

A close-up photograph of an excavator bucket, showing the metal structure and the soil it is digging. The bucket is positioned on the left side of the cover, with a red geometric pattern on the right.

STAGE 2 GEO-ENVIRONMENTAL REPORT

AT

**THORNHILL WORKS
CALDER ROAD
DEWSBURY**

ON BEHALF OF

NEWLAY READYMIX LTD

ARP GEOTECHNICAL LTD

CHARTERED CONSULTING ENGINEERS

Northwest House 5/6 Northwest Business Park Servia Hill Leeds LS6 2QH

☎ 0113 245 8498 ✉ leeds@arpgeotechnical.co.uk 🌐 www.arpconsultingengineers.co.uk

CLIENT: NEWLAY READYMIX LIMITED

JOB NUMBER: NRL/01

PROJECT: THORNHILL WORKS, CALDER ROAD, DEWSBURY

REPORT TYPE: STAGE 2 GEO-ENVIRONMENTAL REPORT

REPORT REFERENCE: NRL/01r1

	Name	Signature
Prepared By:	O Gwilym MSc BSc	
Reviewed By:	J Race BSc CGeol FGS EurGeol M Harper BSc(Hons) MSc CEnv MEnvSc	
Authorised By:	M Harper BSc(Hons) MSc CEnv MEnvSc	

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1.0 EXECUTIVE SUMMARY

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

Proposed Development	Proposed concrete batching plant including single-storey office block and installation of a concrete pad.
Existing Site Description	Part of a larger works and adjacent to a smaller concrete batching plant. The site is currently used for storage and stockpiling.
Site History	Rail sidings from 1900s until 1930s, part of wider concrete works from 1950s.
Geology	Undifferentiated strata (mudstones, siltstones and minor sandstones) of the Pennine Lower Coal Measures. No superficial deposits are indicated on or near the site. The site is indicated to be within an area of infilled ground.
Coal Mining	Findings of Intrusive Coal Mining Investigation are reported in letter NCL/03/WWjcl2, dated 1 st August 2024. There is sufficient rock cover above the encountered underground workings on the east of the site, in the area of the proposed concrete plant and associated infrastructure, and no grout treatment should be required. However, if any future structures are proposed in the southwest of the site (none are currently), further investigation would be required due to potential insufficient cover to workings.
Hazardous Gases	No radon protection measures required. Several landfills within 250m of the site and potential for shallow coal workings. Gas monitoring is ongoing.
Ground Conditions	Between 0.6m and 1.6m of made ground on the proposed batching plant and office area. Up to 3.9m of made ground on the southwest. The underlying natural strata generally comprise residual clays over mudstone. At some locations, the clays are absent and made ground

	sits directly onto mudstone. No water ingress noted during the investigation, but this may not be the case at other times of year.
Contamination and Remediation	No elevated contamination was identified. No remediation required.
Foundations	As the proposed batching plant and office will be of modular construction, it is assumed founding requirements will be dictated by the suppliers. An allowable bearing pressure of 100kN/m ² is available on the natural clay and 300kN/m ² on intact mudstone.
Excavations	Likely to be stable within natural strata, but instability can be expected within any made ground. Groundwater not encountered during the investigation, but shallow groundwater may be present at wetter times of the year. Likely that most of the time, any groundwater ingress should be controllable by pumping
Concrete	FND2 designation for unreinforced buried concrete. For any reinforced concrete, other design-specific mixes will apply.
Road Pavement	A design CBR value of 3% considered applicable on the natural clay.
Other Constraints	The site is immediately adjacent to a railway line. Consultation with Network Rail may be required for any works undertaken near the southern boundary.

2.0 TERMS OF REFERENCE

- 2.1 Newlay Readymix Ltd is considering relocating an existing concrete batching plant at Thornhill Works at Calder Road, Dewsbury. The proposed development will include a new single-storey office block, three 11m high silos, feed hoppers and extension of existing concrete pad. In June 2024 ARP Geotechnical Ltd issued a Stage 1 Desk Study Report (Reference NCL/03r1). This involved an assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. In addition to comments and conclusions on a wide range of environmental and geotechnical issues, the report also provided recommendations for intrusive investigation and assessment.
- 2.2 In July 2024, ARP Geotechnical Ltd was appointed by Newlay Readymix Ltd to undertake the recommended further works, with the intrusive investigation comprising windowless sample boreholes to assess the ground conditions.
- 2.3 The investigation was implemented generally in accordance with BS 5930:2015 +A1:2020 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality - managing ground conditions", Environment Agency LCRM "Land Contamination Risk Management" and BS10175: 2011 + A2: 2017 "Investigation of potentially contaminated sites - Code of practice". This report is limited to the data obtained as part of this investigation. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions, including groundwater levels, after the preparation of this report.
- 2.4 The findings or contents of the Stage 1 Desk Study Report are not reproduced here in full, and it is recommended that this report is read in conjunction with the Stage 1 Report.
- 2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist to undertake a more detailed survey, including for any invasive/harmful weeds.

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

3.0 THE SITE

Site Location

- 3.1 The site, which is centred on Ordnance Survey Grid Reference SE 22642 19900, is located off Calder Road, in Dewsbury.
- 3.2 A site location plan, aerial photograph and proposed site layout, are presented in Appendix A.

Site Description

- 3.3 The site is part of a large concrete plant at Thornhill Works which is used for manufacture of concrete blocks and asphalt. An existing concrete batching plant is located at the eastern end of the site extending eastward beyond the development boundary. This part of the site was fully under concrete hardstanding with evidence of cracking at the surface. Several buildings and structures are present in the eastern end of the site including a two-storey porta cabin office and storage bays. Sand and gravel are stockpiled within the storage bays for use in the concrete production. The western end of the site was fully under hardcore covering with a small single storey brick building towards the northwestern corner. Previously this end of the site was used for stockpile storage. However, at the time of the site walkover much of the stockpiles had been removed and a compound was now present towards the west centre of the site. This compound was for contractors working on the railway side of the site boundary.
- 3.4 A large electricity pylon is located immediately northeast of the site and overhead power cables cross the site.
- 3.5 The site is generally level. A vegetated embankment is present along the southern boundary sloping down towards the railway track to the south.

Site History

- 3.6 Ordnance Survey archive maps show rail sidings were present on site from 1900s before being dismantled in the 1930s. Since the 1950s the site has been part of the wider concrete works. Several coal mines and associated colliery spoils were located immediately northwest of the site from the 1900s.

4.0 ENVIRONMENTAL SETTING

- 4.1 The environmental setting for the site was established by the Stage 1 Desk Study Report undertaken by ARP Geotechnical Ltd under reference NCL/03r1 and dated June 2024. The findings of the Desk Study Report, updated and amended where deemed appropriate, are summarised below.

Geology

- 4.2 The geological maps show the site to be underlain by undifferentiated strata (mudstones, siltstones and minor sandstones) of the Pennine Lower Coal Measures of the Carboniferous Period. No superficial deposits are indicated on or near the site. There are no faults shown to affect the site.

Coal Mining

- 4.3 A Coal Mining Risk Assessment undertaken by ARP (NCL/03/JR, dated 17th May 2024) concluded that there are potentially two seams within influencing depth of the surface, and it was recommended that a rotary rock drilling investigation should be carried out. ARP was subsequently appointed to carry out this investigation (reported in letter NCL/03/WWjcl2, dated 1st August 2024). Evidence of workings was identified at between 11.8m and 12.5m depth, but with sufficient rock cover above the workings in the area of the proposed concrete plant and associated infrastructure. It was concluded that no grout treatment would be required for the new batching plant.
- 4.4 Insufficient rock cover was estimated to be present at the location WS3 in the southwestern corner of the site. Presently, no structures or infrastructure are proposed at this location other than the application of concrete hardstanding. Therefore, no treatment would be required. However, if any structures or infrastructure are proposed in this location in the future, further rotary investigation would be recommended to determine any need for grout treatment.

Hydrogeology

- 4.4 The Landmark Envirocheck Report indicates the Bedrock Aquifer Designation to be "a "Secondary A" Aquifer.
- 4.5 There are nine groundwater abstractions within 1km of the site, at between 178m west and 987m to the west. Only three of the abstraction licenses are downgradient of the site at 633m northeast of the site associated with laundry and general washing.
- 4.6 The site is not within a groundwater Source Protection Zone.

Hydrology

- 4.7 There are no watercourses on or adjacent to the site. The nearest downslope surface water is the River Calder at approximately 100m northeast of the site. The site is not in an area at risk from river flooding.
- 4.8 There are eight active surface water abstractions within 1km of the site, at between approximately 187m and 687m from the site. Only three abstraction licenses are down gradient from the site at 687m to the northeast associated with the textile industry and mineral dust suppression and should be unaffected by any activity on the site.

Other Relevant Environmental Data

- 4.9 There are three closed or currently licenced landfills within 250m of the site. The nearest is located 40m southeast of the site. The landfill was licensed to receive inert and industrial waste and the first input was recorded as 31st December 1923.
- 4.10 No radon protective measures are stated to be necessary for new dwellings or extensions on the site, and the site is within a “lower probability radon area”

- 4.11 BGS data indicates the general area has the "potential for groundwater flooding to occur at surface".

Potential Contamination Sources

- 4.12 The following potential sources of contamination were identified in the Stage 1 Desk Study Report

4.12.1 Likely made ground: – metals inorganics, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH), phenol, asbestos. Although substations are indicated to be located at the western and eastern boundary the presence of associated PCB contamination on site is not considered to be risk given the low mobility of PCBs.

4.12.2 Possible asbestos within existing building.

4.12.3 Possible harmful gases from coal/workings and/or landfills within 250m: - methane, carbon dioxide.

5.0 SITE INVESTIGATION

- 5.1 A site investigation was undertaken by ARP Geotechnical Ltd on 28th June 2024. The purpose of the investigation was to produce an assessment of the site in accordance with BS10175: 2011 + A2: 2017 "Investigation of potentially contaminated sites - Code of practice", and to provide geotechnical information to aid design of the development.
- 5.2 The site was gridded on a maximum 25m spacing windowless sample boreholes were sampled on the grid, to satisfy the requirements of the British Standard. Six boreholes (WS1 to WS6) were formed, to depths of between 0.95m and 4.05m. The location of the boreholes was restricted towards the centre of the site due to the presence of a contractors compound. The boreholes were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd.
- 5.3 Three gas monitoring wells were installed, in WS1, WS4 and WS6, and subsequently monitored by ARP Geotechnical Ltd. The wells were installed to between 0.8m and 2.0m depth, with the bottom 0.5m to 1.0m comprising slotted pipe with gravel surround, and the upper 0.5m comprising plain pipe with bentonite seal and lockable flush cover.
- 5.4 The borehole location plan and logs are included in Appendix C.
- 5.5 Chemical analysis of six soil samples, for metals, inorganics, speciated PAH, TPH, phenols, and asbestos, was undertaken by the UKAS accredited Eurofins Chemtest Laboratory in Newmarket. The test certificates are included in Appendix D.
- 5.6 Analysis for Atterberg Limits and moisture content was undertaken by the UKAS accredited Professional Soils Laboratory (PSL) in Doncaster. Geochemical testing comprising pH and water-soluble sulphate was undertaken by Eurofins Chemtest. The test certificates are included in Appendix D.

6.0 SUMMARY OF GROUND CONDITIONS

Strata and Groundwater

- 6.1 In the west of the site (WS1, WS2 and WS3) the site investigation encountered granular made ground from the surface to depths of between 0.6m (WS1 and WS2) and 3.9m (WS03 near the southern boundary). The made ground was underlain by extremely weak mudstone to the base of the exploratory holes in WS1 and WS3. In WS2, a thin (0.15m) layer of firm clay was present below the made ground to 0.75m depth, underlain by a thin layer of coal (0.05m) over the extremely weak mudstone.
- 6.2 In the east of the site (WS4, WS5 and WS6) the site investigation encountered a covering of concrete to between 0.15m and 0.2m depth. The concrete was underlain by granular made ground in WS4 and WS5 to respective depths of 1.1m and 0.35m. Made ground comprising reworked natural clay was present immediately below the concrete in WS6, and below the granular made ground in WS4 and WS5, to between 0.6m and 1.6m depth. The made ground was underlain by extremely weak mudstone to the base of the exploratory holes. In WS6, stiff residual clay was identified from 1.0m to 1.8m depth, overlying the extremely weak mudstone.
- 6.3 All six windowless samples terminated at refusal ('N' value over 50) at between 0.95m and 4.05m depth. This was interpreted to be intact bedrock.
- 6.4 No groundwater was observed during the drilling of the window sample boreholes.

7.0 CONTAMINATION ANALYSIS

Screening Values - Soils

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

Soils Analysis

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

Made Ground

- 7.5 All results were below the screening value for commercial/industrial end use and no asbestos fibres were identified.

Updated Risk Assessment and Conceptual Model

- 7.6 The categorisations of risk adopted in this report are adapted from CIRIA Report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001). This approach assesses the potential severity of any pollution event and the probability of the event occurring, to arrive at a risk category, for the various potential source - pathway - receptor linkages. The relevant tables used, with the definitions, are presented in Appendix E.
- 7.7 The updated source – pathway – receptor matrix is presented below, taking into account the findings of the investigation. Any pathways in italics are deemed not to be viable and the reason given.

Viable Source - Pathway - Receptor Matrix (Finished Development)

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Adjacent landfill: - methane and carbon dioxide	<ul style="list-style-type: none"> Asphyxiation Explosive risk 	<ul style="list-style-type: none"> Construction/de-molition workers Future occupants Buildings 	Severe	Low Likelihood	Moderate
Possible asbestos within existing buildings.	<ul style="list-style-type: none"> Inhalation 	<ul style="list-style-type: none"> Future occupants Maintenance workers Adjacent residents and general public 	Severe	Low Likelihood	Moderate

7.8 It can be seen from the above matrix that pathways to receptors are operative, and this may affect users of the finished development, with a moderate risk applicable. Some form of remedial action is, therefore, considered necessary to allow commercial/industrial development without excess risk.

Risk Based Assessment of Remedial Options

Asbestos Within Existing Buildings

7.9 Provided an asbestos survey is carried out prior to any demolition or work on the existing buildings on the site, and any identified asbestos is removed and disposed to a licenced facility, then the risk to receptors is low. The work should be carried out by appropriately qualified Contractors.

Ground Gases

7.10 To address the potential risk from landfill gases, monitoring of borehole wells is in progress. This will determine whether or not protection measures are likely to be necessary. This will be confirmed by separate letter report on completion of the monitoring.

Migration to Utilities

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

Risks During Construction Period

- 7.12 It is also necessary to consider the effects of the contamination present on the site in relation to the risks to adjacent residents, construction workers and the general public during construction. This is assessed in the following matrix.

Source	Pathway	Potential risk	Risk after employing suitable Health and Safety plan.
Existing made ground	Inhalation	Moderate	Damping down of the site during dry periods and timely placement of the existing made ground below barriers should block this pathway and reduce the risk to negligible.
Existing made ground	Ingestion	Moderate	Site fencing will exclude access to the wider site. Existing made ground will be contained within the site boundary and placed below barriers as soon as possible. Washing facilities and a clean mess room from which work boots and overalls are excluded should be provided. These measures should block this pathway and reduce the risk to negligible.
Existing made ground	Contact	Moderate	Education of workers to use adequate hygiene and PPE should block this pathway and reduce the risk to negligible.
Existing made ground	Surface water	Moderate	Preventing surface water run off by minimising open exposure times of the existing made ground, and using bunds or cut off trenches as necessary should block this pathway and reduce the risk to negligible.
Asbestos in existing buildings	Inhalation	High	Provided an asbestos survey is carried out, and any identified asbestos is removed from site prior to any other works commencing, the pathway is blocked, and the risk is negligible.

- 7.13 Provision of all the above measures will ensure that all the identified pathways for the contamination will be blocked.

Summary of Contamination Assessment and Remedial Options

- 7.14 The site is underlain by up to 3.9m thickness of made ground, overlying natural residual clays over mudstone. At some locations, the clays are absent and made ground sits directly onto mudstone. No contamination was identified above screening value for commercial developments and no asbestos fibres were identified.
- 7.15 An asbestos survey should be carried out prior to any demolition or work on the existing buildings on the site, and any identified asbestos should be removed and disposed to a licenced facility. The work should be carried out by appropriately qualified Contractors.
- 7.16 The local water company are likely to require details of the contaminants present on the site, to make a judgment on any requirement for protection of buried water supply pipes from chemical attack/ingress.

8.0 GEOTECHNICAL TESTING

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

Location	Depth (m)	MC	LL	PL	PI	<425µm	I'p
WS1	0.75	9.6	37	17	20	98	19.6
WS4	1.6	14	44	22	22	97	21.3
WS6	1.7	14	40	20	20	98	19.6
Number of results		3	3	3	3	3	3
Min.		9.6	37	17	20	97	19.6
Max.		14	44	22	22	98	21.3

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

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

8.2 The plasticity test data shows clays of intermediate plasticity, in accordance with BS 5930:2015 +A1:2020 "Code of Practice for Site Investigations". When the percentage retained on the 425-micron BS sieve is considered, the Modified Plasticity Index, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees" is a maximum of 21.3. In accordance with the Standard, this equates to Medium Volume Change Potential.

8.3 Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by Eurofins Chemtest, comprising three samples of natural strata and six samples of made ground. In accordance with the BRE Special Digest 1 "Concrete in aggressive ground", the characteristic values for the two materials are given below:

Characteristic Values

Material	pH	SO ₄
Made Ground	8.3	1025
Natural Strata	8.1	150

SO₄ = Sulphate content in mg/l on a 2:1 water: soil extract pH = Acidity

- 8.4 The geochemical analyses show the natural strata to have low water-soluble sulphate content and slightly alkaline pH. The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1. Testing on the made ground indicates class AC-2. Therefore, the use of FND2 designated concrete will be necessary for unreinforced buried concrete, in accordance with BS 8500-1:2015+A2:2019, unless the existing made ground was removed, in which case GEN1 designated concrete would be satisfactory for unreinforced buried concrete. For any reinforced buried concrete, other design-specific mixes will apply.

9.0 GEOTECHNICAL ASSESSMENT

Coal Mining and Coal Recovery

- 9.1 Findings of the Intrusive Coal Mining Investigation are reported in the ARP letter NCL/03/WWjcl2, dated 1st August 2024 and discussed in section 4.3 and 4.4 of this report. There is sufficient rock cover above the encountered underground workings on the east of the site, in the area of the proposed concrete plant and associated infrastructure and no grout treatment should, therefore, be required.
- 9.2 Insufficient rock cover is concluded to be present at WS3 in the southwestern corner of the site. As no structures or infrastructure are currently proposed in this location, no grout treatment should be required. However, if any structures or infrastructure are proposed in this location in the future, further rotary investigation would be recommended to determine any need for grout treatment.
- 9.3 There will be no significant arisings of coal during proposed development works, and it will not be possible to win any coal from the site before development.

Foundations

- 9.4 For the proposed single storey office in the northeast of the site, this is to be a modular structure and it is assumed that the foundation and load requirements will be dictated by the supplier. If the founding stratum is to be the natural clay encountered at 1m depth in this area, an allowable bearing pressure of 100kN/m² is considered applicable. A higher allowable bearing pressure would be applicable if founded on intact mudstone or any other bedrock.
- 9.5 There are no existing trees within 30m of the proposed building, but in the event any trees are proposed within 30m, any potential impact on proposed foundations will need to be considered.

- 9.6 For the concrete batching plant infrastructure, these may have some potentially high loads and it is assumed that the foundation and load requirements will be dictated by the supplier/structural engineer. In this area (boreholes WS4 and WS5), made ground was seated directly onto mudstone at depths of between 0.6m and 1.6m. An allowable bearing pressure of 300kN/m² should be available on competent mudstone.

Excavations

- 9.7 It is likely that excavations into the natural strata will remain stable in the short term, requiring minimal trench support, in accordance with the prevailing statutory guidance. However, instability may be anticipated within the made ground.
- 9.8 No groundwater was identified during the investigation. However, the presence of water cannot be discounted, as BGS data indicates the general area has the "potential for groundwater flooding to occur at surface". Given the fines content of the made ground and likely low permeability of the natural strata, it is considered likely that most of the time, any groundwater ingress should be controllable by pumping from an artificial sump.
- 9.9 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock or any buried foundations and structures may require a hydraulic breaker.

Chemical Precautions

- 9.10 The Aggressive Chemical Environment for Concrete (ACEC) class is GEN1 for the natural strata and AC-2 for the made ground. Therefore, the use of FND2 designated concrete will be necessary for unreinforced buried concrete, in accordance with BS 8500-1:2015+A2:2019, if the existing made ground is to be retained. If the existing made ground was to be removed, the use of GEN1 designated concrete would be satisfactory for unreinforced buried concrete. For any reinforced buried concrete, other design-specific mixes will apply.

Road Pavement Construction

- 9.11 For any areas of road pavement, including parking areas, the natural clays can provide a design California Bearing Ratio (CBR) value of 3%, below any obvious soft spots, and at equilibrium moisture content. If considered necessary, this should be confirmed by testing at proposed subgrade level before construction.

Flooding and Soakaways

- 9.12 The site is not at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available.
- 9.13 BGS data indicates the general area has the "potential for groundwater flooding to occur at surface".
- 9.14 The disposal of surface water using soakaways is unlikely to be practical on the site, given the potential presence of deep made ground, deep low permeability strata on the site and the proximity to Network Rail assets.

Gas Protection

- 9.15 No radon protective measures are required for properties constructed on the site.
- 9.16 There are three closed or currently licenced landfills within 250m of the site. The nearest is located 40m southeast of the site. The landfill was licensed to receive inert and industrial waste and the first input was recorded as 31st December 1923. Gas monitoring is ongoing and will be reported separately on completion.

Other Potential Constraints

- 9.17 The site is immediately adjacent to a railway line. Consultation with Network Rail may be required for any works undertaken near to the southern site boundary.

APPENDIX A

SITE LOCATION PLAN



Approximate Scale

 ARP GEOTECHNICAL LTD CHARTERED CONSULTING ENGINEERS <small>Northwest House, 5-6 Northwest Business Park, Senvia Hill, Leeds LS6 2QH Telephone: 0113 245 8498 Fax: 0113 244 3864 E-Mail: leeds@arpassociates.co.uk</small>	
Project THORNHILL WORKS CALDER ROAD DEWSBURY	
Client NEWLAY READYMIX LTD	
Title SITE LOCATION PLAN	
Date AUGUST 2024	
Drawn JR	Scale AS SHOWN
Job No. NRL/01	



0m 20m

Approximate Scale

ARP

ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Northwest House · 5-6 Northwest Business Park · Senvla Hill · Leeds LS6 2QH
 Telephone : 0113 245 8498 Fax : 0113 244 3864 E-Mail : leeds@arpassociates.co.uk

Project **HORNHILL WORKS**
CALDER ROAD
DEWSBURY

Client
NEWLAY READYMIX LTD

Title
AERIAL PHOTOGRAPH

Date
AUGUST 2024

Drawn WW	Scale AS SHOWN
--------------------	--------------------------

Job No.
NRL/01



Minerals and Waste Planning
Environmental Permitting
Quarry Consultant

10 Dobroyd, Shepley, Huddersfield HD8 8AU
Tel: 01484 604026 Mobile: 07794 597515
gjb@mwpplanning.co.uk

TITLE
LOCATION PLAN

CLIENT
NEWLAY CONCRETE LTD
THORNHILL WORKS, CALDER ROAD
DEWSBURY

SITE
THORNHILL WORKS, CALDER ROAD
DEWSBURY WF12 9HY

DATE 09/02/2024 **DRAWN BY** CJB **CHECKED BY** CJB

DRAWING NO 20241/01 **SCALE** 1:1250 @ A3

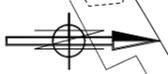
REV	AMENDMENT	DATE

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- LEGEND**
- Planning Application Boundary
 - Land Under the Control of the Applicant



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Asphalt Plant

Office/
Reception



Minerals and Waste Planning
Environmental Permitting
Quarry Consultant
10 Dobroyd, Shepley, Huddersfield HD8 8AU
Tel: 01484 604026 Mobile: 07794 597515
gjb@mwplanning.co.uk

TITLE
LAYOUT PLAN

CLIENT
NEWLAY READYMIX LTD
THORNHILL WORKS, CALDER ROAD
DEWSBURY

SITE
THORNHILL WORKS, CALDER ROAD
DEWSBURY WF-12 9HY

DATE
09/02/2024
DRAWN BY
CJB
CHECKED BY
CJB

DRAWING NO
20241/02
SCALE
1:500 @ A3

REV	AMENDMENT	DATE

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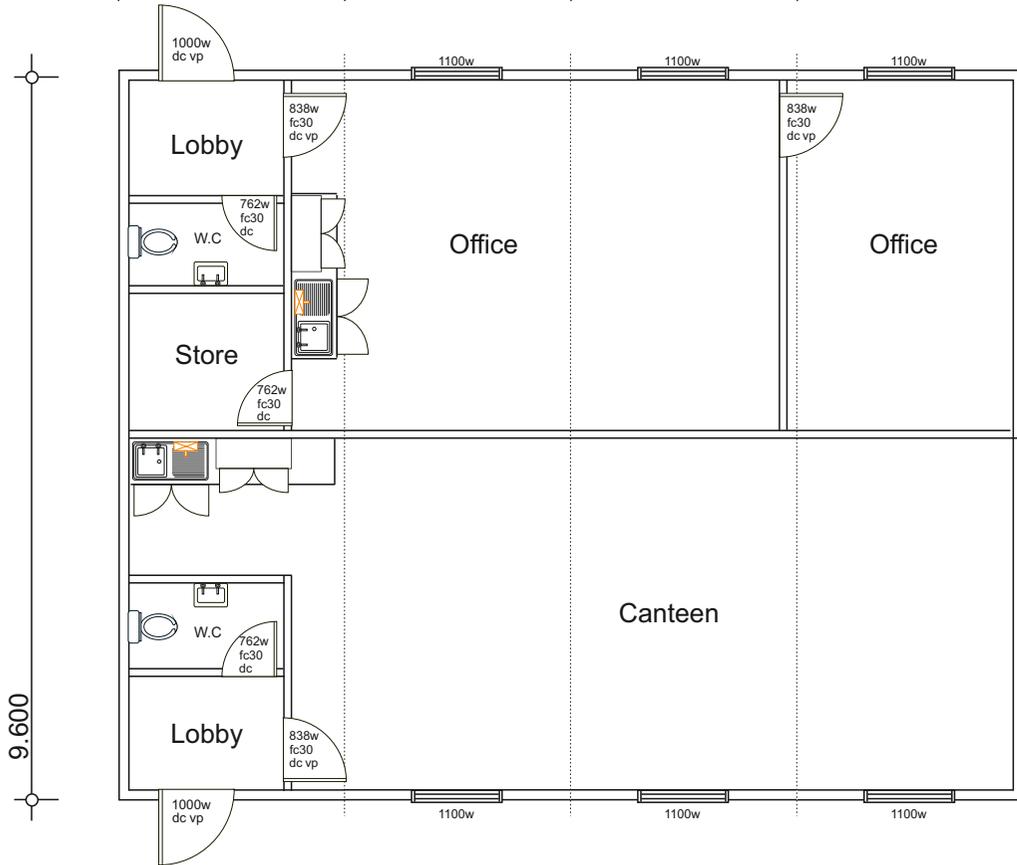
LEGEND

Planning Application Boundary

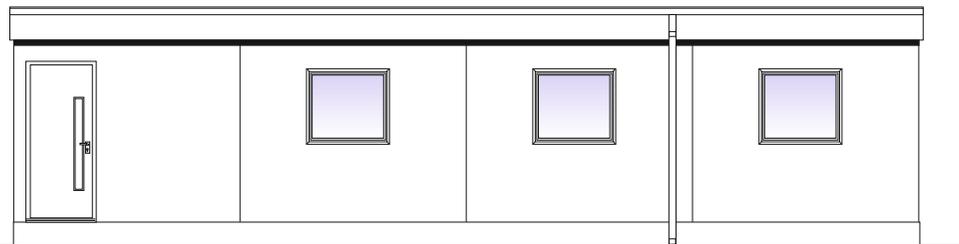
Concrete Pad

12.0 Metres Overall

3.000 3.000 3.000 3.000



9.600



Front Elevation

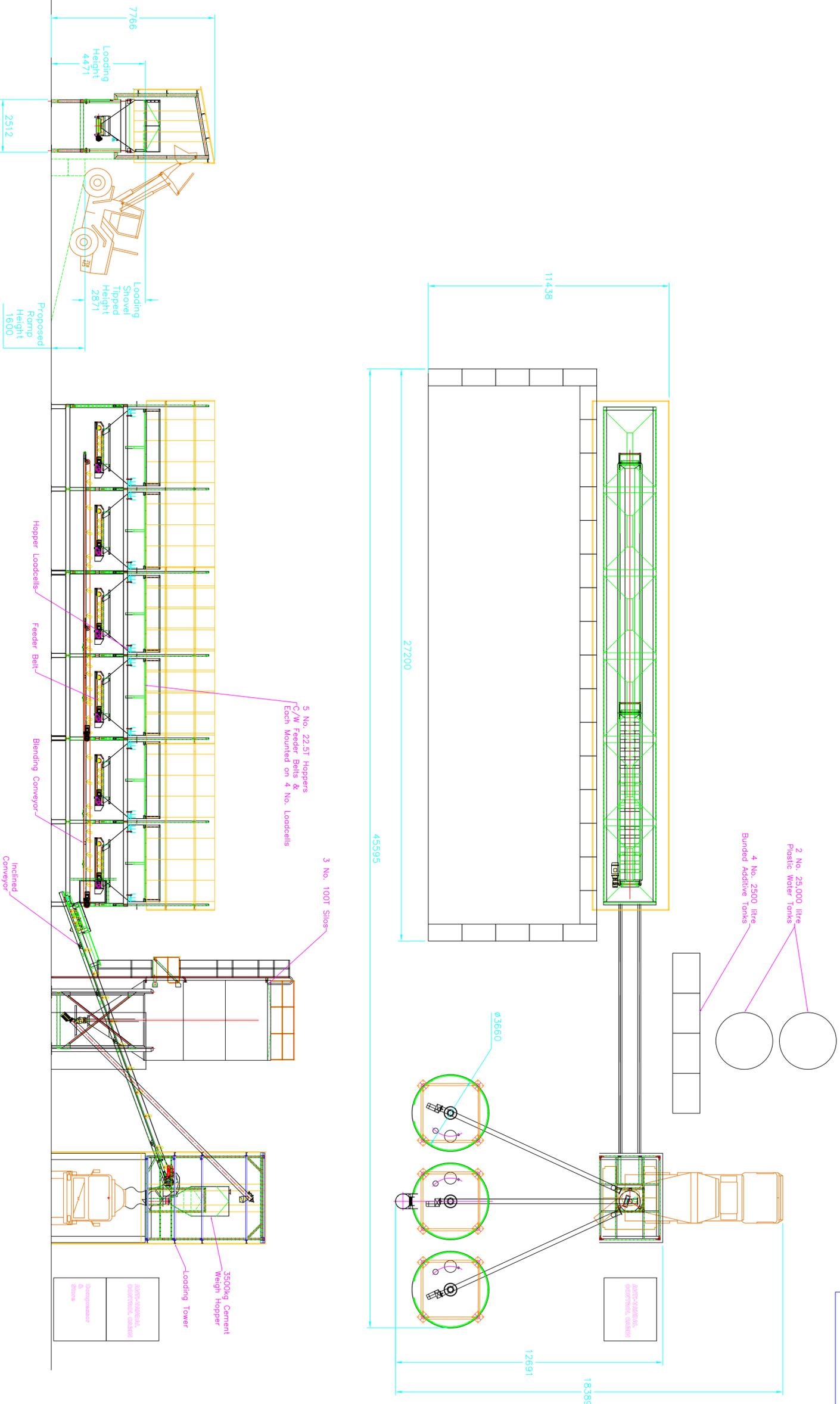
Revision	Date	Comments

 Actiform Queens Buildings Lowlands Rd Mirfield West Yorkshire WF14 8LX actiform.co.uk info@actiform.co.uk 01924 498557	Client Newlay Concrete
	Scheme Ravensthorpe

Drawing Title 4 Bay Office & Canteen

Dwg No.	9875-1	Drawn	Cjf	Checked	
Date	10.5.23	Scale	1:100		
Status	For Information	Paper Size	A4		

A3



REV	DATE	DESCRIPTION	XXXX	XXXX
XX	XX/XX/XX	XXXXXXXXXXXXXXXXXXXX	CHANGE	DESCRPTION
1			DRAWN	CHECKED
2				

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Concrete Batching Systems Ltd.

140 Market Hill Road, Armagh, BT60 1LF
 www.concretebatchingsystems.com
 Tel: +44 (0) 28 3082 1172

TITLE:	Newley Concrete Plant Layout - Dewsbury
CUSTOMER / MACHINE:	xx
SCALE 1:100	DRAWN: K.F. DATE: 19/05/23 CHECKED: XX
Drawing No:	141721
F	SHEET 1 OF 1

APPENDIX B

SITE WALKOVER PHOTOGRAPHS



Photograph 1: Drilling WS01 towards western boundary of the site, facing northwest.



Photograph 2: Small building at western boundary of the site, facing north.



Photograph 3: Access road at northwestern boundary of the site, facing southwest.



Photograph 4: Northwestern end of the site facing south.



Photograph 5: Drilling of WS02 towards the western end of the site, facing east. A compound for a development along the railway track is present in the background.



Photograph 6: Drilling of WS03 at the southwestern boundary of the site.



Photograph 7: Drilling of WS04 at the centre south boundary of the site.



Photograph 8: Drilling of WS05 towards the centre of the site, facing west.



Photograph 9: Drilling of WS05 towards the centre of the site, facing east.



Photograph 10: Location of WS06 towards the northeastern end of the site, facing northeast.



Photograph 11: Access road along northern boundary of the site, facing northeast.



Photograph 12: Two storey porta cabin towards the north centre of the site, facing south.



Photograph 13: Cement trucks parked up towards southeastern end of the site, facing south.



Photograph 14: Centre east of the site, facing east.



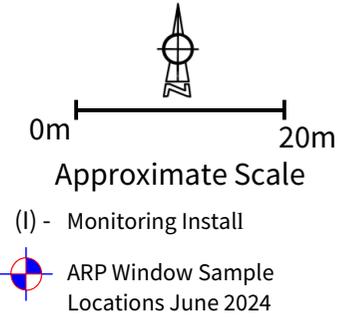
Photograph 15: Stockpiles of sand towards the ? end of the site?



Photograph 16: Drilling works underway beyond the southern boundary of the site parallel with the railway tracks.

APPENDIX C

BOREHOLE PLAN & LOGS



ARP
 ARP GEOTECHNICAL LTD
 CHARTERED CONSULTING ENGINEERS
Northwest House · 5-6 Northwest Business Park · Senvla Hill · Leeds LS6 2QH
 Telephone : 0113 245 8498 Fax : 0113 244 3864 E-Mail : leeds@arpassociates.co.uk

Project THORNHILL WORKS
 CALDER ROAD
 DEWSBURY

Client
 NEWLAY READYMIX LTD

Title
 WINDOWLESS SAMPLE
 BOREHOLE LOCATION PLAN

Date
 AUGUST 2024

Drawn WW	Scale AS SHOWN
-------------	-------------------

Job No.
 NRL/01



Excavation Method Dando Terrier Window Sample Rig.	Dimensions	Ground Level (mOD)	Client Newlay Readymix Ltd	Job Number NCL/03
	Location	Dates 28/06/2024	Engineer W.W	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.40-0.40	D				(0.60)	MADEGROUND: Dark brown clayey very sandy fine to coarse subangular GRAVEL of brick sandstone and limestone with low cobble content. Sand is fine to coarse. Cobbles of brick.			
0.75-0.75	D		25,32/18		0.60 (0.20)	Extremely weak thinly laminated light grey silty MUDSTONE.			
0.80-1.17	D SPT 57*/120 18/250				0.80 (0.15) 0.95	Cone SPT test no recovery.			
						Complete at 0.95m			

Remarks Borehole finished due to SPT refusal at 0.95m on mudstone. Ground checked for services with CAT prior to drilling. No groundwater encountered. Monitoring well installed to 0.8m - slotted from base to 0.4m, with gravel surround, plain above, with bentonite seal. Bung, tap and locking cover provided.	Scale (approx)	Logged By
	1:25	W.W
	Figure No.	



Excavation Method Dando Terrier Window Sample Rig.	Dimensions	Ground Level (mOD)	Client Newlay Readymix Ltd	Job Number NCL/03
	Location	Dates 28/06/2024	Engineer W.W	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.30	D				(0.60)	MADEGROUND: Dark brown clayey very sandy fine to coarse subangular GRAVEL of brick sandstone and limestone with low cobble content. Sand is fine to coarse. Cobbles of brick.		
0.70-0.70	D				0.60 (0.15) 0.75 0.80	Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone.		
1.00-1.45	SPT N=43		6,9/7,6,10,20		(0.60)	COAL. Extremely weak thinly laminated light grey silty MUDSTONE.		
1.40-1.73	SPT 25*/80 50/245		22,3/50		1.40 (0.10)	Cone SPT test no recovery.		
1.50-1.50	D				1.50	Complete at 1.50m		

Remarks Borehole finished due to SPT refusal at 1.5m on mudstone. Ground checked for services with CAT prior to drilling. Backfilled with arisings upon completion. No groundwater encountered.	Scale (approx)	Logged By
	1:25	W.W
	Figure No.	



Excavation Method Dando Terrier Window Sample Rig.	Dimensions	Ground Level (mOD)	Client Newlay Readymix Ltd	Job Number NCL/03
	Location	Dates 28/06/2024	Engineer W.W	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
1.00-1.45	SPT N=8		3,3/2,2,2,2			MADEGROUND: Dark brown clayey very sandy fine to coarse subangular GRAVEL of brick clinker sandstone and limestone with low cobble content. Sand is fine to coarse. Cobbles of brick. Occasional ash.		
2.00-2.45	SPT N=4		2,2/1,1,1,1		(3.90)			
3.00-3.45	SPT N=17		1,1/2,3,6,6					
4.00-4.35	SPT 75*/50 N=0		25,50/		3.90 (0.10) 4.00 4.05			
						Extremely weak thinly laminated light grey silty MUDSTONE.		
						Cone SPT test no recovery.		
						Complete at 4.05m		

Remarks Borehole finished due to SPT refusal at 4.05m on mudstone. Ground checked for services with CAT prior to drilling. Backfilled with arisings upon completion. No groundwater encountered.	Scale (approx)	Logged By
	1:25	W.W
	Figure No.	



Excavation Method
Dando Terrier Window
Sample Rig.

Dimensions

Ground Level (mOD)

Client
Newlay Readymix Ltd

Job Number
NCL/03

Location

Dates
28/06/2024

Engineer
W.W

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.70-0.70	D				0.20	CONCRETE			
1.00-1.45	SPT N=9		3,3/3,2,2,2		0.90	MADEGROUND: Dark brown clayey very sandy fine to coarse subangular GRAVEL of brick clinker sandstone and limestone with low cobble content. Sand is fine to coarse. Cobbles of brick. Occasional ash.			
1.40-1.40	D				1.10	REWORKED: Firm, medium strength, brown slightly sandy slightly gravelly clay. Sand is fine. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone.			
2.00-2.41	SPT 50/255		10,10/25,25		1.60	Extremely weak thinly laminated light grey silty MUDSTONE.			
					2.00	Cone SPT test no recovery.			
					2.18	Complete at 2.18m			

Remarks
Borehole finished due to SPT refusal at 2.18m on mudstone.
Ground checked for services with CAT prior to drilling.
Monitoring well installed to 2.0m - slotted from base to 1.0m, with gravel surround, plain above, with bentonite seal. Bung, tap and locking cover provided.
No groundwater encountered.

Scale (approx)
1:25

Logged By
W.W

Figure No.



Excavation Method Dando Terrier Window Sample Rig.	Dimensions	Ground Level (mOD)	Client Newlay Readymix Ltd	Job Number NCL/03
	Location	Dates 28/06/2024	Engineer W.W	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.30	D				0.15 0.15 0.20 0.35	CONCRETE MADEGROUND: Dark brown clayey very sandy fine to coarse subangular GRAVEL of brick sandstone and limestone with low cobble content. Sand is fine to coarse. Cobbles of brick.		
1.00-1.41	SPT 50/255		8,10/12,13,25		0.25 0.60 0.30 0.90 0.10 1.00 0.33 1.33	REWORKED: Firm, medium strength, brown slightly sandy slightly gravelly clay. Sand is fine. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone. Extremely weak thinly laminated dark grey shaley MUDSTONE with interbedded coal. Coal bands are 2-3mm thick. Extremely weak thinly laminated light grey silty MUDSTONE. Cone SPT test no recovery. Complete at 1.33m		

Remarks Borehole finished due to SPT refusal at 1.33m on mudstone. Ground checked for services with CAT prior to drilling. Backfilled with arisings upon completion. No groundwater encountered.	Scale (approx) 1:25	Logged By W.W
	Figure No.	



Excavation Method
 Dando Terrier Window
 Sample Rig.

Dimensions

Ground Level (mOD)

Client
 Newlay Readymix Ltd

Job Number
 NCL/03

Location
 X=22 Y=

Dates
 28/06/2024

Engineer
 W.W

Sheet
 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.40-0.40	D				(0.20) 0.20	CONCRETE			
					(0.80)	REWORKED: stiff brown slightly sandy slightly gravelly clay. Sand is fine. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone.			
1.00-1.45	SPT N=22		3,3/4,6,6,6		1.00	Stiff, high strength, reddish brown slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone.			
					(0.80)				
2.00-2.35	SPT 25*/80 50/265		20,5/50		1.80 (0.20) 2.00 (0.12) 2.12	Extremely weak thinly laminated light grey silty MUDSTONE.			
						Cone SPT test no recovery.			
						Complete at 2.12m			

Remarks
 Borehole finished due to SPT refusal at 2.12m on mudstone.
 Ground checked for services with CAT prior to drilling.
 Monitoring well installed to 2.0m - slotted from base to 1.0m, with gravel surround, plain above, with bentonite seal. Bung, tap and locking cover provided.
 No groundwater encountered.

Scale (approx)
 1:25

Logged By
 W.W

Figure No.

APPENDIX D

LABORATORY TEST CERTS



ARP GEOTECHNICAL LIMITED
SOIL CONTAMINANT SCREENING VALUES
SITES FOR COMMERCIAL USE

Determinand	S4UL (mg/kg)			C4SL (mg/kg)		
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM
Arsenic	640			640		
Cadmium	190			410		
Chromium (trivalent)	8600					
Chromium (hexavalent)	33			49		
Copper	68000					
Lead				2300		
Inorganic Mercury	1100					
Nickel	980					
Selenium	12000					
Zinc	730000					
Acidity (pH)	*Should be Greater Than 5					
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM
Naphthalene	190	460	1100			
Acenaphthylene	83000	97000	100000			
Acenaphthene	84000	97000	100000			
Fluorene	63000	68000	71000			
Phenanthrene	22000	22000	23000			
Anthracene	520000	540000	540000			
Fluoranthene	2300	2300	2300			
Pyrene	54000	54000	54000			
Benzo(a)anthracene	170	170	180			
Chrysene	350	350	350			
Benzo(b)fluoranthene	44	44	45			
Benzo(k)fluoranthene	1200	1200	1200			
Benzo(a)pyrene	35	35	36			77
Indeno(1,2,3-cd)pyrene	500	510	510			
Dibenzo(a,h)anthracene	3.5	3.6	3.6			
Benzo(g,h,i)perylene	3900	4000	4000			
Phenols	440	690	1300			
Total TPH	*Above 2000, speciate and compare with values below:					
C5 to C6 Aliphatic	3200	5900	12000			
C6 to C8 Aliphatic	7800	17000	40000			
C8 to C10 Aliphatic	2000	4800	11000			
C10 to C12 Aliphatic	9700	23000	47000			
C12 to C16 Aliphatic	59000	82000	90000			
C16 to C35 Aliphatic	1600000	1700000	1800000			
C35 TO C44 Aliphatic	1600000	1700000	1800000			
C5 to C7 Aromatic (Benzene)	26000	46000	86000			
C7 to C8 Aromatic (Toluene)	56000	110000	180000			
C8 to C10 Aromatic	3500	8100	17000			
C10 to C12 Aromatic	16000	28000	34000			
C12 to C16 Aromatic	36000	37000	38000			
C16 to C21 Aromatic	28000	28000	28000			
C21 TO C35 Aromatic	28000	28000	28000			
C35 TO C44 Aromatic	28000	28000	28000			
Asbestos	*Should be None Detected			*Should be None Detected		

* In House Value/Approach

S4UL = Suitable 4 Use Level, CIEH/LQM 2014 C4SL = Cat 4 Screening Level, DEFRA, 2014 ATRISK = ATRISK Soil SSVs, Atkins, 2017

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

S4ULs: Copyright Land Quality Management Ltd reproduced with permission; Publication No. S4UL3378. All rights reserved.

Results - Soil

Project: NCL/03 Thornhill Works

Client: ARP Geotechnical Ltd		Chemtest Job No.: 24-21070											
Quotation No.: Q24-33517		Chemtest Sample ID.: 1829737											
		Client Sample ID.: WS1											
		Sample Type: SOIL											
		Top Depth (m): 0.4											
		Bottom Depth (m): 0.4											
		Date Sampled: 28-Jun-2024											
		Asbestos Lab: DURHAM											
Determinand	HWOL Code	Accred.	SOP	Units	LOD								
ACM Type		U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected							
Moisture		N	2030	%	0.020	8.3	12	11	16	19	16	12	51
Soil Colour		N	2040		N/A	Brown							
Other Material		N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	None	None
Soil Texture		N	2040		N/A	Sand	Clay	Sand	Loam	Clay	Clay	Clay	Clay
pH at 20C		M	2010		4.0	8.3	8.4	8.5	8.6	8.5	8.4	8.1	8.3
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	1.1	0.52	0.95	0.080	0.089	0.083	0.014	0.033
Sulphate (2:1 Extract)		M	2120	mg/kg	20							28	66
Sulphate (Total)		U	2430	mg/kg	100	5100	2900	5600	2000	1900	680		
Arsenic		M	2455	mg/kg	0.5	7.3	8.7	36	33	15	8.1		
Cadmium		M	2455	mg/kg	0.10	< 0.10	0.13	7.8	< 0.10	< 0.10	< 0.10		
Chromium		M	2455	mg/kg	0.5	14	11	23	12	14	15		
Copper		M	2455	mg/kg	0.50	18	25	85	57	26	26		
Mercury		M	2455	mg/kg	0.05	0.09	0.05	0.19	0.05	0.07	< 0.05		
Nickel		M	2455	mg/kg	0.50	13	11	29	28	18	26		
Lead		M	2455	mg/kg	0.50	29	28	110	87	26	16		
Selenium		M	2455	mg/kg	0.25	0.58	0.42	0.53	0.54	0.34	0.37		
Zinc		M	2455	mg/kg	0.50	54	130	430	92	53	73		
Chromium (Trivalent)		N	2490	mg/kg	1.0	14	11	23	12	14	15		
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		
Organic Matter		M	2625	%	0.40	2.9	8.1	11	35	25	8.1		
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	< 10	150	< 10	< 10	< 10	< 10		
Naphthalene		M	2800	mg/kg	0.10	0.13	0.13	< 0.10	0.76	< 0.10	< 0.10		
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10		
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10		
Phenanthrene		M	2800	mg/kg	0.10	0.14	0.50	< 0.10	1.2	< 0.10	0.72		
Anthracene		M	2800	mg/kg	0.10	< 0.10	0.21	< 0.10	0.34	< 0.10	0.46		
Fluoranthene		M	2800	mg/kg	0.10	0.23	0.82	< 0.10	1.6	< 0.10	1.6		
Pyrene		M	2800	mg/kg	0.10	0.20	0.75	< 0.10	1.4	< 0.10	1.4		
Benzo[a]anthracene		M	2800	mg/kg	0.10	0.18	0.51	< 0.10	0.88	< 0.10	1.2		
Chrysene		M	2800	mg/kg	0.10	0.14	0.53	< 0.10	0.89	< 0.10	1.2		
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10	0.65	< 0.10	0.96	< 0.10	1.2		
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10	0.40	< 0.10	0.53	< 0.10	1.1		
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10	0.61	< 0.10	0.88	< 0.10	1.3		
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10	0.51	< 0.10	0.65	< 0.10	1.2		

Results - Soil

Project: NCL/03 Thornhill Works

Client: ARP Geotechnical Ltd		Chemtest Job No.:		24-21070	24-21070	24-21070	24-21070	24-21070	24-21070	24-21070	24-21070	24-21070
Quotation No.: Q24-33517		Chemtest Sample ID.:		1829737	1829738	1829739	1829740	1829741	1829742	1829743	1829744	1829744
		Client Sample ID.:		WS1	WS2	WS3	WS4	WS5	WS6	WS1	WS4	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		0.4	0.3	1.5	0.7	0.3	0.4	0.75	1.6	
		Bottom Depth (m):		0.4	0.3	1.5	0.7	0.3	0.4	0.75	1.6	
		Date Sampled:		28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	
		Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM			
Determinand	HWOL Code	Accred.	SOP	Units	LOD							
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	0.28	< 0.10	0.33	< 0.10	0.71	
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10	0.39	< 0.10	0.54	< 0.10	1.0	
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0	6.3	< 2.0	11	< 2.0	13	
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	

Results - Soil

Project: NCL/03 Thornhill Works

Client: ARP Geotechnical Ltd		Chemtest Job No.:		24-21070		
Quotation No.: Q24-33517		Chemtest Sample ID.:		1829745		
		Client Sample ID.:		WS6		
		Sample Type:		SOIL		
		Top Depth (m):		1.7		
		Bottom Depth (m):		1.7		
		Date Sampled:		28-Jun-2024		
		Asbestos Lab:				
Determinand	HWOL Code	Accred.	SOP	Units	LOD	
ACM Type		U	2192		N/A	
Asbestos Identification		U	2192		N/A	
Moisture		N	2030	%	0.020	14
Soil Colour		N	2040		N/A	Brown
Other Material		N	2040		N/A	None
Soil Texture		N	2040		N/A	Clay
pH at 20C		M	2010		4.0	8.2
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.15
Sulphate (2:1 Extract)		M	2120	mg/kg	20	300
Sulphate (Total)		U	2430	mg/kg	100	
Arsenic		M	2455	mg/kg	0.5	
Cadmium		M	2455	mg/kg	0.10	
Chromium		M	2455	mg/kg	0.5	
Copper		M	2455	mg/kg	0.50	
Mercury		M	2455	mg/kg	0.05	
Nickel		M	2455	mg/kg	0.50	
Lead		M	2455	mg/kg	0.50	
Selenium		M	2455	mg/kg	0.25	
Zinc		M	2455	mg/kg	0.50	
Chromium (Trivalent)		N	2490	mg/kg	1.0	
Chromium (Hexavalent)		N	2490	mg/kg	0.50	
Organic Matter		M	2625	%	0.40	
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	
Naphthalene		M	2800	mg/kg	0.10	
Acenaphthylene		N	2800	mg/kg	0.10	
Acenaphthene		M	2800	mg/kg	0.10	
Fluorene		M	2800	mg/kg	0.10	
Phenanthrene		M	2800	mg/kg	0.10	
Anthracene		M	2800	mg/kg	0.10	
Fluoranthene		M	2800	mg/kg	0.10	
Pyrene		M	2800	mg/kg	0.10	
Benzo[a]anthracene		M	2800	mg/kg	0.10	
Chrysene		M	2800	mg/kg	0.10	
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	
Benzo[a]pyrene		M	2800	mg/kg	0.10	
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	

Results - Soil

Project: NCL/03 Thornhill Works

Client: ARP Geotechnical Ltd		Chemtest Job No.:		24-21070	
Quotation No.: Q24-33517		Chemtest Sample ID.:		1829745	
		Client Sample ID.:		WS6	
		Sample Type:		SOIL	
		Top Depth (m):		1.7	
		Bottom Depth (m):		1.7	
		Date Sampled:		28-Jun-2024	
		Asbestos Lab:			
Determinand	HWOL Code	Accred.	SOP	Units	LOD
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0
Total Phenols		M	2920	mg/kg	0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

Report Information

Key

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

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.

Any comments or interpretations are outside the scope of UKAS accreditation.

The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.

Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

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

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

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

Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

- DW - Drinking Water
- GW - Ground Water
- LE - Land Leachate
- NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

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



LABORATORY REPORT



Contract Number: PSL24/4682

Report Date: 02 August 2024
Client's Reference: NCL/03
Client Name: ARP Geotechnical Ltd
Northwest House
5/6 Northwest Business Park
Servia Hill
Leeds
LS6 2QH

For the attention of: William Watkins

Contract Title: Thornhill Works, Calder Road, Dewsbury
Date Received: 3/7/2024
Date Commenced: 3/7/2024
Date Completed: 2/8/2024

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Managing Director)

R Berriman
(Associate Director)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

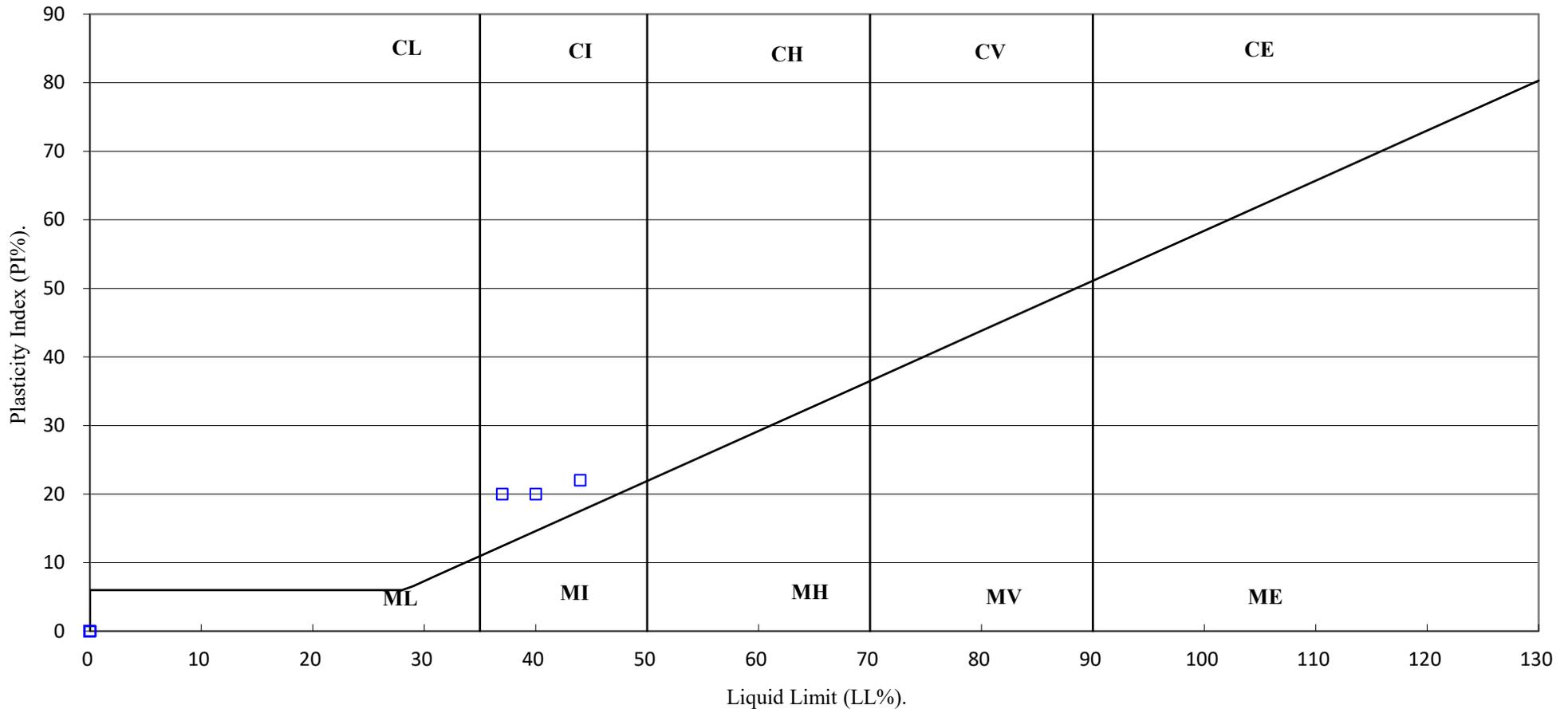
D Nicholson
(Senior Technician)

T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Thornhill Works, Calder Road, Dewsbury

Contract No:

PSL24/4682

Client Ref:

NCL/03

APPENDIX E

RISK CATEGORISATION TABLES

Severity of Consequence

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

Probability of Risk Event Occurring

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

Comparison of Probability Against Severity of Consequence

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

Risk Categories - Definitions

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