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Phase II Contaminated Land Risk Assessment

Lancashire Farm Dairies, Crawford Street, Rochdale

Sept 2024

Site Ref: 6160/VDA-CLRA v1.00

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Phase II Contaminated Land Risk Assessment

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Phase II Contaminated Land Risk Assessment

1. Introduction

This report is an account of a Phase II Contaminated Land Risk Assessment carried out by GeoAssist Limited at the request of the Client Pakeeza Dairies Limited for a proposed commercial development on land formerly used as a light industrial unit with associated carpark and access road on Crawford Street, Rochdale.

The work was commissioned following acceptance of the quotation and an instruction to proceed issued by the Client on the 10th July 2024.

The purpose of this Phase II investigation is to provide information following the conclusions of the phase I report produced by GeoAssist Ltd referenced 6160/VDA-PCLRA and dated August 2024, to ensure that the site:

- § Is assessed in accordance with the UK government methodology outlined online in Land Contamination Risk Management (LCRM)
- § Satisfies the relevant requirements of the National Planning Policy Framework December 2023.
- § Is suitable for the intended proposed land use. In this case, as a Commercial Development

The approximate grid reference for the centre of the site is 390480, 412500. The particular area of the site scheduled for investigation is outlined with a solid red line on the site plan in Appendix A1. The positions of exploratory holes are also indicated on the plan.

2. Description of the Site

2.1 Present

2.1 Present

The site is located within a commercial/ light industrial area at the convergence of Crawford Street and Dodgson Street approximately 1km to the south east of Rochdale Town Centre. The site forms an irregular shape and is generally level with the surrounding area.

The site boundary is formed by commercial property to the west and public roads to the south and north/north east over which lies more commercial property. An area of public open space is located across Dodgson Street to the east.

At the time of the site visit the site had been subject to demolition works and no buildings, structures or hard standing was present on site. The ground cover was noted to be crushed brick and concrete aggregate hardstanding.

Asides from some obvious surface litter there was no particular evidence of spillage or leakage noted on the ground and no other visual or olfactory observations of contaminants were noted during the site walkover.

2.2 Proposed

It is understood that the proposed development incorporates the construction of a new warehouse and associated hardstanding and access road. The proposed site plan forms appendix A2 to this report.

3. Review Of Previous Reports

The following ground investigation reports are known to have been produced for the site:

- § Mini Soil Surveys December 2022 referenced NTH 3429

The issues to be covered in the present investigation are to provide information in respect of any potentially unacceptable geo-environmental risks arising from previous land uses both on site and in the immediate area, and the potential for any sources of contamination to impact both present and future receptors, including:

- § Human
- § Controlled waters via established pathways
- § Property
- § Adjoining land

4. Intrusive Investigation

4.1 Intrusive Investigation Objectives

The objectives of the site investigation are to collect data to confirm whether or not the soils beneath the site, in their current state, pose a risk by reason of substances within or under the land that;

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

Data to describe the following parameters has been collected at a suitable spatial resolution in accordance with BS10175, 2011:

- § Soil Characteristics including type of material
- § Chemical profile of the soil.
- § Ground gas regime at the site

These data will be used to refine a conceptual site model and confirm the existence of any established pollutant linkages in accordance with Land Contamination Risk Management (LCRM) 2020, as well as The Environment Agency Requirements for Land Contamination Reports, 2005.

4.2 Intrusive Investigation Strategy

The ground investigation was carried out in accordance with British Standard 5930: 2015 Code of Practice for Site Investigations and BS BS10175: 2011 Investigation of potentially contaminated sites.

All fieldwork was supervised by suitably qualified GeoAssist Limited Engineers.

All Analytical testing was carried out in an independent UKAS accredited Laboratory.

4.3 Methods Used For Forming Exploratory Holes

The exploratory holes undertaken across the site as part of this investigation were established using percussive boring methods and 360 backhoe machine excavation for soil infiltration tests. The locations of exploratory holes are marked on the plan in appendix A1. Information obtained from the Phase I Preliminary Contaminated Land Risk Assessment was used to inform a decision on the actual exploratory hole locations whilst taking account of the positions that could be reasonably accessed with the drilling plant available.

4.4 Exploratory Hole Programme

In total six exploratory holes were established across the site. Environmental samples were recovered from BH1 to BH4. The details of the strata in the exploratory holes were recorded by a suitably qualified Professional Engineer. Upon completion of the fieldwork gas / groundwater monitoring installations were formed in exploratory holes BH1 to BH4 incorporating a length of plain pipe with a cement/bentonite surround, connected to a length of slotted pipe with a filter sock and pea gravel surround. The headworks comprised of a gas valve and lockable steel cover set in concrete flush with the surrounding ground.

The remaining exploratory holes (TP1 and TP2) were backfilled in accordance with the specification in order to

prevent the establishment of any potential pollutant pathways and the surface reinstated.

All intrusive work was carried out generally in accordance with:

§ British standard 5930: 2015 Code of Practice for Site Investigations where appropriate

§ British Standard 10175: 2011 where applicable

The field works were undertaken and completed between the 29th July to 6th August 2024.

4.5 Field Sampling and Testing

A non-targeted exploratory hole layout was selected as the most appropriate strategy for this site as the Phase I report had highlighted that the site had been used in an industrial capacity the precise location and nature of any potential contaminants of concern was unknown as a result of the previous building including the floor slabs having been demolished and removed from site. Representative samples were taken of all the strata encountered in the exploratory holes. Once exposed, samples to be subjected to chemical analysis were immediately placed into a suitable container and stored in a cool dark sample box prior to submission to the laboratory in order to prevent alteration of the composition of the samples. In all cases 500ml wide necked amber glass jars were used with a Teflon faced foamed polyethylene cap liner that offers excellent chemical resistance with the compressibility and sealing properties of polyethylene foam. These containers were filled with sample, sealed and delivered to the laboratory for testing. Samples for volatile compounds were placed into appropriate containers with a screw cap and pierceable septum as supplied by the testing laboratory specifically appropriate to the determinand. These containers were filled with sample sealed and delivered to the laboratory for testing. Observations of groundwater conditions were recorded throughout the fieldwork operations. All other samples were stored in airtight containers and returned to the laboratory for examination and geotechnical testing where necessary. A photo ionisation detector (PID) was used to indicate the likelihood of the presence of volatile organic compounds during the fieldwork and in the laboratory. The results are indicated on the Borehole logs only where readings in excess of 50ppm were Recorded.

5. Laboratory Investigation

5.1 Contamination Testing

In total 4 soil samples were collected and subjected to elements of the suite of chemical testing as outlined below. All tests were conducted by i2 Analytical Laboratories under UKAS Testing No 1549. The results of all the chemical analysis tests are given in Appendix C1.

Table 5.1 Analytical Determinands

Soils	
Arsenic	Acenaphthene
Boron (water-soluble)	Acenaphthylene
Cadmium	Anthracene
Chromium	Benzo(a)Anthracene
Chromium VI	Benzo(a)Pyrene
Copper	Benzo(b/k)Fluoranthene
Cyanide(Total)	Benzo(ghi)Perylene
Cyanide(free)	Chrysene
Lead	Dibenzo(ah)Anthracene
Mercury	Fluoranthene
Nickel	Fluorene
pH	Indeno(123-cd)Pyrene
Phenols(Mono)	Naphthalene
Selenium	Phenanthrene
SO4(Total)	Pyrene
Sulphide	
Sulphur(Free)	Asbestos screen & ID
Thiocyanate	TPH (only where PID testing indicates a requirement)
Zinc	BTEX (only where PID testing indicates a requirement)

6. Subsurface Stratigraphy

The subsoil profile obtained from the exploratory holes consists of granular mixed sandy gravel, brick and concrete fragments Made Ground overlying silty sands and silty clays.

The Made Ground is generally loose to medium dense in state of compaction.

Soft fibrous Peat was present beneath the Made Ground in BH2 and BH3 to 2.50m depth.

The sands extend to between 10.0m and 11.0m depth and vary from loose to medium dense in state of compaction.

Stiff very silty Clay with sand inclusions of low to intermediate plasticity was present beneath the sands and extended to 9.50m depth in BH1.

Further details of the subsurface stratigraphy can be found in the exploratory hole log sheets which form Appendix B1 to this report.

Table 6.0 Subsoil Profile Summary

Strata	Depth of Strata (m) below ground level	
	Top	Base
Made Ground	Ground Level	1.00 to 2.50
Variable mixed granular		
Soft fibrous Peat present in BH2 and BH3	1.00 to 1.90	2.50
Loose to medium dense silty Sand with occasional gravel inclusions	1.90 to 2.50	10.00 to 11.00
Stiff high strength very silty CLAY with sand inclusions	10.00 to 11.00	13.00 to 13.70
Medium dense SILT/fine Sand with silty clay inclusions	13.70	15.50 BH 1 only
Stiff high strength very silty CLAY with sand inclusions	15.50	>19.50 In BH1 only

7. Groundwater

Seepage groundwater was recorded between 2.80m and 3.00m depth during the course of the fieldwork. The groundwater conditions entered on the exploratory hole logs are those observed at the time of the investigation and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.

Groundwater levels associated with the ground gas monitoring in the standpipes installed on this site indicate that over the monitoring period to date, ground water has been recorded as being present at depths between 2.40m and 2.70m.

Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

8. Ground Gas

Four sets of ground gas risk monitoring readings have been undertaken in accordance with the sensitivity of the development and the generation potential of the anticipated sources.

A preliminary risk assessment undertaken as part of the Phase I report indicated a moderate potential for the presence of ground gas on this site with a moderate risk from historically infilled ground potentially present within 250m of the site boundary. The subsurface stratigraphy obtained from the exploratory holes on this site encountered upto 2.50m of made ground on site underlain by Peat in BH2 and BH3. The made ground was noted to consist of inert type materials. Putrescible materials capable of generating ground gases at volumes and concentrations such that the proposed development would be significantly impacted have not been noted in the exploratory holes established as part of this ground investigation.

The ground gas monitoring protocol used by GeoAssist follows standard practice and measures flow rates followed by gas concentrations. The gas concentrations are measured by pumping for 60 seconds followed by a 5 second stabilization period. Once readings have been logged the instrument is then purge pumped in atmosphere for the same period. The gas analysis equipment is manufactured by Gas Data Limited and is serviced and maintained at the manufacturers recommended intervals and calibrated every 12 months.

Findings from the exploratory holes confirm that made ground with the potential of producing significant volumes of ground gas at high concentrations has not been identified on the site.

Analysis of the gas monitoring data recorded from the installations show that Carbon Dioxide has been detected at levels between 0.4 and 9.2 % v/v within the exploratory holes. Peak CO₂ levels were detected in BH2 during the monitoring readings undertaken on the 03/09/2024. Methane, Hydrogen Sulphide and Carbon Monoxide have not been detected during the monitoring period. Peak flow rates have been monitored at 0.1l/hr. Consequently, a flow rate of 0.1l/hr has been applied for the calculation of gas screening values.

The combined worst-case Gas Screening Values (GSVs) in accordance with Ciria C665 Table 8.5 are calculated at less than 0.01 l/hr across the site. see appendix B2.

The Characteristic Situation is assessed to be 2 (CS2) in accordance with Ciria R149 as a consequence of Carbon Dioxide exceeding the 5% v/v level. It is recommended CS2 levels of protection for commercial buildings are incorporated into the design at this site. In accordance with Ciria C665 best practice guidance these are:

- a) Reinforced concrete cast in situ floor slab (suspended non-suspended or raft) with at least 1200gauge DPM
- b) Beam and block or pre cast concrete slab and minimum 2000 g DPM/reinforced gas membrane
- c) Possibly underfloor venting or pressurisation in combination with a) and b) depending on use
- d) All joints and penetrations sealed

9. Part IIA Legislation

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a new regime for the control of specific threats to health or the environment from existing land contamination. In accordance with the Act and the statutory guidance document on The Contaminated Land (England) Regulations 2000, the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only “contaminated land” where it appears to the regulatory authority, by reason of substances within or under the land that

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

The guidance defines “risk” as the combination of

- § The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and
- § The magnitude (including the seriousness) of the consequences.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- § A source, i.e. a substance that is capable of causing pollution or harm;
- § A receptor (or target). i.e. something which could be adversely affected by the contaminant; and
- § A pathway, i.e. a route by which the contaminant can reach the receptor.

If one of these elements is missing there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

9.1 Assessment Methodology

In order to assess the environmental risk posed by potential contaminants within the near surface soils considering the final levels of the scheme, GeoAssist Limited undertook an initial screen of the laboratory results using GeoAssist Limited Generic Assessment Criteria (GACs) and where applicable Category 4 Screening Levels or Suitable 4 Use Levels as given as part of Appendix C2.

The GeoAssist Limited GACs and Category 4 Screening levels (C4SLs and S4UL herein) are generated in consideration of the proposed end use of the site, in this case as Commercial/Industrial land. Contaminant concentrations below the GACs and or C4SLs levels are considered not to warrant further risk assessment. Concentrations of potential contaminants above the GACs and C4SLs levels require further consideration of the potential pollutant linkages. It should be noted that exceedance of the GACs and or C4SLs levels does not necessarily mean that the site requires remediation, although this is dependent on the nature, type and depth of the contaminant and further justification may be required.

9.2 Soils

For assessment of the soil analysis results with regard to potential human health risks, GeoAssist Limited GACs are selected from the following sources which represent minimal risk to site users:

CLEA Soil Guideline Values (SGVs). These values have been developed by the Department of the Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) using the Contaminated Land Exposure Assessment (CLEA) Model, and are considered to be protective of human health (considered to be a potential receptor on site). To date, SGVs have been published for only a limited suite of contaminants, with SGVs derived for each contaminant for three different land use scenarios namely:

- § residential
- § allotments
- § commercial and industrial.

The proposed assessment of this site is as Commercial/Industrial land as this is considered to be the most appropriate land use scenario for the current and proposed situation on site.

Chartered Institute of Environmental Health Generic Assessment Criteria (LQM CIEH GAC) have been used where available and where CLEA SGVs have not yet been published.

Where CLEA or LQIM CIEH GAC values are not available, Atkins at Risk GAC values have been selected as appropriate all of which represent a minimal risk to receptors.

C4SLs have been used in conjunction with the above GAC and these represent a Low Level of Toxicological Concern (LLTC herein). LLTC represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as Significant Possibility of Significant Harm.

The CLEA guidelines state that for each contaminant, apart from lead, the upper 95th percentile of the mean measured concentration should be calculated where appropriate and this value should be compared to the applicable screening value (defined here as the GeoAssist Limited GACs). For Lead impacts the geometric mean should be calculated and compared to the GAC or C4SL.

The CLEA model states that, 'the contamination is assumed to be at or within 1 m of the surface (CLR10 page 10 now withdrawn).' It is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway. Typically, volatile compounds only significantly affect the indoor inhalation pathway.

9.3 Subsoil Deposits

The contaminants that were identified above the GeoAssist Limited GACs, SGVs or C4SLs for a Commercial end use from the GeoAssist Limited investigations are summarised below:

Table 9.3 Summary identified impacts.

Determinand	GAC (mg/kg) Comm./ind.	Total tests	No. of / No. of tests in impacted strata (Made Ground)	No of samples exceeding SGV/GAC/ C4SL	Max Value (mg/kg)	Treat as Hotspot	US95 Value	Further action required
Heavy Metals and Metalloids								
None Identified exceeding Assessment Criteria								
PAH Compounds								
None Identified exceeding Assessment Criteria								
Total Petroleum Hydrocarbon Compounds								
None Identified exceeding Assessment Criteria								
Asbestos and Asbestos Containing Materials								
Chrysotile Fibre(s)	Detected	4/4		4	No count	No	NA	Yes (see below)

The analytical laboratory test results and analysis are presented in appendix C1 & C2 and, other than asbestos fibre, have not identified any other risks to end users of the Site from elevated levels of anthropogenic contamination within the near surface or deeper natural superficial deposits on the Site. Results have confirmed that no samples were found to exceed the applicable assessment criteria and the site may be considered not to present a significant possibility of significant harm to human health in the context of Part IIA.

Chrysotile asbestos fibre was confirmed to be present within all of the samples tested. Earth works contractors are those most at risk and it is the duty of the principal contractor to apply appropriate measures under the Health & Safety at Work Act 1974 and the Control of Asbestos Regulations 2012. The developer and the contractor should be aware that any excavations may need a specific and detailed method statement and they should satisfy themselves that where applicable the CAR 2012 regulations have been adhered to. The asbestos content of soils on samples submitted to the laboratory has not been determined and further sampling during site clearance is recommended to enable further quantification of the risks and hazard exposure ranking according to the JIWG decision support tool. The soils samples submitted to the laboratory are likely to be representative of those found on site. However, this does not preclude the possibility that further occurrences or pockets of Asbestos or ACM could occur within the made ground on site.

The results of all the chemical laboratory analytical tests form appendix C1 to this report and the analysis of the

results forms appendix C2 to this report.

9.4 Discussion

General

The assessment of the chemical laboratory analytical tests has identified that the soils on this site pose a moderate risk to construction workers when assessed in accordance with the current UK methodology. The risk to end user receptors from the identified risks is considered to be low given the commercial end use of the site and the levels of hardstanding cover to the proposed scheme. The risks to the wider environment are not likely to be significant. The final scheme for the site incorporates limited areas of greenery and soft landscaping mainly to the northern and eastern perimeter of the site and the soils in these areas should be tested to confirm suitability to remain on site as these areas have not been impacted by the demolition works. It is particularly important that arisings from any site works are not reused or stockpiled in areas of soft landscaping.

Construction Workers

The risk to construction workers and site users during the construction phase is assessed to be moderate as a consequence and Standard PPE & RPE precautions should be employed at the site strip stage including the use of disposable coveralls, particulate masks and damping down to suppress airborne dust where conditions dictate. The results of asbestos fibre screening indicate that Chrysotile Asbestos fibres were detected within all of the samples of made ground submitted for analysis. However, this does not completely preclude the possibility that further occurrences of other types of ACM could occur within the made ground on site.

Earth works contractors are those most at risk from this issue and it is the duty of the principal contractor to apply appropriate measures under the Health & Safety at Work Act 1974 and the Control of Asbestos Regulations 2012 (if applicable) To ensure that risks are mitigated to an appropriate level.

Groundwater

The results of the soils chemical analysis also indicate that the underlying aquifer beneath the site or any close by controlled waters are highly unlikely to be at significant risk from the passage of water through the site.

Water Supply Pipes

The risk to building and services from chemical attack is likely to be negligible and as such no special precautions are required to protect the building fabric or services entering the buildings. However, this should be confirmed by a competent person before service routes and locations are finalised.

Off Site Waste Disposal

It is not envisaged that any great quantity of materials will be excavated and disposed of to off site locations as part of the development. It is understood that a piled foundation solution is likely to be implemented for the foundations and where possible a displacement pile type should be preferentially used to reduce disturbance to the ground. It is recommended that the advice of a specialist waste haulage contractor be sought prior to disposal of material from the site. Testing should be undertaken on actual excavated stockpiles of spoil intended for off-site disposal to landfill. It should be noted that disposal at landfill is not the only option for materials leaving the Site

and off site recycling of all arisings through a recognised EA hub site using the voluntary code of practice (COP) could present opportunities for savings over traditional landfilling.

10. Conceptual Model

The updated conceptual model based on the information and test results presented in this report including contamination sources, pathways and receptors is presented below.

Table 10.0 Amended Conceptual Site Model based on information as presented within this report.

Potential Source /Hazard	Nature of Hazard (Risk Level to site given a Commercial end use)	Contaminants Associated with Source	Potential Pathway	Potential Receptor
<i>Previous & Present ON SITE Land uses:</i>				
1. Open Land	Ground contamination Low Risk	None	Dermal Contact Ingestion Inhalation	Site Users Construction workers Controlled Waters
	Gas from in-filled ground CS2 Very Low Risk	Carbon Dioxide	Vertical and Lateral Migration	Site Users Future Buildings & Services
2. Terraced Houses (cellars)	Ground contamination Moderate Risk	Asbestos Fibre	Dermal Contact Ingestion Inhalation	Site Users Construction workers Controlled Waters
	Gas from in-filled ground CS2 Very Low Risk	Carbon Dioxide	Vertical and Lateral Migration	Site Users Future Buildings & Services
3. Works/ Engineering Works	Ground contamination Moderate Risk	Asbestos Fibre	Dermal Contact Ingestion Inhalation	Site Users Construction workers Controlled Waters
	Gas from in-filled ground CS2 Very Low Risk	Methane Carbon Dioxide	Vertical and Lateral Migration	Site Users Future Buildings & Services
4. Peat & Made Ground identified in 2022 GI	Geotechnical Hazard Moderate Risk	None	Subsidence	Future Buildings & Services
	Ground contamination Low Risk	None Identified	None	Site Users Services
	Ground Gas CS2 Very Low Risk	Carbon Dioxide	Vertical and Lateral Migration	Humans (site users) Future Buildings & Services
<i>Previous OFF SITE land uses within 250m as indicated by Historical Plans Including:</i>				
5. Cotton Mills Works & Associated Chimneys Reservoirs and Tanks Corporation Yard Garage Foundry	Ground contamination Low to Moderate Risk	See DoE Profiles	Dermal Contact Ingestion Inhalation	Site Users Construction workers Controlled Waters
	Gas from in-filled ground CS2 Very Low Risk	Carbon Dioxide	Vertical and Lateral Migration	Site Users Future Buildings & Services
6. Coal Workings & Mineral Extraction	Geotechnical Hazard Low Risk	None	Ground Collapse Subsidence	Humans (site users) Future Buildings & Services
	Ground contamination Low Risk	None	None	Site Users Services
	Mine Gas CS2 Very Low Risk	None	None	Humans (site users) Future Buildings

Only sources that have not been present on site in the past or currently are considered within the off site category. Unless the information is deemed to be pertinent to the analysis.

11. Conclusions

Evidence presented elsewhere within this report indicates that the ground on this site presents a Moderate risk to construction worker receptors and a low risk to end users given a commercial/industrial end use scenario. Specific measures should be taken to mitigate against risks from ground gas.

Elsewhere,

- § The controlled waters (groundwater) beneath the site are unlikely to become significantly impacted by the passage of water through the soils on site.
- § The site is unlikely to be defined as contaminated land within the context of part IIA.
- § The site, in its present condition, does not represent a significant risk to the environment and is unlikely to become an environmental liability in the future.
- § The risk to building services from chemical attack is likely to be negligible and as such no special precautions are required to protect the building fabric or services entering the buildings. However, this should be confirmed by a competent person once service routes and locations have been decided.
- § The risk classification should be reassessed once a final scheme design incorporating final finished levels has been issued.
- § Further asbestos identification and quantification testing should be undertaken during any site clearance/enabling operations.

11.1 Supplementary Recommendations

None



Matthew Benson MSc GMICE
Geotechnical/Environmental Engineer



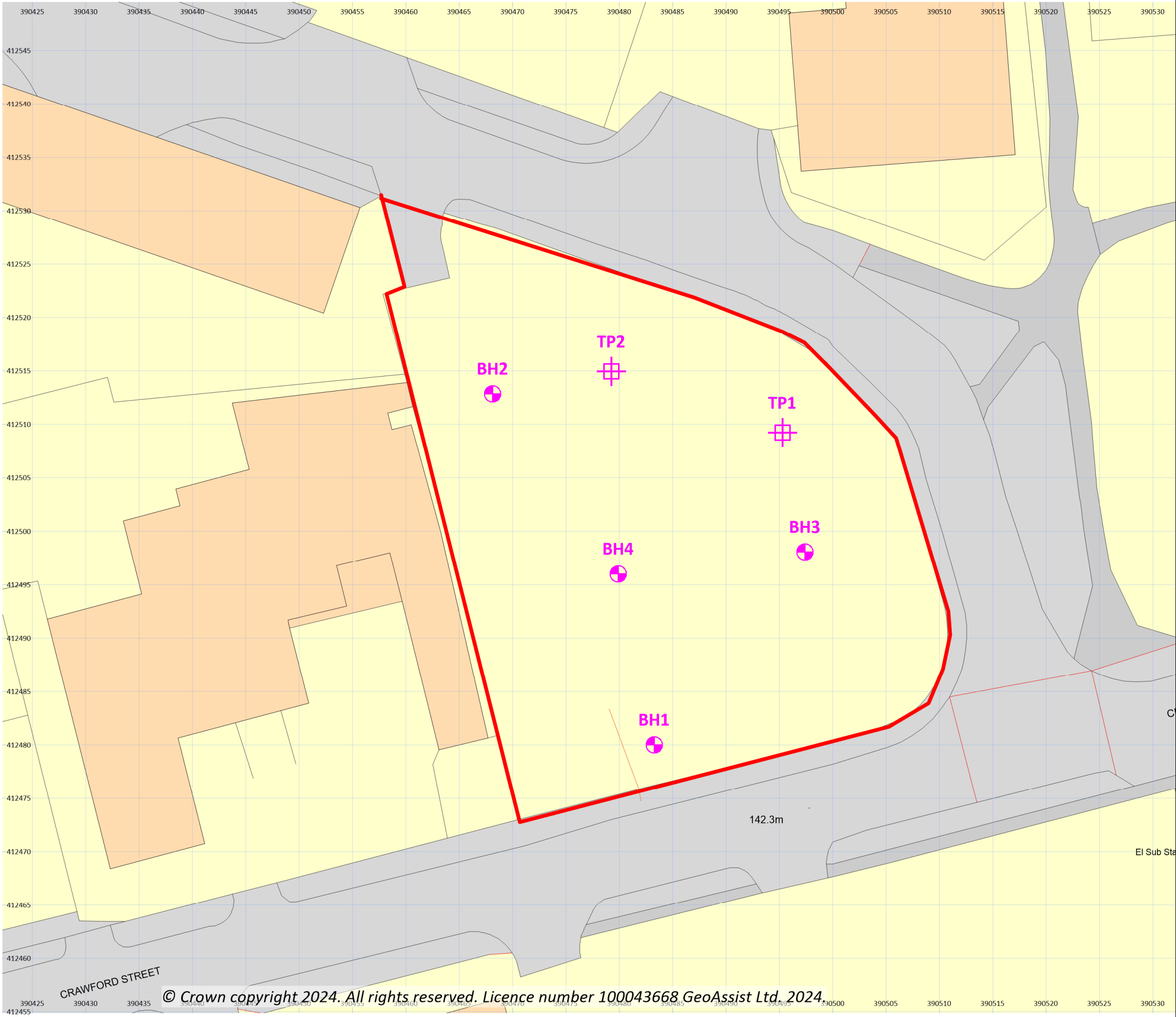
Mark Richardson MSc CEng MICE
Technical Director

Field investigations have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions are, and can be, variable and have only been tested at isolated locations across the site. Therefore the potential exists for ground conditions to be encountered which are different to those considered in this report. Chemical analysis was conducted for a number of parameters based on an expert understanding of the historical and operational data available at the time and it should not be inferred or otherwise, that other chemical species are not present.

This report has been prepared by GeoAssist Limited with all reasonable professional skill, care and diligence within the terms of the contract with Pakeeza Dairies Limited. The report is confidential to Pakeeza Dairies Limited and BrennanConsult Ltd, their/the named persons advisors and bankers, and GeoAssist Limited accepts no responsibility of whatever nature to third parties to whom this report may be divulged. GeoAssist Limited owns the copyright in this report. All rights are reserved, and unauthorised use is prohibited. Pakeeza Dairies Limited and BrennanConsult Ltd may use the report for their/her/his own purposes.

Appendix A

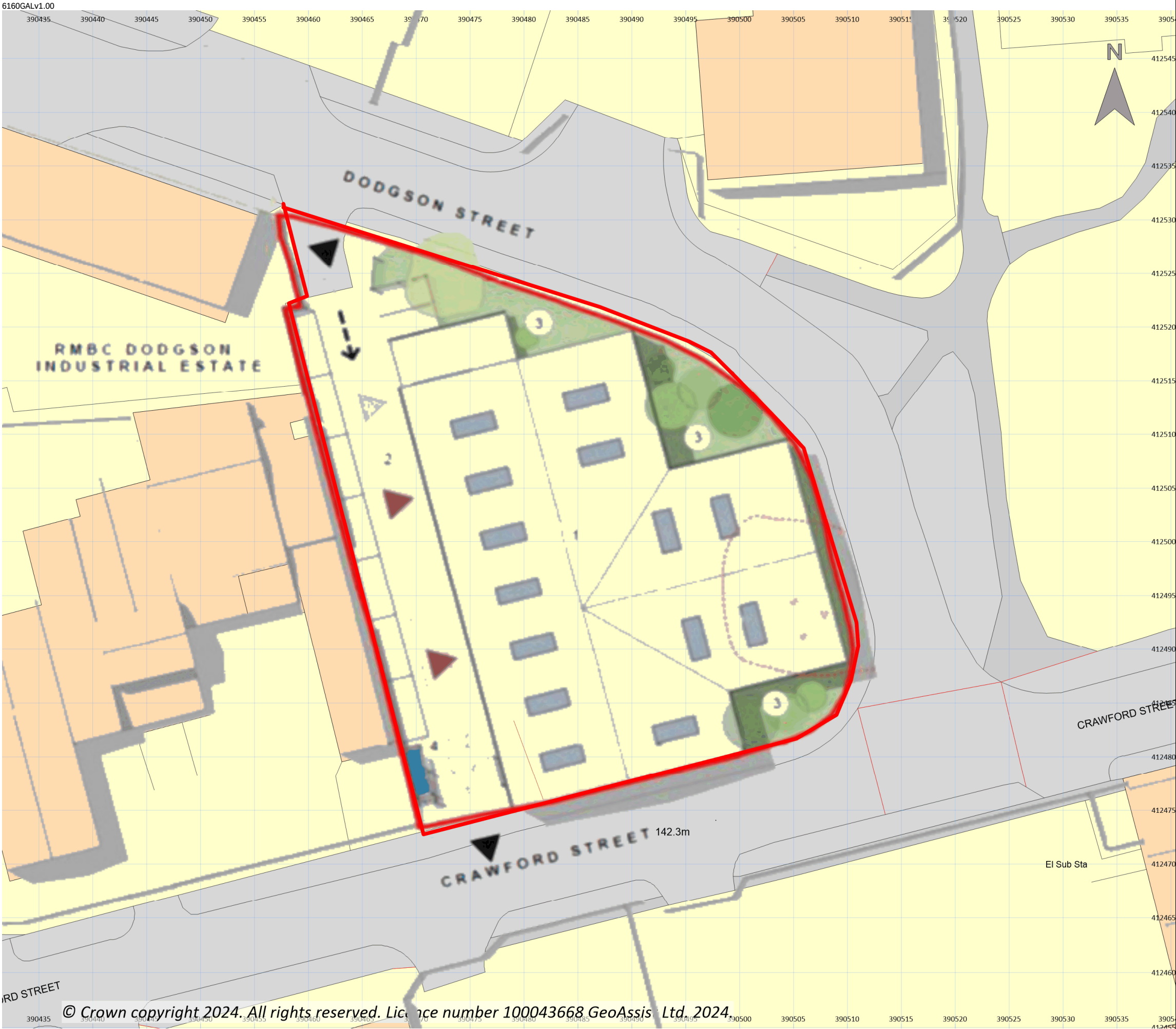
- A1 Site Plan with Exploratory Hole Locations
- A2 Proposed Site Plan



A1 Site Plan

Site Name	Lancashire Farm Dairies
Location	Crawford Street, Rochdale
GeoAssist Ref	6160VDA
Client	Pakeeza Dairies Limited
	Unit 2b Moss Bridge Road Rochdale, Greater Manchester OL16 5LX
Planning Consultant	BrennanConsult Ltd
NGR (centre of site)	390480,412500
Production Date	August 2024
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

Do Not Scale



A2 Site Development Plan

Site Name	Lancashire Farm Dairies
Location	Crawford Street, Rochdale
GeoAssist Ref	6160VDA
Client	Pakeeza Dairies Limited
	Unit 2b Moss Bridge Road Rochdale, Greater Manchester OL16 5LX
Planning Consultant	BrennanConsult Ltd
NGR (centre of site)	390480,412500
Production Date	August 2024
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

Do Not Scale

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Appendix B

- B1 Exploratory Hole Logs
- B2 Ground Gas Readings and Risk Assessment

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: BH1								
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies					Sheet: 1								
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale				Equipment: Dando LCP Rig (150mm casing)									
						Ground Level: 142.09 m.AOD									
						Co-ordinates: Easting: 390483.3(m) Northing: 412480(m)									
						Dates: 29/07/2024 to 31/07/2024									
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION		Depth (Thick) (m)		Reduced Level (mAOD)		Strata Legend/ Standpipe Backfill		Samples/Tests/Core Records				Field Records			
Site Geotechnical Engineer/Geologist: M Benson								Depth (m) from to		Ref.		Count N/(U) T % S % RQD %			
0 Very loose to loose dark brown/grey sandy gravel with brick and slate fragments - MADE GROUND								0.50 0.60		C1					
1		(2.50)						1.00 1.45		P1		4		P1 at 1.00m - 7,2/1,1,1,1	
								1.50 1.60		D1					
2								2.00 2.45		P2		7		P2 at 2.00m - 1,3/3,2,1,1	
3		2.50		139.59				2.50 2.60		D2				Water struck at 3.00m depth. Water level at 2.80m after 20mins. P3 at 3.00m - 2,2/2,3,3,4	
4		(2.70)						3.00 3.45		P3		12			
								3.50 3.60		D3					
5								4.00 4.45		P4		18		P4 at 4.00m - 3,4/5,5,4,4	
								4.50 4.60		D4					
6		5.20		136.89				5.00 5.45		P5		26		P5 at 5.00m - 2,3/4,5,9,8	
7		(3.80)						5.50 5.60		D5					
								6.00 6.45		P6		16		P6 at 6.00m - 2,3/3,5,3,5	
8								6.50 6.60		D6					
								7.00 7.45		P7		11		P7 at 7.00m - 2,2/2,2,3,4	
9								7.50 7.60		D7					
								8.00 8.45		P8		16		P8 at 8.00m - 2,3/3,4,4,5	
10		9.00		133.09				8.50 8.60		D8					
11		(1.00)						9.00 9.45		P9		22		P9 at 9.00m - 2,4/5,5,5,7	
								9.50 9.60		D9					
12		10.00		132.09											
Remarks: The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.														Logged: M Benson	
														Date: 02/08/2024	
														Checked: M Richardson	
														Date: 05/09/2024	
														Site Ref: 6160/VDA	
														Scale 1:50 nominal	

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: BH1					
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies					Sheet: 2					
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale			Equipment: Dando LCP Rig (150mm casing)							
					Ground Level: 142.09 m.AOD							
					Co-ordinates: Easting: 390483.3(m) Northing: 412480(m)							
					Dates: 29/07/2024 to 31/07/2024							
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records			Field Records				
Site Geotechnical Engineer/Geologist: M Benson					Depth (m) from to	Ref.	Count N/(U)					
10 Continued Stratum - Medium dense brown SILT/fine SAND		(0.60)			10.20 10.65	P10		17	P10 at 10.20m - 3,4/4,4,4,5			
		10.60	131.49		10.60 10.70	D10						
Stiff brown/grey sandy very silty CLAY with sand inclusions												
11					11.20 11.65	P11		19	P11 at 11.20m - 3,3/4,5,5,5			
12		(3.10)			12.00 12.45	U1		(35)	Undrained Triaxial at 12.00m-86kPa			
					12.50 12.60	D11						
13					13.10 13.55	P12		26	P12 at 13.10m - 5,5/6,6,7,7			
		13.70	128.39		13.50 13.60	D12			Water struck at 13.70m depth.			
Medium dense brown SILT/fine SAND with silty clay inclusions					13.70 13.80	D13			Water level at 13.40m after 20mins.			
14												
		(1.80)			15.00 15.45	P13		19	P13 at 15.00m - 3,3/3,5,5,6			
15		15.50	126.59		15.50 15.60	D14						
Stiff grey/brown very sandy very silty CLAY with sand inclusions												
16					16.00 16.45	P14		22	P14 at 16.00m - 2,3/4,6,6,6			
					16.50 16.60	D15						
17					17.00 17.45	P15		21	P15 at 17.00m - 4,5/5,5,5,6			
		(4.00)			17.50 17.60	D16						
18					18.00 18.45	P16		24	P16 at 18.00m - 3,4/5,6,6,7			
					18.50 18.60	D17			31/08/2024: Borehole at 18.50m. Casing at 18.00m.			
19					19.00 19.45	P17		38	Water level at 6.40m.			
		19.50	122.59						01/09/2024: Overnight water level at 3.20m. On withdrawal of casing 50mm groundwater monitoring standpipe installed to 5.00m with response zone from 1.00m to 5.00m depth.			
Exploratory Hole complete at 19.50m									P17 at 19.00m - 3,4/7,9,10,12			
20												
Remarks:								Logged: M Benson				
The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.								Date: 02/08/2024				
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.								Checked: M Richardson				
								Date: 05/09/2024				
								Site Ref: 6160/VDA				
								Scale 1:50 nominal				

GeoAssist Limited		Exploratory Hole Record Sheet				Ref: BH2						
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies				Sheet: 1						
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale				Ground Level: 141.64 m.AOD						
		Equipment: Dart WSL + DCP Rig				Co-ordinates: Easting: 390468.1(m) Northing: 412512.8(m)						
						Dates: 02/08/2024 to 02/08/2024						
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION		Depth (Thick) (m)		Reduced Level (mAOD)		Strata Legend/ Standpipe Backfill		Samples/Tests/Core Records			Field Records	
Site Geotechnical Engineer/Geologist: M Benson						Depth (m) from to		Ref.	Count N/(U)			
								T %	S %	RQD %		
0 Dark brown/grey sandy gravel with brick and slate fragments - MADE GROUND						0.50 0.60 0.70 0.80		C1 D1				
1		(1.90)				1.00		P1	9			
						1.50		P2	0			
2 Dark brown fibrous PEAT		1.90 139.74				2.00		P3	0			
		(0.60)				2.30 2.40		D2				
3 Medium dense orange/brown slightly gravelly slightly silty fine to medium SAND		2.50 139.14				2.50		P4	19			
		(1.00)				3.00		P5	27		Wet from 3.00m	
4 Medium dense light grey gravelly slightly silty fine to medium SAND with sandy gravel inclusions		3.50 138.14				3.50 3.60		D3				
		(1.50)				4.00 4.10		P6 D4	25			
5 Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum		5.00 136.64				5.00		P7	31			
		(5.00)				6.00		P8	17			
6						7.00		P9	24			
7						8.00		P10	19			
8						9.00		P11	19			
9												
10		10.00 131.64										
Remarks: The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.								Logged: M Benson Date: 05/08/2024 Checked: M Richardson Date: 05/09/2024 Site Ref: 6160/VDA Scale 1:50 nominal				

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: BH2			
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies					Sheet: 2			
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale			Equipment: Dart WSL + DCP Rig				Ground Level: 141.64 m.AOD	
					Co-ordinates: Easting: 390468.1(m) Northing: 412512.8(m)				Dates: 02/08/2024 to 02/08/2024	
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records		Count N/(U)		Field Records	
Site Geotechnical Engineer/Geologist: M Benson					Depth (m) from to	Ref.	T %	S %	RQD %	
10 Continued Stratum - Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum		(1.00)			10.00	P12		24		
11 Stiff brown very sandy very silty CLAY with sand inclusions - Interpreted Stratum		11.00	130.64		11.00	P13		21		
12		(2.00)			12.00	P14		28		
13 Exploratory Hole complete at 13.00m		13.00	128.64		12.90	P15		31		
14										
15										
16										
17										
18										
19										
20										

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson

Date: 05/08/2024

Checked: M Richardson

Date: 05/09/2024

Site Ref: 6160/VDA

Scale 1:50 nominal

GeoAssist Limited Consultant: BrennanConsult Ltd Client: Pakeeza Dairies Limited	Exploratory Hole Record Sheet Project: Lancashire Farm Dairies Location: Crawford Street, Rochdale Equipment: Dart WSL + DCP Rig					Ref: BH3 Sheet: 1 Ground Level: 142.13 m.AOD Co-ordinates: Easting: 390497.4(m) Northing: 412498.1(m) Dates: 02/08/2024 to 02/08/2024				
	Lead Driller: M Walton Assistant Driller: M Benson		Depth (Thick (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records				Field Records
	STRATUM DESCRIPTION Site Geotechnical Engineer/Geologist: M Benson					Depth (m) from to	Ref.	Count N/(U)		
									T %	S %
0 Dark brown/grey sandy gravel with brick and slate fragments - MADE GROUND		(1.00)			0.50 0.60	C1				
1 Dark brown fibrous PEAT with sand inclusions		1.00	141.13		1.00	P1		2		
					1.50 1.50 1.60	P2 D1		1		
		(1.50)			2.00 2.00 2.10	P3 D2		5		
		2.50	139.63		2.50	P4		3		
3 Loose to medium dense orange/brown slightly gravelly very silty fine to medium SAND					3.00	P5		14		Wet from 3.00m
		(1.50)			3.50 3.60	D3				
		4.00	138.13		4.00	P6		8		
4 Loose light grey slightly gravelly silty fine to medium SAND		(1.00)								
		5.00	137.13		5.00	P7		14		
5 Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum					6.00	P8		19		
					7.00	P9		17		
		(5.00)			8.00	P10		14		
					9.00	P11		22		
10		10.00	132.13							
Remarks: The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.							Logged: M Benson Date: 05/08/2024 Checked: M Richardson Date: 05/09/2024 Site Ref: 6160/VDA Scale 1:50 nominal			

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: BH3						
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies					Sheet: 2						
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale			Equipment: Dart WSL + DCP Rig								
					Ground Level: 142.13 m.AOD								
					Co-ordinates: Easting: 390497.4(m) Northing: 412498.1(m)								
					Dates: 02/08/2024 to 02/08/2024								
Lead Driller: M Walton Assistant Driller:		STRATUM DESCRIPTION		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records			Field Records			
Site Geotechnical Engineer/Geologist: M Benson							Depth (m) from to	Ref.	Count N/(U)	T %	S %	RQD %	
10 Continued Stratum - Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum		(1.00)					10.00	P12		23			
11 Stiff to very stiff brown very sandy very silty CLAY with sand inclusions - Interpreted Stratum		11.00	131.13				11.00	P13		25			
12		(2.00)					12.00	P14		31			
13 Exploratory Hole complete at 13.00m		13.00	129.13				12.90	P15		33			
14													
15													
16													
17													
18													
19													
20													

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson

Date: 05/08/2024

Checked: M Richardson

Date: 05/09/2024

Site Ref: 6160/VDA

Scale 1:50 nominal

GeoAssist Limited		Exploratory Hole Record Sheet				Ref: BH4				
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies				Sheet: 1				
Client: Pakeeza Dairies Limited		Location: Crawford Street, Rochdale				Ground Level: 141.65 m.AOD				
		Equipment: Dart WSL + DCP Rig				Co-ordinates: Easting: 390479.9(m) Northing: 412496(m)				
						Dates: 02/08/2024 to 02/08/2024				
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records				Field Records	
Site Geotechnical Engineer/Geologist: M Benson					Depth (m) from to		Ref.	Count N/(U)		
							T %	S %	RQD %	
0 Dark brown/grey sandy gravel with brick and slate fragments - MADE GROUND					0.50 0.60	C1				
1		(1.90)			1.00	P1		7		
					1.50 1.60	P2 D1		12		
2 Loose to medium dense dark brown silty fine to medium SAND		1.90 139.75			2.00	P3		14		
		(0.80)			2.50	P4		5		
3 Medium dense orange/brown gravelly silty fine to medium SAND		2.70 138.95			3.00	P5		18		Wet from 3.00m
4		(2.50)			4.00	P6		28		
					5.00	P7		28		
5 Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum		5.00 136.65			6.00	P8		25		
6					7.00	P9		21		
		(5.00)			8.00	P10		21		
7					9.00	P11		24		
8										
9										
10		10.00 131.65								
Remarks: The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.							Logged: M Benson Date: 05/08/2024 Checked: M Richardson Date: 05/09/2024 Site Ref: 6160/VDA Scale 1:50 nominal			

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: BH4	
Consultant: BrennanConsult Ltd		Project: Lancashire Farm Dairies Location: Crawford Street, Rochdale					Sheet: 2	
Client: Pakeeza Dairies Limited		Equipment: Dart WSL + DCP Rig			Ground Level: 141.65 m.AOD Co-ordinates: Easting: 390479.9(m) Northing: 412496(m) Dates: 02/08/2024 to 02/08/2024			
Lead Driller: M Walton Assistant Driller: STRATUM DESCRIPTION Site Geotechnical Engineer/Geologist: M Benson		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests/Core Records		Field Records	
					Depth (m) from to	Ref.	Count N/(U) T % S % RQD %	
10 Continued Stratum - Medium dense orange/brown slightly gravelly silty fine to medium SAND - Interpreted Stratum		(1.00)			10.00	P12	22	
11 Stiff to very stiff brown very sandy very silty CLAY with sand inclusions - Interpreted Stratum		11.00	130.65		11.00	P13	29	
12		(2.00)			12.00	P14	32	
13 Exploratory Hole complete at 13.00m		13.00	128.65		12.90	P15	36	
14								
15								
16								
17								
18								
19								
20								
Remarks: The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.							Logged: M Benson Date: 05/08/2024 Checked: M Richardson Date: 05/09/2024 Site Ref: 6160/VDA Scale 1:50 nominal	

Site Reference:	6160 VDA
Project Site:	Lancashire Farm Dairies
Project Location:	Crawford Street, Rochdale
Client:	Pakeeza Dairies Limited

Ground Gas Readings

Date - Time	BH	CH4 (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flw (l/h)	H2O (m)	PID
06/08/2024	BH1	0.0	0.8	19.7	0.0	0.0	0.0	991	0.0	2.40	
06/08/2024	BH2	0.0	1.6	18.2	0.0	0.0	0.0	990	0.0	2.60	
06/08/2024	BH3	0.0	4.0	16.5	0.0	0.0	0.0	990	0.0	3.00	
06/08/2024	BH4	0.0	0.4	9.2	0.0	0.0	0.0	991	0.0	2.65	
22/08/2024	BH1	0.0	0.6	20.1	0.0	0.0	0.0	982	0.0	2.40	
22/08/2024	BH2	0.0	2.3	16.1	0.0	0.0	0.0	981	0.1	2.60	
22/08/2024	BH3	0.0	2.3	17.8	0.0	0.0	0.0	982	0.0	3.00	
22/08/2024	BH4	0.0	1.9	5.8	0.0	0.0	0.0	981	0.1	2.65	
03/09/2024	BH1	0.0	0.7	19.9	0.0	0.0	0.0	996	0.0	2.45	
03/09/2024	BH2	0.0	9.2	6.1	0.0	0.0	0.0	996	0.0	2.70	
03/09/2024	BH3	0.0	2.7	16.7	0.0	0.0	0.0	995	0.0	3.10	
03/09/2024	BH4	0.0	2.0	9.7	0.0	0.0	0.0	996	0.0	2.75	
11/09/2024	BH1	0.0	0.7	19.9	0.0	0.0	0.0	990	0.0	2.40	
11/09/2024	BH2	0.0	8.9	6.3	0.0	0.0	0.0	990	0.0	2.70	
11/09/2024	BH3	0.0	3.3	16.5	0.0	0.0	0.0	988	0.0	3.10	
11/09/2024	BH4	0.0	2.6	6.6	0.0	0.0	0.0	989	0.0	2.75	

Site Reference:	6160 VDA
Project Site:	Lancashire Farm Dairies
Project Location:	Crawford Street, Rochdale
Client:	Pakeeza Dairies Limited

Factual Data Summary										Interpretation & Risk Assessment					
BH Ref.	Response zone/strata	Evidence of Gas contamination	No of Monitoring occasions	Max. Recorded Methane ***	Max. Recorded Carbon Dioxide (%)	Min. Oxygen (%)	Max. Recorded Flow (l/hr)	Water Level (mbgl)	Atmospheric Pressure Range (mb)	Is Water Level within top 10% of the response zone?	Are readings considered representative	Explanation / Justification	Gas Screening Value (GSV) Methane*	Gas Screening Value (GSV) Carbon Dioxide*	Risk Classification & Characteristic Situation **
BH1	0	Yes	4	0.0	0.8	19.7	0.0	2.4	982-996	No	Yes		0.000	0.001	Very Low Risk Characteristic Situation 1
BH2	0	Yes	4	0.0	9.2	6.1	0.1	2.6	981-996	No	Yes		0.000	0.009	Low Risk Characteristic Situation 2
BH3	0	Yes	4	0.0	4.0	16.5	0.0	3.0	982-995	No	Yes		0.000	0.004	Very Low Risk Characteristic Situation 1
BH4	0	Yes	4	0.0	2.6	5.8	0.1	2.7	981-996	No	Yes		0.000	0.003	Very Low Risk Characteristic Situation 1
Worst Case	0	No	16	0.0	9.2	5.8	0.1	2.4	981-996	No	Yes		0.000	0.009	Low Risk Characteristic Situation 2

*** Methane & hydrocarbon cross sensitivity influenced readings

* Where no flow measured, GSV value is determined with an instrument minimum value of 0.1 l/hr

** Risk classification/Characteristic situation based on GSV and Methane >1% /CO2 >5% and other influencing factors

Appendix C

- C1 I2 Analytical Test Results
- C2 Analytical Results with Assessment Criteria



GeoAssist Ltd
Unit 4, Sheffield Street
Heaton Norris
Stockport
Cheshire
SK4 1RU

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

t: 01923 225404
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e: reception@i2analytical.com

e: info@geoassist.co.uk

Analytical Report Number : 24-035627

Project / Site name:	Lancashire Farm Dairies, Rochdale	Samples received on:	09/08/2024
Your job number:	6160 VDA	Samples instructed on/ Analysis started on:	09/08/2024
Your order number:	2240808	Analysis completed by:	19/08/2024
Report Issue Number:	1	Report issued on:	19/08/2024
Samples Analysed:	4 soil samples		

Signed:

Rafał Szczepańczyk
Technical Reviewer
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: 24-035627
Project / Site name: Lancashire Farm Dairies, Rochdale
Your Order No: 2240808

Lab Sample Number	283256	283257	283258	283259
Sample Reference	BH1	BH2	BH3	BH4
Sample Number	C1	C1	C1	C1
Depth (m)	0.50	0.50	0.50	0.50
Date Sampled	08/08/2024	08/08/2024	08/08/2024	08/08/2024
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	14	10	13
Total mass of sample received	kg	0.1	NONE	0.7	0.6	0.2	0.7

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB
Actinolite detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Amosite detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Anthophyllite detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Chrysotile detected	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected
Crocidolite detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Tremolite detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected

Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	Loose Fibres	Loose Fibres	Loose Fibres	Loose Fibres
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General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8.4	8.2	7.8	8.2
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
Total Sulphate as SO ₄	%	0.005	MCERTS	0.057	0.073	0.07	0.089
Sulphide	mg/kg	1	MCERTS	3.1	5.3	6.4	40
Total Sulphur	mg/kg	50	MCERTS	400	470	480	630
Total Sulphur	%	0.005	MCERTS	0.04	0.047	0.048	0.063

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.29	0.35	2.3	1.2
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.49	0.15
Acenaphthene	mg/kg	0.05	MCERTS	0.5	0.49	3.5	2.5
Fluorene	mg/kg	0.05	MCERTS	0.33	0.34	2.8	1.7
Phenanthrene	mg/kg	0.05	MCERTS	3.1	3.3	23	15
Anthracene	mg/kg	0.05	MCERTS	0.69	0.85	5.4	4.2
Fluoranthene	mg/kg	0.05	MCERTS	4	5	27	23
Pyrene	mg/kg	0.05	MCERTS	3.7	4.4	22	19
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	2.2	11	8.9
Chrysene	mg/kg	0.05	MCERTS	2.1	2.6	12	10
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.2	2.4	11	9.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.74	1.1	5.8	4.4
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	2	11	7.9
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.78	0.92	4.1	3.9
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.16	< 0.05	0.93	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.94	1.2	4.7	4.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	23.2	27	146	116
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Analytical Report Number: 24-035627

Project / Site name: Lancashire Farm Dairies, Rochdale

Your Order No: 2240808

Lab Sample Number				283256	283257	283258	283259
Sample Reference				BH1	BH2	BH3	BH4
Sample Number				C1	C1	C1	C1
Depth (m)				0.50	0.50	0.50	0.50
Date Sampled				08/08/2024	08/08/2024	08/08/2024	08/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	40	26	24	19
Barium (aqua regia extractable)	mg/kg	1	MCERTS	440	220	170	260
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.9	1.3	1.3	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	1.8	0.6	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1	5.5	< 0.2	0.9
Chromium (hexavalent) Low Level	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	22	20	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	120	110	78	93
Lead (aqua regia extractable)	mg/kg	1	MCERTS	360	280	150	230
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.6	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	40	30	28	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	55	40	41	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	250	160	110	190

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



Analytical Report Number : 24-035627

Project / Site name: Lancashire Farm Dairies, Rochdale

* 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 *
283256	BH1	C1	0.5	Brown loam and sand with gravel and brick
283257	BH2	C1	0.5	Brown sand with gravel and brick
283258	BH3	C1	0.5	Brown sand with gravel and brick
283259	BH4	C1	0.5	Brown sand with gravel and vegetation

Analytical Report Number : 24-035627

Project / Site name: Lancashire Farm Dairies, Rochdale

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
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, 2021	A001B	D	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	In-house method	L010	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
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	L038B	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Hexavalent chromium in soil (low level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	NONE
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	L080	W	MCERTS
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	L080	W	MCERTS
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	L080	W	MCERTS

Analytical Report Number : 24-035627

Project / Site name: Lancashire Farm Dairies, Rochdale

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
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	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.

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.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

Soils Risk Assessment

Site Reference: 6160 VDA
 Project Site: Lancashire Farm Dairies
 Project Location: Crawford Street, Rochdale
 Client: Pakeeza Dairies Limited

i2 Reference	Commercial	BH1	BH2	BH3	BH4
Customer Sample Ref:	C4SL / S4UL	C1 - 0.50	C1 - 0.50	C1 - 0.50	C1 - 0.50
	SOM 1% GAC	08/08/2024	08/08/2024	08/08/2024	08/08/2024
Determinand	LQM II				
Arsenic	640	40	26	24	19
Boron (water-soluble)	240000	0.5	1.8	0.6	1.1
Cadmium	410	1	5.5	0.2	0.9
Chromium*	8600	27	22	20	25
Chromium VI	49	1.2	1.2	1.2	1.2
Copper	68000	120	110	78	93
Cyanide(Total)	-	1	1	1	1
Cyanide(free)**	34	1	1	1	1
Lead	2300	360	280	150	230
Mercury	58	0.3	0.3	0.6	0.3
Nickel	980	40	30	28	37
pH	-	8.4	8.2	7.8	8.2
Phenols(Mono)	3200	1	1	1	1
Selenium	12000	1	1	1	1
SO4(Total)	-	0.057	0.073	0.07	0.089
Sulphide	-	3.1	5.3	6.4	40
Sulphur(Free)	-	400	470	480	630
Thiocyanate	-	-	-	-	-
Zinc	730000	250	160	110	190
Acenaphthene	100000	0.5	0.49	3.5	2.5
Acenaphthylene	100000	0.05	0.05	0.49	0.15
Anthracene	540000	0.69	0.85	5.4	4.2
Benzo(a)Anthracene	-	1.8	2.2	11	8.9
Benzo(a)Pyrene SM	77	1.9	2	11	7.9
Benzo(b)Fluoranthene	-	2.2	2.4	11	9.5
Benzo(ghi)Perylene	-	0.94	1.2	4.7	4.1
Benzo(k)Fluoranthene	-	0.74	1.1	5.8	4.4
Chrysene	-	2.1	2.6	12	10
Dibenzo(ah)Anthracene	-	0.16	0.05	0.93	0.05
Fluoranthene	23000	4	5	27	23
Fluorene	71000	0.33	0.34	2.8	1.7
Indeno(123-cd)Pyrene	-	0.78	0.92	4.1	3.9
Naphthalene	1100	0.29	0.35	2.3	1.2
Phenanthrene	23000	3.1	3.3	23	15
Pyrene	54000	3.7	4.4	22	19
PAH(total)	-	23.2	27	146	116
Asbestos	Not-detected	Chrysotile detected	Chrysotile detected	Chrysotile detected	Chrysotile detected

*Criteria Assumes Chromium III

**Criteria is derived considering acute effects on 1-2yo Female Receptor ingesting a single dose of 3g of soil

**Criteria is derived considering Total TPH (C10 to C35) is formed entirety of a 50:50 Aliphatic and Aromatic Split C8-C10 range

Basis of Assessment Criteria: EA 2005 WAC (Human Health Value) C4SL
 LQM S4UL Atrisk 06