

# **PHASE II GEO-ENVIRONMENTAL ASSESSMENT**

**BURNT HOUSE FARM, TOTTINGTON, BURY  
FOR  
BURNT HOUSE FARM AGRICULTURAL LTD**

**NOVEMBER 2025**

**GA/1007/00**



## Document Assurance Form

|                  |                                                                                      |
|------------------|--------------------------------------------------------------------------------------|
| PROJECT NAME     | BURNT HOUSE FARM                                                                     |
| CLIENT           | BURNT HOUSE FARM AGRICULTURAL LTD                                                    |
| SITE LOCATION    | BURNT HOUSE FARM, TURTON ROAD, TOTTINGTON, BURY                                      |
| REPORT NAME      | PHASE II GEO-ENVIRONEMNTAL ASSESSMENT                                                |
| REPORT REFERENCE | GA/1007/00                                                                           |
| PROGRESS REPORT  | FINAL                                                                                |
| ISSUE DATE       | NOVEMBER 2025                                                                        |
| REVISION         | 00                                                                                   |
| SIGNATURE        |  |
| AUTHOR           | HOLLIE MARENGO                                                                       |



## Executive Summary

### Site Details

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Location        | The site is located roughly 6km north west of Bury Town Centre at the approximate National Grid Reference SD 76209 14260.                                                                                                                                                                                                                                                                                                          |
| Site Area            | 0.05 hectares                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Current Land Use     | A walkover survey was completed at the time of the investigation and noted Burnt House Farm comprises a two storey, stone built farmhouse, with evidence of historical small scale extensions. Overhead electricity cables transect the site from north west to south east with the site accessed via a track off Turton Road.                                                                                                     |
| Historical Land Use  | Historical mapping reviewed as part of the previous Phase I Desk Study confirmed the presence of the farmhouse from the earliest available mapping of 1850, accessed via the same track off Turton Road. The overhead electricity lines were first recorded on the 1964 year of mapping and remain in the same configuration. The surrounding area has seen little to no development and has remained farmland to the present day. |
| Proposed Development | The site is proposed for redevelopment, including the demolition of the existing Burnt House Farm and construction of a new two storey farmhouse with private garden areas and designated parking.                                                                                                                                                                                                                                 |

### Site Geology & Ground Conditions

|                       |                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Investigation Methods | Five mechanically excavated trial pits to a maximum depth of 1.50m bgl.                                                                                                                                                                                                                 |
| Topsoil               | Topsoil was recorded within TP04 only, to a depth of 0.25m bgl, comprising of a dark brown slightly gravelly, slightly sandy silty clay with abundant rootlets.                                                                                                                         |
| Made Ground           | Made ground was encountered within four positions to a maximum depth of 0.40m bgl and comprised a brown gravelly, sandy clay with a high cobble content. Gravel of mixed lithologies was noted of sandstone, mudstone and brick with fragments of plastic, glass, metal and roof tiles. |
| Superficial Deposits  | Superficial deposits generally comprised soft becoming firm brown slightly gravelly sandy silty clay with gravel of mudstone and sandstone. with frequent pockets of orangish brown sand.                                                                                               |
| Bedrock               | Bedrock was not encountered during this phase of investigation works.                                                                                                                                                                                                                   |
| Groundwater           | A perched groundwater was encountered within all positions at depths between 0.50m and 1.50m bgl, confined by the low permeability clays. The groundwater table is anticipated to lie at depth within the bedrock.                                                                      |



## Ground Evaluation

|                        |                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Foundations            | It is expected that traditional strip foundations will be suitable for the majority of the site, constructed at depths between 1.00m and 1.50m bgl. However, the presence of mature trees along the eastern boundary may necessitate deeper foundations to mitigate the risk of ground heave.                                                                      |
| SuDs                   | Assessment of ground conditions across the site has identified the presence of cohesive, low permeability clays in all trial pit locations and to depth. These materials are considered unsuitable for the implementation of infiltration-based drainage solutions, such as soakaway systems, due to their limited permeability and poor drainage characteristics. |
| Concrete Specification | Design Sulphate Class of DS-1<br>Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1s.<br>Design Chemical Class (DC) of DC-1                                                                                                                                                                                                                         |

## Site Assessment & Remedial Strategy Overview

|                          |                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contamination Assessment | Chemical analysis has not identified any exceedances of the determinands tested and therefore, the material is suitable for reuse and retention within the residential development.                                                                                          |
| Further Works            | Any unusual or suspicious ground conditions encountered during site preparation must be reported to the appropriate authorities for inspection and testing. Site contractors are responsible for notifying relevant parties to ensure potential risks are properly assessed. |



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## Introduction

### Objectives

Marengo Engineering & Geotechnical (MEG) have been appointed by Burnt House Farm Agricultural Ltd to undertake a Phase II Geo-Environmental Assessment at Burnt House Farm, Turton Road, Tottington, Bury, which they intend to redevelop into a residential end usage.

The objective of this Phase II Geo-Environmental Assessment is to characterise the ground conditions and environmental quality of the site, specifically to assess the suitability of near-surface soils for retention within a proposed residential development.

This assessment builds upon the findings of the previously submitted Phase I Desk Study Report, with the purpose of refining the Conceptual Site Model (CSM) and characterising the ground gas risk to the proposed development. The specific objectives of this phase were to:

- ✉ Characterise the subsurface conditions through targeted intrusive investigation, enabling assessment of soil and groundwater quality in relation to historical and current land use.
- ✉ Evaluate potential pollutant linkages identified in the preceding Phase I Desk Study, with reference to the source–pathway–receptor model, and determine their significance under current and proposed site use.
- ✉ Assess the presence, nature, and extent of contamination, including any substances that may pose risks to human health, controlled waters, property, or the wider environment.
- ✉ Inform the site's regulatory status and development constraints, including potential requirements for remediation, mitigation, or further investigation in accordance with relevant guidance (e.g. CLR11, BS 10175, and the Model Procedures).

The investigation was undertaken in accordance with the requirements of BS 5930:2015 and BS 10175:2011+A2:2017, and the appraisal has been prepared in line with current UK legislation and relevant regulatory guidance. The report is intended to support the discharge of Land Quality pre-commencement planning conditions and also contributes to fulfilling the requirements of a Ground Investigation Report (GIR) in accordance with BS EN 1997-2:2007 and the Land Contamination Risk Management (LCRM) framework.



## Site Location & Description

The development site is located roughly 6.00km northwest of Bury Town Centre, located down an access track off Turton Road. The centre of the site is located at the approximate National Grid Reference SD 76209 14260, with the proposed development area circa 0.05 hectares. The location of the site is shown in figures 1 below.



*Figure 1: Site Location (Aerial Imagery)*

## Development Proposals

The site is proposed for redevelopment, which will involve the demolition of the existing Burnt House Farm, and the construction of a new two storey farmhouse. The new property will be constructed in a similar stone material and positions slightly to the south of the original buildings footprint. A designated hardstanding area for parking is planned to the north of the dwelling, whilst a soft landscaped garden will encompass the property and extend southwards. Further details are provided in the appended Proposed Development Plan.



## Disclaimer

This report has been prepared by Marengo Engineering & Geotechnical (MEG) for the exclusive use of the Client, in accordance with the agreed scope of works and generally accepted professional and environmental consulting standards. It is intended for the purposes stated herein and must be read in full. Marengo Engineering & Geotechnical (MEG) accepts no liability for use by third parties without prior written consent, and no duty of care is owed to unauthorised recipients.

The assessment has been undertaken in line with applicable UK legislation, published guidance, and risk assessment methodologies current at the time of writing. Marengo Engineering & Geotechnical (MEG) is not responsible for any implications arising from subsequent changes in legislation, guidance, or site conditions. Findings and interpretations are based on information from third-party sources, public records, and site observations, which are assumed to be accurate unless there was reason to believe otherwise. Marengo Engineering & Geotechnical (MEG) does not warrant the completeness or reliability of external information.

Ground and groundwater conditions reported reflect those encountered at the time and locations of investigation, within access and budgetary constraints. Subsurface conditions can vary significantly between exploratory positions, and groundwater levels are subject to seasonal and environmental fluctuations. Future alterations to site layout, levels, or land use may affect the relevance of this report's conclusions. Exploratory hole positions were located approximately, and Marengo Engineering & Geotechnical (MEG) accepts no responsibility for structural impacts arising from foundation placement within the influence of investigation points. Where full compliance with BS EN 1997-2 was not practicable, alternative approaches were adopted using professional engineering judgement.

Laboratory testing was undertaken by UKAS and MCERTS accredited laboratories, unless otherwise stated. Marengo Engineering & Geotechnical (MEG) accepts no liability for errors or omissions in laboratory data, nor for the suitability of results for other purposes (e.g., water utility requirements) unless explicitly scoped. Where ground gas monitoring has been undertaken, results reflect conditions observed during the monitoring period and may be subject to temporal and meteorological variability. The interpretation of gas risk is based on the data available at the time of reporting and in accordance with relevant guidance (e.g., BS 8485, CIRIA C665/C735). Marengo Engineering & Geotechnical (MEG) accepts no liability for changes in gas regime outside the scope or duration of monitoring, nor for the suitability of mitigation measures unless explicitly scoped and agreed.

This report does not constitute a formal asbestos, ecological, or archaeological survey. While incidental observations may be noted, specialist assessments should be commissioned where required. Asbestos identification was not a primary objective of this investigation; any suspected ACMs were noted and managed in line with health and safety protocols. Responsibility for further asbestos assessment lies with the Client.

Plans and figures provided are for illustrative purposes only and should not be scaled. Boundaries shown do not imply legal title. All recommendations should be discussed with the relevant regulatory authorities prior to implementation to ensure compliance.



## Previous Reports Summary

The site has been subject to previous phases of investigation, the findings of which are documented in the following reports:

- ✉ Phase I Preliminary Risk Assessment by the LK Group (reference: LKC 22 1267 dated June 2022)
- ✉ Coal Mining Risk Assessment by the LK Group (reference: LKC 22 1267, dated June 2022)
- ✉ Coal Mining Investigation Report by Marengo Engineering & Geotechnical (reference: CMI/1007/00, dated June 20025)

This report should be read in conjunction with the above documents to ensure a comprehensive understanding of the site's history and current condition.

## Site History

Historical mapping reviewed as part of the previous Phase I Desk Study confirmed the presence of the farmhouse from the earliest available mapping of 1850, accessed via the same track off Turton Road. The overhead electricity lines were first recorded on the 1964 year of mapping and remain in the same configuration. The surrounding area has seen little to no development and has remained farmland to the present day.

## Geology & Hydrogeology

Geological mapping obtained from the BGS GeoIndex indicates that the site is underlain by superficial deposits of glacial till, comprising a heterogeneous mix of clay, silt, sand, and gravel. Beneath the superficial strata lies the Pennine Lower Coal Measures Formation, of interbedded mudstone, siltstone, and sandstone units.

Geological mapping shows a small area of made ground located 55m north west, however this deposit is situated downhill of the site and is not anticipated to pose a gas risk to the development. Nevertheless, minimal deposits of made ground are anticipated due to the site's history as a residential property.

A Coal Mining Risk Assessment was produced by the LK Group and summarised that shallow workings are likely to be present underlying the development site and as such, there will be a requirement for further investigations. Marengo Engineering & Geotechnical undertook a Coal Mining Investigation which comprised the drilling of two rotary open hole positions utilising water flush techniques. The results of the drilling confirmed solid strata with minimal superficial deposits from ground level to 29.50m bgl. No evidence of worked or unworked coal seams, broken ground or other indicators of underground mining activity were recorded and as such, no further investigations or remedial measures were deemed necessary with respect to historical coal mining activity.

The Phase I Desk Study report noted a high risk for ground gas based on the probable presence of shallow mine workings underlying the development. The Coal Mining Investigation recorded solid strata to depths of 29.50m bgl, with no evidence of coal or worked ground and



therefore it was determined the ground gas risk can be reduced and a programme of monitoring was not deemed necessary.

## Recommendations

The Phase I Desk Study identified several potential geo-environmental and geotechnical risks requiring further investigation. To address these, the following Phase II works were recommended:

- ✉ Contamination Assessment: Investigation of near-surface soils to determine the presence and extent of contamination, with chemical testing tailored to historical site use and potential imported fill materials.
- ✉ Geotechnical Characterisation: Logging of recovered soils, in-situ testing, and laboratory analysis to determine geotechnical parameters including sulphate content & pH.



## Preliminary Conceptual Site Model

In accordance with CLR11: Model Procedures for the Management of Land Contamination (2004) and BS 10175:2011+A2:2017 Code of Practice for the Investigation of Potentially Contaminated Sites, a Preliminary Conceptual Site Model (CSM) has been developed. The purpose of this model is to identify and assess potential contaminant sources, migration pathways, and sensitive receptors relevant to the site and surrounding area.

### Overview of Potential Pollution Sources

The following potential contamination sources were identified as part of the Phase I Desk Study completed by the LK Group:

- ✉ Possible shallow and localised made ground materials associated with the sites usage as a residential property since the earliest available mapping.

### Identification of Plausible Pathways

Identified pollutant pathways include:

- ✉ Inhalation and ingestion
- ✉ Dermal contact
- ✉ Lateral and vertical migration of leachable contaminants
- ✉ Acidic ground conditions affecting building infrastructure
- ✉ On site vegetation by root uptake

### Identification of Sensitive Receptors

Identified receptors for contamination include:

- ✉ Current site users
- ✉ Construction workers
- ✉ Future site users
- ✉ Controlled waters
- ✉ Buildings and infrastructure

### Preliminary Risk Assessment

A preliminary risk assessment has been undertaken in accordance with the guidance provided in Section 6.3 of CIRIA C552: Contaminated Land Risk Assessment – A Guide to Good Practice (2001).

For a risk to exist, a complete pollutant linkage must be established, whereby a contaminant source has a pathway through which it may impact a sensitive receptor. The assessment involves evaluating both the potential severity of the risk and the likelihood of its occurrence. The following tables outline the criteria used to determine risk levels, based on the source, pathway, receptor model.



**Table 1: Probability of Risk**

| Probability     | Description                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unlikely        | A potential pollutant linkage may exist, but the occurrence of harm, even in the long term, is considered improbable under current site conditions.                                                                           |
| Low Likelihood  | A pollutant linkage is possible, but the risk of harm is uncertain and would require specific circumstances to materialise. There is no clear indication that harm is likely to occur.                                        |
| Likely          | A plausible pollutant linkage is present, and it is considered probable that harm may arise to the receptor under the current or foreseeable site conditions over the long term.                                              |
| High Likelihood | A pollutant linkage is identifiable and the occurrence of harm is very likely in the short term, or there is clear evidence that harm to the receptor is already occurring or will almost certainly occur over the long term. |

**Table 2: Severity of Risk**

| Probability | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minor       | Non-permanent or reversible effects on human health, typically manageable through basic protective measures (e.g. use of PPE during site works).<br>May result in limited, localized impacts to non-sensitive ecosystems or minor cosmetic or structural effects on buildings and services.                                                                                                                                                                                                                                                                        |
| Mild        | Refers to pollution events affecting less sensitive water receptors, such as smaller watercourses or unproductive geological strata.<br>May involve notable but non-catastrophic damage to crops, buildings, buried services or infrastructure due to moderate levels of contamination or ground gas.                                                                                                                                                                                                                                                              |
| Medium      | Represents a long-term risk to human health, potentially leading to significant harm from elevated levels of contaminants or ground gases.<br>May result in pollution of sensitive water resources, including principal or secondary aquifers. Could cause measurable adverse impacts on protected ecosystems or species.                                                                                                                                                                                                                                          |
| Severe      | Represents a serious and immediate risk to human health, with the potential to cause significant harm due to very high concentrations of contaminants or hazardous ground gases. Could result in catastrophic damage to buildings or infrastructure (e.g. explosion risk from high gas levels or volatile organic compounds).<br>Includes major pollution incidents affecting controlled waters, such as principal aquifers or surface water bodies within source protection zones.<br>May also lead to acute and widespread harm to sensitive ecological systems. |

**Table 3: Severity vs Probability of Risk**

| Probability     | Severity       |                |                |                |
|-----------------|----------------|----------------|----------------|----------------|
|                 | Minor          | Mild           | Medium         | Severe         |
| Unlikely        | Very Low       | Very Low       | Low            | Moderate / Low |
| Low Likelihood  | Very Low       | Low            | Moderate / Low | Moderate       |
| Likely          | Low            | Moderate / Low | Moderate       | High           |
| High Likelihood | Moderate / Low | Moderate       | High           | Very High      |



**Table 4: Conceptual Site Model**

| Potential Contaminant                                                                                                        | Pathways                                                                                        | Receptors                                                                                   | Probability    | Severity | Risk           | Justification & Further Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------|----------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On site: Made ground associated with the sites usage as a residential property since the earliest available mapping of 1850. | Direct contact including ingestion, inhalation and dermal contact with soils, dust and vapours. | Future site users                                                                           | Likely         | Medium   | Moderate       | End users have the potential to come into direct contact with contamination, present beneath external landscaping.                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                              |                                                                                                 | Site personnel during development                                                           | Low Likelihood | Medium   | Moderate / Low | Contractors will most likely come into direct contact with potentially contaminated soils during the construction phase of works. However, such contact will be short term, limiting potential exposure. Construction workers are expected to undertake good working practices including regular hand washing and appropriate PPE, reducing the likelihood of long term exposure to contamination. If made ground is identified, it is believed to be limited in nature and depth. |
|                                                                                                                              | Made ground and acidic ground conditions affecting future site buildings and services           | Building infrastructure                                                                     | Low Likelihood | Medium   | Moderate / Low | Unknown depth of made ground deposits, which has the potential to cause significant damage to the proposed residential properties. Requirement for a programme of chemical testing as part of the Phase II investigation works                                                                                                                                                                                                                                                     |
|                                                                                                                              | Vertical and lateral migration of contamination through groundwater                             | Secondary undifferentiated aquifer in superficial deposits. Secondary A aquifer in bedrock. | Low Likelihood | Medium   | Moderate / Low | Requirement for a programme of chemical testing as part of the site investigation works. Unknown amount of made ground deposits which has the potential for subsequent vertical and lateral migration into the underlying aquifers. However, superficial deposits are anticipated to be cohesive, non permeable clays, limiting the rate of movement into the underlying aquifer.                                                                                                  |
| Off site sources of made ground as a result of changing site uses                                                            | Lateral migration into site with subsequent dermal contact with soils                           | Future site users                                                                           | Unlikely       | Medium   | Low            | The area of made ground located 55m north west is situated downhill of the proposed development. Additionally, a subsequent mining investigation has shown there is no evidence of coal seams or worked ground within the area of the property and based upon a combination of information, gas monitoring is not deemed necessary within the site.                                                                                                                                |
| Potential for toxic and explosive ground gas                                                                                 | Migration of ground gas                                                                         | Future site users                                                                           | Unlikely       | Medium   | Low            | No evidence of deep made ground or lateral migration of contamination noted and as such, no requirement for a programme of ground gas monitoring.                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                                              |                                                                                                 | Buildings and infrastructure                                                                | Unlikely       | Medium   | Low            | No evidence of deep made ground or lateral migration of contamination noted and as such, no requirement for a programme of ground gas monitoring.                                                                                                                                                                                                                                                                                                                                  |
| Radon Gas                                                                                                                    | Migration of ground gas                                                                         | Future site users                                                                           | Unlikely       | Mild     | Very Low       | The site is located within an area where less than 1% of properties are affected by radon gas.                                                                                                                                                                                                                                                                                                                                                                                     |



## Ground Investigation

### Objectives of Investigation

The primary objectives of the investigation were to:

- ✉ Determine and characterise the underlying geology across the site, to inform geotechnical and environmental assessments.
- ✉ Assess the presence and extent of made or artificial ground, including the determination of its depth, composition, and lateral distribution across the site.
- ✉ Evaluate the geotechnical properties of underlying soils to inform foundation and structural design.
- ✉ Collect representative samples for laboratory-based chemical analysis, aimed at evaluating the suitability of the materials for retention within the context of a proposed residential development.
- ✉ Combine the collected data into an interpretive report to support the discharge of relevant planning conditions

### Scope of works

The following works were undertaken:

- ✉ A total of five (5no.) machine excavated trial pits were completed to depths of up to 1.50m below existing ground level (bgl) across the development area.

The locations of the exploratory holes are illustrated on the Exploratory Hole Location Plan provided in Appendix B, with corresponding borehole logs presented in Appendix C. The rationale for the selection of each trial pit location is summarised in Table 5 below.

**Table 5: Exploratory Hole Rationale**

| Location    | Exploratory Location Justification                                                                                                                                                           |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TP01 – TP05 | Trial pits located across the development area to investigate the shallow superficial deposits for foundation design and to collect necessary samples for chemical and geotechnical analysis |

The exploratory holes were logged by a suitably qualified and experienced geo-environmental engineer, in general accordance with current industry standards and guidance, including but not limited to:

- ✉ BS 5930:2015+A1:2020 – Code of Practice for Ground Investigations
- ✉ BS 10175:2011+A2:2017 – Investigation of Potentially Contaminated Sites – Code of Practice
- ✉ BS EN ISO 14688-1 & 2:2018 – Geotechnical Investigation and Testing – Identification and Classification of Soil



## Walkover Survey

Prior to the commencement of intrusive investigation works, a walkover survey was undertaken by Marengo Engineering & Geotechnical (MEG) to verify current site conditions and identify any notable changes since the completion of the Phase I Desk Study. The survey aimed to assess surface features, access constraints, and any potential indicators of contamination or ground disturbance.

The site was accessed via a track off Turton Road, leading north east, downhill with the residential property located to the north. Overhead electricity cables transect the site from north west to south east, with the pylons located in neighbouring fields. Burnt House Farm comprises a two storey stone built farmhouse, with evidence of historical small scale extensions. The land surrounding the property contains a mixed of grassed soft landscaping and small stockpiles of stone, possibly from the former barn structure.

The findings of the walkover survey were used to inform the final positioning of exploratory holes and to ensure alignment with the updated site layout and development status.

## Field Sampling Procedures

During the intrusive investigation, representative samples were collected at regular intervals, at changes in strata, and in locations where visual or olfactory evidence of contamination was observed. Laboratory analysis was scheduled for selected samples based on their relevance to the investigation objectives. A summary of the samples obtained is provided in the table below:

**Table 6: Breakdown of Sample Types & Quantities**

| Sample Type                | Abbreviation | Quantity |
|----------------------------|--------------|----------|
| Environmental Samples      | ES           | 4        |
| Disturbed Samples          | D            | 4        |
| Bulk Samples               | B            | -        |
| Undisturbed Samples (U100) | U            | -        |

All samples were collected in accordance with current geotechnical and environmental guidance, including the requirements of BS 10175 and BS 5930. The sampling strategy was designed to target all relevant strata using appropriate methods to ensure the integrity and representativeness of the material.

Disturbed samples for geo-environmental testing were placed in laboratory-specified containers compliant with MCERTS and UKAS accreditation requirements. Chain-of-custody procedures were followed, and samples were stored and transported under appropriate conditions, including temperature control, to preserve sample quality.

Sample locations and corresponding depths are recorded on the exploratory hole logs provided in Appendix C.



## Laboratory Testing

To inform the Generic Quantitative Risk Assessment (GQRA), the following geo-environmental testing was scheduled to assess the risk from contamination on the site. The testing was based on potential sources identified in the PRA and observations made during the ground investigation.

Environmental soil samples were collected from targeted depths and locations across the site, with emphasis on proposed garden and soft landscaping areas. All samples were submitted to a UKAS and MCERTS accredited laboratory for chemical analysis, in accordance with BS10175:2011+A2:2017 and relevant guidance under CLR11 and the Land Contamination Risk Management (LCRM) framework.

The laboratory testing schedule included:

| Table 7: Chemical Testing Schedule |                                                                                                                                                                                                                                                                |          |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Sample Type                        | Chemical Parameters                                                                                                                                                                                                                                            | Quantity |
| Metals                             | Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Mercury, Selenium, Zinc                                                                                                                                                                                      | 4        |
| PAH-16MS                           | Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Chrysene, Dibenzo(ah)anthracene, Fluoranthene, Fluorene, Indeno(123-cd)pyrene, Naphthalene, Phenanthrene, Pyrene, Benzo(k)fluoranthene | 4        |
| EPH UKCWG & VPHCWG                 | Aliphatic & Aromatic up to C44 including total Aliphatics and total Aromatics. BTEX & MBTE                                                                                                                                                                     | 4        |
| Asbestos in Soil (inc matrix)      | Quantification if Asbestos noted                                                                                                                                                                                                                               | 4        |
| Inorganics                         | pH, Sulphate (water sol 2:1), Cyanide (total), Phenols (Total by HPLC), Sulphide & Total Organic Carbon (TOC)                                                                                                                                                  | 4        |

The full set of chemical testing results are presented within Appendix D.



## Ground Conditions

### Topsoil

Topsoil was encountered within TP04 only, to a depth of 0.25m bgl and was noted to comprise a dark brown slightly gravelly, slightly sandy silty clay with abundant rootlets and gravel of mudstone and sandstone.

### Made Ground

Made ground was encountered within four positions, to a maximum depth of 0.40m bgl (TP02). The made ground was noted as a brown gravelly sandy clay with a high cobble content. Gravel of mixed lithologies including sandstone, mudstone and brick with cobbles of sandstone and brick were recorded, with occasional fragments of plastic, glass, metal and roof tiles.

Due to the heterogeneous nature of the made ground, foundations should be extended through this unit and found within the underlying natural strata.

### Superficial Deposits

Superficial deposits were encountered at all exploratory positions, with their base not proven. The upper units typically comprised a soft becoming firm, brown gravelly sandy clay, with frequent pockets of orangish brown fine to medium sand. Gravel comprised sandstone and mudstone. At greater depths, the superficial strata transitioned to a firm becoming stiff and friable orangish brown mottled grey, slightly sandy gravelly clay, with gravel of mudstone, sandstone, and siltstone, with frequent pockets of orangish brown sand.

### Bedrock

Bedrock was not encountered during this phase of investigation works.

### Groundwater

Groundwater was encountered within all exploratory hole locations at depths ranging from 0.50m to 1.50m bgl. These water strikes were generally noted as water slow ingress at the base of the trail pits.

**Table 8: Summary of Groundwater Entries**

| Location | Depth (m bgl) | Strata | Notes / Comments  |
|----------|---------------|--------|-------------------|
| TP01     | 1.50          | CLAY   | Ingress / Perched |
| TP02     | 1.50          | CLAY   | Ingress / Perched |
| TP03     | 1.50          | CLAY   | Ingress / Perched |
| TP04     | 1.50          | CLAY   | Ingress / Perched |
| TP05     | 0.50          | CLAY   | Ingress / Perched |



The depth and location of these strikes suggest the presence of a perched groundwater table, confined within the low permeability cohesive clays. It is anticipated that the groundwater table lies at greater depth within the underlying bedrock strata, beyond the limits of the current investigation.

It is anticipated that minor groundwater ingress may occur over time, especially where perched water develops between the surface and the underlying clays. Localised groundwater accumulation within the clay strata may also be exacerbated during episodes of intense or prolonged precipitation. Such conditions could result in temporary flooding of deeper excavations, necessitating localised sump pumping or other dewatering measures during construction.

Groundwater is not considered to present a significant constraint to the proposed development. Nonetheless, the potential for water ingress into excavations should be acknowledged, and suitable mitigation measures incorporated into the construction methodology to manage any inflows that may arise

## Observations

No visual or olfactory evidence of contamination was identified during this phase of investigation. The soils encountered appeared consistent with expected geological conditions, and no staining, odours, or oily residues were noted within the exploratory positions.

However, anthropogenic materials including the fragments of plastics, metal and glass were recorded within the made ground and although these do not constitute direct evidence of contamination, their presence does not exclude the potential for associated chemical risks.

To assess the environmental suitability of the on site strata retention within the proposed residential development, representative samples have been collected and submitted for laboratory analysis. The results will inform the need for any remedial measures prior to reuse in landscaped and garden areas.



## Contaminant Analysis & Qualitative Risk Review

### Risk Assessment Framework

The assessment of land contamination in the UK is underpinned by a risk-based approach, consistent with the principles outlined in the Land Contamination Risk Management (LCRM) guidance, most recently updated by the Environment Agency in June 2025. This framework is based on the identification and evaluation of pollutant linkages, which require the presence of a viable source–pathway–receptor relationship.

In accordance with LCRM, a tiered risk assessment methodology has been adopted, comprising:

- ✉ Preliminary Risk Assessment (Tier 1) – desk study and site reconnaissance
- ✉ Generic Quantitative Risk Assessment (Tier 2) – comparison of site data with generic assessment criteria
- ✉ Detailed Quantitative Risk Assessment (Tier 3) – site-specific modelling where required

This approach aligns with the statutory requirements of Part 2A of the Environmental Protection Act 1990 and supports the planning regime under the Town and Country Planning Act 1990.

### Site Classification and Land Use Assumptions

The proposed end use of the site is residential with private garden areas and associated infrastructure, which represents a sensitive land use scenario. Accordingly, the risk assessment has been undertaken using the most appropriate and conservative criteria available. Where applicable, soil contaminant concentrations have been screened against the Category 4 Screening Levels (C4SLs) developed under Defra's SP1010 project, as well as other relevant Generic Assessment Criteria (GAC) derived from authoritative sources such as the Environment Agency's Science Reports and industry best practice. The site has been assessed in the context of its proposed use, and the classification of risk has been determined based on the presence or absence of complete pollutant linkages

### Results Summary

Environmental samples were collected from the natural superficial deposits across the site to assess the potential presence of contaminants in relation to the proposed residential end use, which includes private areas of soft landscaping. The laboratory analysis results have been grouped according to the type of testing undertaken, with summary data presented in Tables 9 to 13. Each table corresponds to a specific class of analysis, including:

- ✉ Inorganic contaminants (e.g. heavy metals and metalloids)
- ✉ Organic contaminants (e.g. PAHs and TPH)
- ✉ General soil chemistry (e.g. pH, SOM, EC)
- ✉ Asbestos screening (where applicable)



All results have been assessed against the most appropriate Generic Assessment Criteria (GAC), including Category 4 Screening Levels (C4SLs) and other relevant thresholds for a residential land use with plant uptake, in line with current UK guidance.

## Metals

Table 9 below details the range of contaminants tested within the metal analysis, along with their respective assessment criteria. The results show that no elevated results have been recorded in terms of the metals tested.

**Table 9: Laboratory Testing Results – Metals**

| Constituent       | No. of Samples Tested | Range of Values (mg/kg) | S4ULs (mg/kg <sup>-1</sup> DW) | No. of Failures | Location of Failures |
|-------------------|-----------------------|-------------------------|--------------------------------|-----------------|----------------------|
| Arsenic           | 4                     | 9 – 27                  | 37                             | 0               | -                    |
| Lead              | 4                     | 95 – 175                | 200                            | 0               | -                    |
| Cadmium           | 4                     | <1.0                    | 11                             | 0               | -                    |
| Chromium          | 4                     | 17 – 24                 | 910                            | 0               | -                    |
| Copper            | 4                     | 38 – 65                 | 2400                           | 0               | -                    |
| Elemental Mercury | 4                     | <0.17                   | 1.20                           | 0               | -                    |
| Nickel            | 4                     | 13 – 27                 | 130                            | 0               | -                    |
| Selenium          | 4                     | <1.0                    | 250                            | 0               | -                    |
| Zinc              | 4                     | 72 – 207                | 3700                           | 0               | -                    |

*LQN/CIEH S4ULS for Human Health Risk Assessment (Registration No. S4UL3916) 2.5% SOM - Residential with plant uptake*

## Inorganics

Chemical testing was extended to include a suite of inorganic determinands, including phenol and total cyanide. The analytical results indicated that there were no elevated concentrations of either phenol or total cyanide detected across the tested samples. Measured soil organic matter (SOM) values across the site ranged from 4.58% to 14.77%.

For the purpose of human health risk assessment, and in line with conservative assumptions, the site has been classified using an SOM value of 2.5%, with a residential end-use with plant uptake.



**Table 10: Laboratory Testing Results – Inorganics**

| Constituent   | No. of Samples Tested | Range of Values (mg/kg) | S4ULs (mg/kg <sup>-1</sup> DW) | No. of Failures | Location of Failures |
|---------------|-----------------------|-------------------------|--------------------------------|-----------------|----------------------|
| Phenol        | 4                     | <0.2                    | 200                            | 0               | -                    |
| Total Cyanide | 4                     | <1.0                    | 34*                            | 0               | -                    |
| pH            | 4                     | 5.05 – 7.29             | -                              | 0               | -                    |
| TOC           | 4                     | 2.66 – 8.59             | -                              | 0               | -                    |
| SOM           | 4                     | 4.58 – 14.77            | -                              | 0               | -                    |

*LQN/CIEH S4ULS for Human Health Risk Assessment (Registration No. S4UL3916) 2.5% SOM - Residential with plant uptake*

*\*Atkins Atrisk SSV for residential with plant uptake*

## Speciated PAH

Analysis has included for the assessment of polycyclic aromatic hydrocarbons, with a summary of the results show in Table 11 below. The assessment is based upon a presence of 2.5% organic matter within the samples generally, although the tests results do show more variability. No exceedances have been identified within any of the samples tested.

**Table 11: Laboratory Testing Results – Polycyclic Aromatic Hydrocarbons**

| Constituent          | No. of Samples Tested | Range of Values (mg/kg) | S4ULs (mg/kg <sup>-1</sup> DW) | No. of Failures | Location of Failures |
|----------------------|-----------------------|-------------------------|--------------------------------|-----------------|----------------------|
| Acenaphthene         | 4                     | 0.01 – 0.04             | 510                            | -               | -                    |
| Acenaphthylene       | 4                     | <0.01 – 0.02            | 420                            | -               | -                    |
| Anthracene           | 4                     | <0.02 – 0.10            | 5,400                          | -               | -                    |
| Benz[a]anthracene    | 4                     | 0.19 – 0.63             | 11                             | -               | -                    |
| Benzo[a]pyrene       | 4                     | 0.17 – 0.83             | 2.70                           | -               | -                    |
| Benzo[b]fluoranthene | 4                     | 0.26 – 1.02             | 3.30                           | -               | -                    |
| Benzo[ghi]perylene   | 4                     | 0.09 – 0.44             | 340                            | -               | -                    |
| Benzo[k]fluoranthene | 4                     | <0.07 – 0.28            | 93                             | -               | -                    |
| Chrysene             | 4                     | 0.21 – 0.70             | 22                             | -               | -                    |
| Dibenz[ah]anthracene | 4                     | <0.04 – 0.10            | 0.28                           | -               | -                    |
| Fluoranthene         | 4                     | 0.38 – 1.06             | 560                            | -               | -                    |
| Fluorene             | 4                     | <0.01 – 0.02            | 400                            | -               | -                    |
| Indeno[123-cd]pyrene | 4                     | 0.11 – 0.49             | 36                             | -               | -                    |
| Naphthalene          | 4                     | <0.03                   | 5.60                           | -               | -                    |
| Phenanthrene         | 4                     | 0.16 – 0.45             | 220                            | -               | -                    |
| Pyrene               | 4                     | 0.97 – 1.14             | 1,200                          | -               | -                    |

*LQN/CIEH S4ULS for Human Health Risk Assessment (Registration No. S4UL3916) 2.5% SOM - Residential with plant uptake*



## Petroleum Hydrocarbons

The made ground and natural deposits have been tested for the presence of petroleum hydrocarbons, both of the aliphatic and aromatic series. Results are shown in table 12 and indicate no elevated results, with many below the limit of detection.

**Table 12: Laboratory Testing Results – Petroleum Hydrocarbons**

| Constituent         | No. of Samples Tested | Range of Values (mg/kg) | S4ULs (mg/kg <sup>1</sup> DW) | No. of Failures | Location of Failures |
|---------------------|-----------------------|-------------------------|-------------------------------|-----------------|----------------------|
| Aliphatic EC 5-6    | 4                     | <0.01                   | 78                            | 0               | -                    |
| Aliphatic EC >6-8   | 4                     | <0.01                   | 230                           | 0               | -                    |
| Aliphatic EC >8-10  | 4                     | <1                      | 65                            | 0               | -                    |
| Aliphatic EC >10-12 | 4                     | <1                      | 330                           | 0               | -                    |
| Aliphatic EC >12-16 | 4                     | <1                      | 2,400                         | 0               | -                    |
| Aliphatic EC >16-35 | 4                     | <1 – 113                | 92,000                        | 0               | -                    |
| Aliphatic EC >35-44 | 4                     | 1 – 61                  | 92,000                        | 0               | -                    |
| Aromatic EC 5-7     | 4                     | <0.01                   | 140                           | 0               | -                    |
| Aromatic EC >7-8    | 4                     | <0.01                   | 290                           | 0               | -                    |
| Aromatic EC >8-10   | 4                     | <1                      | 83                            | 0               | -                    |
| Aromatic EC >10-12  | 4                     | <1                      | 180                           | 0               | -                    |
| Aromatic EC >12-16  | 4                     | 2 – 4                   | 330                           | 0               | -                    |
| Aromatic EC >16-21  | 4                     | 4 – 16                  | 540                           | 0               | -                    |
| Aromatic EC >21-35  | 4                     | 14 – 111                | 1,500                         | 0               | -                    |
| Aromatic EC >35-44  | 4                     | 3 – 90                  | 1,500                         | 0               | -                    |

*LQN/CIEH S4ULS for Human Health Risk Assessment (Registration No. S4UL3916) 1.0% SOM - Residential with plant uptake*

The scope of petroleum hydrocarbon analysis was extended to include volatile organic compounds within the BTEX group (benzene, toluene, ethylbenzene, and xylenes), as well as methyl tert-butyl ether (MTBE), a common fuel oxygenate. These compounds were selected for targeted analysis due to their mobility, potential toxicity, and relevance to petroleum-related contamination.

As presented in Table 13 below, all reported concentrations for BTEX and MTBE were below the laboratory limits of detection. This indicates that these compounds are either absent or present at concentrations too low to be quantified using the analytical methods employed.



**Table 13: Laboratory Testing Results – BTEX & MBTE**

| Constituent          | No. of Samples Tested | Range of Values (mg/kg) | S4ULs (mg/kg <sup>1</sup> DW) | No. of Failures | Location of Failures |
|----------------------|-----------------------|-------------------------|-------------------------------|-----------------|----------------------|
| BTEX – Benzene       | 4                     | <0.01                   | 0.17                          | 0               | -                    |
| BTEX – Toluene       | 4                     | <0.01                   | 290                           | 0               | -                    |
| BTEX – Ethyl Benzene | 4                     | <0.01                   | 110                           | 0               | -                    |
| BTEX – m & p Xylene  | 4                     | <0.01                   | 140                           | 0               | -                    |
| BTEX – o Xylene      | 4                     | <0.01                   | 130                           | 0               | -                    |
| MTBE                 | 4                     | <0.01                   | 20*                           | 0               | -                    |

*LQN/CIEH S4ULS for Human Health Risk Assessment (Registration No. S4UL3916) 2.5% SOM - Residential with plant uptake*

*\*Atkins Atrisk SSV for residential with plant uptake*

Based on these results, there is no indication of petroleum-related contamination associated with these specific compounds within the tested samples.

## Asbestos

As part of the chemical assessment of made ground materials, selected samples were submitted for asbestos fibre screening in accordance with current guidance on the identification of asbestos-containing materials (ACMs) in soils. No asbestos or ACMs have been identified within any of the samples tested.



## Geotechnical Assessment

This section does not constitute a Geotechnical Design Report (GDR). Rather, it presents preliminary geotechnical observations and indicative recommendations derived from the findings of the ground investigation.

The geotechnical scope of the investigation was undertaken in general accordance with the principles outlined in BS EN 1997-2:2007. The primary aim was to obtain initial data to inform an understanding of the ground's geotechnical characteristics and to support early-stage considerations for foundation and infrastructure design.

### Concrete Classification

A total of five (4 No.) soil samples were submitted for laboratory analysis to determine concentrations of water-soluble sulphates and pH levels across the proposed development site. In accordance with BRE Special Digest 1 (SD1), in a data set that contains less than five samples, then the highest measured sulphate concentration should be taken. On this basis, the characteristic water-soluble sulphate concentration for the site is calculated as <10 mg/l, with the lowest recorded pH value being 5.05.

Given the site's brownfield status and the presence of a mobile groundwater regime, classification under BRE SD1 Table C2 indicates a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1s. Referring to Table D1, and assuming a minimum intended working life of 100 years, the corresponding Design Chemical Class (DC) is DC-1.

### Plasticity Indices

Three soil samples were obtained from the shallow natural clay deposits encountered on site and submitted to a UKAS accredited laboratory to determine the liquid and plastic limits. In accordance with the NHBC Standards Chapter 4.2 (Building Near Trees), the Modified Plasticity Index (MPI) should be calculated to assess the volume change potential of the cohesive soils.

The laboratory results are summarised within the table below and show that the volume change potential of the shallow clay soils are classified as having a medium volume change potential. Copies of the geotechnical laboratory data are provided in Appendix E.

**Table 14: Summary of Plasticity Indices**

| Location | Depth (m bgl) | MPI (%) | Volume Change Potential |
|----------|---------------|---------|-------------------------|
| TP01     | 1.30          | 19.44   | Low                     |
| TP02     | 1.40          | 30.69   | Medium                  |
| TP04     | 1.20          | 23.40   | Medium                  |



## Excavations

The natural strata encountered across the site generally comprises glacial till clay deposits, with minor levels of made ground in the footprint of former barn structure. Excavations within the clay are anticipated to remain stable for a reasonable duration without the need for temporary support.

It is essential that no personnel approach or enter any excavation on site unless appropriate safety precautions have been implemented. This is particularly critical during site preparation, drainage installation, and foundation works, where entry into excavations may be necessary. For further guidance on excavation safety and site-specific precautions, reference should be made to HSE Publication HSG150: Health and Safety in Construction.

## Foundations

The results of the investigation have identified soft to firm cohesive clay soils across the site, which are anticipated to achieve a safe bearing capacity in the order of 100 kN/m<sup>2</sup> at a minimum depth of 1.00 m bgl. Based on these findings, it is expected that traditional strip foundations will be suitable for the majority of the site, typically constructed at depths between 1.00 m and 1.50 m bgl.

However, the presence of mature trees towards the north and east may necessitate deeper foundations to mitigate the risk of ground heave associated with clay soils. Conversely, if softer clay zones are encountered during excavation, foundation depths may also need to be increased to reach suitable bearing strata.

A detailed assessment should be undertaken by a qualified foundation engineer to confirm appropriate foundation design and depth, considering site specific variability and potential tree related ground movement.

## SUDS

Assessment of ground conditions across the site has identified the presence of cohesive, low permeability clays in all trial pit locations and to depth. These materials are considered unsuitable for the implementation of infiltration-based drainage solutions, such as soakaway systems, due to their limited permeability and poor drainage characteristics.

Given these constraints, alternative surface water management strategies should be explored.



## Conclusions & Recommendations

### General

The proposed development comprises the redevelopment of Burnt House Farm residential property with a private garden area and designated parking.

Site investigation works included five mechanically excavated trial pits (TP01–TP05) to a maximum depth of 1.50m bgl. Made ground encountered within four of the positions to a maximum depth of 0.40m bgl. Natural strata comprised glacial till deposits of soft becoming firm dark brown and grey gravelly sandy silty clay. Bedrock was not encountered within any of the exploratory hole locations during this phase of investigation works.

A perched groundwater was encountered within all positions at depths between 0.50m and 1.50m bgl, confined by the low permeability clays. The groundwater table is anticipated to lie at depth within the bedrock.

### Contamination Assessment

As part of the geo-environmental assessment, samples of made ground and natural strata were collected from various locations across the site and subjected to chemical analysis for a range of potential contaminants. No elevated concentrations of contaminants have been noted within any of the samples tested and as such, the material is deemed suitable for reuse and retention within a residential development.

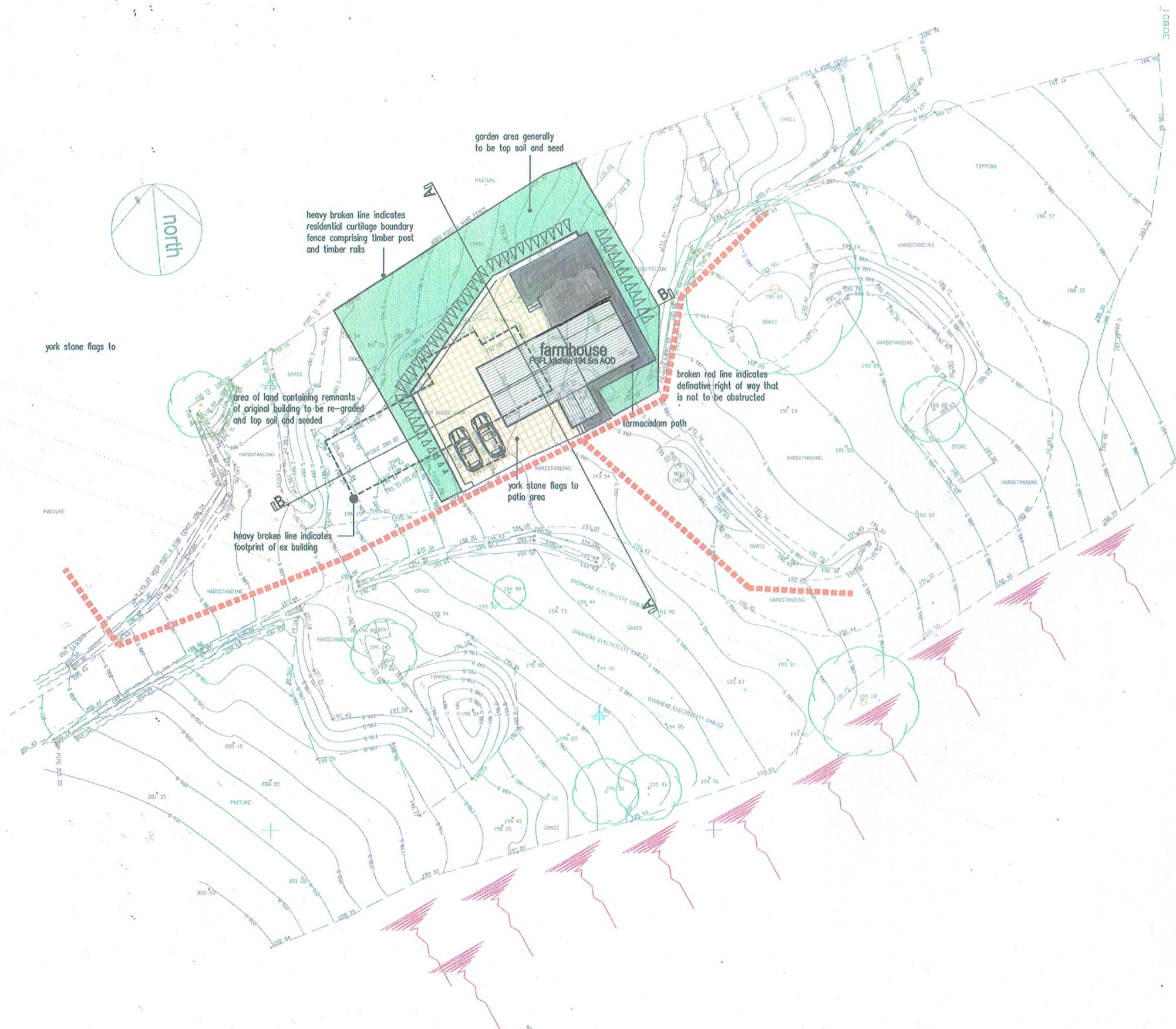
### Further Works

Should any unusual or suspicious strata or ground conditions be encountered during subsequent site preparation or stripping works, these areas must be brought to the attention of the appropriate authorities. All necessary inspection, sampling, and testing should be undertaken to determine whether such materials pose a risk to human health. It is incumbent upon site contractors to notify a responsible authority of any unexpected findings, which may then be subject to further investigation

# **Appendix A**

## **Proposed Development Plan**





amended 10-01-23

footprint of existing building included  
as overlay on proposed site plan

the volume of the proposed building  
amounts to approx 472m<sup>3</sup>

**proposed**

proposed replacement farmhouse at  
**Burnt House Farm**  
**Turton Road**  
**Tottington**  
**Bury**

scale 1:200 @ A1

0m 20m

linear scale 1:200 @ A1

drawing number BHF-24-03-22-C (amended)

Rae Connell Associates Building Design and Planning Consultants  
214 Burnley Road Bacup Lancashire 01706 873000

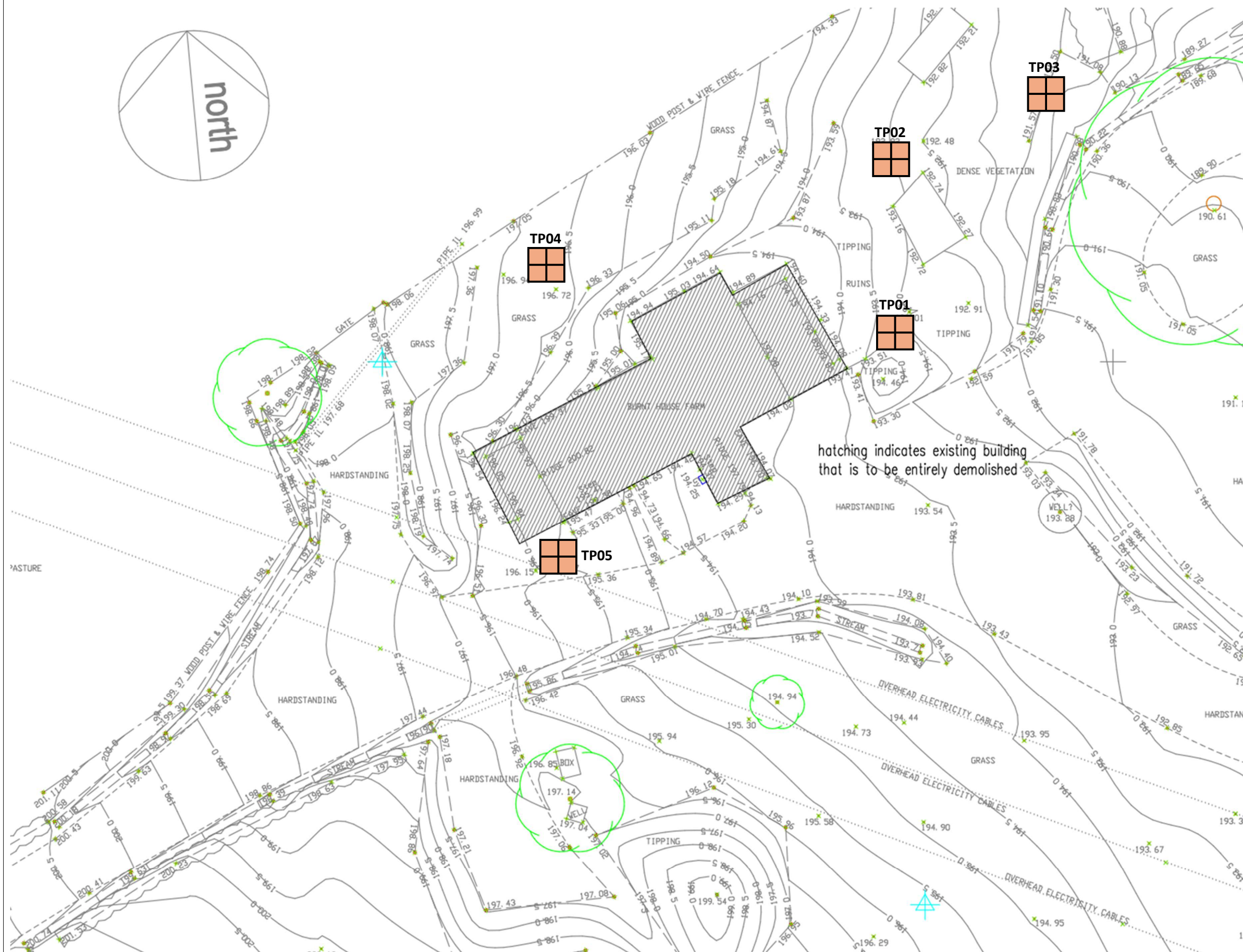
# **Appendix B**

## **Exploratory Hole Location Plan**



Legend:

 Mechanically Excavated Trial Pit Location



# **Appendix C**

## **Exploratory Hole Logs**





# Trial Pit

**TP01**  
Sheet 1 of 1

|                                  |                     |          |                          |                        |
|----------------------------------|---------------------|----------|--------------------------|------------------------|
| Hole Type<br>TP                  | Easting             | Northing | Ground Level (m)         | Scale<br>1:25          |
| Project Name<br>Burnt House Farm | Project No.<br>1007 |          | Start Date<br>2025-10-23 | End Date<br>2025-10-23 |

|                                             |                                                  |            |
|---------------------------------------------|--------------------------------------------------|------------|
| Client<br>Burnt House Farm Agricultural Ltd | Consultant<br>Marengo Engineering & Geotechnical | Contractor |
|---------------------------------------------|--------------------------------------------------|------------|

| Inst/<br>Backfill | Water<br>Levels | Samples and Tests |              |         | Level<br>(m) | Depth<br>(m)<br><small>(thickness)</small> | Strata                    |                                                                                                                                                                                                                                                                                                               |     |
|-------------------|-----------------|-------------------|--------------|---------|--------------|--------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                   |                 | Depth (m)         | Type/<br>Ref | Results |              |                                            | Legend                    | Description                                                                                                                                                                                                                                                                                                   |     |
|                   |                 | 0.20              | ES           |         |              | (0.30)                                     |                           | MADE GROUND: Dark brown gravelly sandy clay with a high cobble content. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone, brick and mudstone. Occasional fragments of plastics, glass, metal and roof tiles. Cobbles are angular to subangular of sandstone and brick. |     |
|                   |                 |                   |              |         |              | 0.30                                       |                           | Firm brown slightly gravelly sandy clay with occasional boulders of sandstone. Gravel is subangular to rounded fine to coarse of sandstone and occasional mudstone.                                                                                                                                           | 0.5 |
|                   |                 |                   |              |         |              | (0.70)                                     |                           |                                                                                                                                                                                                                                                                                                               |     |
|                   |                 |                   |              |         |              | 1.00                                       |                           | Firm greyish brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of sandstone and occasional mudstone. Frequent pockets of fine to medium sand.                                                                                                                             | 1.0 |
|                   |                 | 1.30              | D            |         |              | (0.50)                                     |                           |                                                                                                                                                                                                                                                                                                               |     |
|                   |                 |                   |              |         |              | 1.50                                       | End of Trial Pit at 1.50m |                                                                                                                                                                                                                                                                                                               | 1.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 2.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 2.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 3.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 3.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 4.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 4.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               | 5.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               |     |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               |     |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                                                                                                               |     |

|                                                                                                                                                                                                           |                                      |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|
| Remarks<br>Unable to progress past 1.50m bgl due to stiff ground condntions. Groundwater encountered at 1.50m bgl. Trial pit backfilled with arisings. Trial pit unstable from ground level to 1.00m bgl. | Method, Plant, Stability, Dimensions | Logger |
| Checked By: HM    Approved By: HM                                                                                                                                                                         |                                      |        |



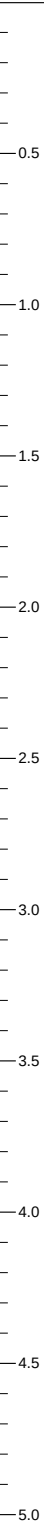


# Trial Pit

**TP03**  
Sheet 1 of 1

|                                  |                     |          |                          |                        |
|----------------------------------|---------------------|----------|--------------------------|------------------------|
| Hole Type<br>TP                  | Easting             | Northing | Ground Level (m)         | Scale<br>1:25          |
| Project Name<br>Burnt House Farm | Project No.<br>1007 |          | Start Date<br>2025-10-23 | End Date<br>2025-10-23 |

|                                             |                                                  |            |
|---------------------------------------------|--------------------------------------------------|------------|
| Client<br>Burnt House Farm Agricultural Ltd | Consultant<br>Marengo Engineering & Geotechnical | Contractor |
|---------------------------------------------|--------------------------------------------------|------------|

| Inst/<br>Backfill                                                                 | Water<br>Levels                                                                   | Samples and Tests |              |         | Level<br>(m) | Depth<br>(thickness)<br>(m)                                                       | Strata                                                                            |                                                                                                                                                                                                                      |                                                                                      |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------|--------------|---------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                                                                                   |                                                                                   | Depth (m)         | Type/<br>Ref | Results |              |                                                                                   | Legend                                                                            | Description                                                                                                                                                                                                          |                                                                                      |
|   |  | 0.25              | ES           |         |              | (0.30)                                                                            |  | MADE GROUND: Dark brown slightly gravelly slightly sandy silty clay with frequent roots and rootlets. Gravel is subangular to rounded fine to medium of sandstone, mudstone and occaisional brick.                   |  |
|                                                                                   |                                                                                   |                   |              |         |              | 0.30                                                                              |  | Soft brown with slight light brown mottling slightly gravelly sandy silty CLAY. Gravel is subangular to subrounded fine to medium of sandstone and mudstone. Frequent pockets of orangish brown fine to medium sand. |                                                                                      |
|                                                                                   |                                                                                   |                   |              |         |              | (0.35)                                                                            |                                                                                   |                                                                                                                                                                                                                      |                                                                                      |
|                                                                                   |                                                                                   |                   |              |         |              | 0.65                                                                              |                                                                                   |                                                                                                                                                                                                                      |                                                                                      |
|                                                                                   |                                                                                   |                   |              |         |              |  | (0.85)                                                                            |                                                                                                                                     |                                                                                      |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      |                                                                                      |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      |                                                                                      |
|  |  |                   |              |         |              | 1.50                                                                              |  | <i>End of Trial Pit at 1.50m</i>                                                                                                                                                                                     | 0.5                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 1.0                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 1.5                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 2.0                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 2.5                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 3.0                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 3.5                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 4.0                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 4.5                                                                                  |
|                                                                                   |                                                                                   |                   |              |         |              |                                                                                   |                                                                                   |                                                                                                                                                                                                                      | 5.0                                                                                  |

|                                                                                                                                                                        |                                      |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|
| Remarks<br>Unable to progress past 1.50m bgl due to stiff ground condntions. Groundwater seepage from 1.50m bgl. Trial pit backfilled with arisings. Trial pit stable. | Method, Plant, Stability, Dimensions | Logger |
| Checked By: HM    Approved By: HM                                                                                                                                      |                                      |        |



# Trial Pit

**TP04**  
Sheet 1 of 1

|                                  |                     |                          |                        |               |
|----------------------------------|---------------------|--------------------------|------------------------|---------------|
| Hole Type<br>TP                  | Easting             | Northing                 | Ground Level (m)       | Scale<br>1:25 |
| Project Name<br>Burnt House Farm | Project No.<br>1007 | Start Date<br>2025-10-23 | End Date<br>2025-10-23 |               |

|                                             |                                                  |            |
|---------------------------------------------|--------------------------------------------------|------------|
| Client<br>Burnt House Farm Agricultural Ltd | Consultant<br>Marengo Engineering & Geotechnical | Contractor |
|---------------------------------------------|--------------------------------------------------|------------|

| Inst/<br>Backfill | Water<br>Levels | Samples and Tests |              |         | Level<br>(m) | Depth<br>(m)<br><small>(thickness)</small> | Strata                    |                                                                                                                                                                                                                               |     |
|-------------------|-----------------|-------------------|--------------|---------|--------------|--------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                   |                 | Depth (m)         | Type/<br>Ref | Results |              |                                            | Legend                    | Description                                                                                                                                                                                                                   |     |
|                   |                 | 0.15              | ES           |         |              | (0.25)                                     |                           | Dark brown slightly gravelly slightly sandy silty CLAY with abundant rootlets. Gravel is subrounded to rounded fine of mudstone and sandstone. (Topsoil)                                                                      |     |
|                   |                 |                   |              |         |              | 0.25<br>(0.20)<br>0.45                     |                           | Soft greyish brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to rounded fine to medium of mudstone and sandstone. Occasional pockets of orangish brown fine to medium sand.                           | 0.5 |
|                   |                 | 1.20              | D            |         |              | (1.05)                                     |                           | Firm becoming stiff and friable, orangish brown mottled grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone and siltstone. Occasional pockets of organish brown sand. | 1.0 |
|                   |                 |                   |              |         |              | 1.50                                       | End of Trial Pit at 1.50m |                                                                                                                                                                                                                               | 1.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 2.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 2.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 3.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 3.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 4.0 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 4.5 |
|                   |                 |                   |              |         |              |                                            |                           |                                                                                                                                                                                                                               | 5.0 |

|                                                                                                                                                                        |                                      |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|
| Remarks<br>Unable to progress past 1.50m bgl due to stiff ground condntions. Groundwater seepage from 1.50m bgl. Trial pit backfilled with arisings. Trial pit stable. | Method, Plant, Stability, Dimensions | Logger |
| Checked By: HM    Approved By: HM                                                                                                                                      |                                      |        |



# **Appendix D**

## **Chemical Laboratory Test Results**



## FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 25/12267  
**Issue Number:** 1

**Date:** 07 November, 2025

**Client:** Marengo Engineering & Geotechnical (MEG)  
Strawberry Fields Digital Hub,  
Euxton Lane  
Chorley  
Lancashire  
UK  
PR7 1PS

**Project Manager:** Hollie Marengo  
**Project Name:** Burnt House Farm, Tottington  
**Project Ref:** 1007  
**Order No:** TBC  
**Date Samples Received:** 27/10/25  
**Date Instructions Received:** 28/10/25  
**Date Analysis Completed:** 07/11/25

**Approved by:**



Richard Wong  
Client Manager

Envirolab Job Number: 25/12267

Client Project Name: Burnt House Farm, Tottington

Client Project Ref: 1007

| Lab Sample ID                                       | 25/12267/1 | 25/12267/2 | 25/12267/3 | 25/12267/4 |  |  |  | Units | Limit of Detection | Method ref  |
|-----------------------------------------------------|------------|------------|------------|------------|--|--|--|-------|--------------------|-------------|
| Client Sample No                                    |            |            |            |            |  |  |  |       |                    |             |
| Client Sample ID                                    | TP01       | TP02       | TP03       | TP04       |  |  |  |       |                    |             |
| Depth to Top                                        | 0.20       | 0.30       | 0.25       | 0.15       |  |  |  |       |                    |             |
| Depth To Bottom                                     |            |            |            |            |  |  |  |       |                    |             |
| Date Sampled                                        | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  |  |  |  |       |                    |             |
| Sample Type                                         | SOIL - ES  | SOIL - ES  | SOIL - ES  | SOIL - ES  |  |  |  |       |                    |             |
| Sample Matrix Code                                  | 6AE        | 4AE        | 4AE        | 6AE        |  |  |  |       |                    |             |
| % Stones >10mm <sub>A</sub>                         | 12.9       | 4.1        | 15.9       | <0.1       |  |  |  | % w/w | 0.1                | A-T-044     |
| pH <sub>D</sub> <sup>M#</sup>                       | 7.29       | 6.86       | 6.82       | 5.05       |  |  |  | pH    | 0.01               | A-T-031s    |
| Sulphate (water sol 2:1) <sub>D</sub> <sup>M#</sup> | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | g/l   | 0.01               | A-T-026s    |
| Cyanide (total) <sub>A</sub> <sup>M#</sup>          | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-042sTCN |
| Phenols - Total by HPLC <sub>A</sub>                | <0.2       | <0.2       | <0.2       | <0.2       |  |  |  | mg/kg | 0.2                | A-T-050s    |
| Sulphide <sub>A</sub>                               | <5         | <5         | <5         | <5         |  |  |  | mg/kg | 5                  | A-T-043-s   |
| Total Organic Carbon <sub>D</sub> <sup>M#</sup>     | 2.66       | 8.59       | 5.06       | 6.70       |  |  |  | % w/w | 0.08               | A-T-032s    |
| Arsenic <sub>D</sub> <sup>M#</sup>                  | 9          | 27         | 19         | 24         |  |  |  | mg/kg | 1                  | A-T-024s    |
| Cadmium <sub>D</sub>                                | <1.0       | <1.0       | <1.0       | <1.0       |  |  |  | mg/kg | 1                  | A-T-024s    |
| Copper <sub>D</sub> <sup>M#</sup>                   | 38         | 65         | 49         | 53         |  |  |  | mg/kg | 1                  | A-T-024s    |
| Chromium <sub>D</sub> <sup>M#</sup>                 | 19         | 24         | 17         | 18         |  |  |  | mg/kg | 1                  | A-T-024s    |
| Lead <sub>D</sub> <sup>M#</sup>                     | 95         | 175        | 151        | 147        |  |  |  | mg/kg | 1                  | A-T-024s    |
| Mercury <sub>D</sub>                                | <0.17      | <0.17      | <0.17      | <0.17      |  |  |  | mg/kg | 0.17               | A-T-024s    |
| Nickel <sub>D</sub> <sup>M#</sup>                   | 13         | 27         | 18         | 15         |  |  |  | mg/kg | 1                  | A-T-024s    |
| Selenium <sub>D</sub> <sup>M#</sup>                 | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-024s    |
| Zinc <sub>D</sub> <sup>M#</sup>                     | 75         | 207        | 148        | 72         |  |  |  | mg/kg | 1                  | A-T-024s    |

Envirolab Job Number: 25/12267

Client Project Name: Burnt House Farm, Tottington

Client Project Ref: 1007

| Lab Sample ID                                                   | 25/12267/1 | 25/12267/2 | 25/12267/3 | 25/12267/4 |  |  |  | Units | Limit of Detection | Method ref |
|-----------------------------------------------------------------|------------|------------|------------|------------|--|--|--|-------|--------------------|------------|
| Client Sample No                                                |            |            |            |            |  |  |  |       |                    |            |
| Client Sample ID                                                | TP01       | TP02       | TP03       | TP04       |  |  |  |       |                    |            |
| Depth to Top                                                    | 0.20       | 0.30       | 0.25       | 0.15       |  |  |  |       |                    |            |
| Depth To Bottom                                                 |            |            |            |            |  |  |  |       |                    |            |
| Date Sampled                                                    | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  |  |  |  |       |                    |            |
| Sample Type                                                     | SOIL - ES  | SOIL - ES  | SOIL - ES  | SOIL - ES  |  |  |  |       |                    |            |
| Sample Matrix Code                                              | 6AE        | 4AE        | 4AE        | 6AE        |  |  |  |       |                    |            |
| Asbestos in Soil (inc. matrix) ^                                |            |            |            |            |  |  |  |       |                    |            |
| Asbestos in soil <sup>#</sup>                                   | NAD        | NAD        | NAD        | NAD        |  |  |  |       |                    | A-T-045    |
| Asbestos Matrix (visual) <sub>D</sub>                           | -          | -          | -          | -          |  |  |  |       |                    | A-T-045    |
| Asbestos Matrix (microscope) <sub>D</sub>                       | -          | -          | -          | -          |  |  |  |       |                    | A-T-045    |
| Asbestos ACM - Suitable for Water Absorption Test? <sub>D</sub> | N/A        | N/A        | N/A        | N/A        |  |  |  |       |                    | A-T-045    |

Envirolab Job Number: 25/12267

Client Project Name: Burnt House Farm, Tottington

Client Project Ref: 1007

| Lab Sample ID                                    | 25/12267/1  | 25/12267/2  | 25/12267/3  | 25/12267/4  |  |  |  | Units        | Limit of Detection | Method ref      |
|--------------------------------------------------|-------------|-------------|-------------|-------------|--|--|--|--------------|--------------------|-----------------|
| Client Sample No                                 |             |             |             |             |  |  |  |              |                    |                 |
| Client Sample ID                                 | TP01        | TP02        | TP03        | TP04        |  |  |  |              |                    |                 |
| Depth to Top                                     | 0.20        | 0.30        | 0.25        | 0.15        |  |  |  |              |                    |                 |
| Depth To Bottom                                  |             |             |             |             |  |  |  |              |                    |                 |
| Date Sampled                                     | 23-Oct-25   | 23-Oct-25   | 23-Oct-25   | 23-Oct-25   |  |  |  |              |                    |                 |
| Sample Type                                      | SOIL - ES   | SOIL - ES   | SOIL - ES   | SOIL - ES   |  |  |  |              |                    |                 |
| Sample Matrix Code                               | 6AE         | 4AE         | 4AE         | 6AE         |  |  |  |              |                    |                 |
| <b>PAH-16MS</b>                                  |             |             |             |             |  |  |  |              |                    |                 |
| Acenaphthene <sub>A</sub> <sup>M#</sup>          | 0.04        | 0.02        | 0.02        | 0.01        |  |  |  | mg/kg        | 0.01               | A-T-019s        |
| Acenaphthylene <sub>A</sub> <sup>M#</sup>        | 0.02        | 0.02        | 0.02        | <0.01       |  |  |  | mg/kg        | 0.01               | A-T-019s        |
| Anthracene <sub>A</sub> <sup>M#</sup>            | 0.10        | 0.09        | 0.08        | <0.02       |  |  |  | mg/kg        | 0.02               | A-T-019s        |
| Benzo(a)anthracene <sub>A</sub> <sup>M#</sup>    | 0.54        | 0.50        | 0.63        | 0.19        |  |  |  | mg/kg        | 0.04               | A-T-019s        |
| Benzo(a)pyrene <sub>A</sub> <sup>M#</sup>        | 0.83        | 0.49        | 0.65        | 0.17        |  |  |  | mg/kg        | 0.04               | A-T-019s        |
| Benzo(b)fluoranthene <sub>A</sub> <sup>M#</sup>  | 1.02        | 0.67        | 0.88        | 0.26        |  |  |  | mg/kg        | 0.05               | A-T-019s        |
| Benzo(ghi)perylene <sub>A</sub> <sup>M#</sup>    | 0.44        | 0.25        | 0.28        | 0.09        |  |  |  | mg/kg        | 0.05               | A-T-019s        |
| Benzo(k)fluoranthene <sub>A</sub> <sup>M#</sup>  | 0.28        | 0.19        | 0.28        | <0.07       |  |  |  | mg/kg        | 0.07               | A-T-019s        |
| Chrysene <sub>A</sub> <sup>M#</sup>              | 0.62        | 0.59        | 0.70        | 0.21        |  |  |  | mg/kg        | 0.06               | A-T-019s        |
| Dibenzo(ah)anthracene <sub>A</sub> <sup>M#</sup> | 0.10        | 0.06        | 0.08        | <0.04       |  |  |  | mg/kg        | 0.04               | A-T-019s        |
| Fluoranthene <sub>A</sub> <sup>M#</sup>          | 0.98        | 0.94        | 1.06        | 0.38        |  |  |  | mg/kg        | 0.08               | A-T-019s        |
| Fluorene <sub>A</sub> <sup>M#</sup>              | 0.02        | 0.02        | 0.02        | <0.01       |  |  |  | mg/kg        | 0.01               | A-T-019s        |
| Indeno(123-cd)pyrene <sub>A</sub> <sup>M#</sup>  | 0.49        | 0.27        | 0.34        | 0.11        |  |  |  | mg/kg        | 0.03               | A-T-019s        |
| Naphthalene <sub>A</sub> <sup>M#</sup>           | <0.03       | <0.03       | <0.03       | <0.03       |  |  |  | mg/kg        | 0.03               | A-T-019s        |
| Phenanthrene <sub>A</sub> <sup>M#</sup>          | 0.38        | 0.45        | 0.40        | 0.16        |  |  |  | mg/kg        | 0.03               | A-T-019s        |
| Pyrene <sub>A</sub> <sup>M#</sup>                | 0.97        | 0.97        | 1.14        | 0.32        |  |  |  | mg/kg        | 0.07               | A-T-019s        |
| <b>Total PAH-16MS<sub>A</sub><sup>M#</sup></b>   | <b>6.83</b> | <b>5.53</b> | <b>6.58</b> | <b>1.90</b> |  |  |  | <b>mg/kg</b> | <b>0.01</b>        | <b>A-T-019s</b> |

Envirolab Job Number: 25/12267

Client Project Name: Burnt House Farm, Tottington

Client Project Ref: 1007

| Lab Sample ID                                  | 25/12267/1 | 25/12267/2 | 25/12267/3 | 25/12267/4 |  |  |  | Units | Limit of Detection | Method ref   |
|------------------------------------------------|------------|------------|------------|------------|--|--|--|-------|--------------------|--------------|
| Client Sample No                               |            |            |            |            |  |  |  |       |                    |              |
| Client Sample ID                               | TP01       | TP02       | TP03       | TP04       |  |  |  |       |                    |              |
| Depth to Top                                   | 0.20       | 0.30       | 0.25       | 0.15       |  |  |  |       |                    |              |
| Depth To Bottom                                |            |            |            |            |  |  |  |       |                    |              |
| Date Sampled                                   | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  | 23-Oct-25  |  |  |  |       |                    |              |
| Sample Type                                    | SOIL - ES  | SOIL - ES  | SOIL - ES  | SOIL - ES  |  |  |  |       |                    |              |
| Sample Matrix Code                             | 6AE        | 4AE        | 4AE        | 6AE        |  |  |  |       |                    |              |
| TPH UKCWG with Clean Up                        |            |            |            |            |  |  |  |       |                    |              |
| Ali >C5-C6 <sub>A</sub>                        | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| Ali >C6-C8 <sub>A</sub>                        | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| Ali >C8-C10 <sub>A</sub>                       | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Ali >C10-C12 <sub>A</sub> <sup>M#</sup>        | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Ali >C12-C16 <sub>A</sub> <sup>M#</sup>        | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Ali >C16-C21 <sub>A</sub> <sup>M#</sup>        | <1         | 4          | 1          | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Ali >C21-C35 <sub>A</sub> <sup>M#</sup>        | 15         | 113        | 29         | 9          |  |  |  | mg/kg | 1                  | A-T-055s     |
| Ali >C35-C44 <sub>A</sub>                      | 7          | 61         | 12         | 1          |  |  |  | mg/kg | 1                  | A-T-055s     |
| Total Aliphatics <sub>A</sub>                  | 22         | 178        | 42         | 11         |  |  |  | mg/kg | 1                  | Calc-As Recd |
| Aro >C5-C7 <sub>A</sub> <sup>#</sup>           | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| Aro >C7-C8 <sub>A</sub> <sup>#</sup>           | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| Aro >C8-C10 <sub>A</sub>                       | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Aro >C10-C12 <sub>A</sub>                      | <1         | <1         | <1         | <1         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Aro >C12-C16 <sub>A</sub>                      | 2          | 4          | 2          | 3          |  |  |  | mg/kg | 1                  | A-T-055s     |
| Aro >C16-C21 <sub>A</sub> <sup>M#</sup>        | 4          | 16         | 8          | 4          |  |  |  | mg/kg | 1                  | A-T-055s     |
| Aro >C21-C35 <sub>A</sub> <sup>M#</sup>        | 14         | 111        | 40         | 15         |  |  |  | mg/kg | 1                  | A-T-055s     |
| Aro >C35-C44 <sub>A</sub>                      | 4          | 90         | 10         | 3          |  |  |  | mg/kg | 1                  | A-T-055s     |
| Total Aromatics <sub>A</sub>                   | 25         | 221        | 60         | 24         |  |  |  | mg/kg | 1                  | Calc-As Recd |
| TPH (Ali & Aro >C5-C44) <sub>A</sub>           | 47         | 399        | 102        | 34         |  |  |  | mg/kg | 1                  | Calc-As Recd |
| BTEX - Benzene <sub>A</sub> <sup>#</sup>       | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| BTEX - Toluene <sub>A</sub> <sup>#</sup>       | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| BTEX - Ethyl Benzene <sub>A</sub> <sup>#</sup> | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| BTEX - m & p Xylene <sub>A</sub> <sup>#</sup>  | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| BTEX - o Xylene <sub>A</sub> <sup>#</sup>      | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |
| MTBE <sub>A</sub> <sup>#</sup>                 | <0.01      | <0.01      | <0.01      | <0.01      |  |  |  | mg/kg | 0.01               | A-T-022s     |

## Report Notes

### General

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

### Key

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

### Asbestos

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

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

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

### Assigned Matrix Codes

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

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

### Soil Chemical Analysis:

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

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

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

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

### TPH by method A-T-007:

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

Results “with Clean up” indicates samples cleaned up with Silica during extraction.

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

EPH CWG results have humics mathematically subtracted through instrument calculation.

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

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

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

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

## Envirolab Deviating Samples Report

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

**Client:** Marengo Engineering & Geotechnical (MEG), Strawberry Fields Digital Hub,  
Euxton Lane, Chorley, Lancashire, UK, PR7 1PS

**Project:** Burnt House Farm, Tottington

**Clients Project No:** 1007

**Project No:** 25/12267

**Date Received:** 28/10/2025 (am)

**Cool Box Temperatures (°C):** 9.3

### NO DEVIATIONS IDENTIFIED

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

## Envirolab Analysis Dates

| Lab Sample ID          | 25/12267/1 | 25/12267/2 | 25/12267/3 | 25/12267/4 |
|------------------------|------------|------------|------------|------------|
| Client Sample No       |            |            |            |            |
| Client Sample ID/Depth | TP01 0.20m | TP02 0.30m | TP03 0.25m | TP04 0.15m |
| Date Sampled           | 23/10/25   | 23/10/25   | 23/10/25   | 23/10/25   |
| A-T-019s               | 30/10/2025 | 30/10/2025 | 30/10/2025 | 30/10/2025 |
| A-T-022s               | 31/10/2025 | 31/10/2025 | 31/10/2025 | 31/10/2025 |
| A-T-024s               | 07/11/2025 | 07/11/2025 | 07/11/2025 | 07/11/2025 |
| A-T-026s               | 05/11/2025 | 05/11/2025 | 05/11/2025 | 05/11/2025 |
| A-T-031s               | 06/11/2025 | 06/11/2025 | 06/11/2025 | 06/11/2025 |
| A-T-032s               | 06/11/2025 | 06/11/2025 | 06/11/2025 | 06/11/2025 |
| A-T-042sTCN            | 30/10/2025 | 30/10/2025 | 30/10/2025 | 30/10/2025 |
| A-T-043-s              | 03/11/2025 | 03/11/2025 | 03/11/2025 | 03/11/2025 |
| A-T-044                | 03/11/2025 | 03/11/2025 | 03/11/2025 | 03/11/2025 |
| A-T-045                | 29/10/2025 | 29/10/2025 | 29/10/2025 | 29/10/2025 |
| A-T-050s               | 05/11/2025 | 05/11/2025 | 05/11/2025 | 05/11/2025 |
| A-T-055s               | 31/10/2025 | 31/10/2025 | 31/10/2025 | 31/10/2025 |
| Calc-As Recd           | 31/10/2025 | 31/10/2025 | 31/10/2025 | 31/10/2025 |

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

**End of Report**

# **Appendix E**

## **Geotechnical Laboratory Test Results**



## TEST REPORT

**Client** Marengo Engineering & Geotechnical

**Address** Strawberry Fields Digital Hub  
Euxton Lane  
Chorley  
Lancashire

**Contract** Burnt House Farm,  
Tottington

**Job Number** MRN 25298/4  
**Date of Issue** 11 November 2025  
**Page** 1 of 4

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870  
Email: [enquiries@murrayrix.com](mailto:enquiries@murrayrix.com) Website: [www.murrayrix.com](http://www.murrayrix.com)

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# MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,  
DUKINFIELD, CHESHIRE SK16 4QX  
TEL 0161 475 0870



## TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

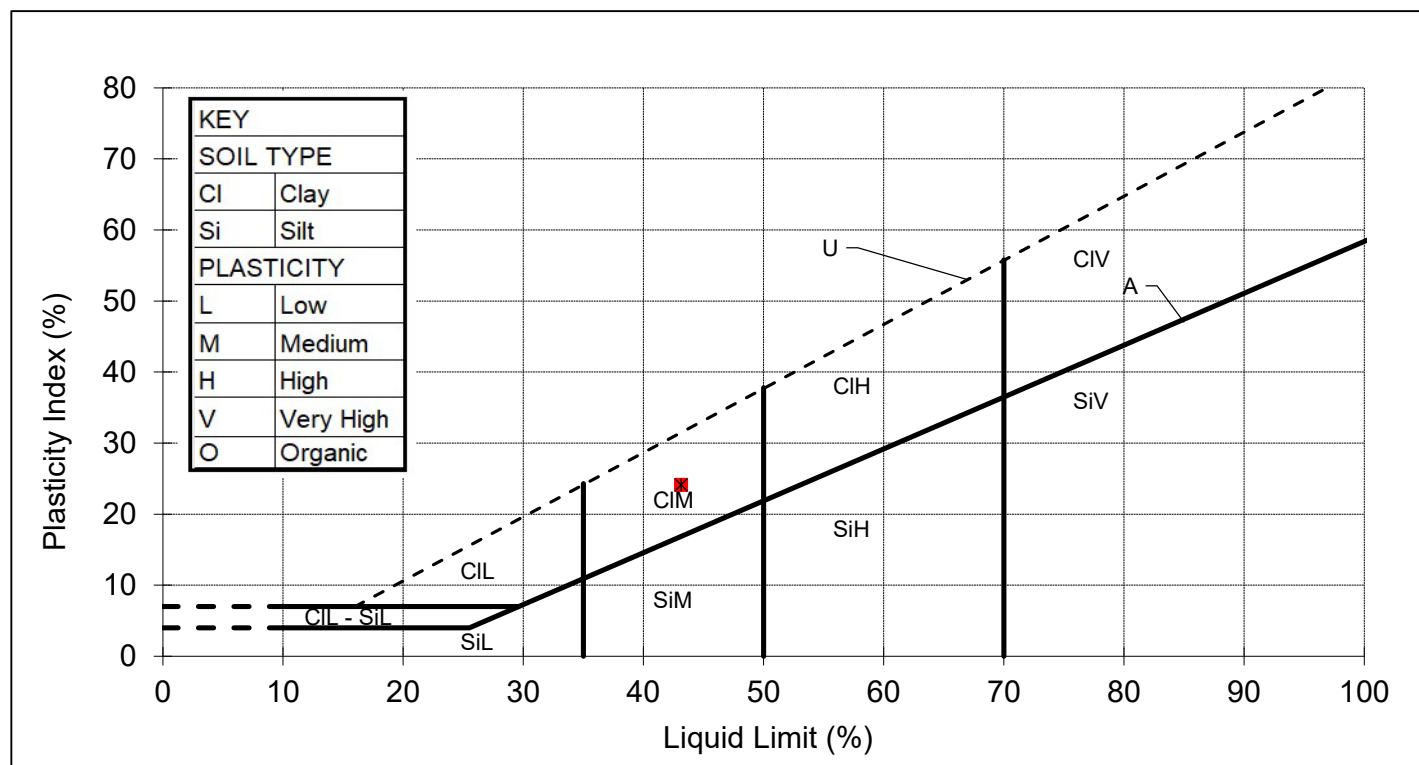
|            |                                    |
|------------|------------------------------------|
| CLIENT     | Marengo Engineering & Geotechnical |
| SITE       | Burnt House Farm, Tottington       |
| JOB NUMBER | MRN 25298/4                        |

|              |              |               |           |
|--------------|--------------|---------------|-----------|
| SAMPLE LABEL | TP01 - 1.30m | DATE SAMPLED  | 23-Oct-25 |
| SAMPLE No.   | 5212701      | DATE RECEIVED | 30-Oct-25 |
| DATE TESTED  | 04-Nov-25    | SAMPLED BY    | Client    |

|                |                                                                       |                 |            |
|----------------|-----------------------------------------------------------------------|-----------------|------------|
| MATERIAL       | Orange brown grey mottled silty slightly sandy slightly gravelly CLAY |                 |            |
| ADVISED SOURCE | Site Investigation Sample                                             | WATER CONTENT   | Increasing |
| SAMPLE HISTORY | Natural State                                                         | % RET. 425um BY | Wet Sieved |

| Test Readings mm (average) | Water Content % | Correction Factor | Correction factor from Clayton and Jukes 1978 |
|----------------------------|-----------------|-------------------|-----------------------------------------------|
| Determination 1 (avg)      | 20.8            | 43.8              |                                               |
| Determination 2 (avg)      | 20.7            | 43.5              |                                               |

| Natural Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Passing 425 micron (%) |
|---------------------------|------------------|-------------------|----------------------|------------------------|
| 25.1                      | 43               | 19                | 24                   | 81                     |



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)  
(Director / Head of Laboratory)

DATE

11-Nov-25

# MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,  
DUKINFIELD, CHESHIRE SK16 4QX  
TEL 0161 475 0870



## TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

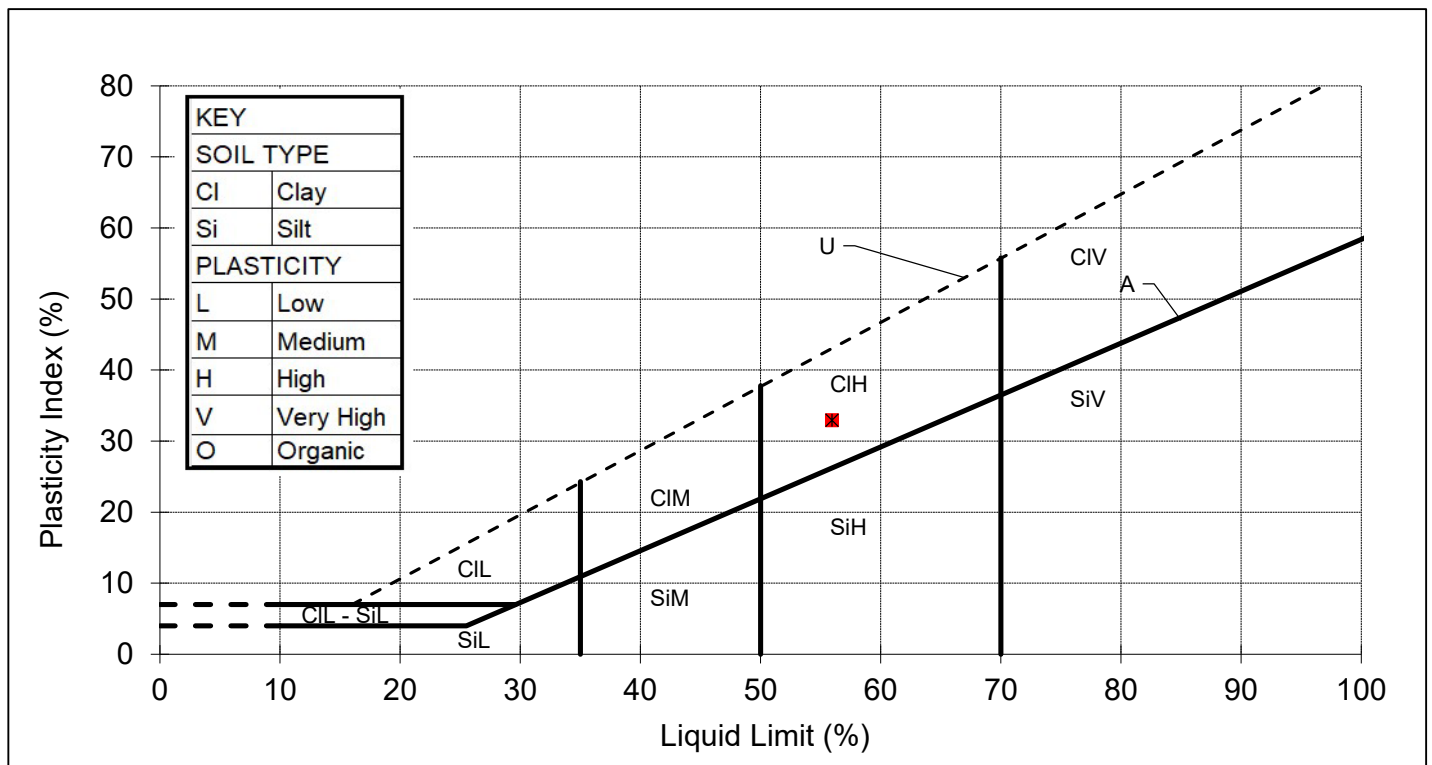
|            |                                    |
|------------|------------------------------------|
| CLIENT     | Marengo Engineering & Geotechnical |
| SITE       | Burnt House Farm, Tottington       |
| JOB NUMBER | MRN 25298/4                        |

|              |              |               |           |
|--------------|--------------|---------------|-----------|
| SAMPLE LABEL | TP02 - 1.40m | DATE SAMPLED  | 23-Oct-25 |
| SAMPLE No.   | 5212702      | DATE RECEIVED | 30-Oct-25 |
| DATE TESTED  | 04-Nov-25    | SAMPLED BY    | Client    |

|                |                                                                    |                 |            |
|----------------|--------------------------------------------------------------------|-----------------|------------|
| MATERIAL       | Brown silty slightly sandy slightly gravelly slightly organic CLAY |                 |            |
| ADVISED SOURCE | Site Investigation Sample                                          | WATER CONTENT   | Increasing |
| SAMPLE HISTORY | Natural State                                                      | % RET. 425um BY | Wet Sieved |

| Test Readings mm (average) |      | Water Content % | Correction Factor | Correction factor from Clayton and Jukes 1978 |
|----------------------------|------|-----------------|-------------------|-----------------------------------------------|
| Determination 1 (avg)      | 19.5 | 55.5            | 1.009             |                                               |
| Determination 2 (avg)      | 19.5 | 55.4            |                   |                                               |

| Natural Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Passing 425 micron (%) |
|---------------------------|------------------|-------------------|----------------------|------------------------|
| 46.8                      | 56               | 23                | 33                   | 93                     |



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)  
(Director / Head of Laboratory)

DATE

11-Nov-25

# MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX  
TEL 0161 475 0870



## TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

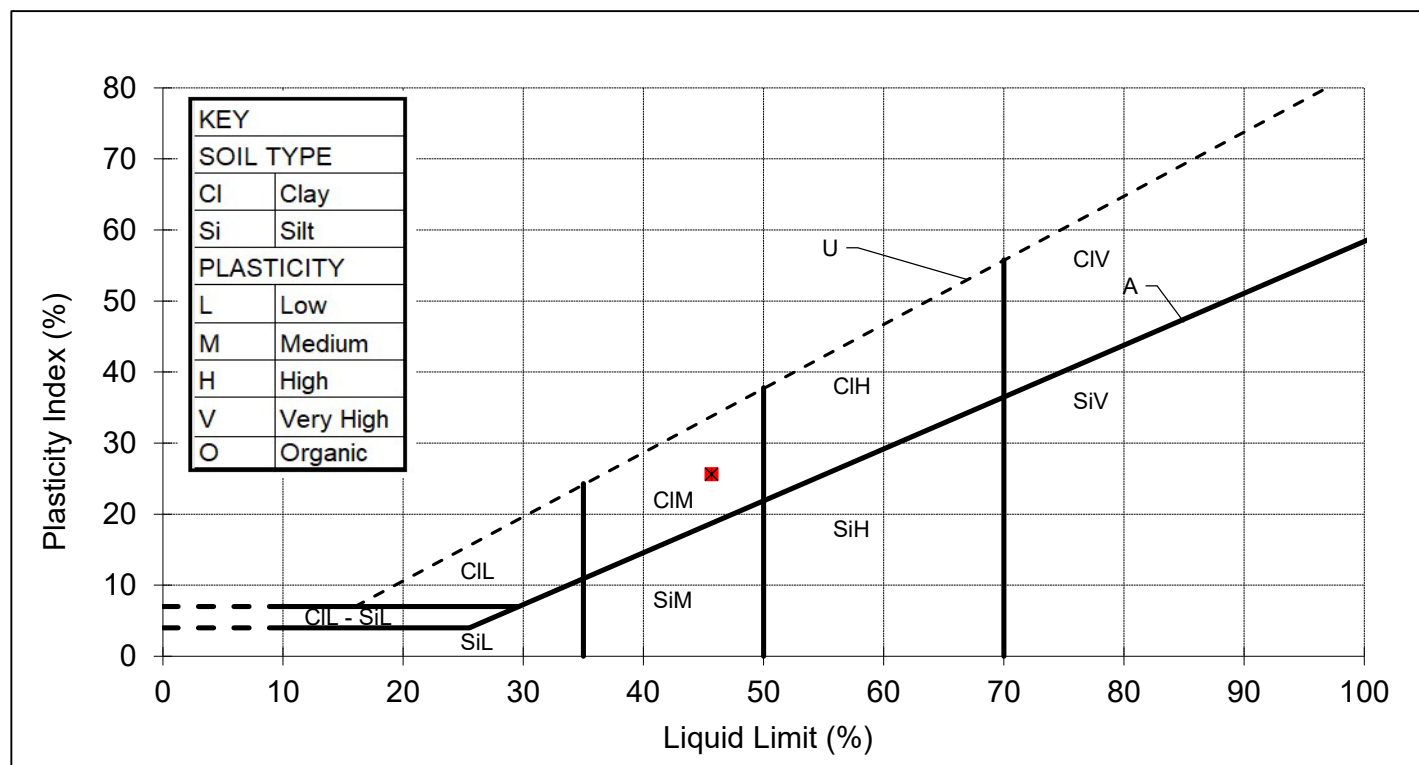
|            |                                    |
|------------|------------------------------------|
| CLIENT     | Marengo Engineering & Geotechnical |
| SITE       | Burnt House Farm, Tottington       |
| JOB NUMBER | MRN 25298/4                        |

|              |              |               |           |
|--------------|--------------|---------------|-----------|
| SAMPLE LABEL | TP04 - 1.20m | DATE SAMPLED  | 23-Oct-25 |
| SAMPLE No.   | 5212704      | DATE RECEIVED | 30-Oct-25 |
| DATE TESTED  | 04-Nov-25    | SAMPLED BY    | Client    |

|                |                                                                    |                 |            |
|----------------|--------------------------------------------------------------------|-----------------|------------|
| MATERIAL       | Brown silty slightly sandy slightly gravelly slightly organic CLAY |                 |            |
| ADVISED SOURCE | Site Investigation Sample                                          | WATER CONTENT   | Increasing |
| SAMPLE HISTORY | Natural State                                                      | % RET. 425um BY | Wet Sieved |

| Test Readings mm (average) |      | Water Content % | Correction Factor | Correction factor from Clayton and Jukes 1978 |
|----------------------------|------|-----------------|-------------------|-----------------------------------------------|
| Determination 1 (avg)      | 18.5 | 44.4            | 1.028             |                                               |
| Determination 2 (avg)      | 18.4 | 44.4            |                   |                                               |

| Natural Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Passing 425 micron (%) |
|---------------------------|------------------|-------------------|----------------------|------------------------|
| 25.4                      | 46               | 20                | 26                   | 90                     |



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)  
(Director / Head of Laboratory)

DATE

11-Nov-25