



Abbeydale

Building Environment Consultants

GROUND INVESTIGATION REPORT

Wheatfields, Tithe Barn Lane, Bardsey

Leeds, West Yorkshire

Report: 452005-GI-v2

Date: March 2024

Client:

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Architect:

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GROUND INVESTIGATION REPORT
Wheatfields, Tithe Barn Lane, Bardsey, Leeds

DOCUMENT VERIFICATION SHEET

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Signature:		

SUMMARY

Grid Ref: 436395(E), 442640(N) **Elevation:** 98m AOD **Site Area:** 0.04ha

Development proposals: Conversion of barn into new residential dwelling.

Past site development: Agricultural barn.

Made Ground: Encountered across the site; max. 0.60m bgl.

Natural Soils: Not encountered.

**Ground
Conditions**

Bedrock: Sandstone bedrock encountered.

Groundwater: Groundwater not encountered.

Shallow mining: Negligible risk from unrecorded shallow mine workings.

Environmental Assessment: Pathways will be broken by buildings and external hardstandings.

Ground gases: No potential sources of significant ground gases identified.

Remediation: No remediation deemed necessary.

Foundations: Strip footings founding at least 250mm into the sandstone bedrock recommended.

Drainage: Use of soakaway drainage is proposed.

Geotechnical Considerations: Foundations will be seated into sandstone bedrock.

Further Investigation: Not deemed necessary at this stage.

GROUND INVESTIGATION REPORT

Wheat fields, Tithe Barn Lane, Bardsey, Leeds

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GROUND INVESTIGATION REPORT

Wheat fields, Tithe Barn Lane, Bardsey, Leeds

1. INTRODUCTION

On the instruction of JMA Architects on behalf of Durkan Homes Ltd, a Phase 2 Ground Investigation was carried out by Abbeydale Building Environment Consultants Ltd (Abbeydale BEC) on a site off Tithe Barn Lane, Bardsey, Leeds, West Yorkshire.

The site is situated on the south of the village Bardsey, north-east of Leeds, centred on National Grid Reference 436395, 442640, with a site area of around 0.04 ha. See Figure 1.

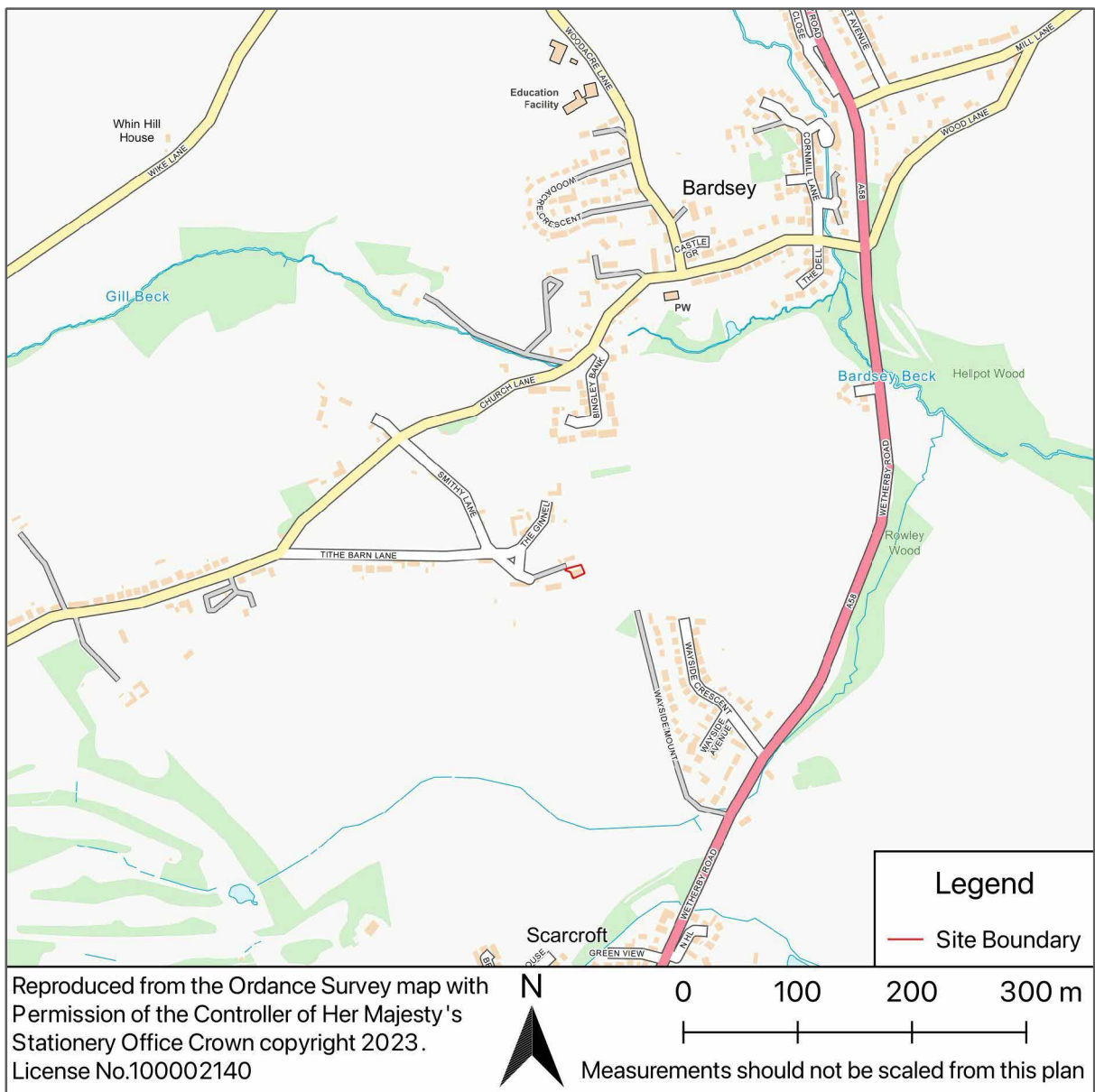


FIGURE 1 - LOCATION PLAN

This report was produced for our client, Durkan Homes Ltd, and their advisors and financiers; it should not be relied upon or transferred to any other parties without the express written authorisation of Abbeydale BEC and our client. If any other unauthorised third party comes into possession of this report they rely on it at their own risk and the authors owe them no duty of care or skill.

The comments and recommendations presented in this Ground Investigation report are based on the findings of a review of available information; ground conditions encountered during the intrusive investigation work and the associated laboratory testing results. There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have therefore not been taken in to account by this report. Responsibility cannot be accepted for conditions not revealed by this investigation.

When writing this report the proposed development was for conversion of an existing barn building into a detached residential dwelling at, or close to, existing ground levels. If there are changes to these proposals then some modification to the comments and recommendations given may be required. The proposed site layout is shown on the site plan included in Appendix A.

A previous Phase 1 Desk Study has been prepared for this site by Abbeydale BEC, ref: 452005-DS, dated March 2023. Extracts from this previous report have been included where necessary. Where information has been used from the Desk Study it is clearly referenced.

A subsequent Phase 2 Ground Investigation report was issued in October 2023 (ref: 452005-GI), which is been updated with this new revision to reflect the most recent development proposals since issuing of the original ground investigation report.

2. OBJECTIVES

This report has been undertaken to evaluate current or former uses of the site and surrounding areas to determine the presence of any potential contaminative sources.

As part of this evaluation the potential impact on the identified receptors has been assessed to determine if a potential significant pollution linkage is present between each source and receptor. Where appropriate the report gives recommendations for further investigations and / or remediation options to mitigate any potential risks to future receptors.

The report also evaluates the current site proposals (where known) with regard to geotechnical and engineering considerations to determine what impact the anticipated ground conditions will have on the integrity of any structures or buildings included in the development proposals. As part of this evaluation the report gives foundation, floor slab, highway and drainage recommendations.

3. THE SITE

The site is a roughly rectangular parcel of land currently comprising of an agricultural barn that is constructed from breeze blocks and metal corrugated sheeting. The current site layout is shown on Figure 2.

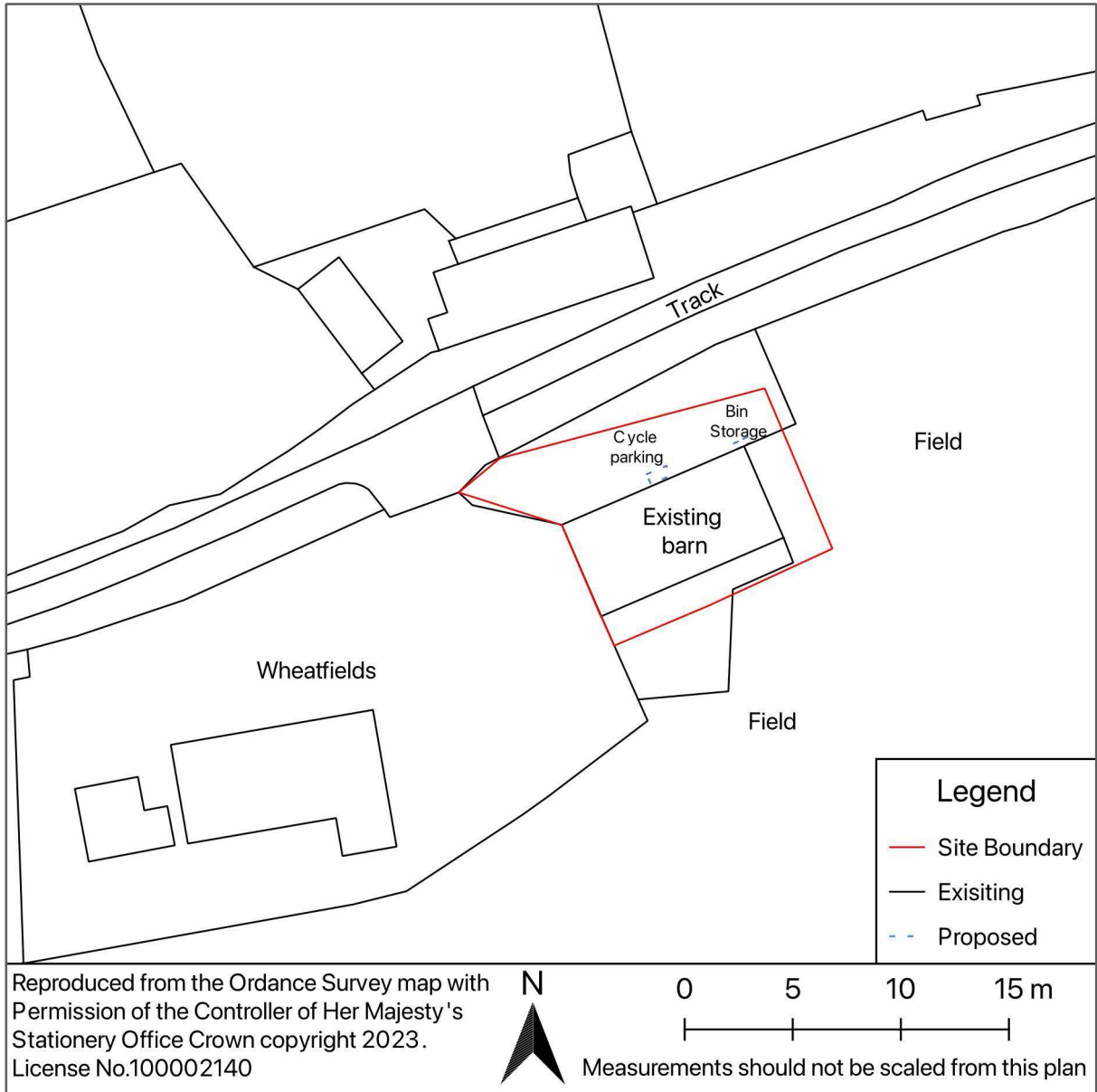


FIGURE 2 - SITE PLAN

The proposed new dwelling was under construction and scaffolding are present all over the existing barn building at the time of the ground investigation, with the surface of the site covered by compacted granular fill or hardstanding. The site is accessed from the north-eastern corner of the site through an existing field gate off Tithe Barn Lane. Ground levels across the site are more or less level.

The site is bounded by an agricultural field to the north, east and south, with existing residential dwelling Wheatfields and associated parking area to the west.

4. HISTORY

The historic Ordnance Survey (OS) maps of the site and surrounding area were obtained from Groundsure as part of the previous Phase 1 Desk Study. For a detailed overview the Phase 1 Desk Study should be consulted, however a summary is given below for ease of reference and contextual purposes.

The site is shown to remain as an undeveloped field from at least 1851. In 2001 the existing barn was constructed across the site. no other significant discernible changes are noted on subsequent OS maps or a review of more recent aerial imagery.

The surrounding area was largely undeveloped land with the village of Bardsey in the north-east of the surrounding area by 1851. On the map dated 1938 a pavilion and cricket ground were present 100m south and south-west of the site, which is then no longer shown from the map of 1966 onwards.

By 2001 a residential property has been constructed, labelled as Wheatfields, to the west of the site. No discernible significant changes are then noted on subsequent maps within the immediate vicinity of the site.

5. GEOLOGY

The geological survey maps of the area, BGS 1:50,000 scale sheet Sheet 70 (Leeds) and Yorkshire County Series Sheet 188SE have been examined along with the memoir of the area. The site is shown to be underlain by the East Carlton Grit, a sandstone of the Millstone Grit Group of Upper Carboniferous age; dipping 5° to the south-east from an assessment of outcrop patterns and dip indicators on the geological maps.

The nearest geological fault is conjectured 30m to the west of the site, trending north-east to south-west and downthrowing strata away from the site.

No superficial drift deposits or made ground / artificial deposits are recorded to overlie the solid geology. However, made ground would be anticipated across the site associated with the existing building recorded to have occupied the site from historical OS maps, to superficial depths.

6. HYDROGEOLOGY AND HYDROLOGY

The hydrogeological and hydrological setting of the site was detailed in the previously prepared Phase 1 Desk Study report prepared for the site, summarised below for ease of reference. For a detailed appraisal the Phase 1 Desk Study report prepared for the site.

The solid geology as a Secondary A (formerly minor) aquifer, described by the EA as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The site is not recorded to be within a groundwater Source Protection Zone (SPZ).

The closest surface watercourse is Gill Beck around 355m north of the site. No surface water abstractions were identified within 250m of the site by the Groundsure Enviro Insight report.

7. MINING RISK ASSESSMENT & QUARRYING

The presence of rock and mineral seams, including coal, which may have been mined or quarried in the area was assessed as part of the previously prepared Phase 1 Desk Study report for the site.

No shallow depth coal seams or other potentially mineable minerals recorded within the underlying geology. The site is not within a defined coalfield area or a Coal Authority reporting zone. The risk of unrecorded shallow mine workings affecting the site is considered to be **negligible**.

No historical quarrying has been identified on or immediately adjacent to the site and the presence of superficial deposits across the site would likely have made any quarrying activities difficult. The resultant risk of unrecorded quarrying having affected the site is considered to be **very low**.

8. FIELDWORK

8.1. General

Fieldwork was undertaken on 19 September 2023 in general accordance with Eurocode 7, BS5930:2015 and BS10175:2011(+A2:2017). The Conceptual Site Model formulated as part of the Phase 1 Desk Study assessment guided the scope of investigation undertaken, to provide further information on the ground conditions present and refine the potential risks to future receptors.

Detailed descriptions of the strata encountered are recorded in the exploratory hole logs in Appendix D.

8.2. Exploratory Hole Locations

The relative ground levels and positions of the exploratory holes undertaken were assessed relative to existing features using a tape measure; the approximate locations of which are shown on Figure 3.

As no specific source of potential contamination was identified from the Phase 1 Desk Study information and Conceptual Site Model, generally non-targeted exploratory hole locations were employed to confirm the ground conditions

across the site and allow representative samples to be taken for geotechnical and environmental laboratory testing.

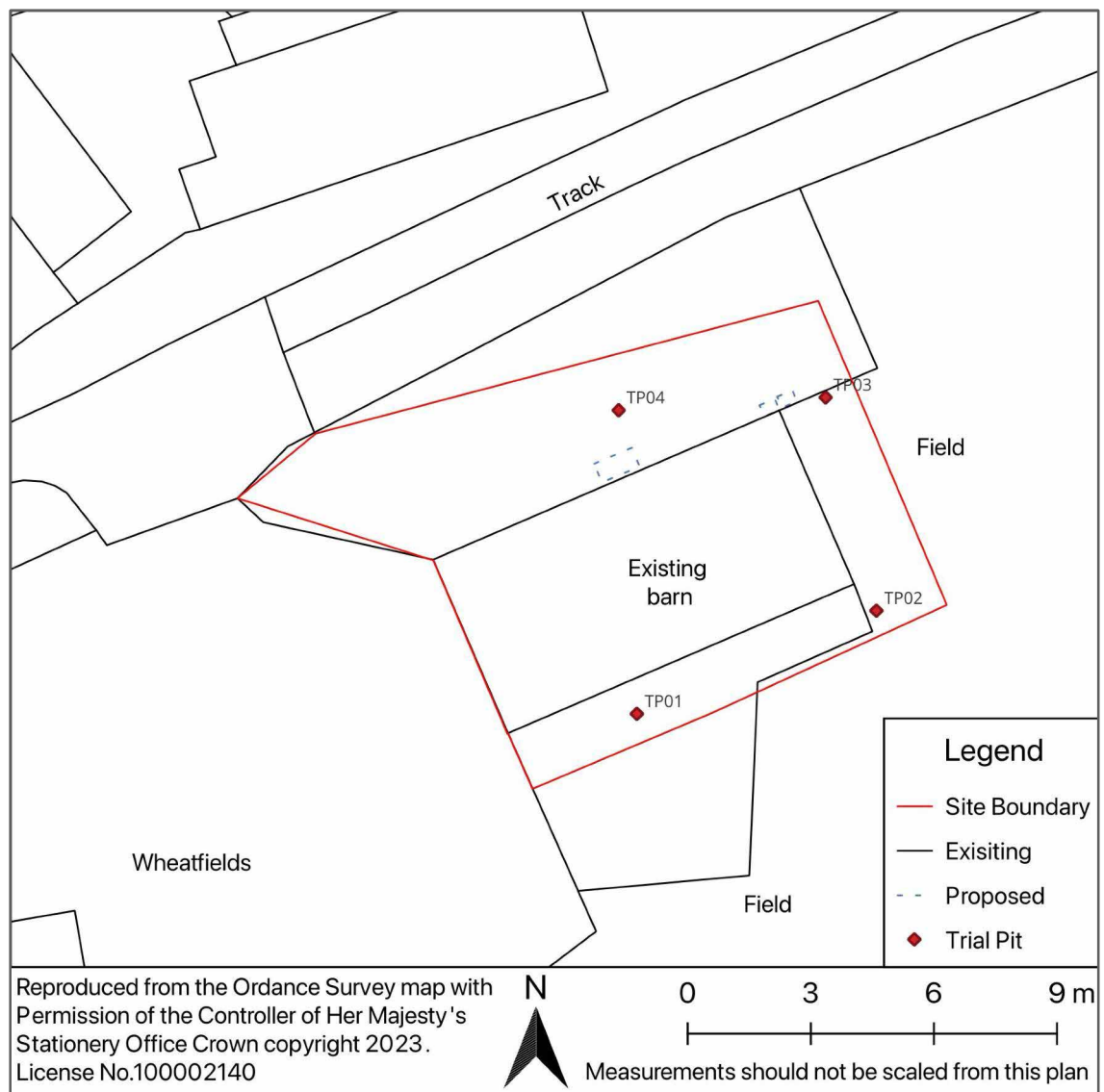


FIGURE 3 - EXPLORATORY HOLE PLAN

8.3. Sampling Strategy

Representative disturbed samples of the soils encountered were taken throughout the course of the intrusive investigation to facilitate subsequent geotechnical and environmental laboratory testing.

The sampling depths were taken based on professional judgement, the ground conditions encountered or at regular depths through the soil profile, or a combination of all three. Where known the sampling depths took account of proposed finished ground levels post-development, the likely source of potential contamination and the likely receptors.

On completion of fieldwork the samples were returned to Abbeydale BEC's office for scheduling of subsequent laboratory testing.

8.4. Trial Pits

To allow a detailed assessment of the shallow soils and weathered bedrock a total of four trial pits (TP01 to TP04) were excavated using a mechanical excavator with a 600mm wide toothed bucket, to depths of between 0.50m and 1.20m below ground level (bgl).

The trial pits were logged by an Abbeydale BEC Site Engineer from the arisings and examination of the sides and base of the trial pit from the surface. An assessment of the excavatability of the ground encountered and the stability of each pit was also recorded.

On completion the trial pits were backfilled with arisings to leave in a safe state.

9. LABORATORY TESTING

Geotechnical laboratory testing was undertaken by i2 Analytical Ltd in accordance with BS1377. To assess the geotechnical characteristics of the natural soils a total of three samples were sent to i2 analytical for Plasticity Index (Atterberg Limits) testing, with natural moisture content testing carried out on the remainder of samples of natural soils obtained, for comparison with the plasticity index testing results. The geotechnical testing results are summarised on Table 1 in Appendix B and shown graphically on Figure 5.

For chemical analysis for a range of potential contaminants based on the historical setting of the site; summarised on Tables 2A to 2C in Appendix B. The testing included a range of heavy metals, semi-heavy metals, polycyclic aromatic hydrocarbons (PAHs), and asbestos screen.

Both the chemical and geotechnical testing results certificates are included in Appendix D.

10. GROUND CONDITIONS

The ground conditions encountered are recorded in detail in the exploratory logs appended to this report (Appendix C) and summarised on a geological section, Figure 4. Any diagram of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance purposes only. If deemed critical confirmation of intermediate ground conditions should be sought.

Made ground was encountered across in all of the trial pits ranging in thickness from 0.30m to 0.40m in TP01 to TP03, within proposed garden areas, increasing to 0.60m bgl in TP04, under an area of proposed parking and hardstanding. The made ground was generally described as slightly clayey, very gravelly sand, with gravel consisting of brick and sandstone.

A plasticity index test undertaken on a sample of the made ground from TP04/0.50m was confirmed to be sandy slightly gravelly clay with a moisture content below the plastic limit of the sample.

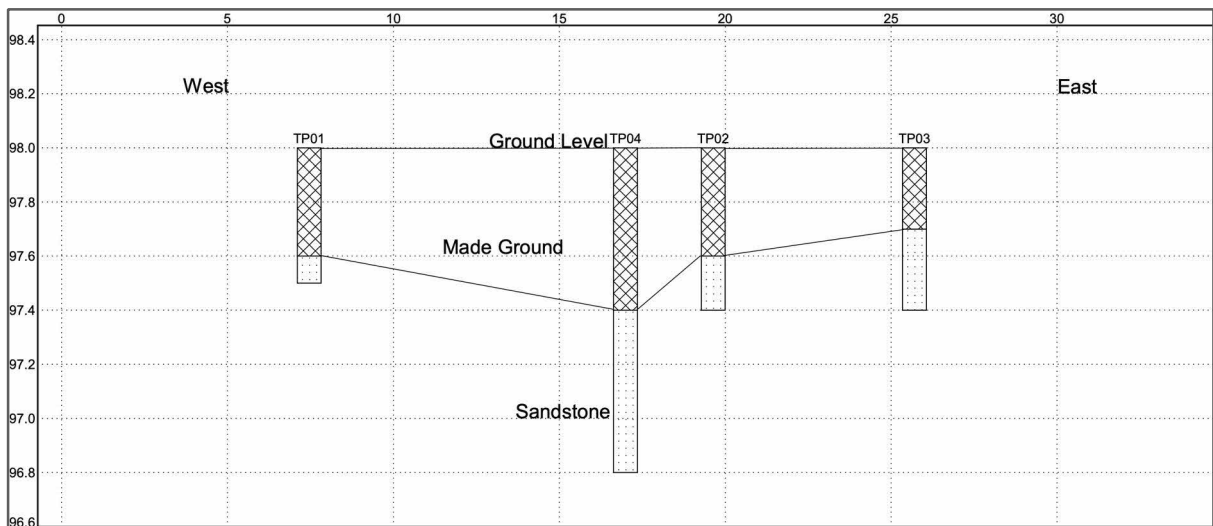


FIGURE 4 - GEOLOGICAL SECTION

Weathered sandstone bedrock was identified in all of the trial pits directly beneath the made ground, which was recovered as medium to coarse cobbles in a sandy matrix.

Noticeable decreases in moisture content were recorded in the sandstone bedrock which is would classify as non-plastic and therefore non shrinkable. Generally the trial pits were only able to penetrate a short distance into the sandstone bedrock without use of a hydraulic breaker, with the maximum achieved being 0.60m in TP04 .

No groundwater or seepages were recorded in any of the trial pits during the course of the ground investigation.

11. GEOTECHNICAL CONSIDERATIONS

11.1. General

An outline plan was available when completing this report. We understand that the existing barn is to be converted into a two storey residential dwelling at, or close to, existing ground levels. The proposed ground loadings were not know but for the purposes of this report are assumed to be less than 100 kN/m. If there are changes to these proposals, then some modification to the comments and recommendations given may be required.

11.2. Mining Precautions

The risk of mine workings affecting the site is deemed to be **negligible** based on the available information assessed as part of the Phase 1 Desk Study report.

11.3. Foundations

Strip footings seated at least 250mm into the underlying sandstone bedrock at a minimum depth of 0.50m bgl can be considered to provide a nett allowable bearing pressure of at least 100 kPa, assuming that a nominal settlement of 25mm is tolerable to the proposed building.

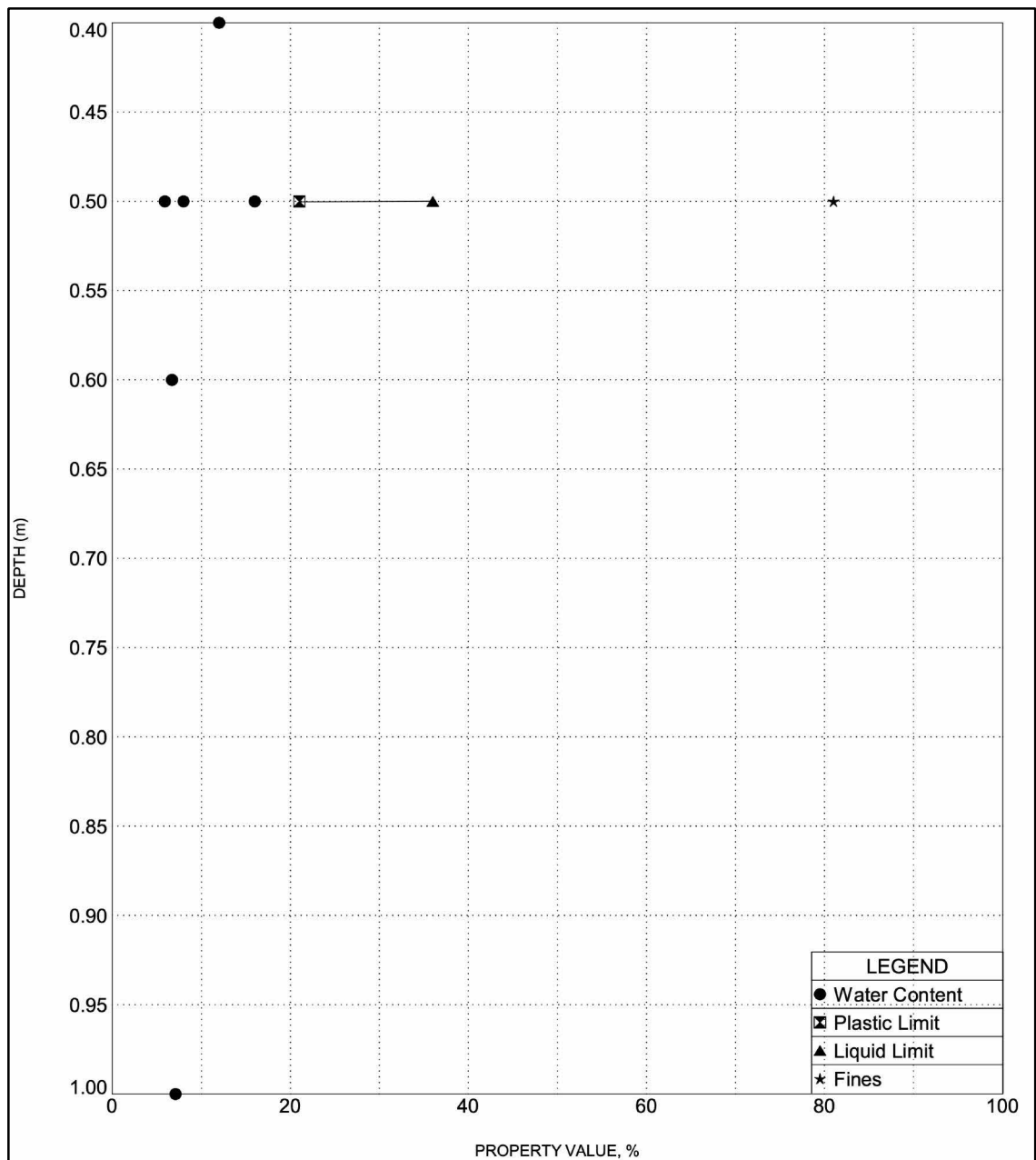


FIGURE 5 - INDEX PROPERTIES VS DEPTH GRAPH

11.4. Floor Slabs

We understand that a ground bearing floor construction has been utilised for the new dwelling, and that it was designed by a structural engineer to take account of the potential for any ground movements from potential shrinkable soils.

11.5. Highways & Hardstanding

Highways and hardstanding will need to be constructed on reengineered material. For design purposes a CBR of 2.5% may be assumed provided that the formation is proof rolled and any soft spots are removed.

11.6. Drainage & Excavatability

Some difficulties in excavation of trenches for sewers and foundations in the bedrock should be anticipated. Consideration should be given to providing safe temporary support of excavations within made ground or where greater than 1.20m deep.

We understand that soakaway drainage is being considered to drain roof water and impermeable areas from the renovated barn, and that soakaway testing has previously been undertaken to confirm the suitability of soakaway drainage.

11.7. Chemical Precautions

To assess the potential for chemical attack of any buried concrete substructures by the existing soils, sulphate and pH testing was undertaken on four samples of the made ground as part of the chemical analysis suite indicate that Class DS-1 (ACEC Class AC-1s) can be used on this site in accordance with BRE Special Digest 1:2005. Where in made ground, water supply pipes should be leachate resistant.

11.8. Ground Source Heating

Providing space heating and hot water using ground source heating could be considered for this site. If this method of heating is being proposed then a further assessment of the site and its underlying geology would be required to determine the most efficient ground loop configuration for the required heat load of the proposed building(s).

12. ENVIRONMENTAL RISK ASSESSMENT

Contaminated Land is defined under Part 2A of the Environmental Protection Act 1990, implemented through Section 57 of the Environment Act 1995. This supports a 'suitable for use' based approach to the risk assessment of contaminated land. The evaluation is based on an assessment of plausible pollutant linkages, referred to as the **source - pathway - receptor** model, based on the current or proposed use of the site.

A **pollutant linkage** is the relationship between a contaminant, a pathway and a receptor. Unless all three elements are present there is not considered to be a potential pollutant linkage.

However, where a potential pollutant linkage is deemed to be present, the resultant risk is based on the consequence should the event occur, and the probability that the event will occur, as outlined in CIRIA C552. A tabulated summary of the resultant risk matrix is provided below for contextual purposes.

Part 2A states that for land to be defined as Contaminated Land by the Local Authority it needs to be in such a condition that:

- Significant harm is being caused, or there is significant possibility of such harm being caused.
- Pollution of controlled waters is being caused, or likely to be caused.

		Consequence (C)			
		Severe	Medium	Mild	Minor
Probability (P)	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 MATRIX FOR ENVIRONMENTAL RISK ASSESSMENT (BASED ON CIRIA C552)

12.1. Proposed Site Use

We understand that the existing barn is to be converted into a two storey residential dwelling at, or close to, existing ground levels. A proposed layout plan is included in Appendix A.

We understand that the development proposals do not include any soft landscaping or soft garden areas, with external areas to be covered by paving stones or stone chippings. However, as the most conservative genetic landuse scenario, the chemical concentrations in the existing soils have been compared against current Soil Guideline Values for a land use scenario of residential with homegrown produce when carrying out a Generic Quantitative Risk Assessment (GQRA) to assess the potential risks to human health.

A native species boundary hedge is proposed to form the north, east and south boundaries of the site, however the growth of the hedge will inhibit exposure to any underlying soils therefore negating potential risks to future receptors.

There is also a lesser potential for any construction workers to come into contact with existing soils, and standard precautionary measures should be employed to reduce the potential for dermal contact and/or inhalation of dust or vapours. Good hygiene practises and facilities should also be provided as a standard precautionary measure.

12.2. Potential Pathways

- Dermal contact (indoor and outdoor).
- Ingestion of soil and indoor dust.

- Indirect ingestion (indoor and outdoor).
- Inhalation of dust (indoor and outdoor).
- Inhalation of vapours (indoor and outdoor).
- Leaching to groundwater
- Surface water run-off.
- Direct contact with concrete substructures.
- Migration through the ground (vertical and horizontal).

12.3. On Site Contamination

The historic OS maps show the site to have been previously occupied by the existing agricultural barn, with a subsequent **low** risk of potential contamination resulting from this usage.

No obvious visual or olfactory signs of potential contamination were identified during the intrusive investigation undertaken.

Although no obvious evidence of potential contamination was noted during the intrusive Ground Investigation works, the made ground was highlighted as the most likely source of any contamination. Chemical testing therefore focused on these soils, to determine the chemically suitability of the made ground for retention close to the surface in any proposed garden or soft landscaping areas.

Soils chemical testing, summarised on Tables 2A and 2B in Appendix B, indicate that all values in the existing made ground from TP01-TP03, within proposed garden areas are all below current GQRA threshold values for residential garden setting and therefore would not pose a potential risk to future receptors even if within a soft garden area.

The area to the north of the site will be used as a car parking / access area and covered with stone chippings, underlain by a layer of compacted granular fill (Type 1 or Class 6F5) with a basal geotextile membrane that would act as a hard to dig membrane and separator layer. Consequently, although elevations of Dibenzo (a, h) Anthracene, Benzo (a) Pyrene and Benzo(b&k) Fluoranthene were noted in TP04 at 0.20m, likely due to some gravel of tarmac in this sample, the proposed use of stone chippings as surfacing across this area which will break any potential pathways between future residents and any underlying made ground soils, therefore negating any potential risks to future receptors.

Based on the above information the potential risk to future receptors from the existing made ground soils is deemed to be **very low**.

12.4. Off Site Contamination

With the majority of chemical levels found to be below current GQRA threshold values. The risk of potential contamination from off-site sources is deemed to be **very low** based on the findings of the ground investigation undertaken.

12.5. Ground Gases

According to the Enviro Insight report the site is not within a radon affected area as defined by the Health Protection Agency (HPA) and no radon protection measures are required to be installed in any new buildings in accordance with Building Research Establishment (BRE) document BR211.

No recorded landfill sites have been identified within 250m of the site, or any other potential sources of significant ground gas generation and only minimal made ground would be anticipated across the site due to the historical setting of the site.

The resultant risk from ground gases is therefore considered to be **very low** and no further investigation or risk assessment is deemed necessary prior to the proposed redevelopment of the site in this regard..

12.6. Invasive Species

The vegetation in and around the site has been examined. No obvious signs of potential invasive plant species were noted during the site walkover undertaken. However, because weedkiller could have been applied prior to carrying out our walkover survey, not seeing any signs of invasive plants during our brief time on site cannot be a guarantee that they are not present on or around the site.

12.7. Conceptual Site Model

Using the information presented above and the **source - pathway - receptor** model, a Conceptual Site Model (CSM) has been formulated to determine whether a potentially significant pollutant linkage is perceivable and what potential risks are posed to the identified future receptor from each potential contaminant source.

The CSM is tabulated and shown graphically in Appendix E. Where required the CSM should be updated as further investigation and/or development works progress to reflect the potential risks to future receptors, especially if any previously unidentified ground conditions are encountered.

12.8. Remediation Requirements

The revised Conceptual Site Model indicates that remediation is not required due to the lack of potential exposure pathways between future residents and the underlying soils.

12.9. Imported Soils

As the development proposals do not include any garden or soft landscaping areas, no imported soils will be brought to site for use in such areas, therefore validation of imported soils is not anticipated to be required.

If the development proposals did change to incorporate any gardens or soft landscaping areas then any imported soils are required to be brought to site to facilitate the proposed development, they will need to be validated to confirm their chemical suitability, and that they do not pose a risk to future receptors. The soils should be validated in accordance with Yorkshire And Lincolnshire Pollution Advisory Group (YALPAG) guidance “*Verification Requirements for Cover Systems*” version 4.1, dated June 2021.

13. WASTE DISPOSAL

Any waste arising from development of the site, such as excess soil or material deemed unsuitable for retention on site, should be disposed of in accordance with the Duty of Care Regulations. If any soils are being disposed directly to a landfill site Waste Acceptance Criteria (WAC) analysis may be required in addition to basic environmental screen testing undertaken, to determine the most appropriate disposal facility for the waste, in accordance with the requirements of the current Landfill Directive.

14. REGULATORY APPROVAL

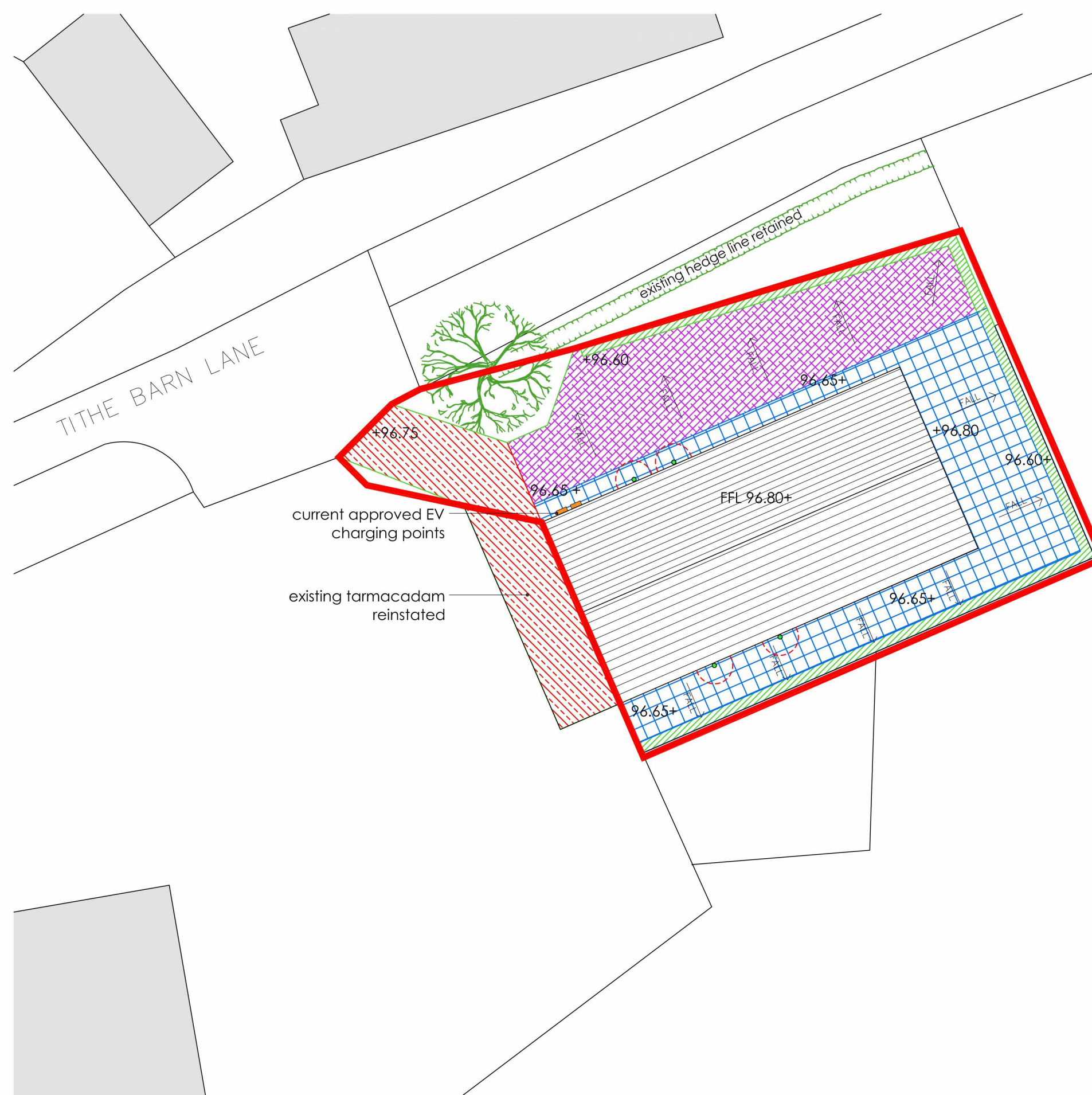
The conclusions and recommendations in this report are based on a review of available information and observations made during the site walkover survey undertaken. The conclusions cannot be guaranteed to gain regulatory approval if this report is required as part of a planning application. If it is required as such it should be passed to the relevant regulatory bodies for their comment and approval.

15. FURTHER INVESTIGATION

The information obtained during the intrusive ground investigation undertaken and associated Conceptual Site Model would suggest that further investigation or remediation works are not deemed necessary to further refine or mitigate the potential risks to future receptors based on the current development proposals.

If any unexpected ground conditions or signs of potential unidentified contamination are encountered during earthworks then further geo-environmental advice should be sought and any additional risk assessment undertaken as required to assess the potential risks to future receptors.

APPENDIX A - PROPOSED LAYOUT DRAWINGS

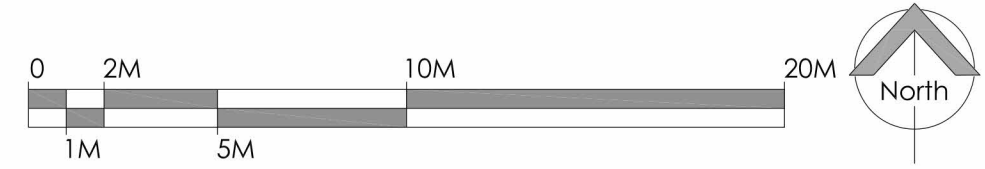


- Outdoor Wall Light (with motion detection)
- Tarmacadam
- Yorkstone Chippings
- Yorkstone Paving Flags (450 square)
- Native Species Boundary Hedge

Mixed Species Native Boundary Hedge Planting:

Name:	Abbv.	Height(cm)	Root	Containers	Habit	% In Mix
Corylus avellana	Ca	40-60	UK Cell grown	/	Branched	20%
Crataegus monogyna	Cm	60-80	C (UK grown)	2L	Transplant - seed raised	50%
Cornus sanguinea	Cs	40-60	C (UK grown)	2L	Branched	10%
Sambucus nigra	Sn	60-80	C (UK grown)	2L	Branched	10%
Ilex aquifolium	Ia	40-60	C (UK grown)	2L	Leader & Laterals	5%
Viburnum opulus	Vo	40-60	UK Cell grown	2L	Branched	5%

Notes:
 Hedge species to be planted in a double staggered row at 500mm centers, 450mm between rows.
 Hedge to be maintained at a maximum height of 1m.
 Hedge plants to be protected with 600mm Tubex Shelterguard Shrub Shelters supported by 32mm x32mm tantalised stakes.
 Hedges to be planted within off the rol fully bio-degradable weed control membrane to suppress weeds and conserve ground moisture.
 Product Ecotec MuichMat by Hy-Tex or similar approved, installed and secured with ground pegs in accordance with manufacturer.
 Shrubs to be sourced as local to the site as possible and "UK-Grown" in accordance with current bio-security best practice.



PROPOSED SITE PLAN
1:200

Copyright Notice: This drawing is the copyright of Design Studio - North LLP (Architects) and shall not be reproduced without permission. © 2023			Project		Client	
			Proposed External Works at Tithe Barn Lane Bardsey, Leeds LS17 9DX		Durkan Developments	
Dwg. Purpose Condition Discharge			A		Dwg. Title	
No.			Revision / Issue		Date	
			landscaping revised		03/2024	



Dwg. No. 578-001-1001		Rev. A
Scale 1:50, 1:200 @ A3	Date October 2023	
Drawn by GSB	Checked DKW	

APPENDIX B - TESTING SUMMARY TABLES

Exploratory Hole	Depth (m bgl)	Water Content (%)	Liquid Limit - LL (%)	Plastic Limit - PL (%)	Plasticity Index - IP (%)	Passing 0.425mm (%)	Modified Plasticity - IP' (%)	PSD D ₆₀	PSD D ₁₀	Dry Density (Mg/m ³)	Bulk Density (Mg/m ³)
TP01	0.50	8.0									
TP02	0.40	12									
TP02	0.60	6.7									
TP03	0.50	5.9									
TP04	0.50	16	36	21	15	81	12.15				
TP04	1.00	7.1									

2016 - ENGINEERING TESTING 452005.GPJ ABEC TEMPLATE.GDT 16/10/23



4 Neville Street, Wakefield, WF1 5EF

GEOTECHNICAL RESULTS SUMMARY

Client: Durkan Development

Project: Tithe Barn Lane, Bardsey, Leeds

Number: 452005

TABLE 1

Residential With Homegrown Produce (RwHP)

Exploratory Hole	Depth (m)	Date	Toxic										Phytotoxic			Organics		Other			
			Arsenic As	Beryllium Be	Cadmium Cd	Chromium (III) Cr	Chromium (VI) Cr	Lead Pb	Mercury Hg	Selenium Se	Nickel Ni	Vanadium V	Copper Cu	Boron B	Zinc Zn	SOM	Phenols	Cyanide (total) Cn	Asbestos	Sulphate g/l	pH (units)
TP01	0.20	19/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	N.D	-	8.1
TP02	0.20	19/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	N.D	-	9.4
TP03	0.20	19/06/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	-	-	N.D	-	8.7
TP04	0.20	19/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	-	-	N.D	-	8.3

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Number Average	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Minimum	4.03	0.30	0.68	1.80	23.40	0.30	1.00	7.40	15.15	14.00	0.43	65.50	1.65	1.00	1.00	1.00	1.00	0.04	8.63	0.012	8.1
Maximum	5.2	0.74	1.9	1.8	36	0.3	1	12	32	21	0.7	130	2.9	1	1	1	1	0.063	9.4	0.063	9.4
Standard Dev US95	1.19	0.31	0.82	0.00	10.83	0.00	0.00	3.19	11.85	4.83	0.22	44.80	1.31	0.00	0.00	0.00	0.00	0.03	0.57	0.03	0.57
Source: LQM S4UL 2015	5.4	1.6	910	6.0	36.1	0.3	1.0	11.2	410	19.7	0.7	118.2	1.0	1.0	1.0	1.0	1.0	0.1	9.3	0.1	9.3
	37	1.7	11	6.0	200	40	250	180	410	2400	290	3700	%	280	50	50	50	0.5	5 to 9	0.5	5 to 9
	CS41		CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	CS41	DUTCH	BRE	BRE	BRE



Notes:

1. Levels expressed as mg/kg (ppm) unless stated.
2. Soil guideline values are for RwHP.
3. Tested levels below S4UL are shown as -
For actual result see certificate sheet.

CHEMICAL RESULTS ASSESSMENT

Client: Durkan Development

Project: Tithe Barn Lane, Bardsey, Leeds

Number: 452005

TABLE 2A

2016 - SOIL METALS - RWHP 452005.GPJ ABEC TEMPLATE.GDT 28/9/23

Residential With Homegrown Produce (RwHP)

Sheet 1 of 1

Exploratory Hole	Depth (m)	Soil Organic Matter (%)	Probable carcinogens ⁽²⁾			Possible carcinogens ⁽²⁾			Fluorene	Phenanthrene	Pyrene	Acenaphthylene	Benzo (g,h,i) Perylene	Acenaphthene	Anthracene	Naphthalene	Fluoranthene	Carcinogenic PAH Total	PAH 16 Total
			Benzo (a) Anthracene	Dibenzo (a,h) Anthracene	Benzo (a) Pyrene	Chrysene	Benzo (b&k) Fluoranthene	Indeno (1,2,3-cd) Pyrene											
TP01	0.20	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.42	0.80
TP02	0.20	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.53	0.80
TP03	0.20	2.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.46	15.9
TP04	0.20	2.6	-	1.1	5.6	-	9.7	-	-	-	-	-	-	-	-	-	-	31.60	69.5

Number	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Average		0.35	1.79	1.90	3.11	0.98	0.41	2.33	3.06	0.25	1.15	0.40	0.56	0.40	3.48			21.75	
Minimum	0.05	0.05	0.07	0.08	0.12	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.09			0.80	
Maximum	6	1.1	5.6	6.1	9.7	3.1	1.3	7.6	9.6	0.85	3.6	1.2	1.8	1.4	2.7			69.5	
Standard Dev	2.82	0.51	2.61	2.86	4.53	1.45	0.60	3.59	4.49	0.40	1.68	0.55	0.84	0.67	5.16			32.62	
US95		0.9	4.9	5.3	8.4	2.7	1.1	6.6	8.3	0.7	3.1	1.0	1.5	1.2	9.6			60.1	
Source: LQM S4UL 2015	7.2	0.24	2.2	5.0	15	2.6	27	170	95	620	170	320	210	2400	2.3	280			

Notes:

1. Levels expressed as mg/kg (ppm) unless stated.
2. International Agency for Research on Cancer (IARC) classifications
3. Soil guideline values are for RwHP.
4. Tested levels below S4UL are shown as -
For actual result see certificate sheet.
5. Levels presented for SOM 1% -
Higher concentrations may be permissible

PAH RESULTS ASSESSMENT

Client: Durkan Development
 Project: Tithe Barn Lane, Bardsey, Leeds
 Number: 452005

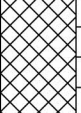


TABLE 2B

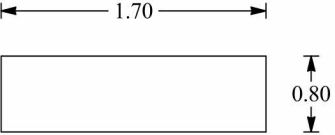


2016 - SOIL PAH - RWHP - 452005.GPJ - ABEC TEMPLATE.GDT - 28/9/23

APPENDIX C - EXPLORATORY HOLE LOGS

Project Tithe Barn Lane, Bardsey, Leeds, West Yorkshire				TRIAL PIT No TP01	
Job No 452005	Date 19-09-23	Ground level (m AOD) 98.00	Co-Ordinates (NGR) E 436,395.0 N 442,632.0		
Method/Plant Used JCB 3CX Sitemaster mechanical backhoe excavator w/600mm toothed bucket					Sheet 1 of 1

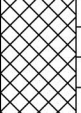



SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.20	J		97.60		0.40	MADE GROUND. Yellow brown, slightly clayey very gravelly SAND. Gravel is fine medium to coarse angular to sub-angular of brick, concret , sandstone.			
0.50	D		97.50		0.50	Very hard light brown SANDSTONE. Recovered as medium to coarse sub angular cobbles. Bottom of trial pit at 0.50m bgl.			

Shoring/Support: None Stability: Stable 	GENERAL REMARKS	
	CAT used to check for services. No groundwater or seepages encountered. Backfilled with arisings on completion. Stable	

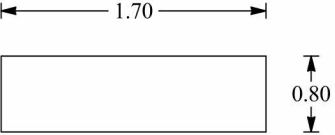
All dimensions in metres Scale 1:25	Client Durkan Development	Contractor DD	Logged By NA
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ABEC TRIAL PIT 452005.GPJ ABEC TEMPLATE.GDT 16/10/23





Project Tithe Barn Lane, Bardsey, Leeds, West Yorkshire				TRIAL PIT No TP02	
Job No 452005	Date 19-09-23	Ground level (m AOD) 98.00	Co-Ordinates (NGR) E 436,407.0 N 442,637.0		
Method/Plant Used JCB 3CX Sitemaster mechanical backhoe excavator w/600mm toothed bucket					Sheet 1 of 1

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		
0.20	J			97.60		0.40	MADE GROUND. Yellow brown slightly clayey very gravelly SAND. Gravel is medium to coarse of an angular to sub-angular sandstone and brick.	
0.40	J			97.40		0.20	Very hard light Brown SANDSTONE. Recovered as medium to coarse sub angular cobbles.	
0.60	D					0.60	Bottom of trial pit at 0.60m bgl.	

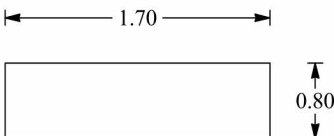
ABEC TRIAL PIT 452005.GPJ ABEC TEMPLATE.GDT 16/10/23

Shoring/Support: None Stability: Stable 		GENERAL REMARKS CAT used to check for services. No groundwater or seepages encountered. Backfilled with arisings on completion. Stable
All dimensions in metres Scale 1:25	Client Durkan Development	Contractor DD
		Logged By NA






Project Tithe Barn Lane, Bardsey, Leeds, West Yorkshire				TRIAL PIT No TP03	
Job No 452005	Date 19-09-23	Ground level (m AOD) 98.00	Co-Ordinates (NGR) E 436,405.0 N 442,648.0		
Method/Plant Used JCB 3CX Sitemaster mechanical backhoe excavator w/600mm toothed bucket					Sheet 1 of 1

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)		
0.20	J			97.70		(0.30) 0.30	MADE GROUND. Very dark brown slightly clayey very gravelly SAND. Gravel is medium to coarse angular to sub-angular of sandstone.	
0.50	D			97.40		(0.30) 0.60	Very hard light brown SANDSTONE. Recovered as medium to coarse sub-angular cobbles.	
							Bottom of trial pit at 0.60m bgl.	

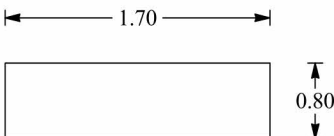
ABEC TRIAL PIT 452005.GPJ ABEC TEMPLATE.GDT 16/10/23

Shoring/Support: None Stability: Stable 		GENERAL REMARKS CAT used to check for services. No groundwater or seepages encountered. Backfilled with arisings on completion. Stable	
All dimensions in metres Scale 1:25		Client Durkan Development	
		Contractor DD	
		Logged By NA	

Project Tithe Barn Lane, Bardsey, Leeds, West Yorkshire				TRIAL PIT No TP04	
Job No 452005	Date 19-09-23	Ground level (m AOD) 98.00	Co-Ordinates (NGR) E 436,394.0 N 442,647.0		
Method/Plant Used JCB 3CX Sitemaster mechanical backhoe excavator w/600mm toothed bucket					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	J				(0.60)	MADE GROUND. Redish brown slightly clayey very gravelly CLAY. Gravel is medium to coarse sub-angular of sandstone and bricks.			
0.50	J		97.40		0.60	Very hard light brown SANDSTONE. Recovered as medium to coarse sub-angular cobbles.			
1.00	D		96.80		1.20				
Bottom of trail pit at 1.20m bgl.									

ABEC TRIAL PIT 452005.GPJ ABEC TEMPLATE.GDT 16/10/23

Shoring/Support: None Stability: Stable 		GENERAL REMARKS CAT used to check for services. No groundwater or seepages encountered. Backfilled with arisings on completion. Stable
All dimensions in metres Scale 1:25	Client Durkan Development	Contractor DD
		Logged By NA

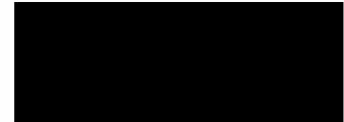
APPENDIX D - LABORATORY TESTING RESULTS



Noman Abbas

Abbeydale Building Environmental Consultants□
4 Neville Street
Wakefield
West Yorkshire
WF1 5EF

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



Analytical Report Number : 23-57663

Project / Site name:	Tithe Barn Lane Bardsey,Leeds,West Yorkshire	Samples received on:	20/09/2023
Your job number:	452005	Samples instructed on/ Analysis started on:	20/09/2023
Your order number:	4211	Analysis completed by:	27/09/2023
Report Issue Number:	1	Report issued on:	27/09/2023
Samples Analysed:	4 soil samples		

Signed:



Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 23-57663

Project / Site name: Tithe Barn Lane Bardsey, Leeds, West Yorkshire

Your Order No: 4211

Lab Sample Number				2818432	2818433	2818434	2818435
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				19/09/2023	19/09/2023	19/09/2023	19/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	19	42
Moisture Content	%	0.01	NONE	12	11	8.9	8.2
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.9	0.7

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	9.4	8.7	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.012	0.062	0.063	0.03
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	24	120	130	61
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	12.1	61.8	62.8	30.4
Organic Matter (automated)	%	0.1	MCERTS	0.9	0.2	2.9	2.6

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.08	1.4
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.85
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	1.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.22	1.3
Phenanthrene	mg/kg	0.05	MCERTS	0.05	0.08	1.6	7.6
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.35	1.8
Fluoranthene	mg/kg	0.05	MCERTS	0.09	0.14	2.7	11
Pyrene	mg/kg	0.05	MCERTS	0.1	0.14	2.4	9.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.05	0.08	1.4	6
Chrysene	mg/kg	0.05	MCERTS	0.08	0.1	1.3	6.1
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.07	0.09	1.7	7.4
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.06	0.75	2.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.07	0.1	1.4	5.6
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.73	3.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.18	1.1
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.88	3.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	15.9	69.5

Analytical Report Number: 23-57663

Project / Site name: Tithe Barn Lane Bardsey, Leeds, West Yorkshire

Your Order No: 4211

Lab Sample Number				2818432	2818433	2818434	2818435
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				19/09/2023	19/09/2023	19/09/2023	19/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Element	Units	Limit of detection	Accreditation Status	2818432	2818433	2818434	2818435
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2.4	4.5	4	5.2
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.22	0.19	0.3	0.74
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.2	0.7	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.9	0.4	0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	5.7	3.2	8.8	15
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	6.4	3.6	9	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	10	13	21
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.6	25	23	36
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.5	4.6	6.5	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	9.8	4.8	14	32
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	27	130	48	57

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-57663

Project / Site name: Tithe Barn Lane Bardsey, Leeds, West Yorkshire

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2818432	TP01	None Supplied	None Supplied	Brown clay and sand with gravel.
2818433	TP02	None Supplied	None Supplied	Brown clay and sand with gravel.
2818434	TP03	None Supplied	None Supplied	Brown sand with gravel and stones.
2818435	TP04	None Supplied	None Supplied	Brown sand with gravel and stones.

Analytical Report Number : 23-57663

Project / Site name: Tithe Barn Lane Bardsey, Leeds, West Yorkshire

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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



Analytical Report Number : 23-57663

Project / Site name: Tithe Barn Lane Bardsey, Leeds, West Yorkshire

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.



TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
 Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



4041

Client: Abbeydale Building Environmental Consultants
 Client Address: 4 Neville Street, Wakefield, West Yorkshire, WF1 5EF
 Contact: Richard Saville
 Site Address: Tithe Barn Lane, Bardsey, Leeds, West Yorkshire
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 452005
 Job Number: 23-57563-1
 Date Sampled: Not Given
 Date Received: 20/09/2023
 Date Tested: 28/09/2023
 Sampled By: Not Given

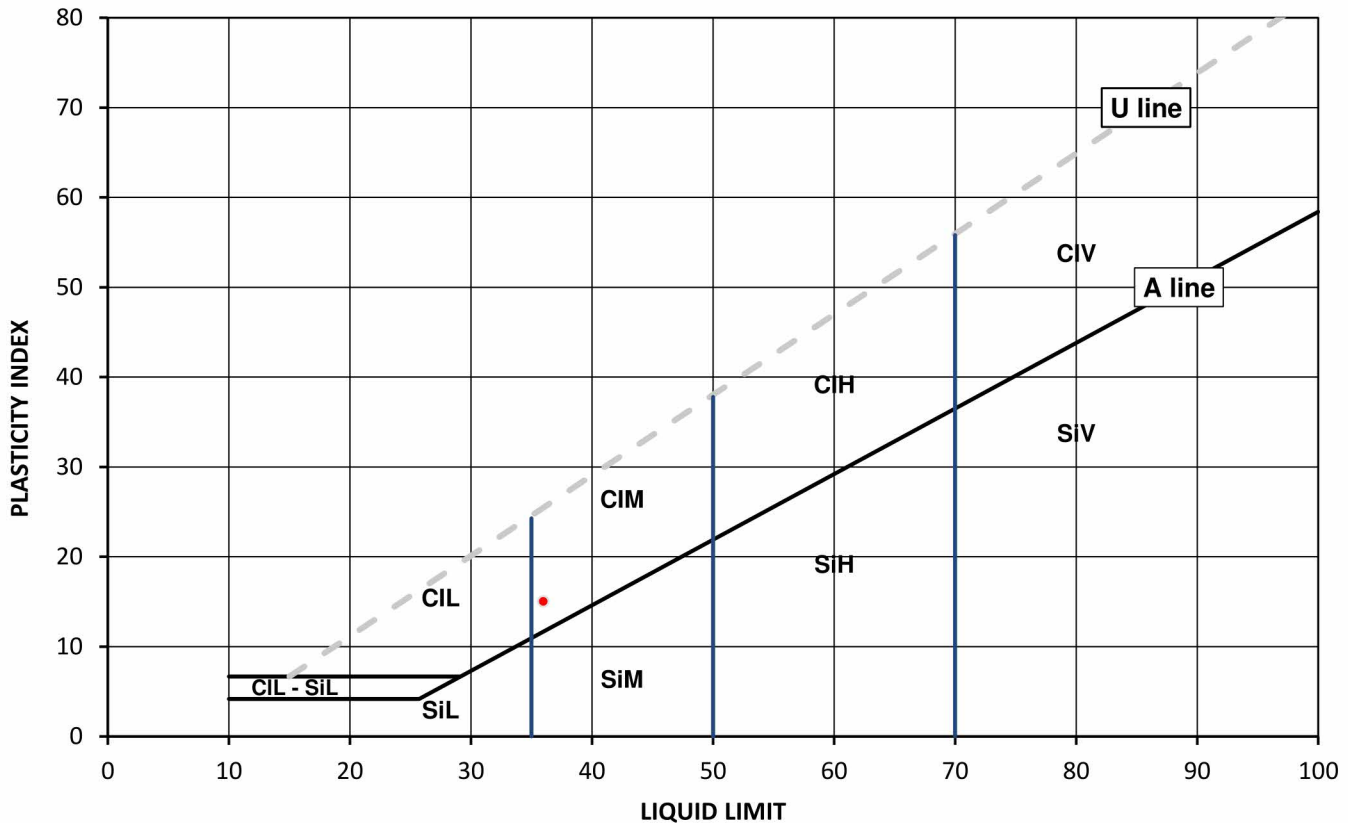
Test Results:

Laboratory Reference: 2817888
 Hole No.: TP04
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.50
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	36	21	15	81



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt	M	Medium	35 to 50		
		H	High	50 to 70		
		V	Very high	exceeding 70		
		O	Organic	append to classification for organic material (eg CIHO)		

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Janoszek
 PL Environmental & Geotechnical Lab Production Specialist
 for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Abbeydale Building Environmental Consultants

Client Reference: 452005

Client Address: 4 Neville Street, Wakefield,
West Yorkshire, WF1 5EF

Job Number: 23-57563-1

Date Sampled: Not Given

Contact: Richard Saville

Date Received: 20/09/2023

Site Address: Tithe Barn Lane, Bardsey, Leeds, West Yorkshire

Date Tested: 28/09/2023

Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

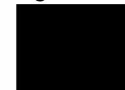
Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC %	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2817884	TP01	Not Given	0.50	Not Given	D	Yellowish brown SANDSTONE		8.0	Sample was quartered, oven dried at 106.6 °C			
2817885	TP02	Not Given	0.40	Not Given	D	Yellowish brown gravelly SAND		12	Sample was quartered, oven dried at 106.6 °C			
2817886	TP02	Not Given	0.60	Not Given	D	Yellowish brown SANDSTONE		6.7	Sample was quartered, oven dried at 106.6 °C			
2817887	TP03	Not Given	0.50	Not Given	D	Yellowish brown SANDSTONE		5.9	Sample was quartered, oven dried at 106.6 °C			
2817888	TP04	Not Given	0.50	Not Given	D	Brown slightly gravelly sandy CLAY		16	Sample was quartered, oven dried at 106.6 °C			
2817889	TP04	Not Given	1.00	Not Given	D	Yellowish brown SANDSTONE		7.1	Sample was quartered, oven dried at 106.6 °C			

Comments:

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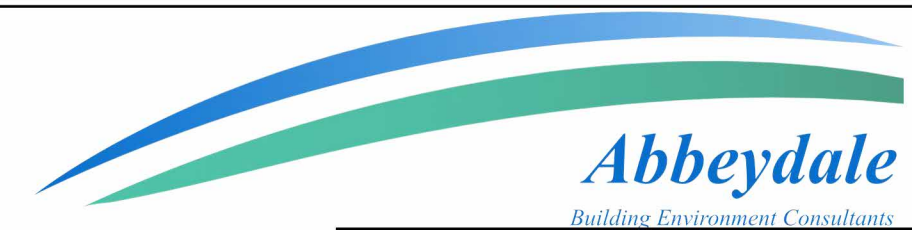
Signed:



Monika Janoszek
PL Environmental & Geotechnical Lab Production Specialist
for and on behalf of i2 Analytical Ltd

APPENDIX E - CONCEPTUAL SITE MODEL

Ref.	Hazard	Source	Pathway	Receptor	Pollutant Linkage ?	Current anticipated risk (1) *	Comment	Action	Residual Risk *^
1	Metals & PAH	Topsoil	Ingestion of soil & indoor dust	Residents	✓	Low / 100%	Localised hotspot will be covered by surface hardstanding. All other levels below GQRA thresholds	No further action deemed necessary	Very Low
2	Asbestos fibres in soils	Topsoil	Inhalation of dust	Residents	✓	Very low / 100%	No risks at levels present	No further action deemed necessary	Very Low
3	TPH	Topsoil	Inhalation of vapour	Residents	✓	Very low / 100%	No signs of potential TPH contamination identified	No further action deemed necessary	Very Low
4	Sulphate	Made Ground	Contact with concrete substructures	On site buildings	✓	Very low / 100%	No risks at levels present	No further action deemed necessary	Very Low
5	Leachable metals	Topsoil	Leaching to groundwater	Groundwater	✓	Very low / 100%	No groundwater encountered	No further action deemed necessary	Very Low
6	Leachable PAH	Topsoil	Leaching to groundwater	Groundwater	✓	Very low / 100%	No groundwater encountered	No further action deemed necessary	Very Low
7	Ground gases	Made Ground	Migration through the ground	Residents	✓	Very low / 100%	No potentially significant sources identified from Desk Study findings	No further action deemed necessary	Very Low
8	Mine gases	N/A	Vertical migration through	On site buildings	✗	Negligible / 100%	No shallow mine workings or shallow coal seams anticipated	No further action deemed necessary	Negligible
9	Radon	Bedrock	Inhalation of vapour	Residents	✓	Very low / 100%	No risks at levels present	No further action deemed necessary	Very Low
10	Invasive plant species	Invasive plant species	Direct contact	On site buildings	✓	Low / 100%	None identified during site walkover survey undertaken	Maintain vigilance during construction	Very Low
11	Trees	On site trees	Changes to soil moisture regime	On site buildings	✓	Low / 100%	Foundations seated into non shrinkable sandstone bedrock	No further action deemed necessary	Very Low
12	Flooding	N/A	Over land flow	Residents	✓	Very low / 100%	Site not within designated flood risk zone	No further action deemed necessary	Very Low



4 Neville Street WF1 5EF

NOTES:

- (1) Anticipated risk over percentage site area.
- * Refer to Risk Matrix Table within report text.
- ^ Anticipated risk after carrying out action

CONCEPTUAL MODEL TABLE

Client : Durkan Homes Ltd
 Project : Tithe Barn Lane, Bardsey, Leeds, West Yorkshire
 Job No : 452005