



GEO-ENVIRONMENTAL AUDIT

PHASE 1 PRELIMINARY RISK ASSESSMENT

PHASE 2 SITE INVESTIGATIONS

PHASE 3 REMEDIATION STATEMENT

PROPOSED RESIDENTIAL DEVELOPMENT
19 BROAD LANE
BURNEDGE
ROCHDALE
OL16 4QQ

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Client: Johnson

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Revision	Date	Reason
0	April 2024	Original to support planning application.

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CONTENTS:

1.	Phase 1 - Preliminary Risk Assessment.....	3
1.1.	Introduction.	3
1.2.	Proposed Development.....	3
1.3.	Historic Maps.....	3
1.4.	Present Day Maps.....	4
1.5.	BGS Data.....	4
1.6.	Environment Agency Data.....	5
1.7.	Planning Data.....	5
1.8.	Landmark Environmental Data.....	5
1.9.	Coal Authority.....	6
1.10.	Industry Profiles.....	7
1.11.	Site Reconnaissance.....	7
1.12.	Identification of Source-Pathway-Receptor.....	8
1.13.	Preliminary Conceptual Model.....	9
2.	Phase 2 – Site Investigations & Assessment.....	11
2.1.	Site Investigations.....	11
2.2.	Final Risk Assessment.....	12
2.3.	Final Conceptual Model.....	15
2.4.	Preliminary Conceptual Model.....	15
3.	Phase 3 - Remediation Statement.....	16
3.1.	Basic Site Details.....	16
3.2.	Conceptual Model (Final), Relevant Pollution Linkages & Remedial Objectives.....	16
3.3.	Recommended Remediation:.....	16
3.4.	Verification (Phase 4 requirements).....	16
3.5.	Additional Notes.....	17
4.	Appendix A: Figures.....	18
4.1.	Location Plan.....	18
4.2.	Existing Development.....	19
4.3.	Proposed Development.....	19
4.4.	Site Investigation Plan.....	20
4.5.	TJBA Soil Analysis.....	21
4.6.	Envirolab Ltd Certificates.....	22
5.	Appendix B: Photos.....	28
6.	Appendix C: Landmark Envirocheck.....	33

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1. PHASE 1 - PRELIMINARY RISK ASSESSMENT.

1.1. Introduction.

T. J. Booth Associates have been appointed by Mr John Johnson to undertake a Phase 1 Geo-environmental Audit to a Site at 19 Broad Lane, Rochdale.

The Site comprises a rectangular plot of land nominally 650sqm in area. It has a Site building currently used as a horse stable, with a small paddock area to the front, and open space adjacent.

The Site is in a rural part of Rochdale surrounded by agricultural land, cottages and farmhouses, as well as some commercial premises such as restaurants and businesses associated with farming.

Ath the time of writing, a planning application for the development hasn't been submitted and there are no conditions to discharge.

The purpose of this report is to assess the potential environmental impacts to & from the Site, in order to redevelop it for residential purposes, and to support planning application/validation.

This report provides a desk-based study & intrusive ground investigation based on current UK guidance for environmental investigation within the construction industry. Principal to the assessment is the potential for contamination pollutant linkages via the CLR-11 source-pathway-receptor methodology. Assessment of potential pollution linkages is primarily undertaken in strict accordance with BS 5930:2015, BS 10175:2011+A2:2017, CIRIA C665, and BS 8485:2015+A1:2019 et al.

1.2. Proposed Development.

The Proposed Site Plan in the Appendix shows the existing building to be renovated into a residential dwelling.

Site access is to the northeast side adjacent No.19 Broad Lane, and the remainder of the site area is to comprise soft landscaping/garden area.

1.3. Historic Maps.

DATE	ON-SITE	OFF-SITE/SURROUNDING AREA
c1851	The Site comprises terraced cottages to the front along Broad Lane, with gardens/yards to the rear.	The wider area is generally agricultural with other cottages along Broad Lane. Sandstone quarry 50m to the northwest. Two reservoirs nominally 25 & 50m to the southeast. Brook/watercourse noted to the southeast of the reservoirs flowing west towards Suden Brook. Burnedge Cotton Mill noted 100m to the southeast.

c1890-93	On-site cottages are split by a central driveway with what appears to be a communal square/yard to the rear.	Sandstone quarry no longer noted. No other changes.
c1930	Dwellings to the west side of the Site by now demolished.	No change.
c1936-37	No change.	No change.
c1955-56	Dwellings to the east side of the Site by now demolished. Site is vacant but split in two halves from the front to rear boundary.	No change.
c1970	No change.	No change.
c1987	Site is now noted as one piece of land & vacant.	Reservoirs to the southeast have been removed and shown as part of the garden areas to the properties on Broad Lane.
c1992	No change.	No change.
c2000	No change.	No change.
c2013	No change.	No change.
c2017	Stable building erected on-site.	No overall change.
c2018	Paddock built to the front of the stable.	No overall change.

1.4. Present Day Maps.

Site boundaries, outlines of structures and buildings:	Present day plans show the stable, paddock, and vacant grass land at the Site. The surrounding area is predominantly agricultural with a farm to the west, and open fields to the north beyond Broad Lane. Residential dwellings still form much of the south side of Broad Lane east of the Site.
Ground contours, natural drainage features:	No topographic survey has been undertaken. The Site is nominally level although it is located upon a natural crest of a hill, with falls from the rear of the Site towards the south/southwest, and to the north/northwest from the front.
Water courses:	The closest open watercourses are an unnamed tributary to Suden Brook 250m southwest, and Suden Brook itself located 325m southwest.
Below ground obstructions:	None noted on current maps/plans.

1.5. BGS Data.

Bedrock geology:	Pennine Lower Coal Measures Formation - mudstone, siltstone and sandstone. Sedimentary bedrock formed between 319 and 318 million years ago during the Carboniferous period.
Superficial geology:	Hummocky (moundy) Glacial Deposits, Devensian - diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.
Coal seams:	The Arley Coal seam is estimated to subcrop nominally 75m southeast of the Application Site dipping to the approximately 8 degrees south.
Hydrogeology:	Pennine Lower Coal Measures Formation. Class 2B. Character: moderately productive aquifer. Flow Mechanism: Flow is virtually all through fractures and other discontinuities.
Boreholes records:	One borehole noted approximately 275m northeast, approximately at the same elevation and nominally along geological strike that comprised the following geology:

	(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far ...	THICKNESS		DEPTH		T D	
			Feet	Inches	Feet	Inches	Feet	Inches
			...	...	...	...	...	...
	FILL	TARMAC ROAD WASTE	3	0	3	0	0.91	0.91
	DRIFT	BROWN CLAY AND STONES	32	0	35	0	9.75	10.66
		YELLOW SAND	14	0	49	0	4.26	14.93
	LOWER COAL MEASURES Deepened March 1970	SHALE AND SANDSTONE BEDS	151	0	200	0	46.02	60.96
		SHALE	50	0	250	0	15.24	76.20

1.6. Environment Agency Data.

Flood Zone:	Site is in flood zone 1.
Drinking Water Protected Area (Surface Water):	Not in area.
Drinking Water Safeguard Zone (Surface Water):	Not in area.
Drinking Water Safeguard Zone (Groundwater):	Not in area.
Source Protection Zone:	Not in area.

1.7. Planning Data

No past planning applications that are pertinent to the environmental assessment.

1.8. Landmark Environmental Data

1.8.1. Agency & Hydrological

Discharge consents:	1 record within a 250m radius of the Site relating to private waste water discharge as follows: Operator: Dr. J. Burt Property Type: DOMESTIC PROPERTY (SINGLE) (INCL FARM HOUSE) Location: 19 Broad Lane, Burnedge, Rochdale, Lancashire, OL16 4qq Reference: 0170/1207 Permit Version: 1 Issued Date: 10th April 1970 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Suddon Brook Status: Pre National Rivers Authority Legislation where issue date < 01/09/1989
Pollution incidents to controlled waters:	None relevant.
Substantiated pollution incident register:	1 record to a property 102m northwest, in December 2020, and relating to inert construction and demolition material.
Water abstractions:	No water abstraction noted within a 250m radius of the Site. Closest is 411m east.

Ground vulnerability map:	Secondary Superficial Aquifer - High Vulnerability
Bedrock aquifer:	Secondary A Aquifer.
Superficial aquifer:	Secondary A Aquifer.
Source protection zone:	Not within a Source Protection Zone. Closest is 800m to the northeast.

1.8.2. Waste

BGS recorded landfill sites:	None noted within a 250m radius.
Historic landfill sites:	1 record noted 17m to the southwest noted as follows: Licence holder: Richardson and Carroll, Burnedge Mill. Reference: EAHL15803. First input: 1st May 1984. Last input: 31st December 1986. Specified waste types: deposited waste included inert waste.
Registered landfill sites:	1 record was noted (same as the historical landfill site above), with additional information as follows: Licence holder: K Richardson & J F I Carroll, revoked on 3 rd May 1984. Authorised waste: brick, stone, slate, tiles, construction & demolition. Inert/non-haz/non-tox inert waste metal scrap soil, clay. Prohibited waste: biodegradable/putrescible waste, carcasses and flesh, food waste, sawdust/bark, vegetable/processing waste, waste N.O.S, wood waste/timber.

1.8.3. Hazardous Substances

Planning hazardous substance consents:	No records within a 250m radius of the Site.
Planning hazardous substance enforcements:	No records within a 250m radius of the Site.

1.8.4. Geological

Coal mining affected areas:	Within a coal mining area.
CBSCB compensation district:	Not within the CBSCB brine district.
Potential for collapsible ground stability hazards:	Very low risk.
Potential for compressible ground stability hazards:	No hazard.
Potential for ground dissolution stability hazards:	No hazard.
Potential for landslide ground stability hazards:	Very low risk.
Potential for running sand ground stability hazards:	Very low risk.
Potential for shrinking or swelling clay ground stability hazards:	Low risk.
Radon potential - radon affected areas:	The property is within a Lower probability radon area (<1% of homes estimated to be at or above the action level).
Radon potential - radon protection measures:	No radon protection measures are required.

1.9. Coal Authority

Mine Shafts, Pits, Adits/Entries:	No coal entries within 20m of the site boundaries.
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Past Recorded Mining.	Underground	No recorded workings noted beneath the Site.
Present/Future Mining.	Underground	Not known to be a risk beneath the Site.
Unrecorded Shallow Underground Workings:	Probable/Potential	Not known to be a risk beneath the Site.
Past/Present/Future Mining/Opencast:	Surface	None noted locally.
Mining Geology and Subsidence:		Not noted.
Hazards and Mine Gas:		Unknown. Not known to be a risk beneath the Site.
Development High Risk Area:		The Site is NOT within a Development High Risk Area.
Abandonment Plan Data:		No data available.

1.10. Industry Profiles

N/A.

1.11. Site Reconnaissance

Details of existing structures:	The Site was accessed off Broad Lane and comprised a small rectangular plot of land with a masonry stable building to the west side of the plot, with a fenced paddock area to the front covered with astroturf. The remainder of the Site comprised a rough grass surface. Timber post and mesh fencing surrounded the Site boundary apart from the northeast corner where there was a vehicular access gate. There were no other structures of note.
Adjacent properties:	No.19 Broad Lane and driveway to the east side, with the garden wrapping around part of the rear of the Site. Broad Lane to the north of the Site with agricultural farm land beyond. To the west side bounding the Site is a lane towards the southwest, and with farm beyond. There is a recently formed car park area to the south east rear corner. Beyond this is agricultural fields.
Water levels, directions of flow and rates in rivers:	No immediate watercourses could be seen on Site reconnaissance, although ground elevation dipped away from the rear of the Site to a valley bottom approximately 300m distant.
Old mine or quarry workings:	None noted.
Obvious/immediate hazards to health/safety:	None noted.
Areas of discoloured soil, polluted water, vegetation, and significant odours:	None immediately noted.
Relevant ground levels, ground water levels, positions of wells and springs:	Site appeared relatively level.

1.12. Identification of Source-Pathway-Receptor

1.12.1. Summary & Discussion.

The local area has been primarily used for agriculture, although the Site is within a small hamlet of buildings, generally comprising residential dwellings, and farmhouses. Previously some of the buildings were used for other purposes, such as a chapel, and as a mill. Historically there were reservoirs associated with the mill in adjacent land to the rear of the Site, and these were infilled with inert waste between 1984-1986.

The Site was historically used for residential dwellings (terraced cottages) lining the front of the Site from around c1850. These were demolished between 1930 & 1960 according to historical maps, and the land left vacant until the current stable block was built around 2015.

Externally the only registered landfill sites are the inert filled reservoirs.

The Site has not been subject to coal mining or its legacy.

Radon is not an issue in the local area according the Landmark database.

The only outlying risk is the existing Site soil which may contain contaminants of concern above residential threshold limits.

1.12.2. Potential Contaminants

CURRENT SOURCE/S	ORIGINAL ASSOCIATED SOURCE	CONTAMINANT/S
Existing historic made ground – is thought to exists across the Site.	Demolition materials, mortars & plasters, cladding, heat resistant fixings/fittings/insulation, other material such as hardcore & planings etc.	Metals, PAHs, sulphates, asbestos.

1.12.3. Potential Pathways

The potential pathways to/from the Development Site include (not an exhaustive list but a summary of the main points):

PATHWAY	MEDIA
Soil and dust ingestion	Soil and indoor dust
Consumption of home-grown fruit and vegetables	Produce
Skin contact (indoors)	Indoor dust
Skin contact (outdoors)	Soil
Inhalation of dust (indoors)	Air
Inhalation of dust (outdoors)	Air
Vapours (indoors)	Air
Vapours (outdoors)	Air

1.12.4. Potential Receptors

Human: receptors mainly comprise residents for the proposed end use.

Controlled waters: underlying aquifers.

1.13. Preliminary Conceptual Model

POLLUTANT RISK IDENTIFIER	SOURCE	CONTAMINANT TYPE	PATHWAY	RECEPTOR	POLLUTION LINKAGE	CONSEQUENCE	PROBABILITY	RISK
PL1	Existing made ground/potential contaminants, and effects on humans/animals/ecology as a receptor	Metals, PAHs, sulphates, asbestos.	Direct ingestion, aerial ingestion, dermal contact. Crops.	Primarily human - Site construction operatives & future residential Site occupants. Pets. Ecological systems.	Historical made ground will have to be investigated but may comprise common contaminants above threshold values allowed for a residential usage.	Medium.	High likelihood.	High risk.
PL2	Existing made ground & associated potential contaminants and effects on groundwater as a receptor.	Metals, PAHs, sulphates. Potential for other chemicals.	Groundwater. Potential contaminants leached into ground water.	Underlying aquifer as a receptor.	Underlying aquifer is Secondary A, moderately productive aquifer, where flow is virtually all through fractures and other discontinuities which mainly provides baseflow to rivers etc. The superficial aquifer is designated also as Secondary A, however, geological maps and local borehole records suggest the area is underlain by an impermeable clay aquitard. While there is the potential noted for minor contamination of made ground, there has only been historic residential use of the Site, and any minor contamination is expected to be low.	Medium.	Unlikely.	Low risk.
PL3	Potential for mortars/plasters and associated effects on concrete.	Sulphates.	Contact with underground structures.	Building structures /concrete. Archaeological sites & ancient monuments	Potential for sulphates in the soil, which could leach into groundwater and negatively impact existing or proposed foundations.	Minor.	Likely.	Low risk.
PL4	Potential historic use of hazardous chemicals on Site.	Hydrocarbons, BTEX & MTBE, VOCs/SVOCs, phenols, cresols and chlorinated phenols	Contact with water pipes/services.	Water pipes/services & human/pet end users.	No potential source noted and no pollution linkage.	Minor.	Unlikely.	Very low risk.
PL5	Geological ground gas. Radon sources in Namurian deposits underlying the Site.	Rn.	Diffusion through soil, substructures,	Future occupants. Explosion, suffocation.	The property is within a lower probability radon area (<1% of homes estimated to be at or above the action level). No radon protection measures are required.	Medium.	Unlikely.	Low risk.

			aerial inhalation.					
PL6	Anthropogenic ground gas. Former reservoir to rear.	CH ₄ , CO ₂ , other trace gases.	Diffusion through soil, substructures, aerial inhalation.	Future occupants. Explosion, suffocation.	Although there is a potential source, records indicate the fill is inert & infilled with construction demolition material only.	Medium.	Unlikely.	Low risk.
PL7	Historic landfill sites in the wider area.	CH ₄ , CO ₂ , other trace gases.	Diffusion through soil, substructures, aerial inhalation.	Future occupants. Explosion, suffocation.	None in the local area.	Medium.	Unlikely.	Low risk.
PL8	Potentially contaminated groundwater (ie groundwater as a source/pathway).	Metals, PAHs, inorganics, sulphates, hydrocarbons.	Groundwater as a pathway to potential end users.	Human - future residential Site occupants, user in the wider area. Pets. Ecological systems. Adjoining land /woodland. Watercourses.	There is not considered to be a pollutant linkage regarding groundwater/aquifers due to the lack of significant source of contaminants, pathway/receptor as follows: - Underlying bedrock aquifer is Secondary A, moderately productive aquifer, where flow is virtually all through fractures and other discontinuities which mainly provides baseflow to rivers etc and not considered as a drinking water resource. - The superficial aquifer is designated also as Secondary A, however, geological maps and local borehole records suggest the area is underlain by an impermeable clay aquitard. - The Site is not in a Drinking Water Protected Area (Surface Water). - It is not in a Drinking Water Safeguard Zone (Surface Water). - It is not in a Drinking Water Safeguard Zone (Groundwater). - It is not in a Source Protection Zone. - No watercourse near the Site.	Medium.	Unlikely.	Low risk.

2. PHASE 2 – SITE INVESTIGATIONS & ASSESSMENT

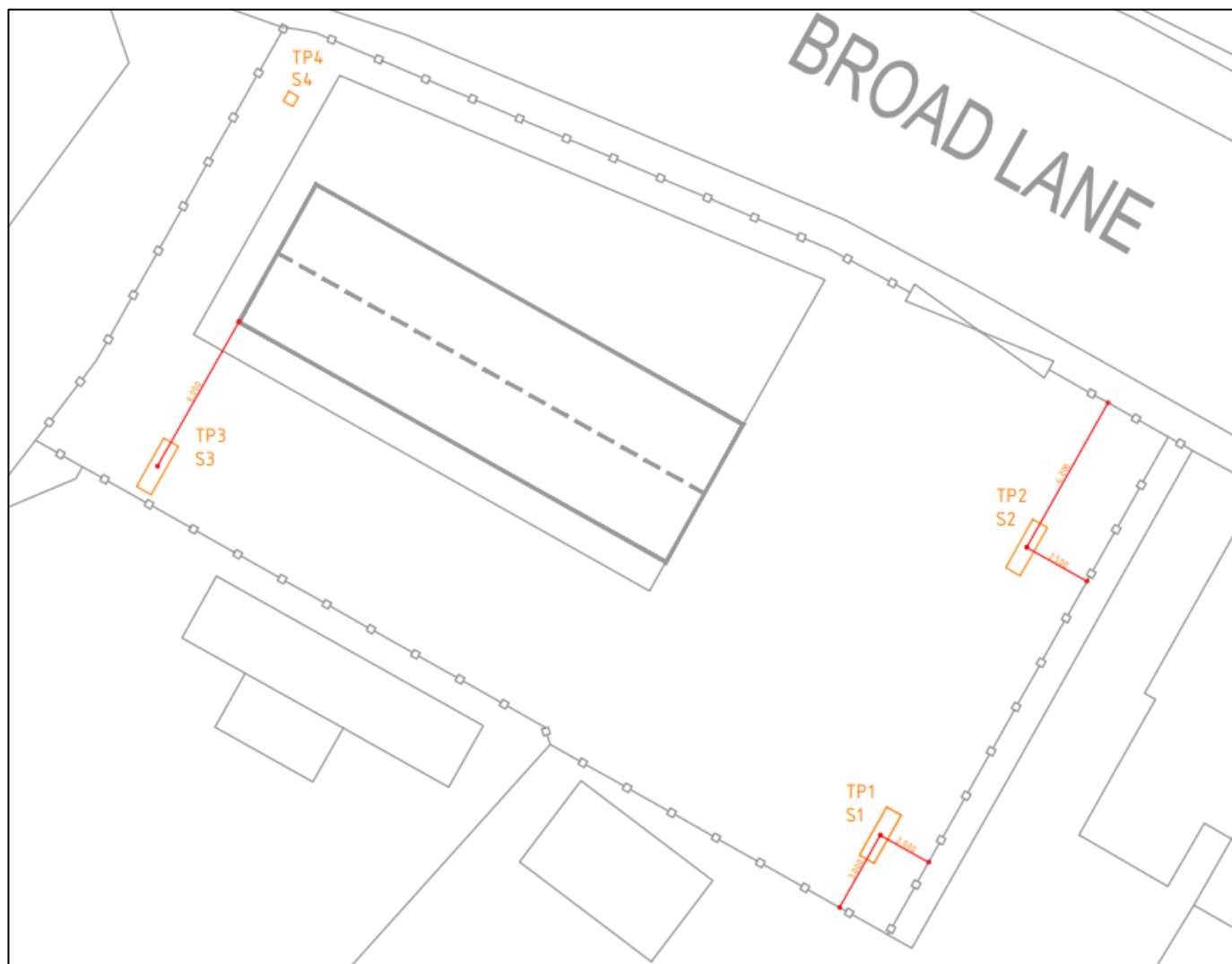
2.1. Site Investigations

2.1.1. Investigation Summary.

A single site investigation to date was undertaken on the 15.03.2024.

2.1.2. Site Investigation Plan.

An excerpt of the Site Investigation Plan is noted below, full Site Investigation Plan in the Appendix.



2.1.3. 15.03.2024

Site Investigations were undertaken by T J Booth Associates and comprised 3No. machine excavated trial pits (TPs 1-3) undertaken with a 3.5t back acting excavator, and one hand excavated trial pit (TP4).

Trial pits were located around the Site to gain an understanding of the geology and to provide a grid format for environmental assessment and soil sampling, as no specific hotspot areas were identified.

Soil samples were taken of the upper made ground as encountered in each of the respective trial pits, totalling 4No. (S1-4). The samples were sealed in 1kg white plastic snap top containers & amber jars & vials, and sent to Envirolab Ltd to be analysed for a range of common contaminants.

Soil samples were analysed for metals, speciated PAH, inorganics & sulphates, SOM, asbestos screening/quantification in accordance with the conceptual model.

No visual or olfactory evidence of hydrocarbon contamination was noted on-site.

2.1.4. Stratigraphy.

Trial pits recorded a general slightly sandy gravelly, SILT MADE GROUND across the Site. This was underlain by CLAY in all trial pits as follows:

TP1

0-1250	Dark brown slightly sandy slightly gravelly SILT (MADE GROUND) with occasional cobbles of brick. Gravel is brick, stone, glass, rare plastic and clay. (S1).
1250-1600	Soft light brown/grey mottled CLAY.
Comments: No groundwater noted.	

TP2

0-500	Dark brown sandy slightly gravelly SILT (MADE GROUND) with occasional cobbles of brick. Gravel is brick, stone, glass, rare plastic and clay. (S2).
500-1200	Soft to firm light brown/grey mottled CLAY.
Comments: No groundwater noted.	

TP3

0-500	Dark brown sandy gravelly SILT (MADE GROUND) with occasional cobbles of brick. Gravel is brick, stone, glass, rare plastic and clay. (S3).
500-900	Firm brown silty CLAY (MADE GROUND).
900-1400	Firm light brown/grey mottled slightly sandy CLAY.
Comments: No groundwater noted.	

TP4

0-1250	Dark brown slightly silty SAND & GRAVEL (MADE GROUND). Gravel is brick & stone. (S4).
Comments: No groundwater noted.	

2.2. Final Risk Assessment.

2.2.1. Human Health Risk.

2.2.1.1. Shallow soil contamination.

On return the samples were assessed by TJ Booth Associates to common threshold comparison data in the following order: Defra Category 4 Screening Levels (C4SLs) > LQM/CIEH (S4ULs) > EIC/AGS/CL:AIRE 2010.

Testing of made ground revealed contaminant levels above residential threshold values with elevated levels of the following contaminants of concern, (refer to testing certificates, and full analysis spreadsheets in the Appendix):

Trial Hole/Soil Sample	Made ground horizon	Mitigation/Action
TP1/S1	Metals (arsenic & lead).	FURTHER ACTION
TP2/S2	Metals (arsenic & lead).	FURTHER ACTION
TP3/S3	Metals (arsenic & lead).	FURTHER ACTION

TP4/S4	No exceedances.	PASS
Due to above elevated levels noted, existing made ground is considered contaminated above threshold levels allowed for a residential end use. The existing soils will not be suitable for reuse with regard to human receptors and a suitable cover system will need to be employed. 2.2.1.2. Ground Gas. 2.2.1.2.1. Historic landfill Sites. The closest historic landfill is approximately 50m to the southeast. It is not considered to be a source of ground gas generation as records indicate the fill was inert. There is not considered to be a risk associated with this pollutant linkage. 2.2.1.2.2. On-site refuse tips/infilled ponds/infilled land. None noted. There is not considered to be a risk associated with this pollutant linkage. 2.2.1.2.3. Radon. The Landmark database indicated that the Site was in a Class 1 radon area where <1% of homes are above the action level, and no gas protection measure are required. There is not considered to be a risk associated with this pollutant linkage. 2.2.1.2.4. Alluvium. No alluvium in the local area. There is not considered to be a risk associated with this pollutant linkage.		
2.2.2. Buildings & Services. 2.2.2.1. Water pipes. United Utilities pipeline risk assessment methodology states the following: “The application of the source, pathway, receptor concept will be an integral part of any pipeline risk assessment. For each potential source (the contamination), and each potential receptor (the water pipe), consideration shall be given to whether a potential pathway between source and receptor exists, or may exist in the future, linking the two. There are normally only three pathways by which contamination may come into contact with water pipes. These are direct contact with the soil or backfill, an excessive vapour phase or a contaminated groundwater regime. If none of these conditions exist on site (adopting the source, pathway, receptor concept) then it is likely that extended and/or targeted soil testing will not be required, and a simple risk assessment will suffice.” The preliminary risk assessment has found no specific historic use of the Site that was at risk of potentially polluting the ground with hydrocarbons, BTEX & MTBE, VOCs/SVOCs, phenols, cresols and chlorinated phenols which are a risk to PE pipes. In addition, there was no visual or olfactory evidence of organic contamination noted on site investigations, nor any groundwater noted. Therefore, in accordance with UK contaminated land assessment guidance & the United Utilities water pipe assessment methodology, sources of the risk chemicals in the PSRAS tables have NOT been identified, and there is no pollutant linkage regarding polyethylene water pipes. Testing for PSRAS contaminants is NOT advised or required. Normal PE pipe will suffice for potable water supplies to the development. There is not considered to be a risk associated with this pollutant linkage. 2.2.2.2. Sulphate. Readings for existing made ground were low at Design Sulphate Class DS1. There is not considered to be a risk associated with this pollutant linkage.		
2.2.3. Controlled Waters Risk. Where ground/surface water sampling is undertaken, samples are assessed by TJ Booth Associates to common threshold comparison data. Groundwater samples are generally compared against the drinking water standards (UK DWI 2016 & WHO		

2022), and Environment Quality Standards for Freshwater (EQS). Surface water samples are primarily compared against the against the EQS.

2.2.3.1. Groundwater.

Only minor contamination noted to existing Site soil, above limited & unproductive superficial cover which comprises soft to firm CLAY.

No groundwater noted on site investigations in any of the trial holes.

No groundwater samples taken.

Soft to firm clay was noted beneath the made ground which acts as a barrier to potential minor contamination.

The Site is not within a Source Protection Zone, and there were no groundwater abstractions noted in the local area.

The risk to groundwater either as a source or receptor is considered mitigated.

There is not considered to be a risk associated with this pollutant linkage.

2.2.3.2. Watercourses.

There are no watercourses local to the Site.

No surface water pathways from the Site to offsite sources.

No Site groundwater risk to affect baseflow to rivers via aquifers.

The risk to surface water is considered mitigated.

2.3. Final Conceptual Model.

2.4. Preliminary Conceptual Model

POLLUTANT RISK IDENTIFIER	SOURCE	CONTAMINANT TYPE	PATHWAY	RECEPTOR	POLLUTION LINKAGE	CONSEQUENCE	PROBABILITY	RISK	MITIGATION PROPOSED
PL1	Existing made ground/potential contaminants, and effects on humans/animals/ecology as a receptor.	Metals.	Direct ingestion, aerial ingestion, dermal contact. Crops.	Primarily human - Site construction operatives & future residential Site occupants. Pets. Ecological systems.	Made ground has been sampled and analysed, and lead/arsenic contaminants of concern have been noted above residential levels. The made ground will need some form of remediation to ensure safety of the end user.	Medium.	High likelihood.	High risk.	REQUIRES REMEDIATION. EITHER REMOVAL & REPLACEMENT OF EXISTING SITE SOIL (REMOVAL OF SOURCE), OR SUITABLE COVER LAYER PROVIDED (REMOVAL OF PATHWAY).

3. PHASE 3 - REMEDIATION STATEMENT

3.1. Basic Site Details

Full details included in the Phase 2 Site Investigation Introduction & subsequent sections.

3.2. Conceptual Model (Final), Relevant Pollution Linkages & Remedial Objectives.

Site investigations undertaken as part of the Phase 2, comprised trial pits & soil sampling, with historic made ground recorded to between 500-1500mm.

Only 1 pollutant linkage from the Phase 2 Site Investigation was confirmed in the ground investigation:

- PL1: Existing made ground/potential contaminants, and effects on humans/animals/ecology as a receptor.

The risk is specific to the end use, and required to ensure Site soils are safe for the end user.

3.3. Recommended Remediation:

Made Ground/Soil Risk:

PL1: Existing made ground as a source via historic former dwellings, demolition infill & associated made ground as well as possible infill related to reservoirs to the rear.

While made ground may remain on site beneath permanent hardstandings such as buildings, roads, pavements & pathways etc; to mitigate the risk to receptors, it is advised that a cover layer of clean inert soil is imported for garden and soft landscaping areas ONLY.

Dependent on the final finished levels, existing made ground within proposed soft landscaping areas, should either be covered with 600mm of imported soil, or excavated to 600mm from finish levels and replaced with a clean imported cover soil to suit finishes. The 600mm cover system is adopted for the following reasons:

Root systems for shrubs are typically up to 600 mm;

Excavations are unlikely to be deeper than 600 mm in typical gardening activities;

Bio-turbation is typically limited to the top 600 mm of the soil profile;

Excavations by children or pets are unlikely to exceed 600 mm.

Imported soil should be clean/inert and free from deleterious materials and should be suitable for use in a residential end use setting; and should be able to pass testing of metals, speciated PAH, inorganics & sulphates, SOM, and asbestos screening to current Defra Category 4 Screening Levels (C4SLs) where available, and then to the LQM/CIEH (S4ULs), for use in a residential end use setting.

3.4. Verification (Phase 4 requirements)

Verification of the imported soil may be required for Planning or Building Control/Building Regulations submission. Should this be required, it will need to be undertaken by suitably qualified consultants and comprise the following:

- Import source material.
- Characterisation & suitability of material.
- Soil sampling should be undertaken as per YALPAG Guidelines as per the following ratios:

Virgin quarried materials, 1-2 samples to confirm inert nature.

Crushed hardcore, stone, brick, min 1 sample per 500cum.

Greenfield/manufactured, generally 1 sample per 250cum (min 3 samples).

Brownfield, generally 1 sample per 50cum (min 6 samples).

Samples should be tested for the following contamination suites: metals, inorganics, PAH USEPA16 speciated, and asbestos screening. Defra Category 4 Screening Levels (C4SLs) > LQM/CIEH (S4ULs) > EIC/AGS/CL:AIRE 2010; for use in a residential end use setting..

- Verification Depth.
- Reporting (including photographic evidence).



3.5. Additional Notes

Before any further work is undertaken, this report should be submitted to and agreed by the Local Planning Authority Contaminated Land Department/Building Control Department as necessary.

We trust that the above clear, but should you require further advice please contact the undersigned.

Signed.....

D.S. Slattery BSc (Hons).

T J Booth Associates.

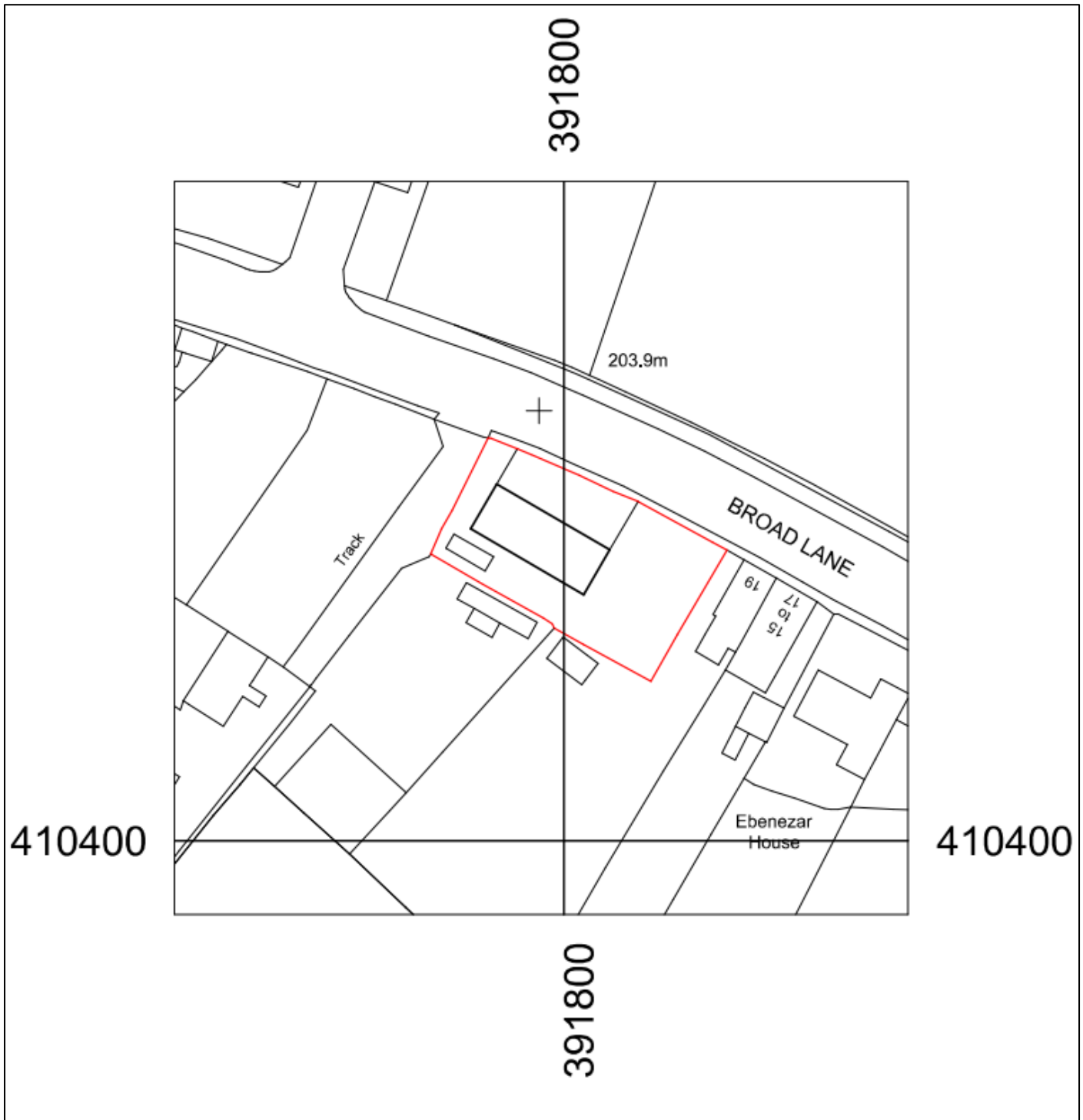
Authorised...

T J Booth BSc (Hons), C. Eng. C. Env. MICE.

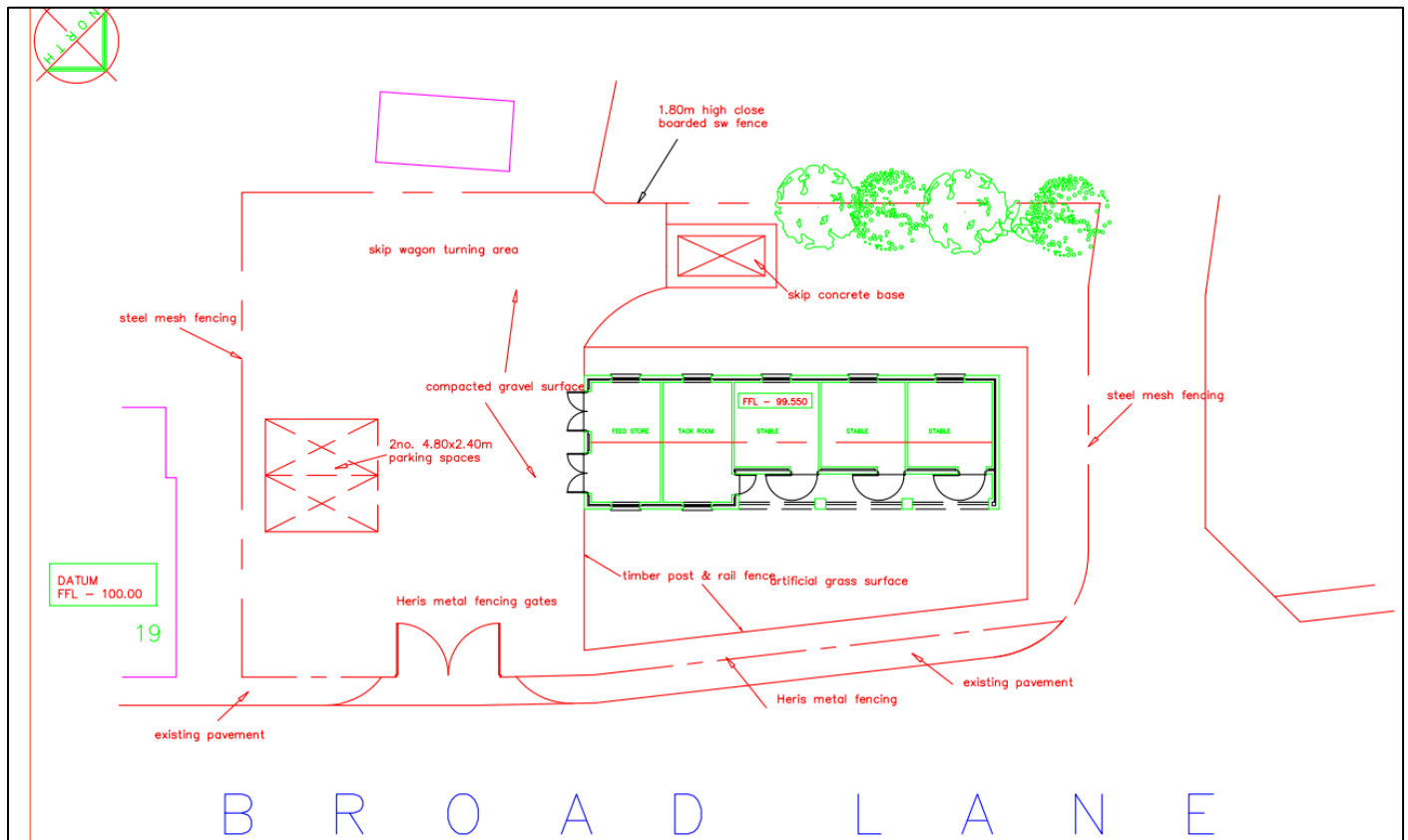
T J Booth Associates.

4. APPENDIX A: FIGURES

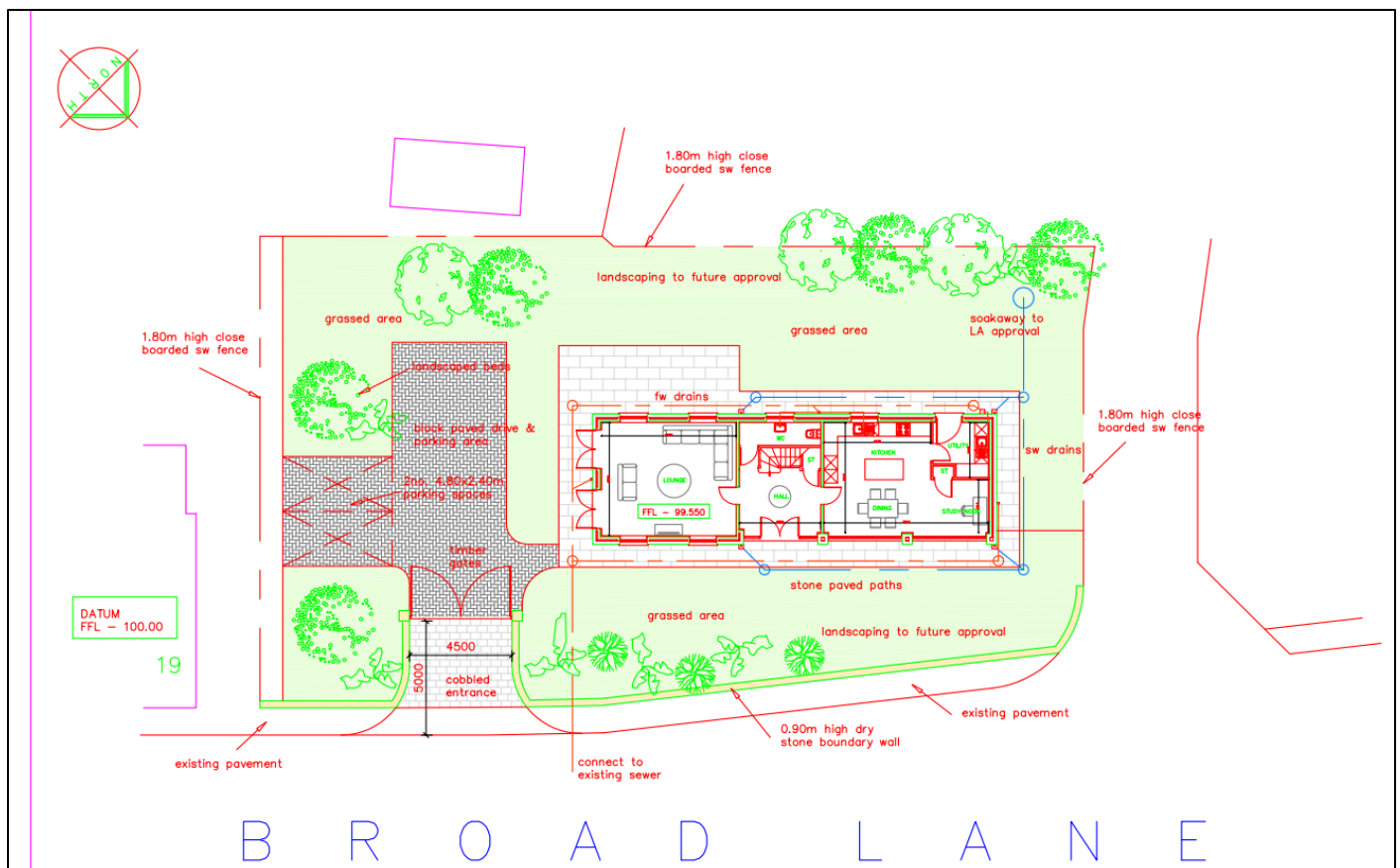
4.1. Location Plan



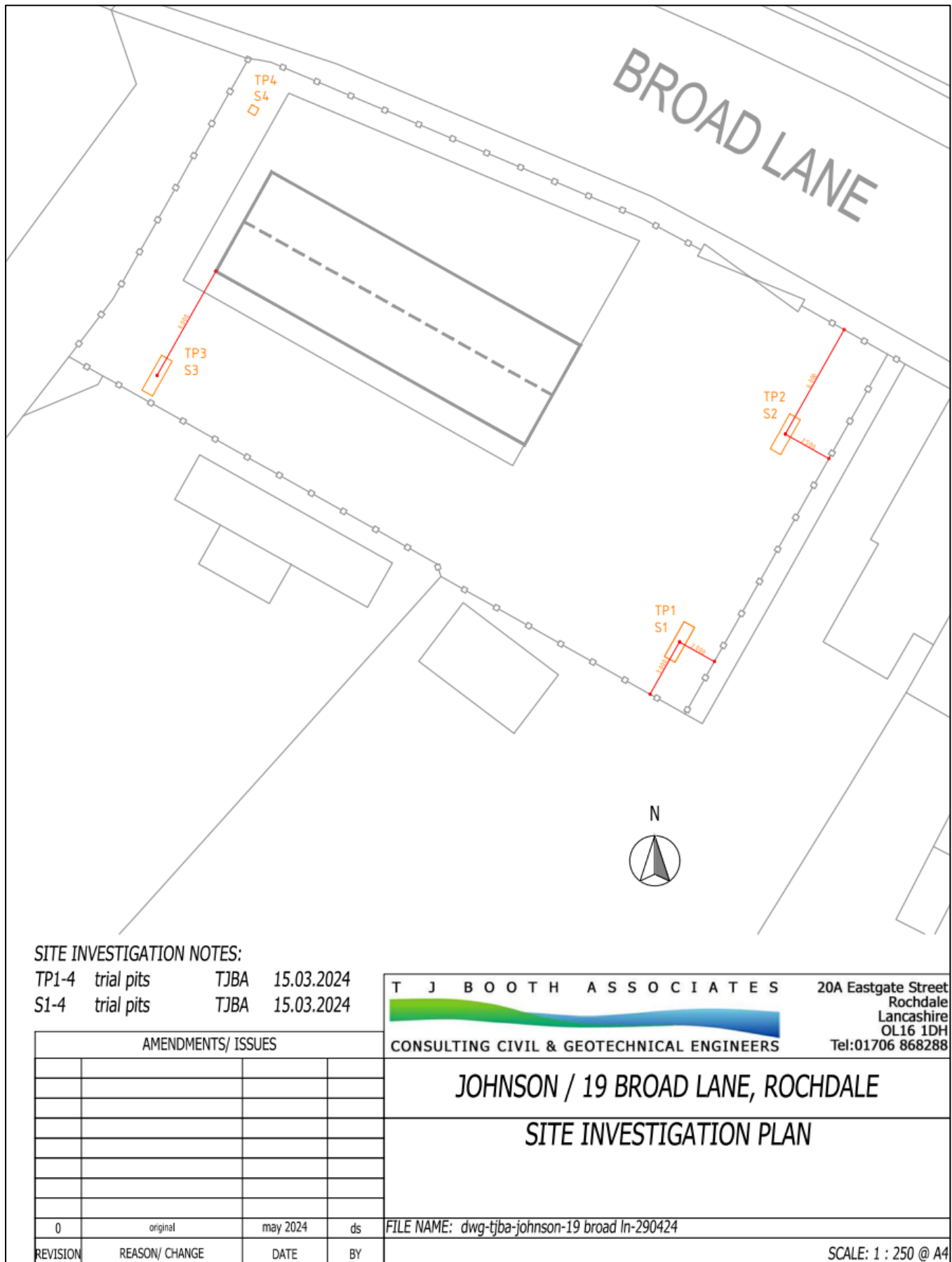
4.2. Existing Development



4.3. Proposed Development.



4.4. Site Investigation Plan



4.5. TJBA Soil Analysis

CLIENT/SITE:		Johnson - 19 Broad Lane, Burnedge, Rochdale, OL16 4QQ						
SAMPLE TYPE:		SOILS						
SAMPLING DATE:		15.03.2024						
Contaminant		No	Max	Mean	t 95	RESIDENTIAL (with or without plant uptake)		
							Pass/Fail	Comment
METAL	Arsenic	4	58	38.5	56.5	37	FURTHER ACTION	S1, S2, S3
METAL	Boron	4	1	1	1	290	PASS	
METAL	Cadmium	4	1.7	1.275	1.685	22	PASS	
METAL	Chromium as Cr(III)	4	40	22.00	36.55	910	PASS	
METAL	Chromium as Cr(VI)	4	1	1	1	21	PASS	
METAL	Copper	4	204	102.5	186.9	2400	PASS	
METAL	Lead	4	630	331.75	593.7	200	FURTHER ACTION	S1, S2, S3
METAL	Mercury (inorganic)	4	0.57	0.425	0.5595	40	PASS	
METAL	Nickel	4	39	28	37.8	130	PASS	
METAL	Selenium	4	1	1	1	250	PASS	
METAL	Zinc as Zn	4	487	248.25	468.25	3700	PASS	
INORGANIC	Cyanide (Total)	4	1	1	1	34	PASS	
INORGANIC	Sulphate (Total) as SO4	4	0.11	0.09375	0.11	0.24	PASS	
INORGANIC	Sulphide	4	5	5	5	250	PASS	
INORGANIC	pH	4	8.14	7.27	8.1145	6 to 8	ALKALINE	
INORGANIC	Sulphur (Elemental)	4	12	6.75	10.95	100	PASS	
INORGANIC	Asbestos Identification	4	0	0	0	0	PASS	
ORGANIC	SOM	4	6	6	6			
PAH	acenaphthene	4	0.23	0.1	0.2135	1100	PASS	
PAH	acenaphthylene	4	0.04	0.0175	0.0355	920	PASS	
PAH	anthracene	4	0.3	0.1475	0.285	11000	PASS	
PAH	benzo[a]anthracene	4	1.28	0.625	1.1975	13	PASS	
PAH	benzo[a]pyrene (BaP)	4	1.07	0.535	1.0145	5	PASS	
PAH	benzo[b]fluoranthene	4	1.41	0.68	1.3185	3.7	PASS	
PAH	benzo[g,h,i]perylene	4	0.5	0.3025	0.4985	350	PASS	
PAH	benzo[k]fluoranthene	4	0.38	0.2175	0.3635	100	PASS	
PAH	chrysene	4	1.47	0.7125	1.368	27	PASS	
PAH	dibenz[ah]anthracene	4	0.11	0.0725	0.1085	0.3	PASS	
PAH	fluoranthene	4	3.34	1.5275	3.0895	890	PASS	
PAH	fluorene	4	0.15	0.0725	0.141	860	PASS	
PAH	indeno[123-cd]pyrene	4	0.57	0.32	0.558	41	PASS	
PAH	naphthalene	4	0.08	0.0425	0.0725	13	PASS	
PAH	phenanthrene	4	1.85	0.8375	1.709	440	PASS	
PAH	pyrene	4	2.97	1.41	2.7555	2000	PASS	
PHENOLS AND CHLOROPHENOLS (S Phenol		4	0.4	0.3	0.4	380	PASS	
Comments Key Asbestos: A=amosite (brown), CH=chrysotile (white), CR=crocidolite (blue)								

4.6. Envirolab Ltd Certificates



Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/02816

Issue Number: 1

Date: 10 April, 2024

Client: T J Booth Associates
20a East Gate Street
Rochdale
Rochdale
Greater Manchester
UK
OL16 1DH

Project Manager: Daniel Slattery

Project Name: Johnson - 19 Broad Lane, Burnedge, Rochdale OL16 4QQ

Project Ref: Not specified

Order No: N/A

Date Samples Received: 18/03/24

Date Instructions Received: 19/03/24

Date Analysis Completed: 10/04/24

Approved by:

Gemma Berrisford
Deputy Client Services Supervisor





Envirolab Job Number: 24/02816

Client Project Name: Johnson - 19 Broad Lane, Burnedge,
Rochdale OL16 4QQ

Client Project Ref: Not specified

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4				Units	Limit of Detection	Method ref
Client Sample No	S1	S2	S3	S4						
Client Sample ID	TH1	TH2	TH3	TH4						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom	0.50	0.50	0.50	0.25						
Date Sampled	15-Mar-24	15-Mar-24	15-Mar-24	15-Mar-24						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4ABE	4ABCE	4AB	4ABE						
% Stones >10mm _A	3.7	5.7	5.9	10.6				% w/w	0.1	A-T-044
pH _D ^{MF}	6.87	8.14	6.10	7.97				pH	0.01	A-T-031s
Sulphate (acid soluble) _D ^{MF}	1100	1100	910	640				mg/kg	200	A-T-028s
Cyanide (total) _A ^{MF}	<1	<1	<1	<1				mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.4	<0.2	<0.4				mg/kg	0.2	A-T-050s
Sulphide _A	<5	<5	<5	<5				mg/kg	5	A-T-043-s
Sulphur (elemental) _D ^{MF}	<5	<5	12	<5				mg/kg	5	A-T-029s
Organic Matter _D ^{MF}	24.8	26.8	17.7	7.9				% w/w	0.1	A-T-032s
Arsenic _D ^{MF}	48	58	41	7				mg/kg	1	A-T-024s
Boron (water soluble) _D ^{MF}	<1.0	<1.0	<1.0	<1.0				mg/kg	1	A-T-027s
Cadmium _D ^{MF}	1.2	0.6	1.6	1.7				mg/kg	0.5	A-T-024s
Copper _D ^{MF}	204	82	90	34				mg/kg	1	A-T-024s
Chromium _D ^{MF}	40	15	17	16				mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1				mg/kg	1	A-T-040s
Lead _D ^{MF}	630	222	388	87				mg/kg	1	A-T-024s
Mercury _D	0.50	0.57	0.46	<0.17				mg/kg	0.17	A-T-024s
Nickel _D ^{MF}	39	21	31	21				mg/kg	1	A-T-024s
Selenium _D ^{MF}	<1	<1	<1	<1				mg/kg	1	A-T-024s
Zinc _D ^{MF}	362	46	487	98				mg/kg	5	A-T-024s



Envirolab Job Number: 24/02816

Client Project Name: Johnson - 19 Broad Lane, Burnedge,
Rochdale OL16 4QQ

Client Project Ref: Not specified

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4				Units	Limit of Detection	Method ref
Client Sample No	S1	S2	S3	S4						
Client Sample ID	TH1	TH2	TH3	TH4						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom	0.50	0.50	0.50	0.25						
Date Sampled	15-Mar-24	15-Mar-24	15-Mar-24	15-Mar-24						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4ABE	4ABCE	4AB	4ABE						
Asbestos in Soil (inc. matrix)										
Asbestos in soil ₀ ^g	NAD	NAD	NAD	NAD						A-T-045
Asbestos Matrix (visual) ₀	-	-	-	-						A-T-045
Asbestos Matrix (microscope) ₀	-	-	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ₀	N/A	N/A	N/A	N/A						A-T-045



Envirolab Job Number: 24/02816

Client Project Name: Johnson - 19 Broad Lane, Burnedge,
Rochdale OL16 4QQ

Client Project Ref: Not specified

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4				Units	Limit of Detection	Method ref
Client Sample No	S1	S2	S3	S4						
Client Sample ID	TH1	TH2	TH3	TH4						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom	0.50	0.50	0.50	0.25						
Date Sampled	15-Mar-24	15-Mar-24	15-Mar-24	15-Mar-24						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4ABE	4ABCE	4AB	4ABE						
PAH-16MS										
Acenaphthene _A ^{MS}	0.23	0.01	0.04	0.12				mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{MS}	0.04	<0.01	<0.01	0.01				mg/kg	0.01	A-T-019s
Anthracene _A ^{MS}	0.30	<0.02	0.07	0.20				mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{MS}	1.28	<0.04	0.45	0.73				mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{MS}	1.07	<0.04	0.33	0.70				mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{MS}	1.41	<0.05	0.46	0.80				mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{MS}	0.50	<0.05	0.17	0.49				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{MS}	0.38	<0.07	0.15	0.27				mg/kg	0.07	A-T-019s
Chrysene _A ^{MS}	1.47	<0.06	0.53	0.79				mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	0.11	<0.04	<0.04	0.10				mg/kg	0.04	A-T-019s
Fluoranthene _A ^{MS}	3.34	<0.08	1.02	1.67				mg/kg	0.08	A-T-019s
Fluorene _A ^{MS}	0.15	<0.01	0.04	0.09				mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{MS}	0.57	<0.03	0.19	0.49				mg/kg	0.03	A-T-019s
Naphthalene _A ^{MS}	0.08	<0.03	<0.03	<0.03				mg/kg	0.03	A-T-019s
Phenanthrene _A ^{MS}	1.85	0.09	0.50	0.91				mg/kg	0.03	A-T-019s
Pyrene _A ^{MS}	2.97	<0.07	1.06	1.54				mg/kg	0.07	A-T-019s
Total PAH-16MS _A	15.8	0.10	5.01	8.91				mg/kg	0.01	A-T-019s



Report Notes

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and Interpretations expressed are outside our scope of accreditation.

The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.

A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

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

Asbestos

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

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

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Assigned Matrix Codes

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

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

Soil Chemical Analysis:

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

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

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

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

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.

Results "with Clean up" indicates samples cleaned up with Silica during extraction.

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

EPH CWG results have humics mathematically subtracted through instrument calculation.

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

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

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

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



Envirolab Deviating Samples Report

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

Client: T J Booth Associates, 20a East Gate Street, Rochdale, Rochdale, Greater Manchester, UK, OL16 1DH
Project: Johnson - 19 Broad Lane, Burnedge, Rochdale OL16 4QQ
Clients Project No:

Project No: 24/02816
Date Received: 19/03/2024 (am)
Cool Box Temperatures (°C): 15.1

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4
Client Sample No	S1	S2	S3	S4
Client Sample ID/Depth	TH1 0.00-0.50m	TH2 0.00-0.50m	TH3 0.00-0.50m	TH4 0.00-0.25m
Date Sampled	15/03/24	15/03/24	15/03/24	15/03/24
Deviation Code	F	✓	✓	✓

Key

F Maximum holding time exceeded between sampling date and analysis for analytes listed below

HOLDING TIME EXCEEDANCES

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4
Client Sample No	S1	S2	S3	S4
Client Sample ID/Depth	TH1 0.00-0.50m	TH2 0.00-0.50m	TH3 0.00-0.50m	TH4 0.00-0.25m
Date Sampled	15/03/24	15/03/24	15/03/24	15/03/24
PAH-16MS	✓	✓	✓	✓

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Page 6 of 7



Envirolab Analysis Dates

Lab Sample ID	24/02816/1	24/02816/2	24/02816/3	24/02816/4
Client Sample No	S1	S2	S3	S4
Client Sample ID/Depth	TH1 0.00-0.50m	TH2 0.00-0.50m	TH3 0.00-0.50m	TH4 0.00-0.25m
Date Sampled	15/03/24	15/03/24	15/03/24	15/03/24
A-T-019s	10/04/2024	10/04/2024	10/04/2024	10/04/2024
A-T-024s	02/04/2024	02/04/2024	02/04/2024	02/04/2024
A-T-027s	28/03/2024	28/03/2024	28/03/2024	28/03/2024
A-T-028s	02/04/2024	02/04/2024	02/04/2024	02/04/2024
A-T-029s	02/04/2024	02/04/2024	02/04/2024	02/04/2024
A-T-031s	28/03/2024	28/03/2024	28/03/2024	28/03/2024
A-T-032s	02/04/2024	02/04/2024	02/04/2024	02/04/2024
A-T-040s	28/03/2024	28/03/2024	28/03/2024	28/03/2024
A-T-042sTCN	22/03/2024	22/03/2024	22/03/2024	22/03/2024
A-T-043-s	22/03/2024	22/03/2024	22/03/2024	22/03/2024
A-T-044	02/04/2024	02/04/2024	02/04/2024	02/04/2024
A-T-045	20/03/2024	20/03/2024	20/03/2024	20/03/2024
A-T-050s	27/03/2024	02/04/2024	27/03/2024	02/04/2024

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

End of Report

Page 7 of 7

5. APPENDIX B: PHOTOS



General Site photo from NE Site corner.



General Site photo from SW Site corner.



General Site photo from NW Site corner to E.



General Site photo from NW Site corner to S.



Trial Hole TH1.



Trial Hole TH2.



Trial Hole TH3.

6. APPENDIX C: LANDMARK ENVIROCHECK

