 Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by Eurofins Chemtest and Chemtech Environmental, comprising two samples of natural strata and four samples of made ground. In accordance with the BRE Special Digest 1 "Concrete in aggressive ground", the characteristic values for the two materials will be reported upon in an updated statement when the results are available.

9.0 GEOTECHNICAL ASSESSMENT

Coal Mining and Coal Recovery

- 9.1 An intrusive coal mining investigation will be undertaken upon receiving the Coal Authority Permit, and the results will be reported separately.

Foundations

- 9.2 The made ground on the site is not considered suitable for support of foundation loads. For any area not underlain by mine adits, the underlying natural clays are considered suitable for the use of strip/trench fill foundations, with an allowable bearing pressure of 100kN/m² considered applicable.
- 9.3 Strip foundations will need to be 300mm thick and reinforced with two layers of B503 mesh – one near the bottom and one near the top, to mitigate any potential differential settlement associated with more deeply weathered zones or tilted/stepped strata associated with the geological fault indicated to cross the site.
- 9.4 The Coal Authority records indicate that two mine adits are present on the site (421417-007 and 421417-041) and are likely to be present underlying (or close to) the proposed dwelling based on the Coal Authority records. However, Coal Authority records are often inaccurate and the actual position of the adits may be up to 20m out of position and may not subsequently underlie any new foundations. An investigation to locate the position of the adits will be undertaken separately to this report.
- 9.5 If the foundations are affected by the mine adits, it may be possible to effectively “move” the adit positions out of the influencing zone of the proposed property by excavating out the whole surface area of the proposed building footprint to the base of the adit. Foundations could then be constructed by means of backfilling the excavations and using trench fill foundations to the base of the excavation, or placing and compacting fill material into the

excavation in layers and utilising a raft foundation. If rock is present above the adit tunnel, it may be possible to excavate through the rock, and form foundations on the base of the adit. Where intact rock is sufficiently thick and strong to prevent excavation, piled foundations extending through the rock and to below the base of the adit will be required, subject to the absence of any underlying coal workings in influencing depth. Piles, if used, will need to be designed by a specialist piling contractor.

- 9.6 The clays were shown to be of high volume change potential. Therefore, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees", in the presence or absence of trees, foundation design needs to account for this element.
- 9.7 If piled foundations are required, it is recommended that the guidance contained within NHBC Standard Chapter 4.2 "Building Near Trees" is observed in relation to any requirement for heave protection. A tree survey may be required for this, if not already available.
- 9.8 For areas where strip/trench fill foundations are acceptable, the foundation should be taken below the depth of any existing foundations or obstructions, onto natural ground. The whole plan area of the foundation should be placed on similar natural material.
- 9.9 If bedrock is encountered on part of a foundation excavation, the rest of the plot should be deepened to ensure founding on similar material. However, if rock is not encountered by 2.5m depth on the remainder of the plot, then the Engineer should be contacted for further advice.

Excavations

- 9.10 It is likely that excavations into the natural strata will remain stable in the short term, requiring minimal trench support, in accordance with the prevailing statutory guidance. However, instability may be anticipated within the made ground.
- 9.11 Moderate groundwater seepage was encountered in TP3 at 1.2m, and the strata were moist in TP2, TP4 and TP5 at depths ranging between 1.1m and 2.3m. Such encounters should be controllable by pumping from an artificial sump.
- 9.12 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock or any buried foundations and structures are likely to require a hydraulic breaker.

Chemical Precautions

- 9.13 The Aggressive Chemical Environment for Concrete (ACEC) class will be reported on once chemical tests are received from the laboratory.

Road Pavement Construction

- 9.14 Due to the depth of existing made ground on the site (up to 1.5m recorded), a formation for road pavement on natural strata may be impractical. There are robust potential solutions for this situation in the scenario where adoption is required, such as complete excavation of the made ground to natural strata, and replacement with engineered fill to controlled specification, or partial excavation and replacement, with or without layers of geogrid. However, in the situation proposed for the site, where the use of the road pavement is likely to be for light private domestic use and parking, proof rolling and use of an appropriate aggregate thickness for the conditions is likely to provide a more economical solution, although allowance should be made for a possible requirement for intermittent maintenance.

Flooding and Soakaways

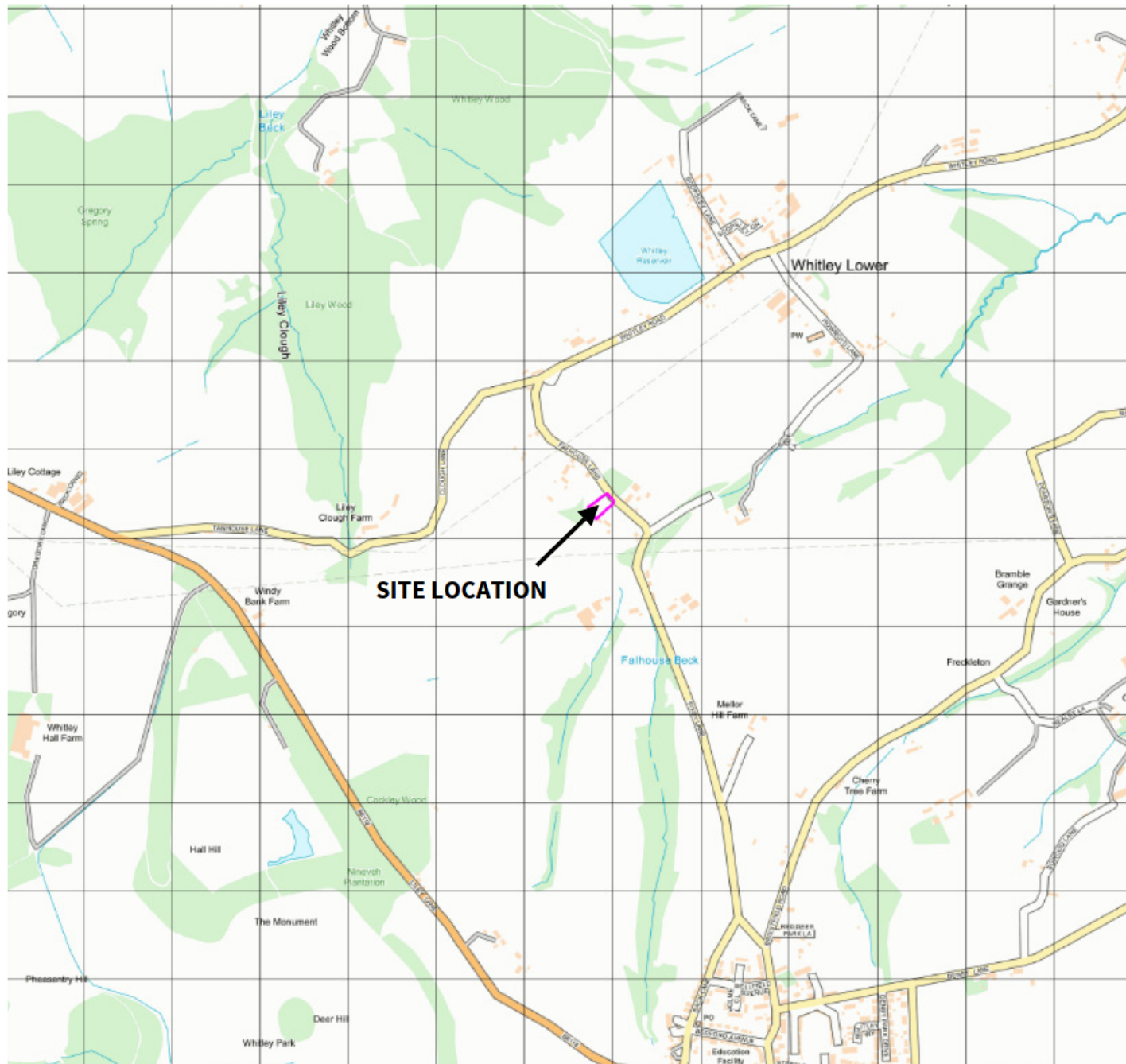
- 9.15 The site is not at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available.
- 9.16 The disposal of surface water using soakaways is unlikely to be practical on the site due to variable depths of made ground and mining legacy on the site.

Gas Protection

- 9.17 Basic radon protection is recommended for the site. This is usually achieved by incorporating an appropriate barrier within a solid floor system, and extending the barrier through the cavity wall.
- 9.18 Gas monitoring wells are proposed to be installed during the forthcoming rotary investigation and will be subsequently monitored and reported separately on completion.

APPENDIX A

SITE LOCATION PLAN, AERIAL PHOTOGRAPH AND PROPOSED LAYOUT



0m 600m

Approximate Scale



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Project
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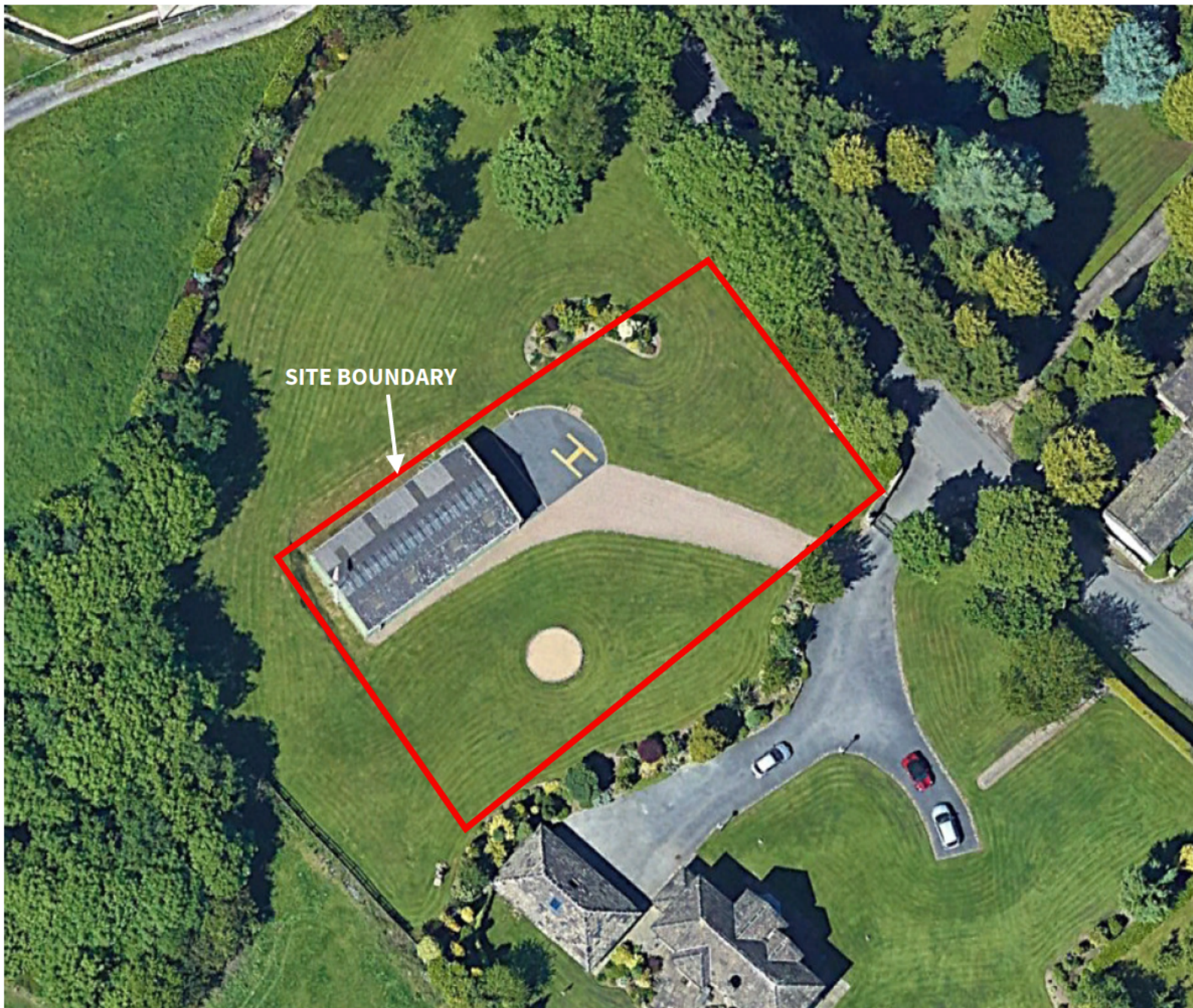
Client
MR TRANTER

Title
SITE LOCATION PLAN

Date
DECEMBER 2020

Drawn DMB	Scale AS SHOWN
----------------------------	---------------------------------

Job No.
TRN/01



0m 19m

Approximate Scale



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Project
LAND AT FALHOUSE LANE
WHITLEY

Client
MR TRANTER

Title
AERIAL PHOTOGRAPH

Date
DECEMBER 2020

Drawn DMB	Scale AS SHOWN
----------------------------	---------------------------------

Job No.
TRN/01

The Old Forge

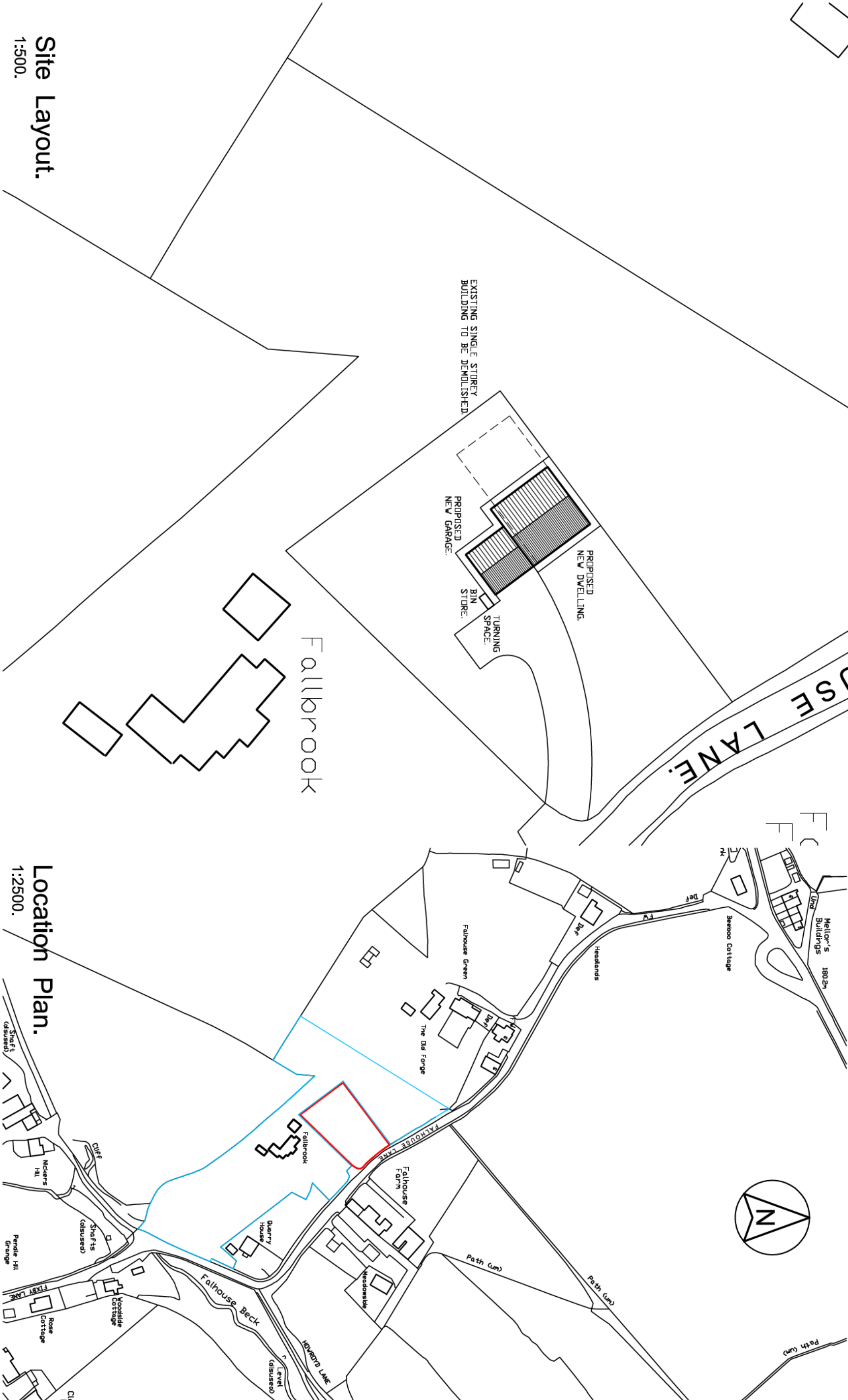
FALHOUSE LANE.

Falbrook

PROPOSED NEW DWELLING.
BIN STORE.
TURNING SPACE.
PROPOSED NEW GARAGE.
EXISTING SINGLE STOREY BUILDING TO BE DEMOLISHED.

VOLUMES.	
EXISTING BUILDING.	764.00 cu.m.
PROPOSED NEW DWELLING.	575.00 cu.m.
PROPOSED NEW GARAGE	125.00 cu.m
TOTAL DEVELOPMENT – 575x125 cu.m.	700.00 cu.m.

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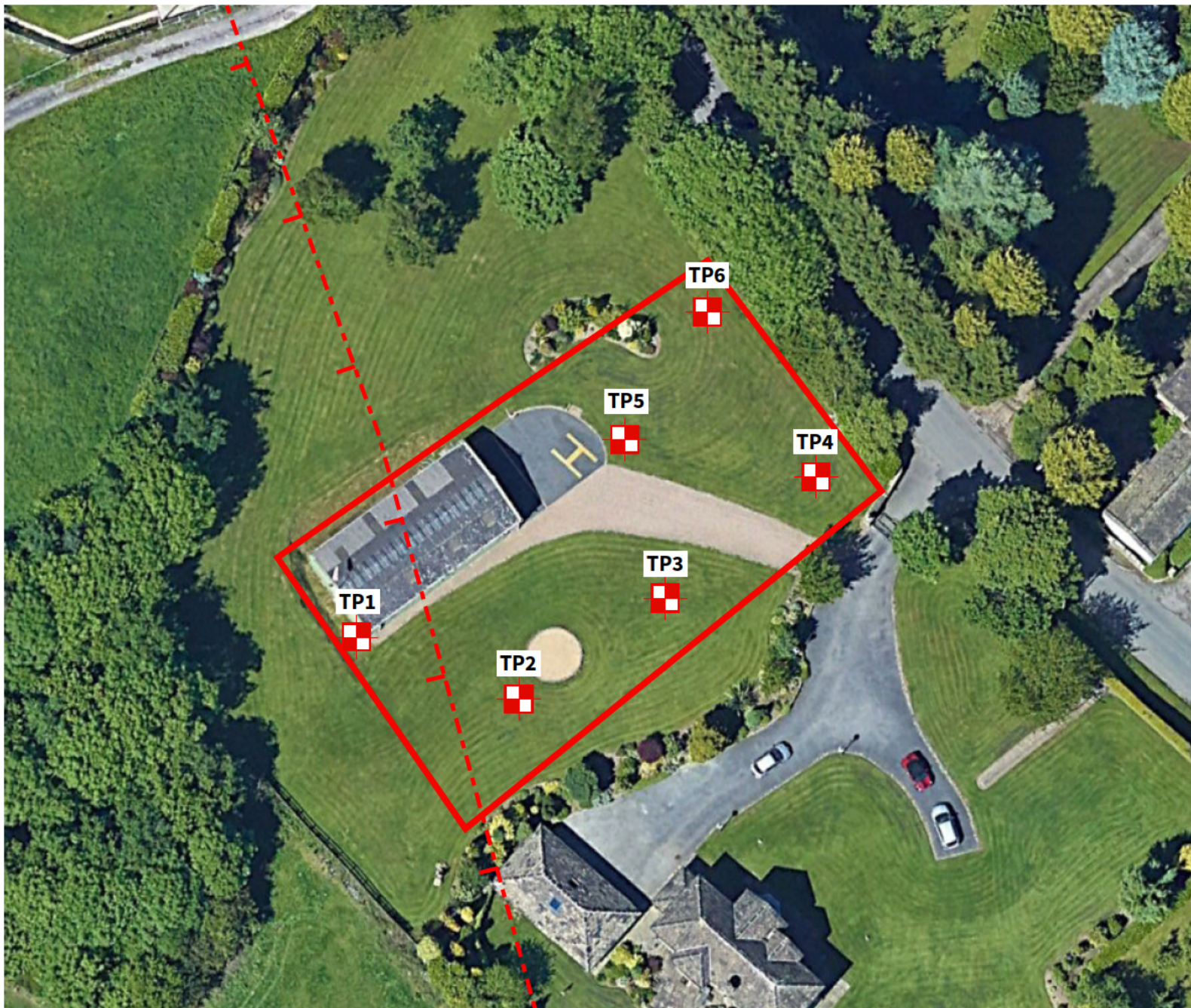
Site Layout.
1:500.

Location Plan.
1:2500.

Property Address	Project Title	Drawing Title	Scale	1:500 - 1:2500 @ A3.
FALBROOK HOUSE . FALHOUSE LANE, WHITLEY, WAKEFIELD. WF12 0NJ.	PROPOSED DWELLING . FALBROOK HOUSE, FALHOUSE LANE, WHITLEY, FOR MR. S. TRANTER.	SITE PLAN AND LOCATION PLAN AS APPROVED.	Date	DEC. 2014
			Drawn by	SW
			Checked by	-
			Drawing no.	2014-76-03
			Revision	

APPENDIX B

TRIAL PIT LOCATION PLAN AND LOGS



0m 19m

Approximate Scale



Trial Pit Location



Approximate Fault Location

ARP

ARP NORTH WEST LTD
CHARTERED CONSULTING ENGINEERS

2nd Floor · 3 Hardman Square · Manchester M3 3EB
Telephone: 0113 245 8498 · E Mail: manchester@arpnorthwest.co.uk

Project

LAND AT FALHOUSE LANE
WHITLEY

Client

MR TRANTER

Title

SITE INVESTIGATION PLAN

Date

JANUARY 2021

Drawn

DMB

Scale

AS SHOWN

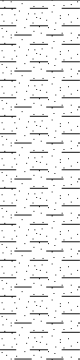
Job No.

TRN/01

 ARP Geotechnical Limited				Trial Pit Log				TrialPit No TP1 Sheet 1 of 1	
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421749.13 - 417265.90 Level:		Date 06/01/2021	
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 2.40 m		Machine Type: JCB3CX	
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG	
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
Depth	Type	Results							
0.05 - 0.10	ES		0.10			Brown clayey sandy TOPSOIL. Firm greyish brown sandy CLAY with pockets of brown clayey sand.			
			0.40						
0.80 - 0.90 0.90	D	HSV=52				Firm (medium strength) orangish brown and grey slightly sandy CLAY. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
			1.30						
1.40		HSV=120				Stiff (high strength) grey and brown slightly sandy CLAY with rare angular gravel of coal. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
			2.10						
			2.30			Very weak grey MUDSTONE recovered as clayey angular gravel. [PENNINE LOWER COAL MEASURES FORMATION] Very weak dark grey sandy angular gravel of MUDSTONE. [PENNINE LOWER COAL MEASURES FORMATION]			
			2.40						
End of Pit at 2.400m Terminated at target dep h.						Strata moist.			
Groundwater: No groundwater seepages encountered.									
Backfill: backfilled with arisings on completion.									
Stability: Sides remained stable throughout.									
Remarks:									

 ARP Geotechnical Limited				Trial Pit Log				TrialPit No TP2 Sheet 1 of 1	
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421765.30 - 417258.81 Level:		Date 06/01/2021	
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 1.10 m		Machine Type: JCB3CX	
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG	
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
Depth	Type	Results							
0.10 - 0.15	ES		0.15 0.25			MADE GROUND: Turf over brown sandy clayey topsoil. MADE GROUND: Brown clayey sand (poss ble subsoil). MADE GROUND: Undifferentiated brown sandy clay and clayey sand with rare pockets of gravel of coal. Occasional fragments of black timber, concrete and brick present.			
0.80 - 0.90	ES		1.10			Strata moist at 1.1m. End of Pit at 1.100m Terminated at target dep h.			
Groundwater: Strata moist at 1.1m. Backfill: Backfilled with arisings on completion. Stability: Slight instability throughout. Remarks:									

 ARP Geotechnical Limited				Trial Pit Log				TrialPit No TP3 Sheet 1 of 1		
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421778.01 - 417270.54 Level:		Date 06/01/2021		
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 1.40 m		Machine Type: JCB3CX		
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG		
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
Depth	Type	Results								
1.20 - 1.40	ES		0.20			MADE GROUND: Brown slightly sandy clayey topsoil.				1 2 3 4 5
						MADE GROUND: Undifferentiated brown and grey sandy clay and clayey sand with occasional boulders of concrete (400mm x 250mm). Large metal fragments, bricks and timber also present.				
						At 1.1m: pocket of grey/light brown and black gravel of mudstone and coal.				
						MADE GROUND: Dark brown gravel of brick, concrete and mudstone. Strata heavily saturated.				
			1.20			End of Pit at 1.400m Terminated due to water ingress.				
			1.40							
Groundwater: Moderate water ingress. Backfill: Backfilled with arisings on completion. Stability: Slight instability throughout. Remarks:										
RrTP_v1.053										

				Trial Pit Log				TrialPit No TP4 Sheet 1 of 1	
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421792.49 - 417283.35 Level:		Date 06/01/2021	
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 1.60 m		Machine Type: JCB3CX	
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG	
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
Depth	Type	Results							
0.20 - 0.30	ES	HSV=75	0.15			Brown sandy clayey TOPSOIL.			
			0.30			Brown clayey SAND (subsoil).			
0.50 - 0.60	D					Firm (medium strength) to stiff (high strength) brown and grey sandy CLAY. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
0.60						Light grey clayey sandy GRAVEL with cobbles and boulders. Gravel, cobbles and boulders are of sandstone. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
						Strata wet at 1.6m. Hard strata encountered at base and unable to excavate further. End of Pit at 1.600m Terminated due to hard strata.			
Groundwater: Strata wet at 1.6m. Backfill: Backfilled with arisings on completion. Stability: Sides remained stable throughout. Remarks:									

				Trial Pit Log				TrialPit No TP5 Sheet 1 of 1	
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421774.40 - 417285.21 Level:		Date 06/01/2021	
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 2.60 m		Machine Type: JCB3CX	
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG	
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
Depth	Type	Results							
0.10 - 0.20	ES		0.20			MADE GROUND: Brown sandy clayey topsoil.			
0.40 - 0.50	ES		0.60			MADE GROUND: Brown sandy clay with angular cobbles of sandstone and rare half bricks. Cobble dimensions measured at 300mm x 200mm.			
			1.20			MADE GROUND: Firm brown slightly gravelly sandy clay and occasional cobbles of sandstone. (possible reworked natural)			
			2.30			Dark brown/grey angular GRAVEL and cobbles of mudstone in a matrix of firm grey clay and rare rounded cobbles of ironstone. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
			2.56			Firm light brown and grey gravelly CLAY. Gravel is angular of sandstone. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation)			
			2.60			<i>Strata wet.</i> Medium strong brown fine grained SANDSTONE recovered as angular boulders (550mm x 200mm). [PENNINE LOWER COAL MEASURES FORMATION] End of Pit at 2.600m Terminated due to hard strata.			
Groundwater: Strata wet below 2.3m.									
Backfill: Backfilled with arisings on completion.									
Stability: Sides remained stable throughout.									
Remarks:									

 ARP Geotechnical Limited				Trial Pit Log				TrialPit No TP6 Sheet 1 of 1			
Project Name: Land at Falhouse Lane, Whitley				Project No. TRN/01		Co-ords: 421782.67 - 417297.10 Level:		Date 06/01/2021			
Location: Land at Falhouse Lane, Whitley						Pit Dimensions (m) Length: m Width: m Depth: 1.60 m		Machine Type: JCB3CX			
Client: Mr Shaun Tranter								Scale 1:25 Logged: OG			
Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
Depth	Type	Results									
0.05 - 0.10	ES	HSV=75	0.10			MADE GROUND: Brown sandy clayey topsoil.				1	
			0.30			MADE GROUND: Brown and grey slightly gravelly clayey sand. Gravel is of mudstone.					
						MADE GROUND: Brown slightly gravelly sand with cobbles and boulders of sandstone and rare slate up to 300mm (possibly reworked).					
1.20	ES										
1.50 - 1.60	D			1.50							
1.60			1.60			Stiff (high strength) brown mottled grey sandy CLAY with rare black gravel fragments. (Residual soils derived from the in-situ weathering of underlying Pennine Lower Coal Measures Formation) End of Pit at 1.600m Target depth achieved.				2	
											3
											4
											5
Groundwater: No groundwater encountered. Backfill: Backfilled with arisings on completion. Stability: Sides remained stable throughout. Remarks:											

APPENDIX C

LABORATORY TEST CERTIFICATES AND SCREENING VALUES



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

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

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

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

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2183

Final Report

Report No.:	21-00225-1		
Initial Date of Issue:	14-Jan-2021		
Client	ARP Geotechnical Ltd		
Client Address:	5/6 Northwest Business Park Servia Hill Leeds Yorkshire LS6 2QH		
Contact(s):	Andrew Hives Owain Gwilym		
Project	TRN/01 Falhouse Lane, Whitley		
Quotation No.:	Q20-21438	Date Received:	08-Jan-2021
Order No.:	TRN/01	Date Instructed:	08-Jan-2021
No. of Samples:	6		
Turnaround (Wkdays):	5	Results Due:	14-Jan-2021
Date Approved:	14-Jan-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: TRN/01 Falhouse Lane, Whitley

Client: ARP Geotechnical Ltd	Chemtest Job No.:					21-00225	21-00225	21-00225	21-00225	21-00225	21-00225
Quotation No.: Q20-21438	Chemtest Sample ID.:					1121378	1121379	1121381	1121382	1121384	1121386
	Sample Location:					TP1	TP2	TP3	TP4	TP5	TP6
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.05	0.8	1.2	0.2	0.4	1.2
	Bottom Depth (m):					0.1	0.9	14	0.3	0.5	
	Date Sampled:					06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021
	Asbestos Lab:					COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	30	26	20	20	20	20	15
pH	U	2010		4.0	5.6	5.9	4.6	6.8	6.9	6.9	6.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.014	< 0.010	0.046	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Total)	U	2430	mg/kg	100	750	1400	29000	1500	3100	3100	620
Arsenic	U	2450	mg/kg	1.0	3.1	25	38	25	28	28	13
Cadmium	U	2450	mg/kg	0.10	0.10	0.22	< 0.10	0.34	0.17	0.17	0.32
Chromium	U	2450	mg/kg	1.0	20	24	6.7	20	20	20	16
Copper	U	2450	mg/kg	0.50	26	32	28	34	28	28	22
Mercury	U	2450	mg/kg	0.10	< 0.10	0.12	0.22	0.18	< 0.10	< 0.10	0.12
Nickel	U	2450	mg/kg	0.50	37	28	7.7	20	33	33	20
Lead	U	2450	mg/kg	0.50	21	42	38	100	28	28	46
Selenium	U	2450	mg/kg	0.20	0.24	0.77	2.0	0.69	0.71	0.71	0.33
Zinc	U	2450	mg/kg	0.50	78	77	20	72	62	62	110
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	24	6.7	20	20	20	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	4.1	9.5	69	8.8	6.9	6.9	4.1
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10	< 10	130	110	110	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.21	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	0.49	< 0.10	1.5	< 0.10	< 0.10	0.52
Pyrene	U	2700	mg/kg	0.10	< 0.10	0.87	< 0.10	1.8	< 0.10	< 0.10	0.60
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.3	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	6.9	< 2.0	< 2.0	< 2.0

Results - Soil

Project: TRN/01 Falhouse Lane, Whitley

Client: ARP Geotechnical Ltd	Chemtest Job No.:		21-00225	21-00225	21-00225	21-00225	21-00225	21-00225
Quotation No.: Q20-21438	Chemtest Sample ID.:		1121378	1121379	1121381	1121382	1121384	1121386
	Sample Location:		TP1	TP2	TP3	TP4	TP5	TP6
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.05	0.8	1.2	0.2	0.4	1.2
	Bottom Depth (m):		0.1	0.9	14	0.3	0.5	
	Date Sampled:		06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021	06-Jan-2021
	Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD				
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

APPENDIX D

RISK CATEGORISATION TABLES

Severity of Consequence

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

Probability of Risk Event Occurring

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

Comparison of Probability Against Severity of Consequence

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

Risk Categories - Definitions

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

APPENDIX E

METHOD STATEMENT FOR ASSESSMENT OF IMPORTED SOILS



METHOD STATEMENT FOR ASSESSMENT OF IMPORTED SOILS

AT
**LAND AT FALHOUSE LANE
WHITLEY**

ON BEHALF OF
MR SHAUN TRANTER

ARP GEOTECHNICAL LTD

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CLIENT: MR SHAUN TRANTER

JOB NUMBER: TRN/01

PROJECT: LAND AT FALHOUSE LANE, WHITLEY

REPORT TYPE: METHOD STATEMENT FOR ASSESSMENT OF IMPORTED SOILS

REPORT REFERENCE: TRN/01imp

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ISSUE	DATE	STATUS
1	25th JANUARY 2021	V1 FINAL

1.0 Introduction

- 1.1 This document has been prepared to provide information for the Client and other interested parties, such as the Regulatory Authorities, outlining how soils imported to the site will be managed to ensure that they are suitable, in terms of human health, for the intended residential use. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

2.0 The Site

- 2.1 The ARP Geotechnical Ltd Stage 2 Geo-environmental Report, dated January 2021 under reference TRN/01r2, makes an assessment of contamination, along with other aspects.
- 2.2 The conceptual site model is for a residential dwelling, including private gardens.
- 2.3 A basal concrete slab is present at surface in the northwest of the site from demolition of the former barn/shed. An area of bitmac hardstanding is present beyond the northeastern end of the slab, which aerial photographs show was used as a helipad. Gravel hardstanding leads from the concrete/bitmac area to the site entrance. A circular brick paved area is also present in the south of the site, presumed also to be a former helipad. The remaining site is covered by lawns.
- 2.4 The site is bounded to the northeast, southeast, and southwest, by undeveloped landscaped land (part of the wider site ownership but not within the site boundary), beyond which are residential properties. Falhouse Lane is present to the northeast of the site, with residential properties and undeveloped land beyond.
- 2.5 Ordnance Survey archive maps show that there is no evidence of any development on the site prior to the construction of the existing building in the western corner, by 1982. The surrounding area has extensive mining and quarrying, with a quarry present 20m to the southeast from 1893, probably backfilled between 1982 and 1989.
- 2.6 The geological maps show the site to be underlain by Undifferentiated Strata (mudstone, siltstone and minor sandstone) of the Pennine Lower Coal Measures Formation. No superficial deposits are shown on the site. One fault is shown to cross the west of the site, trending approximately north-northwest to south-southeast. The western side of the fault is estimated to have been downthrown by around 3m.
- 2.7 A Coal Mining Stability Risk Assessment was undertaken by ARP Geotechnical Ltd (Ref: TRN/01/JR, dated 28th November 2014), for the larger site area, and this concluded that there is the potential for shallow coal mine workings to affect the stability of the site, and a rotary borehole investigation should be undertaken. The mine entries on the site should also be located and appropriately recorded, to allow the safe treatment of the features. The investigation will be undertaken once the Coal Authority Permit is received.

- 2.8 The strata beneath the site are classed as a Secondary A Aquifer. There are no groundwater abstractions within 1km of the site. The nearest surface watercourse is Falhouse Beck, at 125m to the southeast. There are no surface water abstractions within 1km of the site.
- 2.9 Basic Radon Protection Measures are recommended for the proposed properties on the site. There is a backfilled quarry 20m to the southeast, possible shallow coal mine workings, and mine adits on the site. Gas wells will be installed and monitored as part of a forthcoming mining investigation, and will be reported on completion.
- 2.10 In all of the trial pits, a cover of brown sandy clayey topsoil was present between 0.1m and 0.2m thick. At locations TP1 and TP4 only, natural strata were present beneath the topsoil. At the remaining locations, made ground was present to depths of between 1.2m and 1.5m in the north and to at least 1.1m in TP2 and 1.4m in TP3 (the base of the made ground was not proven in the latter two pits). The made ground typically comprised brown sandy clay and clayey sand, with pockets of gravel of mixed lithology, including mudstone and coal. Occasional fragments of black timber, concrete, brick and metal were identified in TP2 and TP3. Beneath the made ground and topsoil/upper natural deposits identified above, orangish brown and grey sandy clay was present, with occasional angular gravel of coal and sandstone. The depth to the base of the clays ranged from 1.5m to 2.56m. In TP5, underlying the made ground, was dark brown angular gravel and cobbles of mudstone and rare ironstone set in a matrix of firm grey clay from 1.2m to 2.3m, and subsequently underlain by the firm gravelly clay. In TP4 underlying the clay, light grey clayey sandy gravel with cobbles and boulders, of sandstone, was identified to the base of the trial pit. Solid strata were encountered in two of the trial pits at depths of 2.1m and 2.56m comprising very weak mudstone and medium strong sandstone.
- 2.11 The contamination testing, carried out on one sample of topsoil, one sample of subsoil and four samples of made ground, did not identify any concentrations of contaminants requiring any remedial measures. However, it is still necessary to have in place a method statement for the assessment of any soils to be imported, in order to satisfy the Regulatory Authorities that the soils are suitable for use on the site, in terms of human health. This needs to be independently confirmed, in accordance with the guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Council (YALPAG): "Guidance on the Verification Requirements for Cover Systems". The measures described below will be required to ensure compliance with the document.

3.0 Imported Soils

- 3.1 If any imported soils are required, the source will need to be confirmed, and the material tested for the attached suite of contaminants, to comply with the maximum screening values listed. The frequency of testing is given on the table below.

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

- 3.2 The material should be placed in quarantined stockpiles and once a stockpile has been approved by the Engineer, no further material should be added to the stockpile, and any further import should be stockpiled separately. Further testing shall be carried out where any mixing is suspected to have occurred.
- 3.3 As and when required, the soils will be used around the site as the development progresses, and it will be necessary to verify that the appropriate soils have been placed, and not soils from any other source. This will be achieved by excavating trial pits on the basis of around a maximum 25 spacing. The trial pits will be photographed, to include a reference scale, and the photographs included within any report to enable the location on site to be identified.
- 3.4 If space is insufficient on the site to store quarantined stockpiles, the soils can be placed directly into the appropriate gardens/landscape areas, but samples of each material would need to be taken and tested directly from the trial pits within the gardens, described in 3.3 above.
- 3.5 The results of all the laboratory analysis, sample descriptions, plans, and import documents, will form part of the Soils Validation Report.

4.0 Unexpected Contamination

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