

FINAL

MTP Dev Ltd

Phase I Desk Study

&

Phase II

Geotechnical and Geo-Environmental Report

Mira North Plot 44

MIRA Technology Park

Nuneaton

CV10 0TU

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CONTENTS

FACTUAL	2
1.1 INTRODUCTION	2
1.2 SOURCES OF INFORMATION	3
1.3 DEVELOPMENT PROPOSALS	3
2 PHASE I DESK STUDY	4
2.1 WALKOVER SURVEY	4
2.2 GEOLOGY	4
2.2.1 Published Geology	4
2.2.2 Bedrock	4
2.2.3 Historical Borehole Data	5
2.3 HISTORY OF THE SITE	6
2.3.1 Ordnance Survey	6
2.3.2 Freely Available Satellite Imagery	7
2.3.3 Unexploded Ordnance and Bomb Sites	7
2.4 HYDROLOGY	8
2.5 HYDROGEOLOGY	8
2.6 WASTE TREATMENT AND LANDFILL SITES	8
2.6.1 Landfills	8
2.6.2 Other Licensed Waste Sites	9
2.7 INDUSTRIAL USAGE SITES	9
2.7.1 Pollution Incidents	9
2.7.2 Historical Site Usage	10
2.8 WORKED OUT GROUND/MADE GROUND	10
2.9 GROUND GASES	10
2.9.1 Radon	10
2.9.2 Landfill Gasses	10
2.10 POTENTIAL GEOTECHNICAL HAZARDS	11
2.11 POTENTIALLY SENSITIVE LAND USES	12
3 INITIAL GEO-ENVIRONMENTAL CONCEPTUAL SITE MODEL	13
4 PHASE II INTRUSIVE INVESTIGATION	15
4.1 SITE WORK AND SAMPLING STRATEGY	15
4.2 GROUND CONDITIONS	16
4.2.1 Summary	16
4.2.2 Made Ground (Forming the Embankment)	16
4.2.3 Reworked Ground	17
4.2.4 Old "buried" Topsoil	17
4.2.5 Mercia Mudstone	17
4.2.6 Sulphate and pH Tests	18
4.2.7 Groundwater	18
4.2.8 California Bearing Ratio	19
4.2.9 Infiltration Tests	19
4.2.10 Gas Monitoring	19
4.2.11 Evidence of Contamination	19
5 GEOENVIRONMENTAL TESTING	20
6 GEOTECHNICAL INTERPRETIVE SECTION	21
6.1 GENERAL GROUND CONDITIONS INTERPRETATION	21
6.2 DESICCATION ASSESSMENT	22
6.3 EXCAVATIONS	23
6.4 FOUNDATIONS	23
6.4.1 Shallow Foundations	23
6.5 FLOOR SLAB DESIGN	24
6.6 SULPHATE ATTACK ON UNDERGROUND CONCRETE	24

6.7	ACCESS ROADS AND PAVEMENTS.....	25
6.8	INFILTRATION MEASURES.....	25
6.9	GAS PROTECTION.....	26
6.10	EARTHWORKS - CLASSIFICATION OF MATERIAL.....	27
6.10.1	Made Ground (<i>Forming the Embankment</i>).....	27
6.10.1.2	Summary.....	27
7	GEO-ENVIRONMENTAL INTERPRETATIVE SECTION.....	29
7.1	RISKS TO HUMAN HEALTH.....	29
7.1.1	Introduction.....	29
7.2	RESULTS OF CONFIRMATORY CHEMICAL TESTING.....	31
7.2.1	Asbestos.....	31
7.2.2	Pathogens.....	31
7.2.3	Natural Soil Sample.....	31
7.3	RISK TO END USERS.....	32
7.3.1	Reducing the Risk to Construction Workers.....	32
7.4	RISK TO CONTROLLED WATERS.....	32
7.5	RISK TO UNDERGROUND WATER SUPPLY PIPES.....	33
8	PRELIMINARY WASTE DISPOSAL CLASSIFICATION.....	34
8.1	INTRODUCTION.....	34
8.2	RESULTS OF HAZARD ASSESSMENT.....	34
8.2.1	Waste Acceptance Criteria (WAC) Testing Results.....	34
9	RE-USE OF MATERIAL ON SITE.....	36
10	DISCOVERY STRATEGY.....	37
11	RECOMMENDATIONS.....	39
	REFERENCES.....	40

APPENDICES

APPENDIX A - PLANS

-  Site Location Plan
-  Development Proposal Plans
-  Exploratory Hole Plan – Proposed
-  Embankment Plan
-  Site Photographs

APPENDIX B – SITE INFORMATION

-  Borehole Logs
-  Trial Pit Logs
-  Soakaway Logs
-  Soakaway Results
-  CBR Logs
-  CBR Results
-  Gas and Groundwater Monitoring

APPENDIX C – LABORATORY INFORMATION

-  Geotechnical Testing
-  Geo-Environmental Testing
-  HazWaste Online Spreadsheet

APPENDIX D – DESK STUDY INFORMATION

-  Groundsure Report Geo/Enviro
-  Historical Maps

EXECUTIVE SUMMARY

Site Location	Mira North Plot 44, MIRA Technology Park, Nuneaton, CV10 0TU
OS Grid Reference	436721, 295117
Development Proposals	<i>"The project comprises the construction of a new industrial-type facility across a 2.5-acre plot. A single steel-framed building will be split into 2 separate units (44a & 44b), which will house workshops, offices, and general production areas. Both units will feature a mezzanine level accommodating office space.</i> <i>The development site will also feature approx. 40 car parking spaces to the south and service yards (with separate access and trailer parking) to the north. The site will also feature some soft landscaping."</i> Geo-Integrity assumes the existing embankment will need to be removed as part of the development, which may involve removing existing soils off-site.
Published Geology	Reference to the British Geological Survey website and Sheet 169; Coventry; 2000; indicates that the site is located directly on Triassic Bedrock known as the Mercia Mudstone Formation and the Gunthorpe Member. There are no superficial deposits recorded within 250m of the site.
Site History	Historical information records the site to have been part of a larger undeveloped field since at least 1887 with a railway along the eastern boundary. The site has remained undeveloped ever since, however, earthworks have been undertaken on the site between 2014 and 2018 associated with the construction of the adjacent MIRA Technology Institutes. The earthworks activity produced an embankment along the northern and eastern side of the site as seen during the walkover survey.
Ground Conditions Encountered	The site comprises an embankment which spans along the northern and eastern boundaries with a maximum thickness of 3.40m. The material described as Made Ground comprises unconsolidated, soft to firm clay, locally containing anthropogenic material including asphalt, concrete, metal, rebar, brick and ceramic. This material is interpreted to reflect reworked Mercia Mudstone with added construction waste from the adjacent development. An old topsoil layer was encountered underlying the Made Ground forming the embankment. The normal site levels surrounding the embankment were underlain by Reworked Ground comprising loose slightly organic silts with gravels of flint, and rare brick, glass and ceramic. The Made Ground, Reworked Ground and Old Topsoil were underlain by the Mercia Mudstone comprising an upper cohesive material of low shrinkability overlying a very weak to weak siltstone. Spot heights were taken using a GPS tracker and therefore associated depths of the lithologies listed above are specified within the report.
Groundwater Encountered	Groundwater was not encountered during the intrusive investigation down to the base of the exploratory holes, the deepest of which was recorded at 3.55m bgl (94.16mOD).
Contamination	Currently, it is considered that the risk of contamination to construction workers, end users and surrounding residents from the proposed development at this site is very low and as such NO further works or remedial measures are necessary prior to development.
Sulphate Attack on Underground Concrete	The following design sulphate class and aggressive chemical environment classification should be applied: Made Ground/Reworked Ground: DS-1/AC-1 Mercia Mudstone: DS-1/AC-1
Foundations	Conventional Shallow foundations have been considered within this report, see section 6.4 for further details.
Waste Soil Classification	Currently, the waste soil on this site is classified as follows: Made Ground (soils forming the embankment): 17 05 04 Inert Reworked Ground: 17 05 04 Non-Hazardous (possibly inert with WAC testing) Natural Soil: 17 05 04 - Inert
Recommendations	We recommend a watching brief should be undertaken during the construction phase, and if during development any previously undiscovered contamination (including visual or olfactory evidence) is found then site management should be immediately informed and inspection by a suitably qualified person should be undertaken.

This executive summary must be read in conjunction with the full report text

FACTUAL

1.1 INTRODUCTION

Geo-Integrity Ltd were commissioned by Mr Mohammad Ziauddin of BCAL Consulting Ltd. on behalf of the client MTP Dev Ltd via email instruction dated 17th of June 2024 to undertake a Phase I Desk Study and Phase II Factual and Interpretative Geotechnical and Geo-Environmental Report for Mira North Plot 44, MIRA Technology Park, Nuneaton, CV10 0TU in order to inform the design and construction of the proposed development.

This report describes desk-based searches of geological, environmental and historical information, the fieldwork and laboratory testing undertaken and provides an interpretative section of the geotechnical and geo-environmental data from this investigation to inform the proposed development.

The site is located at National Grid Reference 436721, 295117.

The report is likely to be reviewed by the Local Authority with reference to the NPPF once the planning permission has been approved. Once the redevelopment is completed, and as a minimum, the land must not be capable of being determined as 'contaminated land' under the terms of Part IIA of the Environmental Protection Act 1990. However, it also states that "Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner." As such the desk study in this report is the first stage in investigating whether the site is likely to be considered "contaminated", in accordance with clause 183 of the NPPF.

The objectives of this phase I and phase II interpretative report are:-

-  To undertake a site walkover to identify any potential pollution sources or geotechnical hazards on the site.
-  To gather historical, geological and environmental information.
-  Briefly summarise the site development proposals and site setting.
-  To describe and report the fieldwork undertaken at the site.
-  To describe and report the geotechnical and chemical laboratory work undertaken on selected samples.

- 📖 To provide an interpretation of the results of this investigation with regards to the geotechnical properties, and geo-environmental and waste disposal implications for the proposed development.

The investigation was performed in accordance with the general requirements of BS 5930:2015, BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant related standards identified below. The fieldwork took place on the 27th and 28th of June 2024.

1.2 SOURCES OF INFORMATION

The following sources of information have been used to compile this report:-

- 📖 Extracts of available historical Ordnance Survey (OS) maps covering the period from 1887 to 2024, which are presented in the Appendices.
- 📖 Groundsure Report Ref GS-ADK-LRN-DB9-AY9 included in the Appendices.
- 📖 The British Geological Survey (BGS) and Environment Agency (EA) websites.
- 📖 A site reconnaissance visit undertaken on the 27th of June 2024.
- 📖 Information from various internet sites on site history and environmental setting.

It should be noted that the information provided in the desk study is obtained from independent third-party sources. It is provided in good faith, but no guarantee can be provided as to its accuracy. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.

1.3 DEVELOPMENT PROPOSALS

The proposed development was outlined by BCAL Consulting:

“The project comprises the construction of a new industrial-type facility across a 2.5-acre plot. A single steel-framed building will be split into 2 separate units (44a & 44b), which will house workshops, offices, and general production areas. Both units will feature a mezzanine level accommodating office space.

The development site will also feature approx. 40 car parking spaces to the south and service yards (with separate access and trailer parking) to the north. The site will also feature some soft landscaping.”

Geo-Integrity assumes as part of the development the existing embankment will need to be removed which may involve removing existing soils off-site or re-using them.

2 PHASE I DESK STUDY

2.1 WALKOVER SURVEY

A site walkover survey was undertaken on the 27th of June 2024. Site location and layout plans are included in Appendix A, along with a selection of photographs taken during the survey.

The investigation area is irregular in shape with an area of 1.46ha with a maximum north-south distance of 120m and a maximum east-west distance of 120m. The site is located within the MIRA Technology Park, accessed via Eastern Avenue to the west.

The site comprises an undeveloped vacant field with an embankment forming the northern and eastern boundary (the outline of the embankment is shown in Appendix A). Spot heights were taken during the intrusive investigation with CT3 located at the top of the embankment (100.94mOD) and CBR7 located adjacent to the embankment (98.04mOD) and indicate the embankment has an approximate height of 2.90m above normal ground levels. The embankment covers an area of approximately 0.4ha. Following a topographical survey the volume of the embankment could be calculated.

The site is surrounded by MIRA Technology Institute to the west, an undeveloped field to the north, a historic railway to the east and the A5 to the south. Further north additional buildings and tracks were observed forming part of the MIRA Technology Park.

The walkover survey was undertaken to identify potential sources of contamination to aid the human-health risk assessment. The walkover survey identified no significant sources of contamination other than potential Made Ground forming the embankment.

2.2 GEOLOGY

2.2.1 *Published Geology*

Reference to the British Geological Survey website and Sheet 169; Coventry; 2000; indicates that the site is located directly on Triassic Bedrock known as the Mercia Mudstone Formation and the Gunthorpe Member.

There are no superficial deposits recorded within 250m of the site.

2.2.2 *Bedrock*

The **Mercia Mudstone Group** is generally described by the British Geological Survey as dominantly red, less commonly green-grey mudstone and subordinate siltstone with localised thick

halite-bearing units and layers of sandstone. Near-surface weathered soils can therefore include clays and sands. This group is characterised by a sequence of mudstones and occasional beds of impersistent green siltstone and fine-grained sandstone. This unit is typically encountered up to 100m in thickness in the site area.

The Mercia Mudstone contains evaporite minerals known as halite and gypsum which can cause significant problems for construction due to potential dissolution.

The **Gunthorpe Member** is generally described by the British Geological Survey as red-brown mudstone with subordinate siltstone and fine-grained sandstone. The thickness of this unit is generally recorded between 70m to 90m.

2.2.3 Historical Borehole Data

The British Geological Survey holds records of exploratory holes, historically put down across the United Kingdom during historical investigation. The nearest historical borehole was recorded 590m east of the site (ref. SP39SE15). The borehole records red and blue marl, variegated rock, sandy rock, and gypsum grouped as part of the Mercia Mudstone Group down to the base of the boreholes in excess of 86m bgl. No reference to groundwater was seen within the historical borehole log.

Gypsum is first recorded along with rock marl at a depth in excess of 45m bgl. No reference to dissolution features within the gypsum were recorded within the log. The material above is described as strong marl and variegated rock and there is no evidence/records of collapse features which would be expected should significant dissolution of gypsum be present.

2.3 HISTORY OF THE SITE

The history of the site has been established by the review of old Ordnance Survey (OS) maps going back to 1887. The maps and any other relevant information are included in Appendix D and indicated the following.

2.3.1 Ordnance Survey

Historical Publication Data		
Date	Features On Site	Features Off Site
1887	The site is part of a larger undeveloped field	- A railway embankment is located along the eastern boundary trending north-east to south-west - A road is located immediately south trending north-west to south-east - Three ponds are located within 20m to the north and west of the site
1938	There are no significant changes to the site	There are no significant changes to the site
1950	There are no significant changes to the site	A blank area is seen immediately north of the site labelled airfield (It is common for important military targets during periods of war to remain hidden which is potentially why this area is shown blank)
1967	There are no significant changes to the site	- The previously blank area situated north of the site is revealed to comprise a runway, buildings and a 'proving ground'. Proving grounds is a term used for areas where weapons testing is undertaken - An area 250m west of the site is developed with the construction of a sports ground and unspecified works
1988	No significant changes to the site	- The railway located along the eastern boundary is recorded as dismantled - One of the ponds to the north-west is no longer recorded indicating potential backfilling - The airfield to the north changes land-use to a vehicle test centre with additional buildings and tracks constructed
2010	No significant changes to the site	Further development associated with the test centre to the north with the construction of additional buildings
2024	No significant changes to the site	- Eastern Avenue and MIRA Technology Institute is constructed to the west and north-west of the site - One of the original three ponds remains situated to the north-west

2.3.2 *Freely Available Satellite Imagery*

Freely available satellite imagery records the site from 1999 to 2023. Imagery from 1999 shows the site comprises part of a larger undeveloped agricultural field. No significant changes were recorded on site until 2015 when ground scars were recorded across the entire field (possibly associated with trial holes or archaeological surveys). Imagery from 2016 shows wide-scale earthworks activity with the construction of Eastern Avenue to the west of the site and in 2018 the construction of MIRA Technology Institute. Imagery from 2018 shows the site has experienced significant earthworks with an embankment along the northern and eastern boundary resembling the embankments seen during the walkover survey. A small building is also located immediately north-east. No significant changes are recorded on site other than the fact the embankment becomes heavily vegetated.

2.3.3 *Unexploded Ordnance and Bomb Sites*

Reference to the site-specific unexploded bomb risk map (UXO) produced by Zetica indicates that the site is located in close proximity to an area of moderate risk of unexploded ordnance. Moderate-risk regions are those with a bombing density of between 15 to 49 bombs per 1000 acres or less.

Care is however required when assessing the risk for specific sites where the risk may be higher because of local wartime activity, such as munitions factories, pivotal infrastructure, airfields, and dummy airfields, many of which were removed from historical maps in the interest of national security. As previously identified the site is located adjacent to a historic airfield and within close proximity to a moderate risk region, therefore it was considered further consideration of the risk from UXO should be undertaken.

A preliminary UXO risk assessment was undertaken by Impartial Assessments, ref. PRA.10185.24, dated 13th of June 2024. The conclusions of this preliminary assessment were that a Stage 2 Detailed Risk Assessment should be undertaken as there is a potentially elevated risk of encountering explosive (EO) ordnance during both the site investigation works and the development works.

A Stage 2 Detailed risk assessment was therefore undertaken by Impartial Assessments, ref. DRA.10166.24, dated 29th July 2024. The conclusions of this detailed risk assessment proved an overall low risk of encountering EO. **As such, no further action is required as part of the SI works and ongoing development.**

2.4 HYDROLOGY

The nearest surface water course is recorded as the River Anker which is located 1713m south-west of the site.

There are no recorded active or historical surface water abstraction licenses within 2000m of the site.

2.5 HYDROGEOLOGY

Reference to the Environment Agency website indicates that the site is located on the following Aquifers:

-  Secondary B Aquifer - associated with the Mercia Mudstone Formation
-  Secondary Undifferentiated - associated with the underlying Gunthorpe Member

The aquifer designation data is based on geological mapping provided by the British Geological Survey. The maps are divided into two different types of aquifer designation:

Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels.

Bedrock - solid permeable formations e.g., sandstone, chalk and limestone.

For each type, there are four designations: - Principal, Secondary A, Secondary B and Unproductive Strata, ranked by importance.

The site is located outside of any source protection zones.

A Source Protection Zone (SPZ) is a designated area around a well or abstraction borehole.

The nearest groundwater abstraction license is recorded 1157m south-east of the site, relating to a historical license, operated by Warwickshire County Council. The nearest active groundwater abstraction license is recorded 1900m north-east of the site and is operated by Horiba Ltd.

2.6 WASTE TREATMENT AND LANDFILL SITES

2.6.1 Landfills

There are no historical records of landfill sites located within 500m of the site.

There are no records of operational or historical landfill sites within 500m of the site.

2.6.2 Other Licensed Waste Sites

There are no other licensed waste site recorded within 500m of the site.

2.7 INDUSTRIAL USAGE SITES

There are records of past or present potentially contaminative industrial sites recorded within 250m of the site.

The historical potentially contaminative industrial sites relate to railway cuttings located along the entire eastern boundary and an unspecified works located 208m north-west.

The recent potentially contaminative industrial sites relate to an electricity substation located 38m north-west and 209m west.

It is considered the land-uses listed above will have had a negligible impact on the site, with the exception of the historic railway along the eastern boundary which may have introduced Made Ground soils during the construction. The earthworks activity seen on the satellite imagery associated with the construction of the MIRA Technology Institute is likely to have introduced Made Ground soils onto the site.

2.7.1 Pollution Incidents

There are two records of pollution incidents within 500m of the site.

The pollution incidents include:

-  Dated 2003 – Record of diesel with no recorded impact on water and air, minor impact on land, situated 60m south
-  Dated 2001 – Record of biodegradable materials and waste with no recorded impact on water or air, minor impact on land, situated 478m north-east

Given the above pollution incidents were recorded more than 20 years ago and had a minor impact on the land it is considered the risk to the site from the pollution incident is negligible.

2.7.2 *Historical Site Usage*

Historical information records the site to have been part of a larger undeveloped field since at least 1887 with a railway along the eastern boundary. The site has remained undeveloped ever since, however, earthworks have been undertaken on the site between 2014 and 2018 associated with the construction of the adjacent MIRA Technology Institutes. The earthworks activity produced an embankment along the northern and eastern side of the site as seen during the walkover survey.

2.8 WORKED OUT GROUND/MADE GROUND

The desk study information records one area of Worked Ground within 500m of the site associated with the adjacent vehicle testing centre situated 65m north-east of the site.

In addition, historical maps indicated two ponds recorded less than 50m west of the site may have been backfilled with material of an unknown origin. The infilled ground could be considered a potential source of gas.

Imagery from 2016 shows wide-scale earthworks activity with the construction of Eastern Avenue to the west of the site and in 2018 the construction of MIRA Technology Institute. Imagery from 2018 shows the site has experienced significant earthworks activity with the construction of an embankment along the northern and eastern boundary.

2.9 GROUND GASES

2.9.1 *Radon*

Information obtained from the BGS and the National Geoscience Information Service indicates that the site lies within an area where less than 1% of homes exceed the action level of 200Bq/m³ for radon gas. Therefore, no radon protection measures are necessary in the construction of new dwellings or extensions, on this site.

2.9.2 *Landfill Gasses*

In accordance with BS8576:2013 the site has been provisionally assessed for the risk of ground gases. This has been done with reference to “A pragmatic approach to ground gas risk assessment for the 21st Century” Card and Wilson, 2011.

-  No credible sources or pathways for landfill gas migration have been identified. However, potentially backfilled ponds are located <50m west of the site
-  The site has not been a registered landfill

-  The Made Ground is not expected to be 5m deep or an average of 3m in thickness
-  The site is not directly located on a carbonate-rich rock that can produce carbon dioxide
-  No radon protection measures are recommended for this site
-  The site does not lie on potentially naturally organic soil

Currently the existing embankment is not considered a risk of ground gas as it is above normal ground levels and will likely be removed as part of the development. Further consideration may be required should this material be used to raise site levels.

It is considered that there is a very low risk of ground gases affecting the site from nearby potentially backfilled ponds. As such, confirmatory gas monitoring will be undertaken as part of the human-health risk assessment.

2.10 POTENTIAL GEOTECHNICAL HAZARDS

The desk study information identified that the site does not lie within an area affected by coal mining activities. The closest records of non-coal mining activities are located 636m west of the site associated with bedded ore (manganese). There is no evidence from BGS memoirs that non-coal mining activities extend beneath the site.

There is one record of surface ground workings located along the eastern boundary of the site associated with a railway cutting. Other surface ground workings are recorded in the surrounding area associated with the historic ponds located west of the site.

The risk of naturally occurring geotechnical hazards at the site is recorded in the Groundsure report to be as follows:

Ground Stability Hazard	Maximum Hazard Potential Rating
Shrinking and Swelling Clays	Very Low
Landslides	Very Low
Ground Dissolution of Soluble Rocks	Negligible
Compressible Deposits	Negligible
Collapsible Deposits	Very Low
Running Sand	Negligible

The maximum hazard potential rating has been attributed to shrinking and swelling clays associated with the underlying Mercia Mudstone Group and Gunthorpe Member. This formation predominantly comprises low shrinkage cohesive soil in accordance with NHBC guideline. The effects of any trees or hedgerows, within desiccation influencing the distance of the development (as described in the NHBC Standards, Chapter 4.2), should also be considered during design and

construction. Where such vegetation is within the influence of new buildings, then foundations will need to extend to depths where soils are moisture/volume stable and appropriate precautionary foundation and floor slab design measures adopted in accordance with the NHBC Building Near Trees protocol.

Furthermore, the Mercia Mudstone presents few geotechnical hazards limited to the potential for local beds of gypsum/halite which are prone to dissolution. Information obtained from a nearby borehole records gypsum at depths in excess of 45m bgl with no records of dissolution/collapse features above this depth as such the risk of encountering dissolution features within the zone of influence of the development is unlikely. Another potential geotechnical hazard associated with the Mercia Mudstone is it is characteristically silty with a low plasticity and as such will, as an earth fill, rapidly soften on wetting.

The existing embankment situated along the northern and eastern boundary is currently considered to be un-engineered and therefore may present a risk of slope instability. However, given the proposed development it is assumed the embankment will be removed prior to the construction of the proposed commercial buildings.

2.11 POTENTIALLY SENSITIVE LAND USES

The site is located within a nitrate-vulnerable zone associated with the River Trent.

3 INITIAL GEO-ENVIRONMENTAL CONCEPTUAL SITE MODEL

In accord with the Environment Agency guidance LCRM *Land Contamination: Risk Management*, (EA, 2019) this desk study and site reconnaissance report constitutes a preliminary risk assessment in order to establish the potential presence of pollutant linkages. The diagram below illustrates the potential linkages.

Historical information records the site to have been part of a larger undeveloped field since at least 1887 with a railway along the eastern boundary. The site has remained undeveloped ever since, however earthworks have been undertaken on the site between 2014 and 2018 associated with the construction of the adjacent MIRA Technology Institutes. The earthworks activity produced an embankment along the northern and eastern side of the site as seen during the walkover survey.

The potential sources of contamination which may have impacted the site identified from the desk study information include:

-  Recent earthworks activity on site between 2014 and 2016 introducing Made Ground/Reworked Ground associated with the construction of the adjacent MIRA Technology Institutes
-  Ground gas from nearby potentially backfilled ponds
-  Pesticides from previous agricultural land-use
-  Surrounding land-uses including the construction of MIRA technology Institute to the west, the historic airfield to the north, and the historic railway along the eastern boundary

Therefore, currently it is considered that the following potential source/pathway/receptors may be present at and around the site;

Potential Source	Potential Pathway	Potential Receptor	Considered Risk
Made Ground (from recent earthworks activity between 2014 and 2018 soils on site which may contain asbestos, heavy metals, hydrocarbons, and BTEX)	Ingestion, inhalation, or absorption from direct contact with soil.	End Users	Low Risk
	Leaching through the ground	Controlled Waters	Low Risk
	Possible contact during work phase	Construction Workers	Low Risk
Ground gas from nearby potentially infilled ponds	Inhalation	End Users	Very Low Risk
Surrounding land-uses including the historic railway line located along the	Leaching through the ground	Controlled Waters	Very Low Risk

Potential Source	Potential Pathway	Potential Receptor	Considered Risk
eastern boundary, the historic airfield to the north and the adjacent MIRA Technology Institute immediately west	Ingestion, inhalation, or absorption from direct contact with soil	End User	Very Low Risk
	Possible contact during work phase	Construction Workers	Very Low Risk
Pesticide use from previous agricultural land-use	Leaching through the ground	Controlled Waters	Very Low Risk
	Ingestion, inhalation, or absorption from direct contact with soil	End User	Very Low Risk
	Possible contact during work phase	Construction Workers	Very Low Risk

4 PHASE II INTRUSIVE INVESTIGATION

4.1 SITE WORK AND SAMPLING STRATEGY

The fieldwork was undertaken in accordance with BS 5930:2015, BS EN 1997-2 (2007) and BS EN ISO 22475-1 (2006), with the exploratory locations being selected by Geo-Integrity Ltd. The exploratory hole locations can be seen in the Appendices.

The fieldwork was undertaken on the 27th and 28th of July 2024 and consisted of three windowless sampler boreholes (CT1 – CT3), five machine excavated trial pits (TP1 – TP5), eight machine excavated trial pits for subsequent plate load testing (CBR1 – CBR8), and three machine excavated trial pits (SA1 – SA3) for subsequent infiltration testing following the guidance within BRE365 Digest.

Exploratory Hole	Location	Reasoning
CT1, CT2, TP3 and TP4	Positioned within the footprint of the proposed building	To log the ground conditions underlying the proposed footprint and retrieve samples for subsequent laboratory testing. In addition, SPTs were undertaken to record the strength properties of the underlying soils. A monitoring well was installed within CT1 for subsequent groundwater and gas monitoring given the potential risk of gas identified from the desk study
CT3, TP1, TP2 and TP5	Positioned on the existing embankment	To locate the depth of the Made Ground/Reworked Ground forming the embankment and record the composition of these soils. Samples will be collected for testing as part of the human health risk assessment and waste classification as it is likely these soils will be reused or removed from site. Additionally, classification tests and compaction tests will be undertaken on bulk samples to obtain soil parameters for earthworks design
CBR1 – CBR8	Positioned within the proposed parking areas at the south and northern ends of the site	Plate load tests were undertaken on the underlying subgrade material to obtain a design CBR value to aid with road and pavement design
SA1 - SA4	Within the proposed car park to the south and proposed soft landscaping along the western boundary	To undertake soakage testing following BRE365 guidelines to assess the infiltration potential of the underlying soils to aid soakaway design. The tests were generally undertaken at the southern end of the site as this was topographically the lowest point of the site. An additional, soakage test was undertaken within CBR5 (SA4) to assess the infiltration potential of the underlying siltstone at depth

Disturbed samples were taken at selected depths down to the base of the exploratory holes for subsequent laboratory testing and inspection. On completion, all exploratory holes were carefully backfilled with arisings in thin layers, ensuring that excavated material was replaced in the same order as it had been removed.

4.2 GROUND CONDITIONS

4.2.1 Summary

The site and laboratory test work revealed that the general succession of strata can be represented by local Made Ground, Reworked Ground, and Topsoil, overlying the Mercia Mudstone Group. Descriptions of the strata encountered are given on the exploratory hole records and are summarised below. Further information is provided on the exploratory hole logs within the Appendices.

4.2.2 Made Ground (*Forming the Embankment*)

Encountered within the exploratory holes positioned on the un-engineered embankment (TP1, TP2, TP5, and CT3) from ground level down to depths ranging between 2.20m and 3.40m bgl (97.88m to 97.32mOD). An outline of the embankment is provided within Appendix A. The embankment covers an area of approximately 0.40ha with a maximum height of 2.90m. The material was encountered as soft to firm, red, brown, very silty, gravelly clay, gravels being fine to coarse siltstone with cobbles of siltstone. Locally significant portions of anthropogenic material were encountered as seen within TP1 and TP5, including plastic tubes, asphalt, concrete, metal, rebar, brick and ceramic. These localised concentrated areas of anthropogenic material are interpreted to reflect construction waste from the adjacent development and on-site earthworks which occurred at the same time between 2014 and 2018.

SPT tests undertaken within this material recorded 'N' values between 5 and 6 indicating a soft, unconsolidated cohesive soil.

Laboratory tests undertaken on representative bulk soils samples recovered from TP2 at a depth between 0m and 2m bgl and TP5 at a depth between 1.00m and 2.00m bgl revealed a moisture content range of 19% to 21% and a modified plasticity index of 14% to 17% indicating a low shrinkable soil in accordance with NHBC guidelines.

Particle size distribution tests were also undertaken on the same representative bulk soil samples recording the following grain size percentages: Fine: 70% - 77%; Sand: 16% - 21%; Gravel: 2% - 14%

Compaction tests were also undertaken on the same representative bulk soil samples recording a maximum dry density of 1.73Mg/m³ to 1.79Mg/m³ and an optimum moisture content of 20% to 21%.

4.2.3 *Reworked Ground*

Encountered in the remaining exploratory holes surrounding the embankment (CT1, CT2, SA1 – SA3, CBR1 – CBR8, TP3, TP4) from ground level down to depths ranging between 0.25m and 1.20m bgl (97.49m and 96.50m OD).

The material was generally encountered as loose, brown, slightly clayey, sandy, gravelly silt, gravels being fine to coarse sub-angular flint, brick, glass, and ceramic.

Reworked Ground is a term used for reworked natural soils and the near surface soils covering the majority of the site with the exception of the embankment were generally found to be reworked soils with some rare anthropogenic material. The near surface soils comprised loose organic silts (topsoil) and loose, brown, slightly clayey silt (subsoil) with gravels of flint, and rare brick, glass and ceramic.

4.2.4 *Old “buried” Topsoil*

Encountered in exploratory holes CT3, TP2 and TP5 underlying the Made Ground soils forming the embankment at depths from 2.20m and 3.10m bgl (97.88m and 97.76mOD) down to depths ranging between 2.80m and 3.40m bgl (97.68m and 97.16mOD). The material was encountered as very soft to soft, dark brown, silty organic clay.

It is interpreted that the organic soils underlying the Made Ground soils forming the embankment likely represent the original topsoil layer prior to the construction of the embankment.

4.2.5 *Mercia Mudstone*

Encountered in the majority of the exploratory holes with the exception of the shallow CBR pits and TP1 undertaken on the embankment where Made Ground soils were encountered in excess of >3.30m bgl (97.32mOD). The top of the strata was encountered at depths ranging between 0.25m and 3.40m bgl (97.76m and 96.65mOD).

The material was encountered as an upper firm becoming stiff to very stiff, red brown, silty, slightly sandy, slightly gravelly clay, gravels being fine to coarse, subangular to subrounded siltstone. This upper cohesive layer was generally underlain by a very weak to weak, red, grey rock-quality siltstone. Rock quality strata was encountered from depths ranging between 1.60m and 4.40m bgl (96.54m and 94.61mOD) with refusal depths ranging between 2.00m and 3.55m bgl (95.83m and 94.16mOD) indicating a variable rockhead exists across the site.

SPT tests undertaken within the upper cohesive material recorded 'N' values ranging between 15 and 26 indicating a stiff to very stiff cohesive soil.

Laboratory testing undertaken on representative upper cohesive soil samples recorded moisture contents ranging between 19% and 26% and a modified plasticity index ranging between 12% and 19% indicating a low shrinkage soil in accordance with NHBC guidelines.

SPT tests undertaken on the underlying rock quality material recorded 'N' values ranging between 42 to >50.

Laboratory testing undertaken on the underlying rock quality strata recorded a moisture content ranging between 5% and 18%. The majority of the samples tested were recorded between 5% and 12% therefore based on both the SPT results and average modified plasticity values it is considered this underlying material are non-shrinkable soils reflecting the rock quality strata as seen on site.

4.2.6 Sulphate and pH Tests

Water soluble sulphate and pH tests were carried out on one sample of Reworked Ground taken at a depth of 0.30m bgl, one sample from the Made Ground taken at a depth of 2.50m bgl, two samples from the Mercia Mudstone (upper cohesive) at depths between 0.80m and 3.00m bgl, and two samples taken from the Mercia Mudstone (rock-quality strata) at depths ranging between 1.60m and 3.00m bgl. These recorded values as shown in the table below:

Parameter	Range
Soluble Sulphate (mg/l)	13 – 36
pH units	7.2 – 9.0
Acid Soluble Sulphate	0.01 – 0.05
Total Sulphur	<0.01 – 0.04

4.2.7 Groundwater

Groundwater was not encountered during the intrusive investigation down to the base of the exploratory holes, the deepest of which was recorded at 3.55m bgl (94.16mOD) below normal ground levels excluding the embankment.

Subsequent groundwater monitoring was undertaken on four occasions between 05/07/2024 and 26/07/2024 within CT1 and recorded dry conditions down to the base in excess of 3.55m bgl (94.16mOD).

4.2.8 California Bearing Ratio

Eight plate load tests were undertaken at depths ranging between 0.35m and 0.45m bgl (97.69m and 97.19mOD) within the underlying sub-grade soils (Reworked Ground). The plate load tests were undertaken in areas of proposed parking and lorry bays. Equivalent CBR values ranged between 0.21% and 6.50%.

4.2.9 Infiltration Tests

Infiltration testing was carried out within SA1 – SA4 within the Mercia Mudstone at depths of 0.74m and 2.30m bgl (96.13m and 94.91mOD). The general methods set out in BRE 365 Digest were followed.

The soakaway results indicated the underlying soils are effectively impermeable with water levels dropping a maximum depth of 5cm over a period of 23 hours.

4.2.10 Gas Monitoring

Four gas monitoring visits were undertaken between 05/07/2024 and 26/07/2024 to assess the gas regime at the site. Methane was recorded below detectable limits on all four occasions; carbon dioxide was recorded between 1.4% to 2.8% with oxygen between 15.9% and 17%. Peak flow was recorded at 0l/h and atmospheric pressure was recorded between 995mb to 1000mb. Currently, the worst-case gas screening value (GSV) is 0 due to no flow recorded.

4.2.11 Evidence of Contamination

The near surface soils were generally composed of reworked natural soils with rare brick and therefore unlikely to be considered as significant evidence of contamination. However, the made Ground soils forming the embankment comprised locally of significant portions of anthropogenic material plastic tubes, asphalt, concrete, metal, rebar, brick and ceramic. It is interpreted the source of this anthropogenic material is the more-recent development works situated immediately west of the site and the on-site earthworks which occurred at the same time between 2014 and 2018. It is considered the concentrated anthropogenic material could potentially be a source of contamination.

5 GEOENVIRONMENTAL TESTING

Geo-environmental laboratory testing was scheduled by Geo-Integrity on six soil samples recovered during the fieldwork. The testing was carried out at a MCERTS and UKAS accredited laboratory. The results are presented in the Appendices.

Six soil samples were tested for a varied suite containing the following

-  Metals and inorganic substances
-  Speciated Polyaromatic Hydrocarbons (PAH)
-  Benzene, Toluene, Ethylbenzene and Xylene (BTEX)
-  Total Petroleum Hydrocarbons (TPH), with eight band split
-  The five Made Ground soil samples were also tested for the presence of asbestos

Two soil samples taken at depths between 0.60m and 1.00m bgl within the Reworked Ground and Mercia Mudstone were also tested for a suite of hydrocarbons, volatile organic compounds (VOCs), and Semi-volatile organic compounds (SVOCs) as part of the UKWIR Suite to assess whether barrier pipe is required for underground water pipes.

Two soil samples collected from the original topsoil layer at a depth of 3.00m to 3.20m bgl and one recovered from the Reworked Ground at a depth of 0.20m bgl were tested for a suite of pesticides given the historic agricultural land use.

WAC testing was also undertaken on a representative Made Ground sample from the embankment to aid with waste classification. In addition, a sample of the bituminous material encountered locally within the Made Ground soils forming the embankment was sampled and tested for a suite of PAHs to assess whether this blacktop is coal tar derived to aid waste classification.

6 GEOTECHNICAL INTERPRETIVE SECTION

6.1 GENERAL GROUND CONDITIONS INTERPRETATION

The exploratory fieldwork undertaken during this investigation has identified the site is underlain locally by Reworked Ground, Made Ground and Topsoil, underlain by the Mercia Mudstone.

The Made Ground soils were identified forming the embankment with thicknesses ranging between 2.20m and 3.40m. The embankment covered an area of approximately 0.40ha situated along the northern and eastern boundary. This material comprised soft to firm, red, brown, very silty, gravelly clay, gravels being fine to coarse siltstone with cobbles of siltstone. Locally significant portions of anthropogenic material were encountered as seen within TP1 and TP5, including plastic tubes, asphalt, concrete, metal, rebar, brick and ceramic. These localised concentrated areas of anthropogenic material are interpreted to reflect construction waste from the adjacent development and on-site earthworks which occurred at the same time between 2014 and 2018. The overall source of the material is interpreted to be reworked Mercia Mudstone.

The near surface soils surrounding the embankment were identified as Reworked Ground down to depths ranging between 0.25m and 1.20m bgl (97.49m and 96.50mOD). Reworked Ground is a term used for reworked natural soils and the near surface soils covering the majority of the site with the exception of the embankment were generally found to be reworked soils with some rare anthropogenic material.

Locally a historic Topsoil layer was encountered underlying the Made Ground soils forming the embankment at depths of 2.20m and 3.10m bgl (97.88m and 97.76mOD) down to depths ranging between 2.80m and 3.40m bgl (97.68m and 97.16mOD) further indicating that no engineering was included in the earthworks design. The material was encountered as very soft to soft, dark brown, silty organic clay.

The near surface soils described above were underlain by the Mercia Mudstone across the entire site. The Mercia Mudstone was encountered as an upper cohesive soil down to depths ranging between 1.60m and 4.40m bgl (96.54m and 94.61mOD). This material was encountered as a firm to stiff clay with a low shrinkability in accordance with NHBC guidelines.

The upper cohesive soils of the Mercia Mudstone were underlain by a rock quality siltstone with refusal recorded at depths of 2.00m and 3.55m bgl (95.83m and 94.16mOD). Plasticity tests indicate this material is predominantly non-shrinkable in accordance with NHBC guidelines.

Given the fact there are low shrinkage soils underlying the site associated with the upper cohesive soils of the Mercia Mudstone the guidelines within NHBC 'Building Near Trees' should be followed. The effects of any trees or hedgerows, within desiccation influencing distance of the development (as described in the NHBC Standards, Chapter 4.2), should also be considered during design and construction. Where such vegetation is within influence of new buildings, then foundations will need to extend to depths where soils are moisture/volume stable and appropriate precautionary foundation and floor slab design measures adopted in accordance with the NHBC Building Near Trees protocol.

Groundwater was not encountered during the intrusive investigation down to the base of the exploratory holes, the deepest of which was recorded at 3.55m bgl (94.16mOD).

6.2 DESICCATION ASSESSMENT

The desk study information indicates the history of the site has been entirely agricultural remaining as an undeveloped field. Historical records made no reference of trees located on site and the walkover survey also identified no evidence of mature vegetation. However, as cohesive soils have been encountered underlying the site, albeit low shrinkage, an assessment of desiccated soils has been undertaken based on the moisture contents and index properties measured from the laboratory testing.

The method used as part of this assessment was first proposed by Richard Driscoll (Driscoll R. (1983) "Influence of Vegetation on Clay Soils" Geotechnique. Vol. 33). The method seeks to establish a relationship between the moisture content and index properties of the soil. Driscoll suggested that soil might be desiccated if the moisture content is less than (a) $0.4 \times LL$ or (b) $2\% + PL$. Driscoll preferred the LL test as the more reliable of the two and recommends this assessment is always used in conjunction with other forms of testing. In addition, if the soil is highly desiccated the tests perform better and become less clear and confusing as the level of desiccation diminishes, as stated by Plante, S., Rollit, E. and Nazareth, C. (2007) "Site Investigation and Soil Testing" The Clay Research Group, Pg. 18.

The laboratory tests indicate equivalent moisture contents are generally at or above the index properties outlined above. One exception being the samples recovered from CT2 where the equivalent moisture contents were slightly less than $PL+2\%$ but above $LL*0.4$.

Therefore, it is considered as there is no clear evidence the underlying soil at this site are unlikely to be significantly desiccated.

6.3 EXCAVATIONS

Conventional plant should be sufficient for the excavation of the underlying soils at the site down to depths ranging between 2.00m and 3.55m bgl (95.83m and 94.16mOD). At these depths refusal on rock quality strata was recorded and therefore excavating deeper would require specialist breaking equipment. During the intrusive works there was no record of collapse indicating excavations are likely to be stable in the short term.

Excavations are unlikely to encounter water ingress down to depths in excess of 94.16mOD the greatest depth achieved from this investigation.

6.4 FOUNDATIONS

The proposed development includes the construction of a new industrial-type facility across a 2.5-acre plot. A single steel-framed building will be split into 2 separate units (44a & 44b), which will house workshops, offices, and general production areas. Both units will feature a mezzanine level accommodating office space.

Shallow foundations have been considered as part of this investigation.

6.4.1 *Shallow Foundations*

The Made Ground, Reworked Ground and Topsoil are considered unsuitable as bearing strata due to their variability, and potential for unacceptable total and differential settlement under applied foundation loadings. The underlying Mercia Mudstone is considered suitable as a bearing stratum. The top of the strata was encountered at depths ranging between 0.25m and 3.40m bgl (97.76m and 96.65mOD).

The underlying Mercia Mudstone may be suitable for conventional shallow foundations at a depth of 1.00m below ground level or 0.20m into the top of the formation, whichever is the deeper. At this depth a net allowable bearing pressure of 140kPa may be adopted for strip foundations not exceeding 1m in width. This allows for a factor of safety of three against shear failure and for settlements generally not to exceed 25mm taking place over a number of years.

It is recommended foundations are suitably reinforced to combat differential settlement given the fact foundations may cross shrinkable and non-shrinkable soils associated with the Mercia Mudstone.

6.5 FLOOR SLAB DESIGN

Floor slabs at the site can be ground bearing, provided the Reworked Ground/Made Ground is stripped and removed and is based on a blanket of good quality, free draining, well compacted granular material, placed prior to the construction of the floor slab, in order to make up the level. Given potential for soft spots beneath the site differential settlement will be expected over large areas of the ground bearing slab and reinforcement is recommended. In addition, some ground improvement (addition of lime) may be required depending on the bearing capacity required.

Alternatively in areas of thicker Made Ground >600mm or where foundations require deepening past 1.50m bgl, suspended floors should be used.

The advice given within the NHBC Standards regarding the construction of floor slabs on shrinkable soil should be followed.

6.6 SULPHATE ATTACK ON UNDERGROUND CONCRETE

Water soluble sulphate and pH tests were carried out on one sample of Reworked Ground, one sample from the Made Ground and two samples from the Mercia Mudstone to give an indication of the aggressivity of the ground in relation to buried concrete, as set out in the Building Research Establishment (BRE) Special Digest 1 (2005) Concrete in Aggressive Ground, Part 1: Assessing the aggressive chemical environment.

Therefore, in accordance with the BRE Special Digest, these results have been given in the table below, in relation to strata type and required Design Sulphate Class and site Aggressive Chemical Environment Classification (ACEC).

Strata	Design Sulphate Class	Aggressive Chemical Environment Classification
Made Ground	DS-1	AC-1
Reworked Ground	DS-1	AC-1
Mercia Mudstone	DS-1	AC-1

The recommendations given in the above digest, with respect to suitable concrete design and other associated precautions against sulphate attack, should be followed for all below ground level concrete.

6.7 ACCESS ROADS AND PAVEMENTS

TRL DCP (Equivalent CBR) Tests were undertaken at depths ranging between 0.35m and 0.45m bgl (97.69m and 97.19mOD) within the underlying sub-grade soils (Reworked Ground). The plate load tests were undertaken in areas of proposed parking and lorry bays. Equivalent CBR values ranged between 0.21% and 6.50%.

Made Ground has been proven across the site, and given the unknown origin of the soil, its variability and the likelihood and proven possibility for soft spots, we recommend that any areas of soft or deleterious material should be excavated, replaced with a properly compacted coarse-grained fill and proof rolled prior to construction.

A design CBR value of 0.21% should be taken for the underlying soft subgrade. In line with the Highways Department Document HD 25-94 when a subgrade has a CBR sufficiently below 2% such that it becomes unsuitable as a pavement foundation then the soft subgrade should be removed and replaced by more suitable material.

6.8 INFILTRATION MEASURES

Appropriately designed sustainable drainage systems (SuDS) are more sustainable than using piped drainage to local sewer systems. However, infiltration measures close to buildings may result in undermining of foundations and softening of soils leading to instability. Attenuation measures should be located at suitable distances from foundations and infrastructure.

The four infiltration tests (SA1 – SA4) were undertaken at depths ranging between 0.70m bgl and 2.30m bgl within the underlying Mercia Mudstone. As the Mercia Mudstone was encountered as predominantly cohesive soils overlying siltstone both sets of material were tested for their infiltration.

An accurate infiltration rate could not be calculated due to the insufficient drop in water level recorded in each location. A maximum drop in water level of 5cm was recorded over a period of 24 hours. Therefore, the underlying soils are considered to be effectively impermeable and unviable for conventional soakaways.

The results from the infiltration tests are presented in Appendix B.

6.9 GAS PROTECTION

The risk of ground gases impacting the site was assessed by reference to the paper “A pragmatic approach to ground gas risk assessment for the 21st Century” Card and Wilson, 2011.

Four monitoring visits undertaken at the site, in conjunction with groundwater level monitoring, recorded no methane gas above detectable limits, and carbon dioxide levels at a maximum of 2.8%. A peak flow rate of 0l/h was also recorded. Therefore, the worst-case gas screening value (GSV) is 0.

Based on the conditions measured during the monitoring visits carried out to date, in accordance with BS8485:2015 and CIRIA C665, 2007 this would be considered as a Characteristic Situation 1 (CS1).

The site is located in an area where less than 1% of homes exceed the action level of 200Bq/m³ for radon gas, and therefore no radon protection measures are necessary in the construction of new dwellings or extensions.

Full details of gas concentrations and gas flow data recorded during the monitoring visits are given in the Appendices.

Currently the existing embankment is not considered a risk of ground gas as it is above normal ground levels and will likely be removed as part of the development. Further consideration may be required should this material be used to raise site levels.

6.10 EARTHWORKS - CLASSIFICATION OF MATERIAL

Made Ground soil samples were recovered from the embankment for laboratory testing. These samples were tested for a variety of geotechnical classification tests and the results reported are included in full detail within Appendix C of this report.

6.10.1 Made Ground (Forming the Embankment)

6.10.1.1 Summary of Atterberg Limits Summary of Gradings

	Moisture Content (%)	Plastic Limit (%)	Plasticity Index (%)	Percentage Passing Sieve Size (%)		
				125mm	2mm	63µm
Range	19 – 21	17-21	15-21	100	85.90 - 97.70	69.70 – 77.10
Average	20	19	18	Average	91.80	73.40

Summary of Compaction Testing

	Maximum dry density (Mg/m ³)	Optimum moisture content (%)
Range	1.73 – 1.79	20 – 21

6.10.1.2 Summary

A preliminary assessment of class is provided below. Further hydrometer testing could be undertaken to prove the clay/silt percentage as further evidence.

Material	Suggested Series 600 Earthworks Class	Typical Use	Compaction Requirements
Made Ground	Silty Cohesive Material – 2C	General Fill	Table 6/4 Method 3

The advice of specialist earthworks contractors should be sought to formulate a suitable methodology should the Made Ground soils forming the embankment be reused on site. It is considered the specialist earthworks contractor will review the localised anthropogenic material found during this investigation which included plastic tubes, asphalt, concrete, metal, rebar, brick and ceramic and should be removed from the end material being reused.

It should be understood the Made Ground forming the embankment has been interpreted to be largely and predominantly reworked Mercia Mudstone. Mercia Mudstone is characteristically silty with a low plasticity and as such will, as an earth fill, rapidly soften on wetting. This should be considered as part of the earthworks design should earthworks be undertaken.

Notably should the earthworks material be reused on the site, to raise site levels ect, then under the Definition of Waste: Code of Practice (DoWCoP); when planning to reuse excavated materials

either on-site a Materials Management Plan (MMP) is likely to be required. An MMP ensures that the materials are reused safely and appropriately, avoiding disposal and reducing off-site construction vehicle movements. An MMP should be completed once all lines of evidence have been gathered regarding the suitability, certainty of use, and quantity required. It must also be provided to a Qualified Person for verification.

Alternatively, should the earthwork remain on site – unchanged or removed from site as part of a muck-away waste removal programme (see section 8 of this report) then an MMP would not be required.

7 GEO-ENVIRONMENTAL INTERPRETATIVE SECTION

7.1 RISKS TO HUMAN HEALTH

7.1.1 Introduction

Environment Agency guidance LCRM *Land Contamination: Risk Management*, (EA, 2019), states that human health risk assessment should be undertaken by a tiered approach using the source-pathway-receptor principle. A desk study constitutes the first tier, and this has been undertaken as part of this investigation. The conclusions of this phase were that: -

“Historical information records the site to have been part of a larger undeveloped field since at least 1887 with a railway along the eastern boundary. The site has remained undeveloped ever since, however earthworks have been undertaken on the site between 2014 and 2018 associated with the construction of the adjacent MIRA Technology Institutes. The earthworks activity produced an embankment along the northern and eastern side of the site as seen during the walkover survey.

The potential sources of contamination which may have impacted the site identified from the desk study information include:

-  *Recent earthworks activity on site between 2014 and 2016 introducing Made Ground/Reworked Ground associated with the construction of the adjacent MIRA Technology Institutes*
-  *Ground gas from nearby potentially backfilled ponds*
-  *Pesticides from previous agricultural land-use*
-  *Surrounding land-uses including the construction of MIRA technology Institute to the west, the historic airfield to the north, and the historic railway along the eastern boundary”*

Therefore, it is considered that there are potential source/pathway/receptor linkages at the site and as such chemical testing was undertaken. The risk of ground gas was assessed in section 6.9 of this report and indicated the proposed development is at no significant risk of ground gas, see section 6.90 for further details.

Results are analysed under the second tier, known as a Generic Quantitative Risk Assessment (GQRA), which uses generic guideline values to compare site chemical data against, and the final tier would be a Detailed Quantitative Risk Assessment (DQRA), which use data derived from the ground investigation to assess risks to identified receptors.

The assessment included in this report comprises a GQRA, which is undertaken by comparing soil contaminant concentrations from this investigation with conservative Generic Assessment Criteria (GAC). GAC for various land use and exposure scenarios have been selected from the following sources:

-  CL:AIRE Category 4 Screening Levels (C4SL);
-  LQM Suitable for Use Levels (S4UL);
-  CL:AIRE/EIC/AGS GAC

The GAC have been derived using the Environment Agency Contaminated Land Exposure Assessment (CLEA) model, for a range of land uses and exposure scenarios, including:

-  Residential with the consumption of home-grown produce;
-  Residential without the consumption of home-grown produce;
-  Commercial;
-  Allotments;
-  Public Open Space near residential housing (POS_{resi}); and
-  Public Open Space public park scenario (POS_{park})

Given the proposed development is to construct commercial buildings with limited soft landscaping areas a “Commercial” land-use scenario has been selected, for this assessment.

7.2 RESULTS OF CONFIRMATORY CHEMICAL TESTING

Three soil samples were screened as part of this investigation.

Made Ground Soil (Forming the Embankment) Samples:

-  TP1 at a depth of 2.50m bgl
-  TP2 at a depth of 0.00m to 1.00m bgl
-  TP5 at a depth of 0.00m to 1.00m bgl

Reworked Ground Samples:

-  TP3 at a depth of 0.60m bgl
-  CBR6 at a depth of 0.30m to 0.80m bgl

Natural Soil Sample

-  CT1 at a depth of 0.80m to 1.00m bgl

The above soil samples were screened against the relevant GAC for a “Commercial” land-use scenario as described above and identified no significantly elevated levels. The samples were screened for a range of heavy metals, banded total petroleum hydrocarbons, polycyclic aromatic hydrocarbons and BTEX.

Additionally, when compared to the strictest GAC for a “Residential with the consumption of home-grown produce” land-use scenario no significantly elevated levels were recorded.

7.2.1 Asbestos

Screening for the presence of asbestos did not reveal any asbestos containing material (ACM) or fibres in the three Made Ground samples tested.

7.2.2 Pathogens

Two samples recovered from the Reworked Ground and the old Topsoil layer underlying the existing embankment were also specifically tested for a suite of pesticides given the historic agricultural land-use. Each determinant was recorded below detectable limits indicating these underlying soils are not impacted by pesticides.

7.2.3 Natural Soil Sample

A soil sample recovered from the Mercia Mudstone within CT1 at a depth of 0.80m to 1.00m bgl was screened as part of this investigation and recorded no significantly elevated levels of

contaminants when compared to the relevant GAC's for a commercial land-use scenario. Additionally, when compared to the strictest GAC for a "Residential with the consumption of home-grown produce" land-use scenario no significantly elevated levels were recorded.

7.3 RISK TO END USERS

Given the findings of the desk study, walkover survey, intrusive investigation and laboratory testing it is considered that the risk of contamination to end users and surrounding residents from the proposed development at this site is very low and **as such NO further works or remedial measures are necessary prior to development.**

7.3.1 Reducing the Risk to Construction Workers

To reduce the risk to as low as reasonably practicable for the construction workers it is recommended that high standards of personal hygiene should be maintained amongst the site personnel at all times. All personnel coming into contact with the soil, ground workers in particular, should be instructed to use gloves when on site to avoid dermal contact and restrict inadvertent hand-to-mouth ingestion. Washing facilities should be provided for the site staff to use and should be used prior to eating or smoking. Reference should be made to the HSE Document, "Protection of Workers and the General Public during Development of Contaminated Land".

It is also recommended that a watching brief for undiscovered contamination is included in the Works Method Statement. Given the long human history of the site, it is always possible that some previous undiscovered contamination may be encountered. If this is the case, the area should be isolated, and contact be made to a suitably qualified professional for further advice. This is particularly important if the contamination is possibly ACM or liquid based.

7.4 RISK TO CONTROLLED WATERS

The desk study identified:

-  The nearest surface water course is recorded as the River Anker which is located 1713m south-west of the site.
-  There are no recorded active or historical surface water abstraction licenses within 2000m of the site.
-  The site is located on a Secondary B Aquifer associated with the Mercia Mudstone, overlying a Secondary Undifferentiated Aquifer associated with the Gunthorpe Member

-  The site is located outside of any source protection zones.
-  The nearest groundwater abstraction license is recorded 1157m south-east of the site, relating to a historical license, operated by Warwickshire County Council. The nearest active groundwater abstraction license is recorded 1900m north-east of the site and is operated by Horiba Ltd.

Given the above information it is considered the potential receptors are limited to the River Anker which is located a significant distance away from the site as well as the underlying Secondary B Aquifer. However, given the proven impermeable nature of the underlying soils and the fact that chemical testing recorded no significantly elevated levels it is considered there is no significant risk of significant harm to controlled waters from the proposed development.

The Environment Agency is the regulatory body charged with protection of controlled waters and may be a consultee in the planning process. We recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

7.5 RISK TO UNDERGROUND WATER SUPPLY PIPES

Based upon the guidance document from the UK Water Industry Research (UK WIR), 'Contaminated Land Assessment Guidance', February 2014, and the results of the samples tested from the site, it is considered that conventional PE water pipe would be suitable at this site as no elevated levels of hydrocarbons, VOCs, SVOCs or BTEX were recorded.

This should be confirmed with the local water company as not all authorities use this guidance.

8 PRELIMINARY WASTE DISPOSAL CLASSIFICATION

8.1 INTRODUCTION

Excavation for foundations or services will produce waste soil and possibly other waste streams. As a waste producer, you have a duty of care under section 34 of the Environmental Protection Act 1990 to ensure, amongst other things that these wastes are:-

-  Correctly stored
-  Correctly classify
-  Handed only to an authorised person
-  Disposed of properly.

To aid with these obligations we have used HazWasteOnline to undertake the Hazard Assessment Screen as part of this investigation, to establish whether the sampled soils should be considered as either hazardous or non-hazardous waste. This classification process is in line with the Environment Agency's guidance WM3 "Guidance on the classification and assessment of waste", Version 1.2,2021.

8.2 RESULTS OF HAZARD ASSESSMENT

The two Made Ground samples, two Reworked Ground samples and one natural sample analysed for the human health risk assessment, listed in section 6.2, have been classified using HazWasteOnline.

The full results of the HazWasteOnline analyses can be seen in the Appendices.

The HazWasteOnline classification summary sheet from this investigation provides a waste classification of non-hazardous waste for each soil sample tested.

8.2.1 Waste Acceptance Criteria (WAC) Testing Results

To further classify the waste soil for landfill disposal, Waste Acceptance Criteria (WAC) testing has been carried out on a representative sample of Made Ground forming the embankment recovered from TP1 at a depth of 2.50m bgl. This second stage of classification is used to determine whether the samples are inert or non-hazardous waste.

The results show that the sample passes the inert waste criteria.

Additionally, it is considered that the underlying natural soils beneath the site qualify in accordance with EU Council Decision 2003/33/EC para. 2.1.1. “Uncontaminated soil can be classified as inert without testing”.

As such, given the testing results, currently, the underlying soils from the site are considered to be classified as follows: -

Strata	Description of Material	Recommended Classification	List of Waste code	Recommended Landfill Tax Rate
Made Ground (soils forming the embankment)	Naturally occurring soils and stones with man-made materials including rare fragments of flint, brick, rebar and glass.	Inert	17 05 04	Lower Rate
Reworked Ground	Naturally occurring soils and stones with man-made materials including rare fragments of brick, glass and ceramic	Non-Hazardous <i>(Possibly Inert with further WAC testing)</i>	17 05 04	Standard Rate
Natural Soil	Naturally occurring soils and stones (subsoil)	Inert	17 05 04	Lower Rate

Under section 63(2) of the Finance Act 1996 it states where a disposal to landfill consists mainly of qualifying material(s), but includes a small amount of standard-rated material, the whole load is taxable at the lower rate. As such, the reworked and Made Ground soils (excluding any Topsoil) are considered to be taxable at the lower rate. The natural soils are taxable at the lower rate.

Analytical results relevant to the materials being disposed of should be provided to the landfill operators or waste management contractors to confirm whether it meets their license agreements and to confirm tipping costs.

All wastes removed from the site should be consigned, transported and disposed of in full accordance with all relevant UK legislation.

9 RE-USE OF MATERIAL ON SITE

Currently, if surplus arisings are 'fit for re-use' on the site and have not been treated, its re-use is allowed within the planning law. If it needs treating prior to re-use, exemptions can be sought from the Environment Agency to allow this activity.

Based upon the human health and groundwater risk assessments, the underlying soil is currently considered suitable for re-use on site. This analysis is, however, dependent on the agreement of the Local Authority.

It should be understood the Made Ground forming the embankment has been interpreted to be largely and predominantly reworked Mercia Mudstone. Mercia Mudstone is characteristically silty with a low plasticity and as such will, as an earth fill, rapidly soften on wetting. This should be considered as part of the earthworks design should earthworks be undertaken.

Notably should the earthworks material be reused on the site, to raise site levels ect, then under the Definition of Waste: Code of Practice (DoWCoP); when planning to reuse excavated materials either on-site a Materials Management Plan (MMP) is likely to be required. An MMP ensures that the materials are reused safely and appropriately, avoiding disposal and reducing off-site construction vehicle movements. An MMP should be completed once all lines of evidence have been gathered regarding the suitability, certainty of use, and quantity required. It must also be provided to a Qualified Person for verification.

Alternatively, should the earthwork remain on site and unchanged or removed from site as part of a much-away waste removal programme (see section 8 of this report) then an MMP would not be required.

The reuse of potential waste soils on a site is governed by environmental legislation. For waste to be reused on a site or moved to another site it must hold an environmental permit, or an exemption. By following the CL:AIRE Definition of Waste Development Industry Code of Practice it is possible to reuse soil waste on a site or transfer soil to a separate site, subject to appropriate testing and risk assessment, as non-waste. This removes the need for an environmental permit, but will require the production of a Materials Management Plan (MMP). The use of the material would need to be agreed with the regulators and have a defined purpose though the MMP sign-off process.

10 DISCOVERY STRATEGY

During construction, unexpected ground or groundwater conditions may be encountered despite prior investigation.

During construction, ground workers must immediately report any previously undiscovered contamination or unforeseen ground conditions to the Site Manager, who will then notify the developer/client and by extension an appointed consultant (such as Geo-integrity Ltd).

When deemed necessary, the Consultant shall attend the site and inspect the area of contention and provide recommendations for further actions, if any. Where necessary the regulatory authority shall be informed.

Following any additional investigation and/or subsequent laboratory testing the client shall report the results of any proposed remedial measures shall to the regulatory authority or other appropriate organisation for consensus, prior to implementation of additional remedial measures.

A documented discovery strategy folder should be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious, abnormal, unforeseen or contaminated ground and/or groundwater conditions they may encounter, in keeping with their requirements under H&S and safe working practises.

Depending on the nature, type, and extent of any "discovery," it may be necessary to stop development work in that area until the assessment is complete. This will be evaluated on a case-by-case basis for each "discovery" and in consultation with the client, other technical staff, and regulatory or approval organizations.

As a general guide, where such unexpected conditions are encountered the following approach is required as a minimum:

-  All discoveries are to be reported to the Site Manager immediately and works at that location (which qualify under the above) are to halt until further notice;
-  If any unexpected discoveries are made, the Site Manager must immediately report them to the Client and consult with a consultant, such as Geo-Integrity Ltd. All discoveries must be reported immediately to the Site Manager. Any works being carried out at that location, which fall under the above criteria, should be halted until further notice.

- Following notification of a qualifying discovery from the Site Manager, the relevant parties should be informed and if considered necessary, arrange to meet on site to view the discovery;
- An appointed consultant will visit the site to document the location, extent, and nature of any qualifying discoveries. They will also implement a suitable sampling and analysis plan, taking into consideration the type and nature of the discovery, as well as the known and probable land uses in that particular area of the site.;
- When additional remedial action is necessary, the client should seek regulatory consultation and approval;
- A record will be produced by the appointed consultant and held on site (with copies held by the Consultant, Client and Local Authority/other relevant organisation), detailing the discovery, assessment works undertaken, conclusions, Confirmation should either state no action required or detail remedial action taken and its validation.

Any future works such as the above fall outside the scope of this report, and would necessitate further instruction and fees.

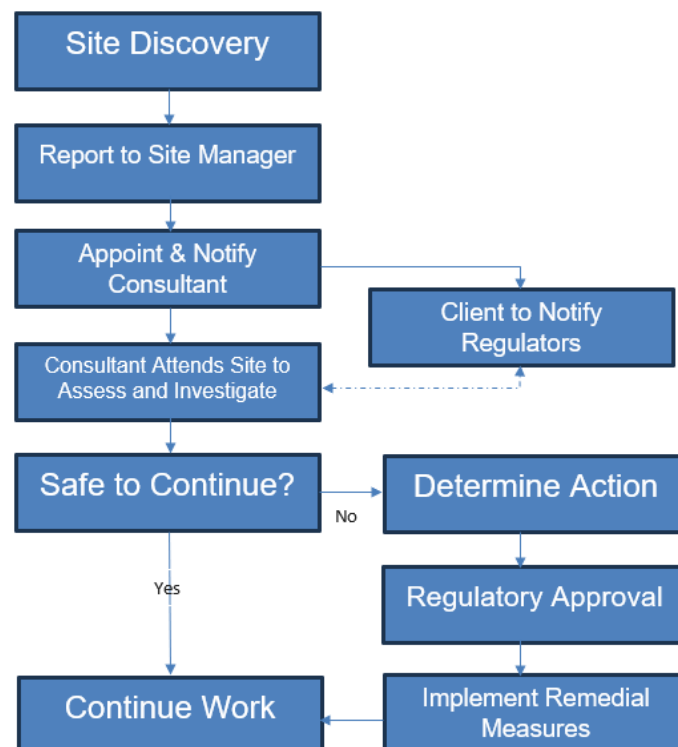


Chart 1 Discovery Strategy Process

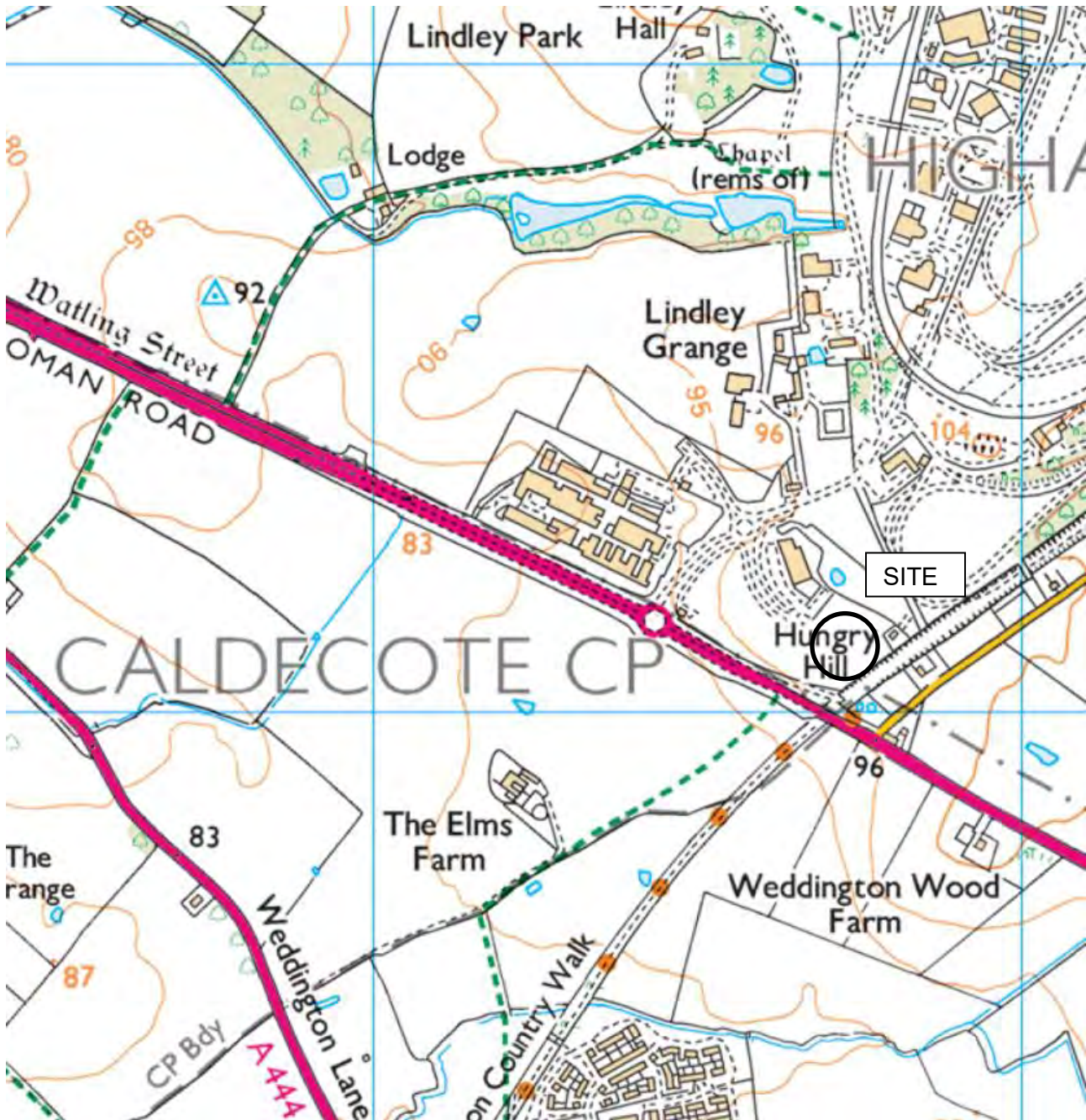
11 RECOMMENDATIONS

We recommend a watching brief should be undertaken during the construction phase, and if during development any previously undiscovered contamination (including visual or olfactory evidence) is found then site management should be immediately informed and inspection by a suitably qualified person should be undertaken.

REFERENCES

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- BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.
- BS EN ISO 14688-2:2004+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution.
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- Environment Agency, “Waste Sampling and Testing for Disposal to Landfill” March 2013
- G Card and S Wilson, An Alternative Approach for Ground Gas Risk Assessment, 2011.

APPENDIX A



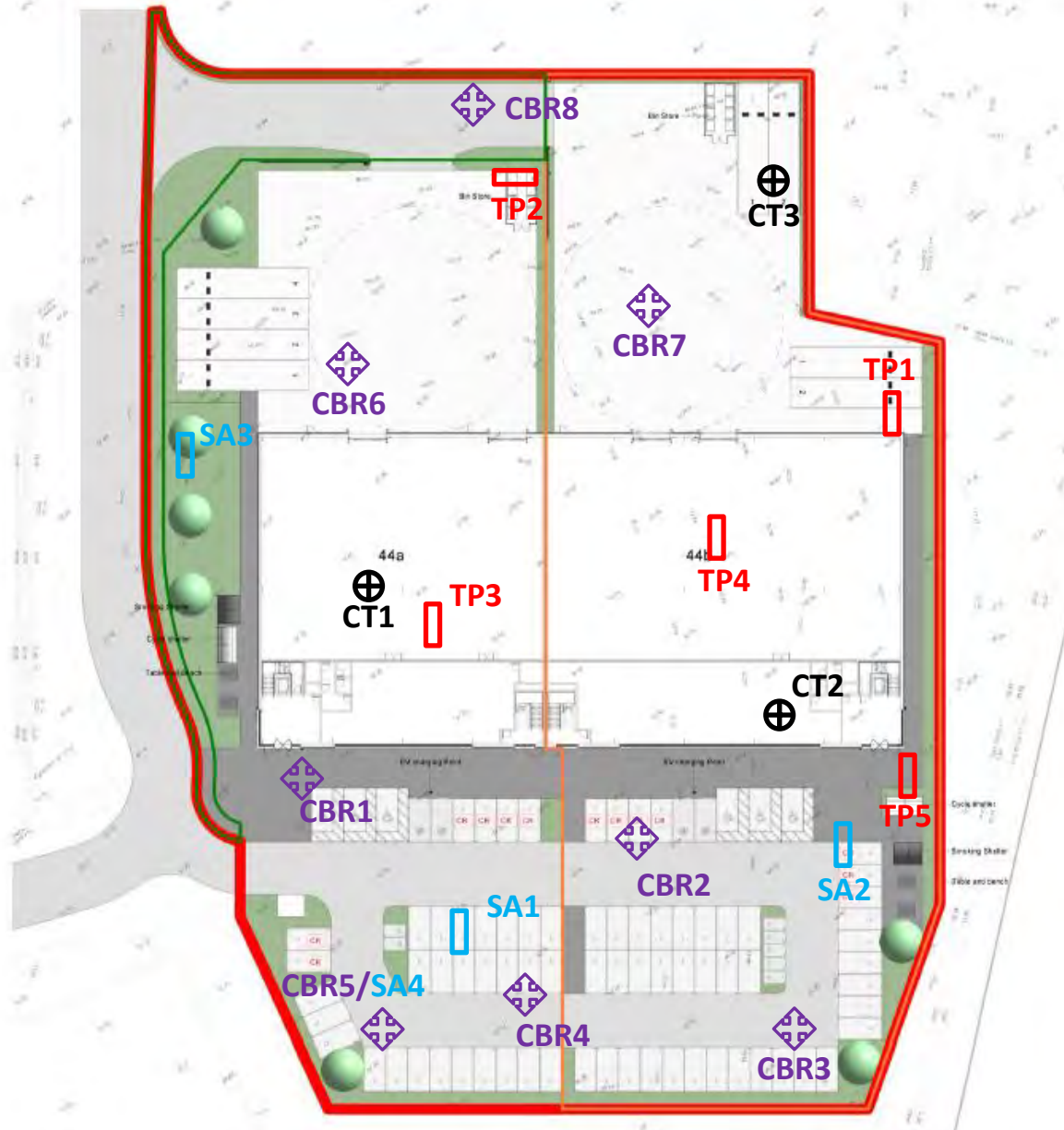
August 2024

SITE LOCATION PLAN

Report No:- 24-06-07



Proposed Base-Build Site Plan



Key

-  Continuous Tube Borehole
-  Trial Pit
-  Soakaway Pit
-  CBR Test



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[www. geo-integrity.co.uk](http://www.geo-integrity.co.uk)

Exploratory Hole Location Plan

SITE:- Mira North Plot 44,
Mira Technology Park,
CT10 0TU

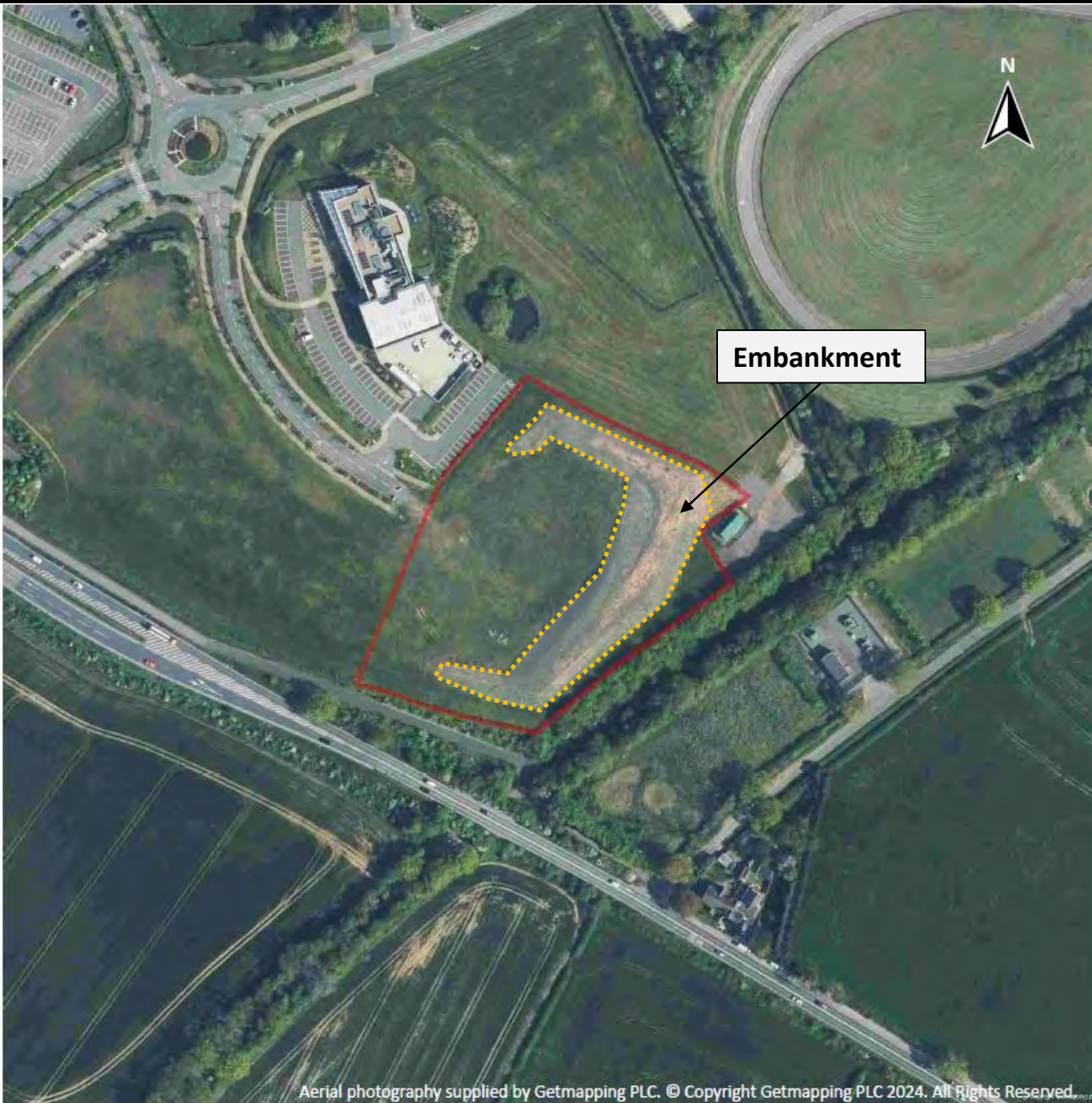
JOB NO.:- 24-06-07

CLIENT:- BCAL

Drawn
HF

Checked
LA

Scale: Not To Scale, for
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Embankment Plan

**SITE:- MIRA North Plot
44**

JOB NO.:- 24-06-07

CLIENT:- MTP Dev Ltd

**Drawn
LA**

**Checked
DL**

**Scale: Not To Scale, for
indicative purposes only**



CBR Testing



CBR Testing

August 2024

SITE PHOTOGRAPHS

24-06-07



Trial Pitting



Trial Pitting

August 2024

SITE PHOTOGRAPHS

24-06-07



Trial Pitting (Embankment)



Trial Pitting (Embankment) note rare anthropogenic material

August 2024

SITE PHOTOGRAPHS

24-06-07



Trial Pitting (Embankment) note rare anthropogenic material



Trial Pitting (Embankment) note unconsolidated material

August 2024

SITE PHOTOGRAPHS

24-06-07



Trial Pitting and Window Sampling



Trial Pitting note siltstone fragments

August 2024

SITE PHOTOGRAPHS

24-06-07



Trial Pitting note refusal on rock quality strata



Window Sampling

August 2024

SITE PHOTOGRAPHS

24-06-07



Window Sampling (embankment)



Infiltration Testing

August 2024

SITE PHOTOGRAPHS

24-06-07



Infiltration Testing



Infiltration Testing

August 2024

SITE PHOTOGRAPHS

24-06-07

APPENDIX B



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Number
CT1

Machine : Window Sampling Rig
Method : Drive-in Windowless
Sampler

Dimensions
87mm to 1.00m 57mm to 3.55m
77mm to 2.00m
67mm to 3.00m

Ground Level (mOD)
97.71

Client
BCAL

Job
Number
24-06-07

Location (Handheld GPS)
436705.908 E 295127.397 N

Dates
28/06/2024

Engineer
Lee Ashworth

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				(0.35)	REWORKED GROUND - Loose dark brown gravelly TOPSOIL with occasional cobbles. Gravel is fine to coarse angular			
0.35	D			97.36	0.35				
					(0.45)	REWORKED GROUND - Firm dark brown sandy slightly gravelly CLAY. Gravel is fine to medium angular			
0.80	D			96.91	0.80				
1.00	PP 150kPa		2,2/3,5,4,3			MERCIA MUDSTONE - Stiff to very stiff red brown CLAY with occasional light grey silt inclusions, and occasional limestone cobbles			
1.00-1.45	SPT N=15								
1.00	D								
1.50	PP 225kPa								
1.50	D								
2.00	PP 250kPa		4,3/4,5,5,6		(2.30)				
2.00-2.45	SPT N=20								
2.00	D								
2.50	PP 250kPa								
2.50	D								
3.00	PP 250kPa		7,7/20,11,11,17	94.61	3.10				
3.00-3.45	SPT N=59				(0.45)	MERCIA MUDSTONE - Weak red brown SILTSTONE			
3.10	D			94.16	3.55				
						No further penetration			
						Complete at 3.55m			

Remarks

Scale
(approx)

1:40

Logged
By

HF

Figure No.

24-06-07.CT1



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Number
CT2

Machine : Window Sampling Rig
Method : Drive-in Windowless
Sampler

Dimensions
87mm to 1.00m
77mm to 2.00m
67mm to 2.60m

Ground Level (mOD)
97.32

Client
BCAL

Job
Number
24-06-07

Location (Handheld GPS)
436717.725 E 295087.142 N

Dates
28/06/2024

Engineer
Lee Ashworth

Sheet
1/1

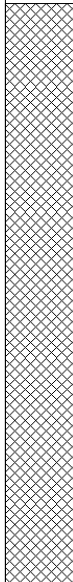
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.30)	REWORKED GROUND - Loose dark brown slightly gravelly TOPSOIL with occasional cobbles. Gravel is fine to coarse angular		
0.30	D			97.02	0.30			
0.50	D				(0.60)	MERCIA MUDSTONE - Stiff red brown very gravelly CLAY. Gravel is fine to medium angular of mudstone		
0.90	D			96.42	0.90			
1.00	PP 250kPa		2,2/4,4,5,7		(0.70)	MERCIA MUDSTONE - Stiff to very stiff red brown CLAY with occasional light grey silt inclusions		
1.00-1.45	SPT N=20							
1.50	PP 250kPa			95.72	1.60			
1.60	D					MERCIA MUDSTONE - Weak red brown and occasional light grey SILTSTONE		
2.00	PP 250kPa		7,7/8,9,9,12		(1.00)			
2.00-2.45	SPT N=38							
2.00	D							
2.60-3.05	SPT N=84		15,14/14,20,50	94.72	2.60	Very little penetration (refused on rock quality strata) Complete at 2.60m		

Remarks

Scale
(approx)
1:40

Logged
By
HF

Figure No.
24-06-07.CT2

				www.geo-integrity.co.uk info@geo-integrity.co.uk 01280 816409		Site Mira North Plot 44, MIRA Technology Park, Nuneaton, CV10 0TU		Number CT3	
Machine : Window Sampling Rig Method : Drive-in Windowless Sampler		Dimensions 87mm to 2.00m 57mm to 5.60m 77mm to 3.00m 67mm to 4.00m		Ground Level (mOD) 100.94		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436770.466 E 295139.672 N		Dates 28/06/2024		Engineer Lee Ashworth		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D	1,0/1,1,1,2				MADE GROUND - Very soft red brown and brown gravelly CLAY. Gravel is fine to medium angular, with mudstone			
0.50	D								
1.00 1.00-1.45 1.00	PP 112.5kPa SPT N=5 D								
1.50 1.50	PP 75kPa D								
2.00 2.00-2.45 2.00	PP 75kPa SPT N=5 D								
2.50 2.50	PP 67.25kPa D	0,1/1,2,1,1							
3.00 3.00-3.45 3.10	PP 25kPa SPT N=6 D								
3.40 3.50	D PP 225kPa								
4.00 4.00-4.45 4.00	PP 250kPa SPT N=26 D	4,4/4,6,7,9							
4.40	D								
5.00-5.45 5.00	SPT N=42 D	6,6/8,8,12,14				MERCIA MUDSTONE - Weak red brown and occasional light grey SILTSTONE			
5.60-6.05	SPT N=50								
						No further penetration (refused on rock quality strata) Complete at 5.60m			
Remarks								Scale (approx)	Logged By
								1:40	HF
								Figure No. 24-06-07.CT3	



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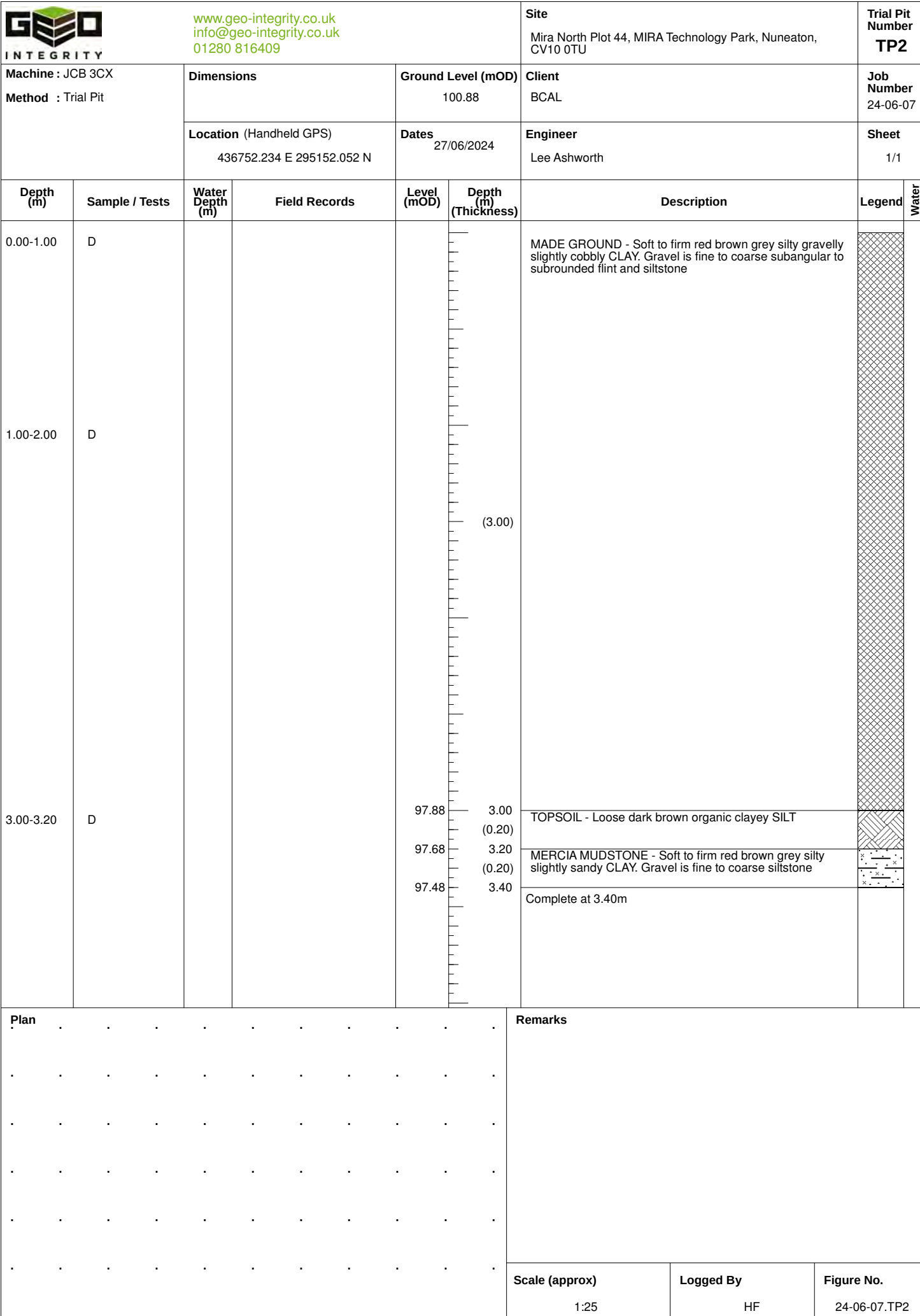
Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
TP1

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 100.62		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436764.349 E 295106.073 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D					MADE GROUND - Loose red brown gravelly SILT		
				100.32	0.30	MADE GROUND - Soft to firm red brown silty slightly gravelly CLAY. Gravel is fine to coarse subrounded flint		
1.00-2.00	D				(1.40)			
				98.92	1.70	MADE GROUND - Soft to firm red brown silty gravelly CLAY. Anthropogenic material - plastic tubes, asphalt, concrete, metal, rebar, brick, ceramic		
2.50	D				(1.60)			
3.00	D							
				97.32	3.30	Complete at 3.30m		

Plan					Remarks			
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					Scale (approx) 1:25		Logged By HF	Figure No. 24-06-07.TP1





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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
TP3

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 97.85		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436701.263 E 295121.138 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D					REWORKED GROUND - Loose light brown slightly clayey gravelly SILT. Gravel is fine to coarse subrounded to subangular		
0.60	D				(1.20)			
				96.65	1.20	MERCIA MUDSTONE - Firm to stiff red brown grey very silty gravelly CLAY. Gravel is medium to coarse subangular siltstone		
					(1.10)			
2.00	D			95.55	2.30	Complete at 2.30m		

Plan					Remarks			
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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
TP4

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 97.83		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436738.631 E 295113.502 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D				(0.95)	REWORKED GROUND Loose brown slightly clayey sandy gravelly SILT. Gravel is fine to coarse subangular flint, glass and ceramic		
1.00	D			96.88	0.95 (1.00)	MERCIA MUDSTONE Stiff red brown grey very silty CLAY with interbedded layers of grey siltstone		
2.00	D			95.88 95.83	1.95 2.00	MERCIA MUDSTONE Weak light grey SILTSTONE Complete at 2.00m		

Plan



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
TP5

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 99.96		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436727.708 E 295066.105 N		Dates 28/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D					MADE GROUND - Soft to firm red brown very silty gravelly CLAY. Gravel is fine to coarse siltstone with cobbles of siltstone		
1.00-2.00	D			99.06	0.90	MADE GROUND - Firm dark brown red grey silty gravelly CLAY. Gravel is siltstone, tarmac, brick, ceramic and wire		
1.80	D				(1.30)	Layer of bituminous material 1.70 - 2.00m		
				97.76	2.20	Concrete obstructions at 2.20m		
					(0.60)	TOPSOIL - Soft dark brown silty organic CLAY		
2.60	D			97.16 97.06	2.80 (0.10) 2.90	MERICA MUDSTONE - Firm to stiff red brown very silty CLAY Complete at 2.90m		

Plan					Remarks			
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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
SA1

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 97.02		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436673.211 E 295104.427 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D			96.77	(0.25) 0.25	REWORKED GROUND - Loose brown clayey slightly gravelly organic SILT. Gravel is fine to coarse subrounded flint		
1.00	D				(1.25)	MERCIA MUDSTONE - Firm to stiff red brown grey very silty slightly gravelly CLAY with horizons of very weak siltstone and rare rounded medium gravel		
				95.52	1.50	Complete at 1.50m		

Plan					Remarks			
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Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

**Trial Pit
Number**
SA2

Method : Trial Pit

96.83

BCAL

**Job
Number**
24-06-07

01/07/2024

Lee Ashworth

Sheet
1/1

436712.48 E 295076.187 N

Water

MERCIA MUDSTONE - Firm to stiff red brown grey very silty, slightly gravelly CLAY with horizons of very weak siltstone and rare rounded medium gravel

Complete at 0.70m

Remarks

Figure No.

24-06-07.SA2



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
SA3

Machine : JCB 3CX Method : Trial Pit		Dimensions	Ground Level (mOD) 97.65	Client BCAL	Job Number 24-06-07
		Location (Handheld GPS) 436702.216 E 295162.979 N	Dates 27/06/2024	Engineer Lee Ashworth	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				97.50	(0.15) 0.15	REWORKED GROUND - Loose dark brown clayey slightly gravelly SILT. Gravel is medium subrounded flint		
					(0.55)	REWORKED GROUND - Soft to firm dark brown very silty slightly gravelly CLAY . Gravel is fine to coarse subangular to subrounded		
				96.95	0.70	MERCIA MUDSTONE - Firm to stiff red brown silty slightly gravelly CLAY Gravel is fine to medium subrounded quartz and siltstone		
				96.65	1.00	MERCIA MUDSTONE Loose red brown slightly clayey silty SAND		
					(0.50)			
				96.15	1.50	MERCIA MUDSTONE - Stiff red brown grey silty slightly gravelly CLAY. Gravel is fine to medium subrounded quartz and siltstone		
				96.05	(0.10) 1.60			
						Complete at 1.60m		

Plan					Remarks			
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					Scale (approx)	Logged By	Figure No.	
					1:25	HF	24-06-07.SA3	

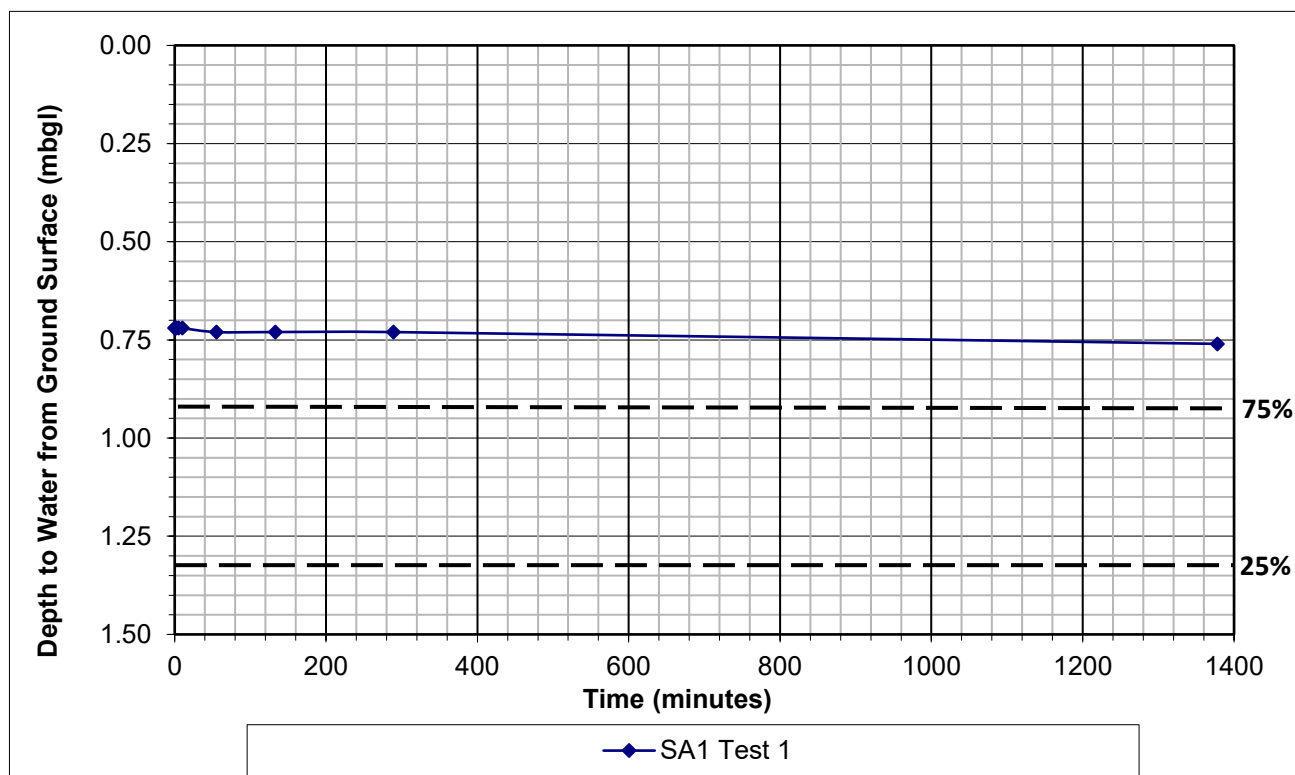
Trial Pit Infiltration Testing
to BRE Digest 365

Client:	BCAL	Report No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date Tested:	27-28/06/24
Dimensions:	0.40m x 1.50m x 1.52m (width x length x depth)	Test Location:	SA1

Test Response Zone Description - : Mercia Mudstone Formation

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.72	289	0.73		
1	0.72	1378	0.76		
2	0.72				
5	0.72				
10	0.72				
55	0.73				
133	0.73				

Unable to calculate Soil Infiltration Rate
Due to insufficient drop in water levels



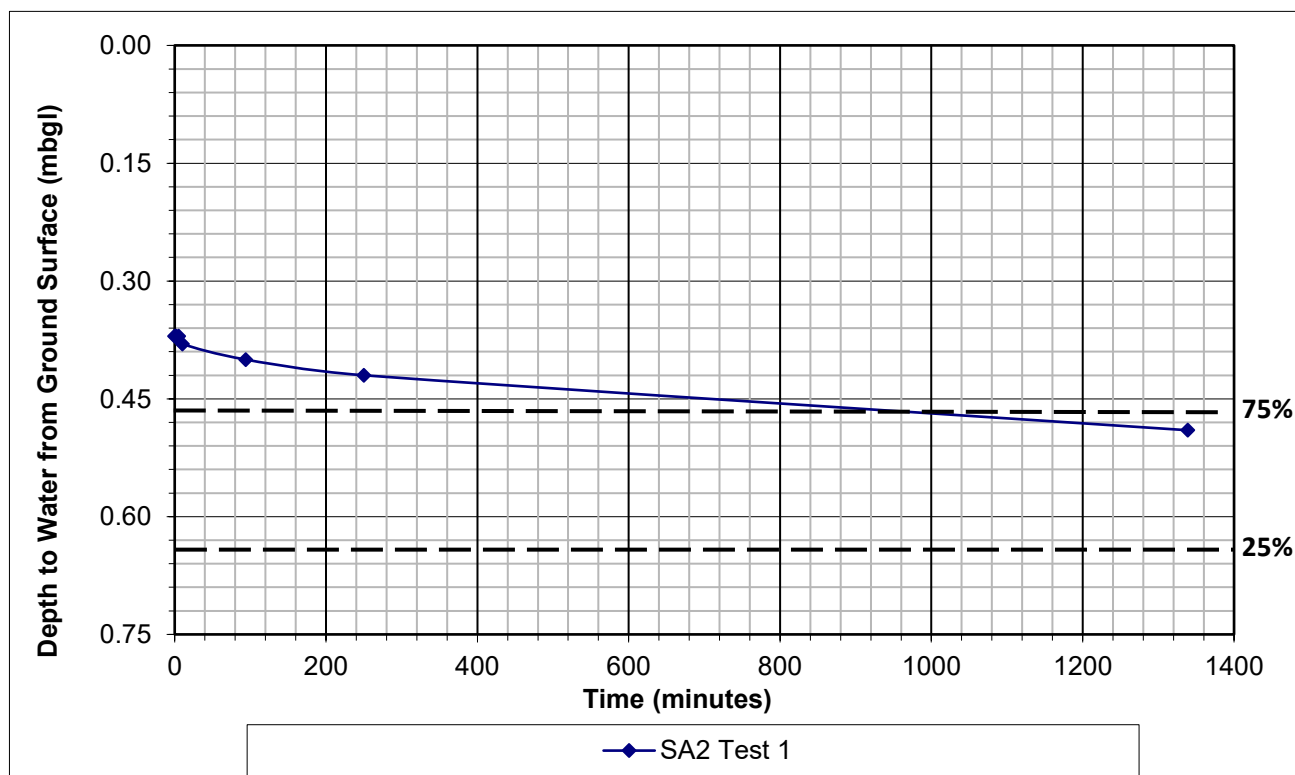
**Trial Pit Infiltration Testing
to BRE Digest 365**

Client:	BCAL	Report No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date Tested:	27-28/06/24
Dimensions:	0.40m x 1.00m x 0.74m (width x length x depth)	Test Location:	SA2

Test Response Zone Description - : Mercia Mudstone Formation

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.37	1339	0.49		
1	0.37				
2	0.37				
5	0.37				
10	0.38				
94	0.40				
250	0.42				

**Unable to calculate Soil Infiltration Rate
Due to insufficient drop in water levels**



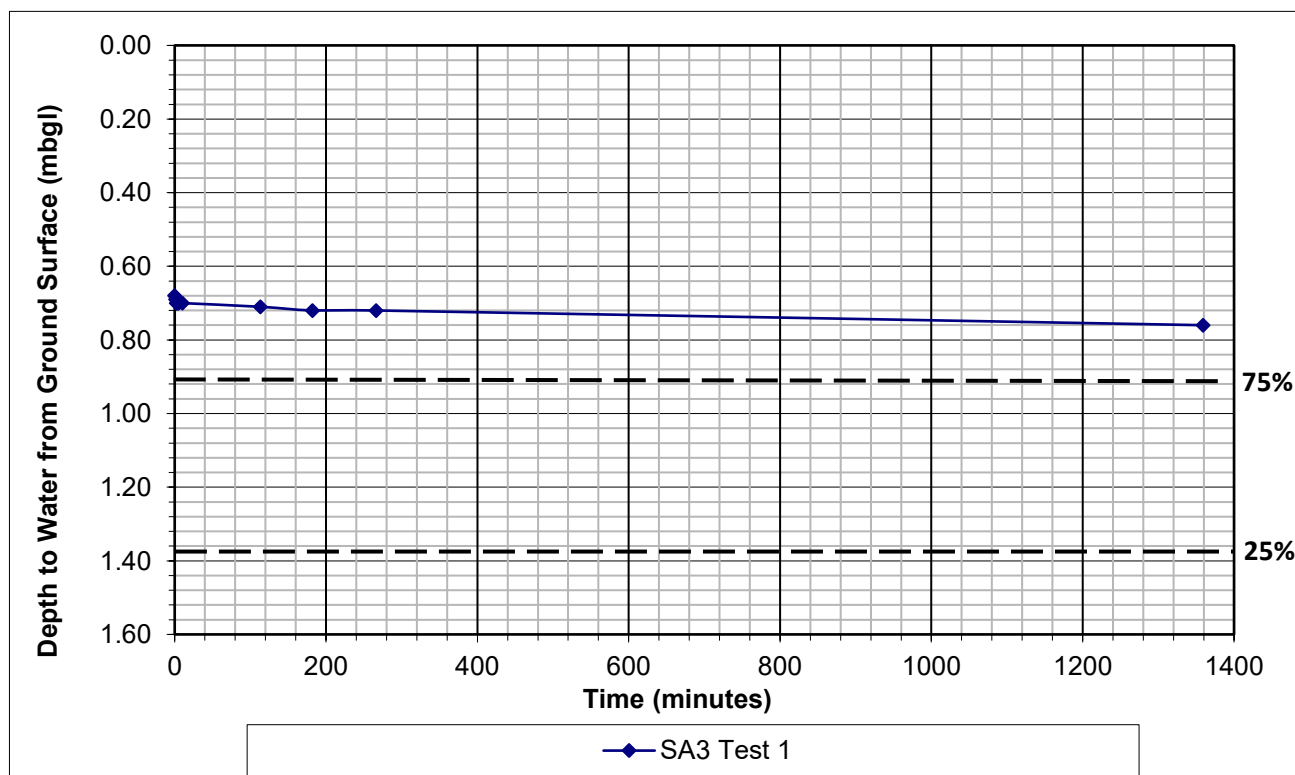
**Trial Pit Infiltration Testing
to BRE Digest 365**

Client:	BCAL	Report No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date Tested:	27-28/06/24
Dimensions:	0.40m x 1.00m x 1.60m (width x length x depth)	Test Location:	SA3

Test Response Zone Description - : Mercia Mudstone Formation

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.68	113	0.71		
1	0.69	182	0.72		
2	0.70	266	0.72		
3	0.70	1359	0.76		
4	0.70				
5	0.70				
10	0.70				

Unable to calculate Soil Infiltration Rate
Due to insufficient drop in water level



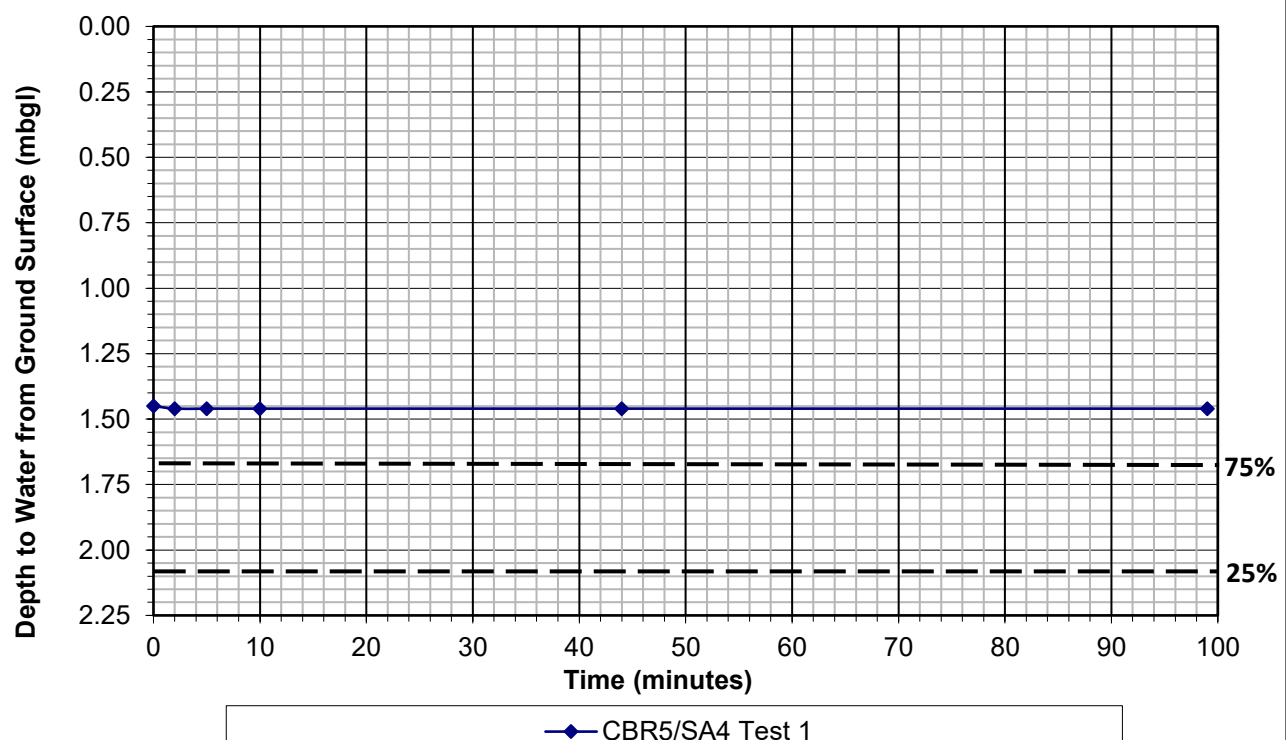
Trial Pit Infiltration Testing
to BRE Digest 365

Client:	BCAL	Report No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date Tested:	28/06/2024
Dimensions:	0.60m x 1.60m x 2.30m (width x length x depth)	Test Location:	CBR5/SA4

Test Response Zone Description - : Mercia Mudstone Formation

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	1.45				
2	1.46				
5	1.46				
10	1.46				
44	1.46				
99	1.46				

Unable to calculate Soil Infiltration Rate
Due to insufficient drop in water level





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Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

**Trial Pit
Number
CBR1**

Method : Trial Pit

Ground Level (mOD)

BCAL

**Job
Number**
24-06-07

Dates

Engineer

Lee Ashworth

Sheet
1/1

Sample / Tests

Field Records

Level
(mOD)

Depth
(m)
(Thickness)

Description

Legend

Water

(0.40)

96.88

0.40

Complete at 0.40m

Remarks

Scale (approx)

1:25

Logged By

HF

Figure No.

24-06-07.CBR1



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
CBR2

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 97.64		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436692.195 E 295097.213 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D				(0.50)	REWORKED GROUND - Loose brown slightly clayey slightly gravelly SILT		
1.00	D			97.14	0.50	MERCIA MUDSTONE - Firm to stiff red brown very silty slightly gravelly CLAY. Gravel is siltstone		
2.00	D				(1.90)			
2.50	D			95.24	2.40	MERCIA MUDSTONE - Weak red grey SILTSTONE in a matrix of red silty clay		
3.00	D			94.69 94.64	2.95 3.00	MERCIA MUDSTONE Weak grey SILTSTONE Complete at 3.00m		

Plan					Remarks			
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					Scale (approx) 1:25		Logged By HF	
							Figure No. 24-06-07.CBR2	



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Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

**Trial Pit
Number
CBR3**

Method : Trial Pit

Ground Level (mOD)

Client

**Job
Number**
24-06-07

Dates

Engineer

Sheet
1/1

Depth
(m)Water
Depth
(m)Level
(mOD)

Depth
(m)
(Thickness)

Legend

Water

0.40

Complete at 0.40m

Remarks

Logged By

1:25

LA

24-06-07.CBR3



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Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

**Trial Pit
Number**
CBR4

Method :

Ground Level (mOD)

97.25

BCAL

Job Number
24-06-07

Dates

27/06/2024

Lee Ashworth

Sheet
1/1

436668.842 E 295093.619 N

Sample / Tests

Field Records

Depth
(m)
(Thickness)

Description

Legend

Water

Complete at 0.40m

96.85

(0.40)

0.40

Remarks

Scale (approx)

1:25

Logged By

LA

Figure No.

24-06-07.CBR4



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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton,
CV10 0TU

Trial Pit
Number
CBR5/SA4

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 97.21		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436661.909 E 295111.919 N		Dates 28/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	D				(0.50)	REWORKED GROUND - Loose brown slightly clayey SILT. Gravel is coarse rounded flint		
				96.71	0.50	MERCIA MUDSTONE - Firm to stiff very silty red brown slightly gravelly CLAY		
1.00	D				(1.20)			
				95.51	1.70	MERCIA MUDSTONE Weak red brown siltstone in a matrix of CLAY		
2.00	D				(0.60)			
				94.91	2.30	Complete at 2.30m		

Plan					Remarks			
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					Scale (approx) 1:25		Logged By HF	Figure No. 24-06-07.CBR5/SA4



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Site
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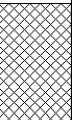
Trial Pit
Number
CBR6

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 98.04		Client BCAL		Job Number 24-06-07	
		Location (Handheld GPS) 436720.391 E 295151.699 N		Dates 27/06/2024		Engineer Lee Ashworth		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	D				(0.85)	REWORKED GROUND - Loose light brown slightly clayey very silty GRAVEL. Gravel is siltstone, brick and glass		
1.00	D			97.19	0.85	MERCIA MUDSTONE - Firm to stiff red brown grey very silty slightly gravelly CLAY. Gravel is grey siltstone		
2.00	D				(1.45)			
2.50	D			95.74	2.30	MERCIA MUDSTONE Weathered mudstone/siltstone encountered with loose red brown grey coarse subangular siltstone in a red brown silty clayey matrix		
2.80	D			95.04	3.00	Refused on grey siltstone		
						Complete at 3.00m		

Plan					Remarks			
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					Scale (approx) 1:25		Logged By HF	
							Figure No. 24-06-07.CBR6	



Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				97.64	0.40	REWORKED GROUND - Loose brown slightly clayey SILT. Gravel is coarse rounded flint		
						Complete at 0.40m		

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Site
Mira North Plot 44, MIRA Technology Park, Nuneaton, CV10 0TU

Trial Pit Number
CBR8

Machine : JCB 3CX
Method : Trial Pit

Dimensions

Ground Level (mOD)
98.09

Client
BCAL

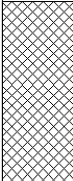
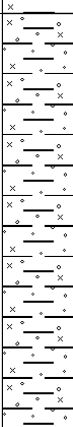
Job Number
24-06-07

Location (Handheld GPS)
436754.06 E 295162.579 N

Dates
27/06/2024

Engineer
Lee Ashworth

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D			97.49	0.60	REWORKED GROUND - Loose brown clayey slightly gravelly SILT. Gravel is fine to coarse subrounded		
1.00	D			96.69	1.40	MERCIA MUDSTONE - Firm red brown mottled grey very silty slightly gravelly CLAY. Gravel is fine to medium siltstone		
1.50	D			96.49	1.60	MERCIA MUDSTONE - Firm red brown very silty CLAY with thin beds of weak grey siltstone		
2.00	D				(1.40)	MERCIA MUDSTONE - Red brown siltstone and grey siltstone gravel in a matrix of loose/firm red brown silt and clay		
3.00	D			95.09	3.00	Complete at 3.00m		

Plan

Remarks

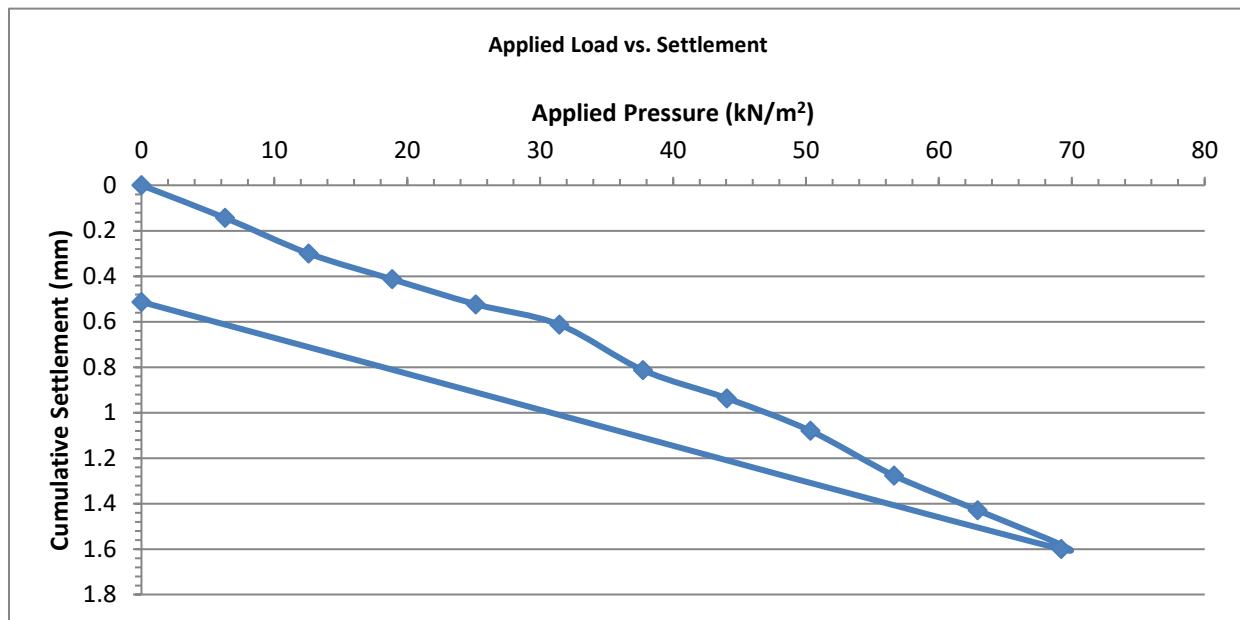
Scale (approx)
1:25

Logged By
HF

Figure No.
24-06-07.CBR8

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.4 m	TP No:	CBR1
Plate Size (m):	0.45 m		

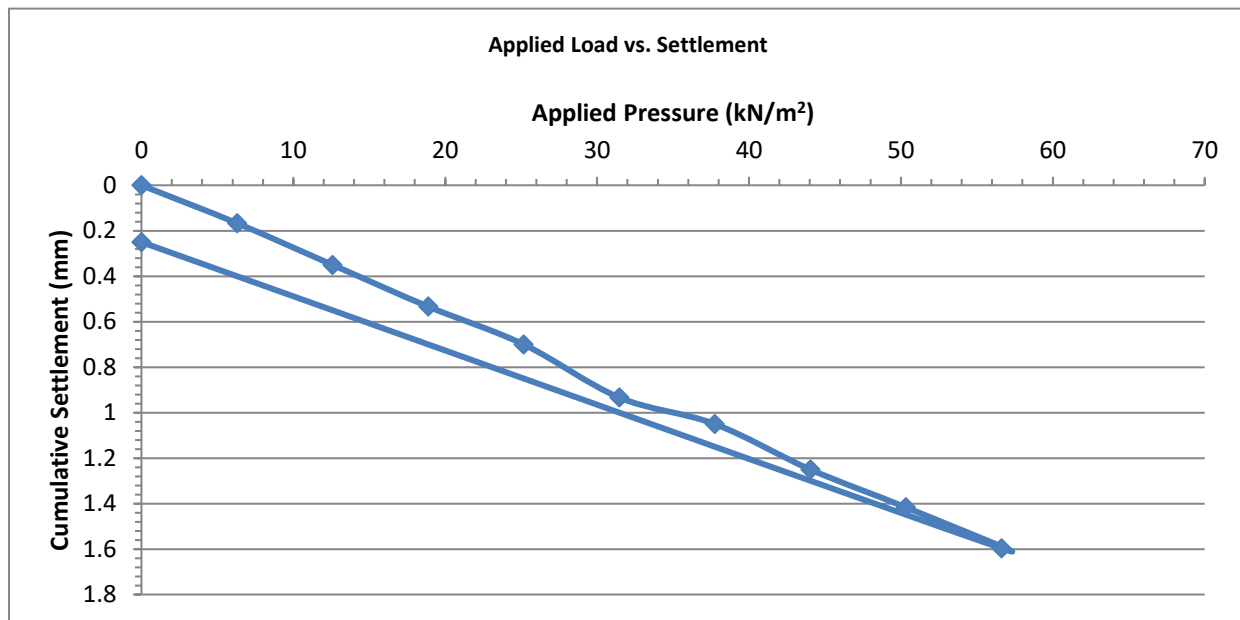


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
1	6	0.14
2	13	0.30
3	19	0.41
4	25	0.52
5	31	0.61
6	38	0.81
7	44	0.94
8	50	1.08
9	57	1.28
10	63	1.43
11	69	1.60
0	0	0.51
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
57 kN/m ²
Pressure at 1.25mm (kN/m ²)
56 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
27.91 MN/m ² /m
Equivalent CBR Value (%)
3.09 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.45 m	TP No:	CBR2
Plate Size (m):	0.45 m		

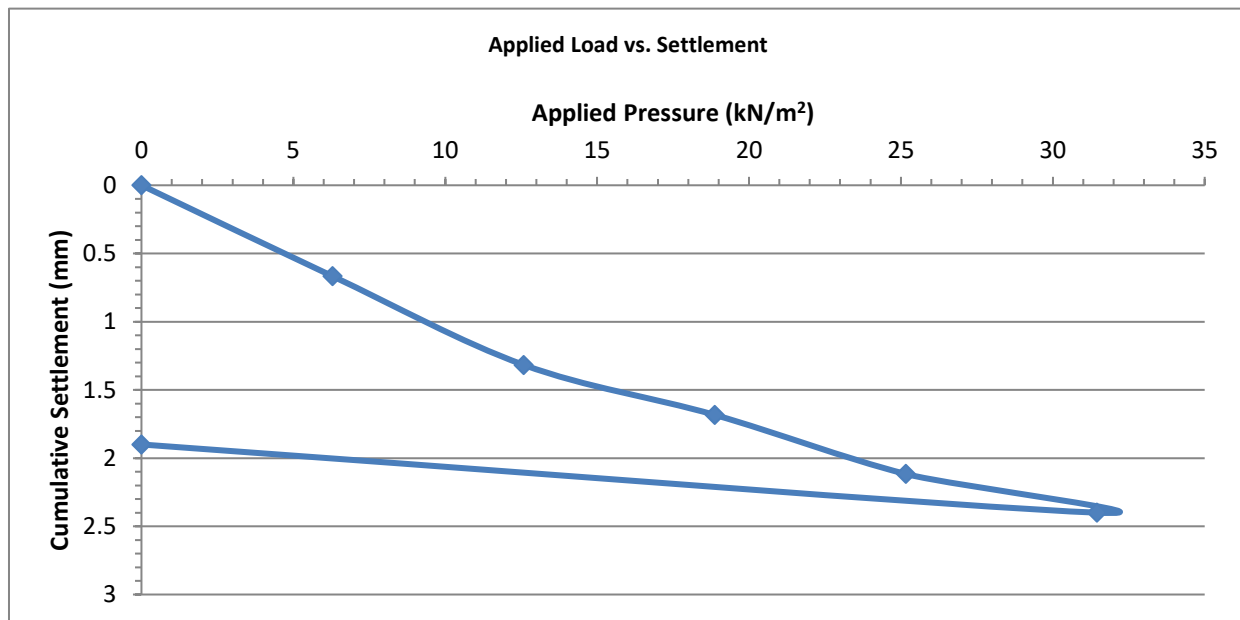


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
1	6	0.17
2	13	0.35
3	19	0.53
4	25	0.70
5	31	0.93
6	38	1.05
7	44	1.25
8	50	1.42
9	57	1.60
0	0	0.25

Seating Pressure for 1.5mm initial settlement
19 kN/m ²
Pressure at 1.25mm (kN/m ²)
44 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
21.93 MN/m ² /m
Equivalent CBR Value (%)
2.03 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.4 m	TP No:	CBR3
Plate Size (m):	0.45 m		

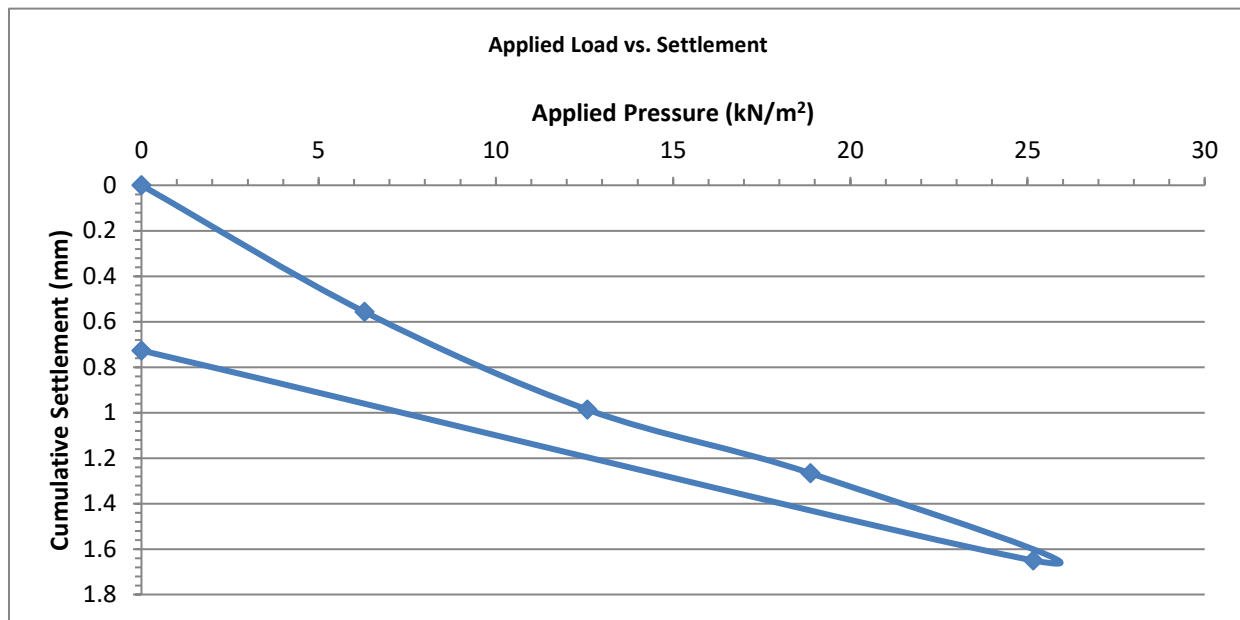


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
1	6	0.67
2	13	1.32
3	19	1.68
4	25	2.12
5	31	2.40
0	0	1.90
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
6 kN/m ²
Pressure at 1.25mm (kN/m ²)
12 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
5.98 MN/m ² /m
Equivalent CBR Value (%)
0.21 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.35 m	TP No:	CBR4
Plate Size (m):	0.45 m		

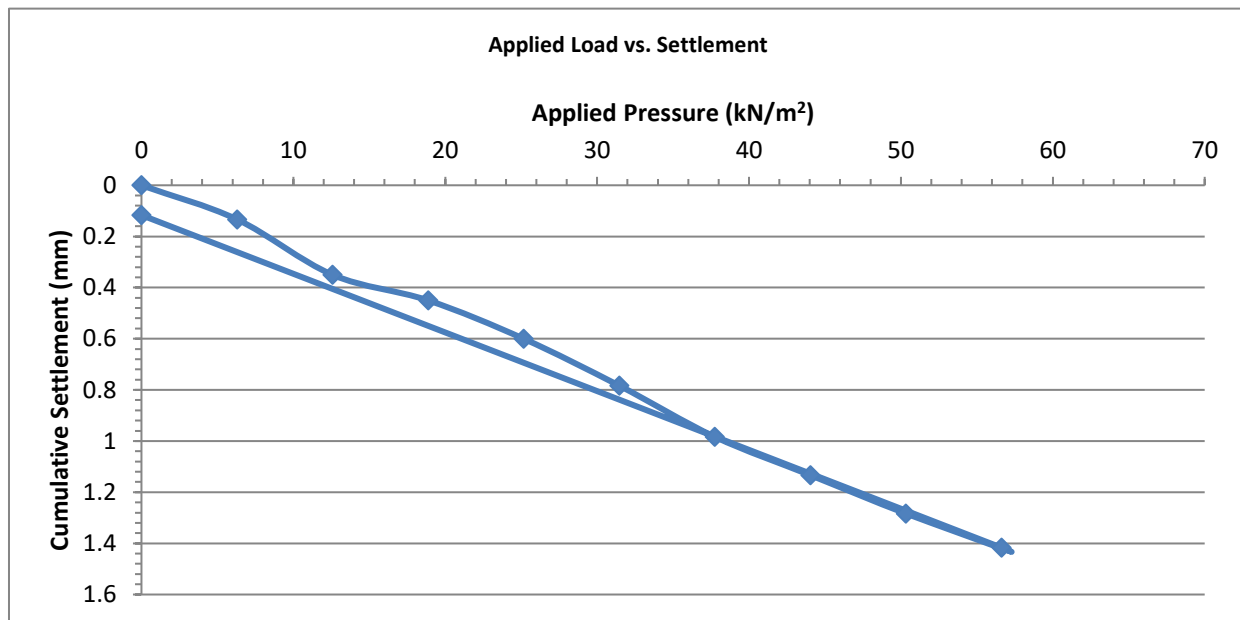


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
1	6	0.56
2	13	0.99
3	19	1.27
4	25	1.65
0	0	0.73
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
6 kN/m ²
Pressure at 1.25mm (kN/m ²)
18 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
8.97 MN/m ² /m
Equivalent CBR Value (%)
0.43 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.4 m	TP No:	CBR5
Plate Size (m):	0.45 m		

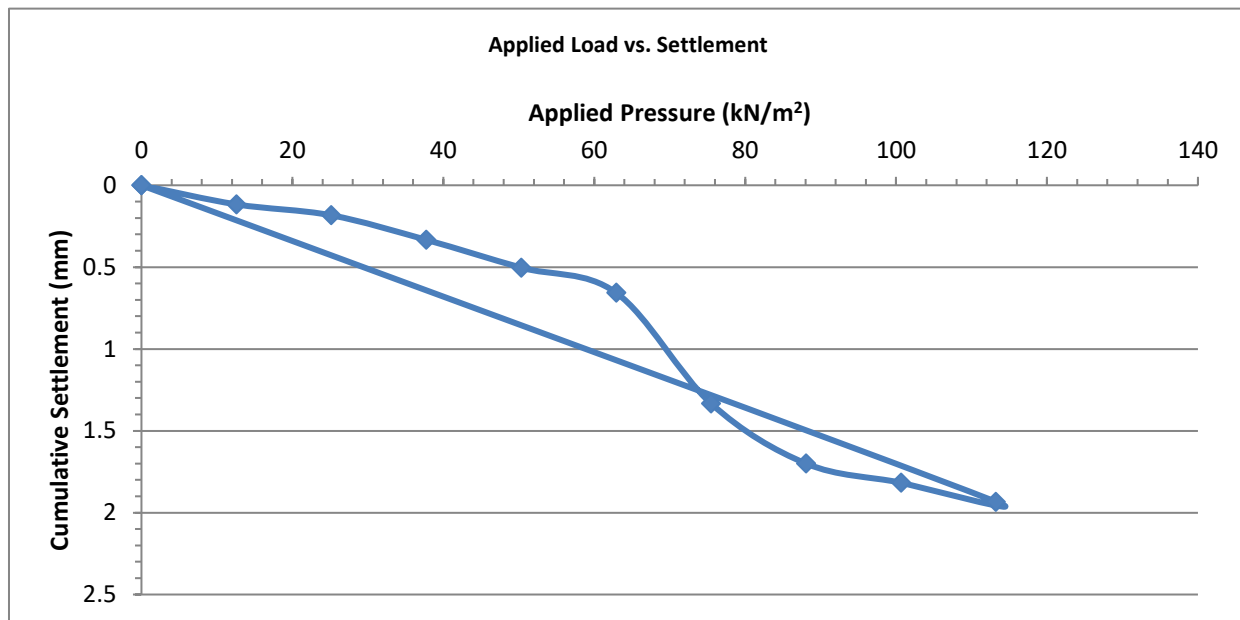


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
1	6	0.13
2	13	0.35
3	19	0.45
4	25	0.60
5	31	0.78
6	38	0.98
7	44	1.13
8	50	1.28
9	57	1.42
0	0	0.12
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
25 kN/m ²
Pressure at 1.25mm (kN/m ²)
49 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
24.42 MN/m ² /m
Equivalent CBR Value (%)
2.45 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.4 m	TP No:	CBR6
Plate Size (m):	0.45 m		

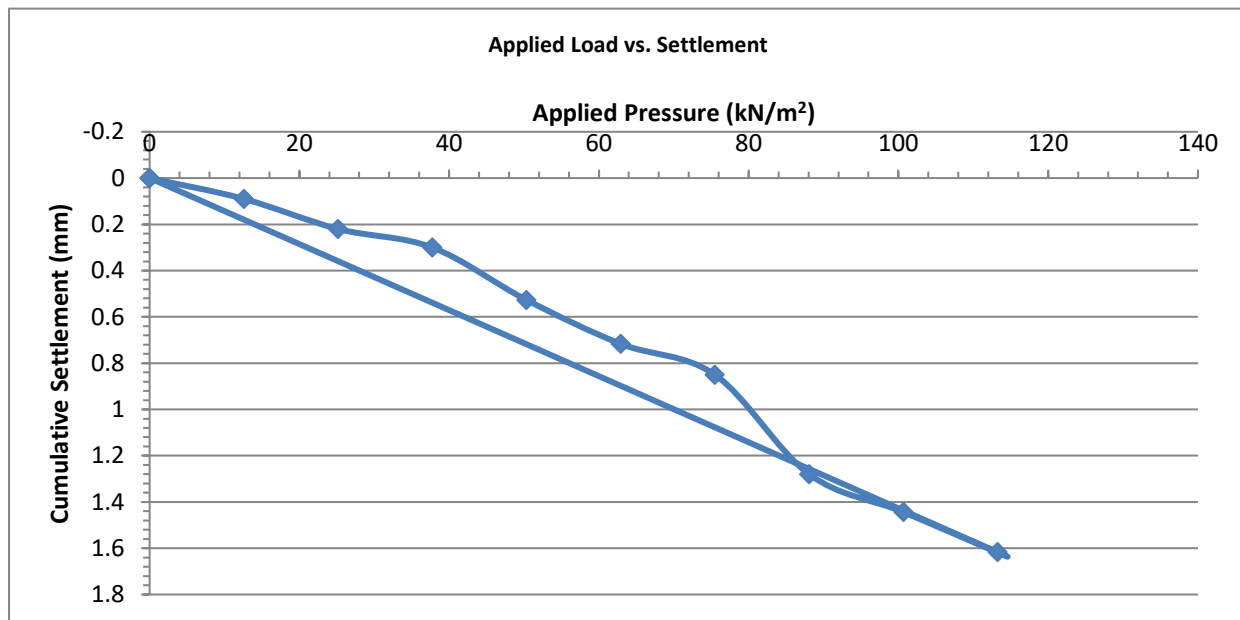


Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
2	13	0.12
4	25	0.18
6	38	0.33
8	50	0.50
10	63	0.66
12	75	1.33
14	88	1.70
16	101	1.82
18	113	1.93
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
88 kN/m ²
Pressure at 1.25mm (kN/m ²)
72 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
35.89 MN/m ² /m
Equivalent CBR Value (%)
4.78 %

Calculation of Modulus of Sub-Grade Reaction and CBR from Plate Bearing Test

Client:	BCAL	Job No:	24-06-07
Site:	Mira North Plot 44, CV10 0TU	Date:	27-28/06/24
Depth (bgl):	0.4 m	TP No:	CBR7
Plate Size (m):	0.45 m		



Applied Load (kN)	Applied Pressure (kN/m ²)	Average Settlement (mm)
0	0	0.00
2	13	0.09
4	25	0.22
6	38	0.30
8	50	0.53
10	63	0.72
12	75	0.85
14	88	1.28
16	101	1.44
18	113	1.62
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00
0	0	0.00

Seating Pressure for 1.5mm initial settlement
69 kN/m ²
Pressure at 1.25mm (kN/m ²)
86 kN/m ²
Modulus of Subgrade Reaction (kN/m/m ²)
42.87 MN/m ² /m
Equivalent CBR Value (%)
6.50 %