

Phase I - II Geo-Environmental Site Assessment

Land at Letchmere Farm, Camp Road, Upper Heyford, OX25 5LS

Prepared for: David Wilson Homes

January 2022

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Quality Assurance

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		Januar	y 2022			
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Air Quality

	Executive Summary
Site Address	Land at Letchmere Farm, Camp Road, Upper Heyford, OX25 5HA
National Grid Reference	451945 225926
Site Area	Phase 1 area – 3.12 ha Phase 2 area – 1.09 ha
Current Site Use	The area of investigation is located north of Camp Road in Upper Heyford, just south of Letchmere Farm. The Phase 1 area of site comprised a roughly rectangular area of open scrubland and was bounded on its southern and western extents by access roads. It bounded the Phase 2 area to the north via a wooden fence whilst the eastern boundary consisted of a hedgerow with some trees. At the time of the site investigation, two areas where bonfires had been lit were present on the site. The Phase 2 area was situated immediately north of the Phase 1 area and comprised of open horse fields. It was split into two areas bounded by wooden fences. It's northern and southern extents were bounded by wooden fences, whilst the sites eastern extent was bounded by a hedgerow and trees. It's western extent was bounded by Trenchard
Site History	Circle, an access road to Letchmere Farm. Both the Phase 1 and Phase 2 areas of site have been open fields/agricultural use since the date of earliest mapping (1875-1880). Leys Farm, now Letchmere Farm, has been present north of the site since at least 1875 and extensive development within 250m of the site area occurred from 1965 onwards. An airfield is located within 250m of the site and has been since approximately 1954
Geology & Hydrogeology	British Geological Survey Map Sheet 218 (Chipping Norton, Solid and Drift Edition at a scale of 1:63,360, 1968) indicates that the site is underlain by the White Limestone Formation of the Great Oolite Group. Superficial deposits are absent on the site. The White Limestone Formation is classified as a Principal Aquifer with a high vulnerability.
Hydrology & Flooding	The site is not located within a Source Protection Zone (SPZ) and no surface water, potable water or groundwater abstraction licences are present within 250m of the site area. Based on local topography and the location of surface watercourses, any shallow groundwater present will likely flow towards Gallos Brook to the east.
Landfill Sites & Ground Gases	The Groundsure report did not identify any historic landfill or waste treatment sites within 250m of the Phase 2 area. The Groundsure report did not identify any waste exemptions within 250m of the Phase 2 area.
Radon	The Phase 2 area lies within an area where between 1% and 3% of the properties are above the Action Level. At these levels BRE publication BR211 indicates that no special radon protective measures are required in the construction of new extensions or dwellings.



Geo-environmental





Air Quality

Revised Conceptual Site Model

Elevated concentrations of PAH are considered likely to be present within two areas of burning (Figure 5) in the Phase 1 area (Photograph 4 and 5), which are considered to have the potential to present a significant risk to future site users and therefore limited localised remedial works, comprising the removal and off-site disposal of topsoil, will be required in these areas.

Concrete Classification

Soils encountered beneath the Phase 2 area of site have been classified as DS-1, Aggressive Chemical environment for Concrete Classification (ACEC) AC1-s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

Ground Gas Classification

Three rounds of gas monitoring have been undertaken across both the Phase 1 and Phase 2 areas of site.

According to CIRIA publication C665, the Phase 1 and Phase 2 areas of site are classified as Green under the NHBC Traffic Light System. Green indicates a negligible ground gas regime, for which no special gas protection measures are required in the construction of new dwellings or extensions.

According to BS 8485:2015+A1(2019), the site is classified as a Characteristic Situation 1 (CS1); a very low hazard potential. In CS1, neither Type A nor Type B buildings, both of which are included within the proposed development, require special ground protection gas measures.

Permeability Testing

T&P conducted six (6no.) infiltration tests in the Phase 1 area of the site, of which 4no locations were in accordance with BRE 365, yielding infiltration rates of 4.10×10^{-6} m/s to 4.12×10^{-4} m/s indicating low to medium permeability with good drainage conditions. T&P avoided the eastern part of the site due to shallow groundwater.

Four (4no.) soil infiltration tests were undertaken within the Phase 2 area consisting of TP102 (SA), SA102, SA103 and TP103. TP102 (SA) and SA103 were unsuccessful due to the effective storage depth intercepts were not reached within a 24-hour period, whilst SA102 and TP103 were considered successful. The soil infiltration rates calculated for TP103 (design value of 3.62×10^{-6}) and TP103 (design value of 1.30×10^{-5}) are indicative of low permeability with good to poor drainage conditions.

Consideration should be given to shallow groundwater encountered on the eastern side of both the Phase 1 and Phase 2 areas, SA101 and SA104 were unable to be tested due to high groundwater encountered on excavation. This may have implication on the viability of soakaway features within the current proposed drainage strategy (Infrastruct CS Ltd Reports reference: 4388-LETCH-ICS-002-RP-C-07.003 dated October 2021, and 4388-LETCH-ICS-XX-RP-C-07.001 dated July 2021).

Geotechnical Assessment

The site should be cleared of any vegetation below the areas of proposed development and stripped in accordance with Series 200 of Specification of Highway Works.

Neither Topsoil nor Made Ground would be considered to form a suitable founding stratum, due to their characteristic variabilities and associated potential for differential settlement. As such, it is recommended that loads are transferred through the Made Ground and/or Topsoil to a depth at which competent bedrock sufficient to support the proposed load, is encountered.

It is considered appropriate for low-rise housing to be founded at a minimum 1.00m bgl within high volume change soils in the southwest of Phase 1 and the west of Phase 2, and a minimum of 0.75m bgl within low volume change soils across the remainder of the site. Firm to stiff clays of the White Limestone Formation provide bearing capacities of 100-200kN/m², whereas granular deposits and weathered bedrock limestone provide bearing capacities of 500-800kN/m².

If bearing capacities prove insufficient for the proposed scheme, alternative foundation solutions, such as a piled foundation solution may be suitable for the site. However, further ground investigation works would be required in order to prove competency of the encountered White Limestone Formation to a sufficient depth below building footprints.

It is considered that ground floor slabs are not suitable for adoption and therefore a suspended floor slab should be adopted in accordance with NHBC Chapter 5.2 to mitigate against the effects of differential settlement.

Recommendations

Environmental

Areas of burning were noted within the Phase 1 area being covered by the previous T&P report (ref: 2019Mar_CAM2362_DSGI dated March 2019) and were identified in the current phase of ground investigation.

It is recommended that a localised excavation via a surface scrape is undertaken in the immediate areas of burning and disposed of as hazardous waste to an appropriately licensed waste disposal facility. Upon removal of the impacted material, it is recommended that validation works are undertaken to confirm that the associated concentrations have been removed successfully.

If during the development stage any evidence of contamination is identified, works should be halted, and contact made with a suitably qualified Environmental Consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the regulator to achieve sign off of the works.

Geotechnical

Whilst no visual evidence of solution features were identified within the intrusive investigation works from the borehole logs and trail pit logs, should visual signs of solution features be identified in the earthworks and construction phases, such as foundation excavation, contact with a Geotechnical Engineer should be made and further assessment should be undertaken.

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7.

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1 INTRODUCTION

1.1 Background

Omnia have been commissioned by David Wilson Homes Southern to undertake a Phase I-II Geo-Environmental Site Assessment within the Phase 2 area of their proposed residential development at the site of Land at Letchmere Farm, Camp Road, Upper Heyford, Oxfordshire, OX25 5LS. In addition to this, supplementary investigative works were also undertaken in the Phase 1 area to fill in data gaps from previous ground investigation works undertaken by others. A site location plan is presented as Figure 1.0 within Appendix III.

1.2 Proposed Development

It is understood that the proposed development comprises developing the site from existing agricultural fields to one hundred and twenty-two (122no.) residential dwellings comprising a mixture of terraced, semi-detached and detached housing as well as two (2no.) blocks of flats with parking, associated infrastructure, public open space and swales. The development will be split into two phases, Phase 1, the southern field, comprising eighty-nine (89no.) units and Phase 2, the northern fields, comprising thirty-three (33no.) units.

The outline proposed site layout is presented as Figure 2.0 in Appendix III.

1.3 Objectives

The objectives of the Phase I-II Geo-Environmental Site Assessment are to:

- Undertake a site walkover and inspection, including interviews with site representatives if available;
- Review historical plans, site investigations, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available in order to complete a Desk Study in line with the Environment Agency (EA) document Land Contamination Risk Management (LCRM);
- Undertake an assessment of the near surface through intrusive site investigation;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and,
- Provide a factual and interpretative report relating to the site and provide recommendations on any potential development issues with consideration of residential and environmental receptors.

1.4 Sources of Information

Background information was sought from the following sources:

- Groundsure Environmental Database Search (GS-8391755);
- Historical Ordnance Survey Mapping (1875 2021) (GS-8391754);
- The British Geological Survey (BGS) map for the site (Chipping Norton, Sheet 218, Solid and Drift Edition at a scale of 1: 50,000, 1968);

- Environment Agency flood designations, aquifer designations and groundwater source protection zones (https://magic.defra.gov.uk/MagicMap.aspx);
- Zetica UXO Risk Maps (https://zeticauxo.com/downloads-and-resources/risk-maps);
- British Standard BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites Code of Practice;
- British Standard BS5930:2015+A1:2020 Code of Practice for Ground Investigations;
- British Standard BS1377-9:1990 Incorporating Amendment No. 1 Methods of Test for Soils for Civil Engineering Purposes Part 9: In-situ Tests;
- British Standard BS8485:2015+A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings;
- CIRIA Publication C665 (2007). Assessing Risks Posed by Hazardous Ground Gases to Buildings;
- BRE DG365 (2016). Soakaway Design;
- BRE Special Digest 1 (2005). Concrete in Aggressive Ground;
- Tomlinson, M.J. (2001). Foundation Design and Construction. 7th Edition. Pearson Prentice;
- NHBC Standards (2019). Chapter 4.2 Building Near Trees (2020); and,
- British Standard BS8004:2015 Code of Practice for Foundations.

1.5 Limitations

The limitations of this report are presented in Appendix I.

1.6 Confidentiality

Omnia has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Omnia; a charge may be levied against such approval.

2 SITE SETTING

2.1 Site Details

Table 2-1 Site Details

Site Address	Land at Letchmere Farm, Camp Road, Upper Heyford, OX25 5LS
National Grid Reference	451945 225926
	Phase 1 area – 3.12 ha
Site Area	Phase 2 area – 1.09 ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan is presented as Figure 1.0 (Appendix III).

2.2 Current Site Use

2.2.1 Site Description

The area of investigation was located on land at Letchmere Farm to the east of a former military base in Upper Heyford, 5km northwest of Bicester village, Oxfordshire. The area of investigation comprised three open fields segregated by wooden fencing. Access to the site area was obtained via Trenchard Circle located west of the site and joined Camp Road to the south.

The site area was separated into two Phases; Phase 1 and Phase 2. At the time of the investigation the Phase 1 area comprised a roughly rectangular field narrowing towards the south, approximately 3.12ha. The Phase 2 area comprised a roughly rectangular field, immediately north of the Phase 1 area, with its long axis orientated east to west, approximately 1.09ha in area. There was a gentle fall in level in a southeast direction across the phases. With reference to OS mapping elevations were approximately 120m AOD in the northwest to 115m AOD in the southeast. The topography of the Phase 2 area was generally flat lying with the east of the site, gently sloping towards the east to southeast. With reference to OS mapping elevations were approximately from 119m AOD in the west to 116m AOD in the southeast.

At the time of the site walkover the Phase 2 area comprised open horse fields separated into two areas by wooden fencing and a 5-bar gate. Both areas are roughly rectangular; the western area was approximately 22x55m and the eastern area was approximately 22x130m. Access to the Phase 2 area was gained from the west from Trenchard Circle via a wooden gate. Access between the western and eastern areas of site was also obtained via a wooden 5-bar gate. The site area comprised an open field used for grazing livestock. To the north, west and south the site area was bounded by wooden fencing, whilst the east of the site was bounded by an approximately 3m high hedgerow. A concrete roller was located on the boundary between the western and eastern areas of the site, shown in Photograph 3.

Mature deciduous trees (up to approximately 10m in height) were located west of Trenchard Circle. Mature 10-15m tall trees were located on the eastern boundary of the site noted to be oak trees and dense hedgerows, shown in Photograph 2. Smaller (up to 10m tall) deciduous tree saplings were located within the hedgerow to the east of the site area.

The Phase 1 area was located directly south of the Phase 2 area, separated by a wooden fence and comprised of open scrubby grassland. It was broadly rectangular in shape with eastern boundary narrowing towards the south. It was bound on its eastern edge by an approximately 3m high hedgerow

and some smaller (up to 5m) deciduous trees. The western boundary was bound by Trenchard Circle with a housing development immediately beyond, the southern boundary was bound by an access track orientate east to west to agricultural fields and Letchmere Farm.

An area of burnt ground was noted to the northeast of the Phase 1 area, evidence of a bonfire. Burnt wood and tree branches were noted in the area. This is shown in Photograph 4.

A watercourse was noted to run along the eastern boundary of the Phase 1 and 2 areas in a north-west to south-east direction.

A selection of site photographs from the site walk-over survey are located in Appendix IV.

2.2.2 Hazardous Materials Storage

No hazardous materials storage was noted during the site walkover.

2.2.3 Potential Asbestos Containing Material (PACM)

No potentially asbestos containing materials were noted during the site walkover.

2.2.4 Waste Storage

No waste storage was noted during the site walkover.

2.2.5 Tree Species

Mature deciduous trees (up to approximately 10m in height) trees were located west of Trenchard Circle, though due to the time of year species were not identifiable. One mature 10-15m tall tree was located on the eastern boundary of the Phase 2 area and was likely to be an oak tree. Some smaller (up to 10m tall) trees deciduous trees were located within the hedgerow to the east of the Phase 1 area.

2.2.6 Potential Invasive Species

No obvious signs of potential invasive species were noted during the site walkover. However, it should be noted that the site walkover took place during the winter months.

2.3 Surrounding Area

The surrounding land uses are summarised in Table 2-2 below:

Table 2-2 Land Use

Direction	Land Use
North	Agricultural land with Letchmere Farm beyond.
East	Stream with agricultural land beyond.
South	Camp Road with residential dwellings beyond.
West	An active construction site and residential housing beyond.

3 SITE HISTORY

3.1 Site History

This review of historical land uses applies to the Phase 2 area only as the Phase 1 area is covered by T&P's 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI).

A review of historical land use pertinent to the Phase 2 area and within a 250m radius is summarised in Table 3-1.

Man Edition	Historical Land Use						
	On Site	Off Site					
1875-1880 (1:10,560)	Open space, with additional fields to the east, south and west.	Forested areas bordering the east side and continuing to the north. Gorse Covert 100m west extending to 375m east. Quarry 240m southeast North Leys Farm 250m north.					
1881 (1:2,500, 1:10,560)	No significant changes noted.	Quarry 145m west and 237m southeast.					
1898 (1:10,560)	No significant changes noted.	Pond 175m north.					
1900 (1:2,500)	No significant changes noted.	No significant changes noted.					
1919 (1:10,560)	No significant changes noted.	Extent of forested areas bordering the east side of site is reduced significantly.					
1922 (1:2.500)	No significant changes noted.	Residential building 110m north					
1923 (1:10,560)	No significant changes noted.	No significant changes noted.					
1954 (1:10,560)	No significant changes noted.	'Airfield' noted north west of site area, extent of airfield not clear.					
1965 (1:10,560)	No significant changes noted.	North Leys Farm renamed Letchmere Farm. Quarries to the west and southeast are no longer identified Quarries 130m west and 230m south absent. Extensive development of unspecified buildings associated with an Airfield from 191m southwest, 191m northwest and 129m east of the site.					
1975-1976 (1:2,500)	No significant changes noted	Extensive residential developments from 21m west. Electrical substation 60m west and 250m south. Upper Heyford Airfield 110m east. Large unspecified buildings from 131m northwest. Tanks located 225m south. Caravan park located 225m southeast.					

Man Edition	Historical Land Use						
	On Site	Off Site					
1980-1981 (1:10,000)	No significant changes noted.	No significant changes noted.					
1992 (1:10,000)	No significant changes noted.	No significant changes noted.					
1994 (1:2,500)	No significant changes noted.	No significant changes noted.					
1995 (1:2,500)	No significant changes noted.	No significant changes noted.					
2001 (1:10,000)	No significant changes noted.	No significant changes noted.					
2003 (1:2,500)	No significant changes noted.	No significant changes noted.					
2010 (1:10,000)	No significant changes noted.	Residential development 243m south.					
2021 (1:10,000)	No significant changes noted.	Ponds/lakes appear from immediately east and northeast of the site area to 175m north.					

A selection of historical maps are presented in Appendix V.

3.1.1 RAF Upper Heyford

From review of the historical maps and the Groundsure Report, the identified airfield was located immediately west of the site. This is supported by review of the available information available on GOV.UK which suggests that the site was located outside of the Upper Heyford base perimeter (RAF Upper Heyford, 2014, Accessed on 02/02/2022, <u>http://www.raf-upper-heyford.org/</u> and Secretary of State for Defence (1986), *Royal Air Force Upper Heyford Byelaws*, No 744, Statutory Instruments, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file /39547/raf_upper_heyford.pdf).

3.2 Historical Tank Database

The Groundsure Report identified two (2no.) records of historical tanks within 250m of the study site.

- 226m south Tanks (dated 1975); and,
- 237m south Unspecified Tank (dated 1975).

3.3 Historical Energy Features Database

The Groundsure Report identified two (2no.) historical energy features within a 250m radius of the subject site.

- 59m west Electricity Substation (1975); and,
- 248m south Electricity Substation (1975-1995).

Due to the distance (>50m) and direction from the site and the low mobility of PCBs, the identified electricity sub stations are not considered to have the potential to impact the subject site and have therefore not been considered further.

3.4 Historic Garages and Petrol Stations

The Groundsure Report did not identify any historical petrol stations or garages within a 250m radius of the site.

3.5 Historic Industrial Land Uses

The Groundsure Report identified ten (10no.) records of historical industrial land uses within 250m of the study site, upon further review these relate to six (6no.) separate historical land uses, of which one was located on site relating an Airfield dating 1954.

The identified land uses are:

- Adjacent to west boundary Airfield (1 record) (1954);
- 109m northeast Airfield (1 records) (1980-1992);
- 144m west Unspecified Pit/Quarry (3 records) (1880-1923);
- 231m south– Unspecified Quarry (1 record) (1898);
- 238m south Sand Pit (1 record) (1880); and,
- 249m south Unspecified Quarry (1954).

3.6 Planning History

Omnia have undertaken a review of online planning records held by Cherwell District Council and have located no environmentally pertinent planning applications.

The available nearly planning conditions for post code OX25 5LS relate to Letchmere farm building extensions of existing dwellings, timber farm buildings, barn renovation and new equipment stores.

3.7 Unexploded Ordnance Risk Assessment

A review of publicly available information (provided by Zetica UXO) shows the site as having a 'low risk' associated with bombing density and bomb risk.

The site is consequently considered **Low Risk** with regards to unexploded ordnance.

4 ENVIRONMENTAL SETTING

This review of environmental setting applies to the Phase 2 area only as the Phase 1 area is covered by T&P's 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI).

4.1 Geology and Hydrogeology

British Geological Survey Map (Sheet 218, Chipping Norton, Solid and Drift Edition at a scale of 1:63,360, 1968) indicates that the site is underlain by the following geological sequence:

Table 4-1 Geology

Geological Unit	Formation Name	Description	Aquifer Classification	
Superficial	None Recorded	N/A	N/A	
Bedrock	White Limestone Formation (Great Oolite Group)	Limestone	Principal	

Review of BGS mapping indicates that the site is not underlain by superficial deposits. Bedrock geology is noted as the White Limestone Formation (Great Oolite Group) which comprises a mudstone dominated and ooidal, bioclastic and fine-grained limestone deposited in a shallow marine setting, Jurassic in age. The bedrock geology is classified as a Principal Aquifer, noted to have high intergranular and fracture permeability providing a high level of water storage.

The Groundsure report records no data for Artificial and Made Ground on the proposed site. 1:10,000 scale BGS geological mapping indicates the presence of landscaped ground immediately west of the site.

Review of the environmental database indicates that the site is not located within a groundwater Source Protection Zone (SPZ). There are no active or historical surface water abstractions are located within 250m of the site. The closest active groundwater abstraction is located 975m southeast. There are no active or historical potable water abstractions are located within 250m of the site.

Groundwater vulnerability data indicates that the site is underlain by a Principal Bedrock Aquifer with high vulnerability.

Based on local topography and the location of surface watercourses it is considered that shallow groundwater, if present, will follow local topography and flow in an east to south-easterly directly towards the inland river bordering the east of the site, which is attributed to a tributary from the River Ray, 10km to the southwest.

4.1.1 Groundwater Flooding

The Groundsure report indicates that the site is at negligible risk of groundwater flooding.

4.2 Hydrology and Flooding

The Groundsure report identifies seventeen (17no.) entries of inland watercourses and water bodies

to the north, northeast, east and south of the site, which are attributed to four (4no.) entries, detailed below:

- 6m north east-lake;
- 19m north to 240m south inland river not normally influenced by tidal action;
- 82 to 85m north lake;
- 137m north lake

A surface water body catchment was recorded on site, noted as the Gallos Brook. The Gallos Brook was noted as having chemical and ecological ratings of 'Fail' and 'Moderate' respectively, with an overall rating of 'Moderate' measured in 2019 by the Environment Agency.

No surface water abstraction licences were identified on-site or within a 250m radius of the site area.

The Groundsure Report identified the site as not being within an area at risk of flooding from rivers and the sea, with no historical flood events. The eastern edge of the site was identified as a risk from surface water flooding, with a risk of a 1 in 30-year event to depths between 0.3 and 1.0m, attributed to the inland river to the east of the site boundary.

4.3 Geotechnical Data

Geotechnical Data presented within the Groundsure Report identifies the following potential ground hazards which are summarised in Table 4-2 below:

Table 4-2 Geotechnical Data

Hazard	Designation		
Shrink-Swell Clay	Negligible – due to Limestone bedrock on site		
Landslides	Very Low		
Ground Dissolution	Very Low		
Compressible Ground	Negligible - due to Limestone bedrock on site		
Collapsible Deposits	Very Low		
Running Sand	Negligible - due to Limestone bedrock on site		

The groundsure report highlights that there is a soluble rock risk on site due to the limestone bedrock, due to the carbonate content of limestones having the potential to be eroded and forming karstic features. However, states that 'problems are unlikely except with considerable surface or subsurface water flow'.

4.4 Mining and Ground Workings

The site is not located within an area that is affected by coal mining and therefore no Coal Authority mining report was obtained for the purposes of this report.

There are no active records of mining within 500m of the site, however, seven (7no) entries for surface ground workings have been identified which are attributed to three (3no.) records for historic surface ground workings within 250m of the study site. The historic surface ground workings were:

- 144m west Unspecified Pit (1880-1923);
- 231-249m south Unspecified Quarry (1898 and 1954); and,
- 238m south Sand Pit (1880).

Additionally, two (2no.) entries relating to records of BritPits were noted 165m west of the site, named Gorse Covert which is now ceased, and 248m south of the site, named Leys Farm which is now ceased. Upon review with the records outlines above, it is considered that the record of the BritPits relate to the Unspecified Pit to the west of the site and the Sand pit to the south of the site.

4.5 Radon Risk Potential

The site lies within an area where between 1% and 3% of the properties are above the Action Level. At the lower level, BRE publication BR211 indicates that no special radon protective measures are required in the construction of new extensions or dwellings.

4.6 Current Industrial Land Uses

The Groundsure Report identified three (3no.) current industrial land uses within a 250m radius of the subject site:

- 58m west Electricity Sub Station;
- 161m northwest Water Pumping Station; and.
- 213m west Industrial products including: measurement and inspection equipment and radar and telecommunications equipment.

4.7 Sensitive Land Uses

The Groundsure report indicates that the site is located within a currently defined Nitrate Vulnerable Zone (NVZ) associated with the surface water of the Cherwell and Woodeaton Brook.

The Groundsure report identified that the western boundary of the site lies within a designated conservation area named RAF Upper Heyford of the district of Cherwell, as well as an Open mosaic Habitat located 108m north east. The report did not identify and other sensitive land uses within a 250m radius of the site.

4.7.1 Sites of Special Scientific Interest (SSSI) Impact Risk Zones

The Groundsure Report identified that the site is located within an SSSI Impact Risk Zone.

The Groundsure Report does not indicate that residential development will require prior consultation with a planning consultant.

4.7.2 Nitrate Vulnerable Zone (NVZ)

The site lies within the Charwell (Ray to Thames) and Woodeaton Brook Nitrate Vulnerable Zone and states that farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

4.8 Site Sensitivity Assessment

Based on the information presented in the sections above, the site is considered as being located within a Moderate sensitivity setting due to the following reasons:

- Underlying Principal Aquifer within bedrock;
- Absence of superficial deposits across the site;

- Site is within a Nitrate Vulnerable Zone (NVZ);
- Surface water flooding noted to be 1 in 30 year to the east of the site.

5 CONSULTATIONS

This section applies to the Phase 2 area only as the Phase 1 area is covered by T&P's 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI).

5.1 Contaminated Land Officer

Contact was unable to be made with Cherwell District Council via email in January 2022 regarding whether the council were aware of any environmental issues pertaining to the site. To date no response has been received from the Council. Upon issue of a response, the report will be updated and reissued.

5.2 Landfill and Waste Treatment Sites

The Groundsure Report identified no records of historic landfill sites or historic waste treatment sites within 250m of the subject site.

The Groundsure Report identified no active or recently closed licensed waste sites within 250m of the site boundary.

No waste exemption licenses were identified within 250m of the site, the nearest one being located 352m west attributed to the treatment of waste wood and waste plant matter.

5.3 Potentially Infilled Land

The Groundsure report identified no areas of infilled land within 250m of the site. However, from review historical mapping (1975-1976 at 1:2,500) and aerial photography there is no evidence of the quarries previously identified (144m west and 231m south of the site) suggesting they have been backfilled.

5.4 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table (Table 5-1) only includes records not otherwise detailed in the report. Where more than two entries have been identified, the Table summarises the closest two entries to the site.

	0-249m	250-500m	Details
Sites Determined as Contaminated Land	0	0	N/A
Control of Major Accident Hazards (COMAH)	1	0	102m west – Heyford Park Management Company Limited, Current Bomb Store/Site – Current COMAH site
Regulated Explosive Sites	1	0	Onsite – Cosmic Fireworks Ltd, RAF Upper Heyford, Camp Road, Oxon, OX25 5HE
Hazardous substance storage/usage	0	0	N/A
Historical licensed Industrial Activities (IPC)	0	0	N/A
Licensed Industrial Activities (Part A(1))	0	0	N/A
Licensed Pollutant Release	0	0	N/A

Table 5-1 Summary of Groundsure Data

	0-249m	250-500m	Details
(Part A(2)/B)			
Radioactive Substance Authorisations	0	2	 340m west – Oxford Bio-innovation Limited – Keeping and Use of Radioactive Materials – Status: Revoked/Cancelled 340m west – Oxford Bio-innovation Limited – Disposal of Radioactive Waste – Status: Revoked/Cancelled
Licensed discharges to controlled waters	2	2	109m north – Trade Discharges - Site Drainage, receiving water Leys Farm Ditch 208m north – Trade Discharges - Site Drainage, receiving water Leys Farm Ditch – final/treated – not water company
Pollutant release to surface water (Red List)	0	0	N/A
Pollutant Release to public sewer	0	0	N/A
List 1 Dangerous Substances	0	0	N/A
List 2 Dangerous Substances	0	0	N/A
Pollution Incidents (EA/NRW)	0	1	476m west 19/05/2003 Pollutant: Contaminated water, Firefighting Run-off No impact to water, minor impact to land and air
Pollution Inventory Substances	0	0	N/A
Pollution Inventory Waste Transfers	0	0	N/A
Pollution Inventory Radioactive Waste	0	0	N/A

5.4.1 Regulated Explosive Sites

Review of the Groundsure the mapped area of the 'regulated explosive sites' relates to the historic airfield (c.1954). Review of historic mapping dating back to c.1881 indicates that the site has remained undeveloped since earliest mapping. Additionally, from searches online it is now understood that Cosmic Fireworks are now located at a former RAF base in Lincolnshire (LNH 6HF). The Groundsure notes that records were last updated in April 2011, with evidence of Cosmic Fireworks being Incorporated in July 2011 at with the address relating to the company's current location, which may indicate these are historical records and are not linked to the subject site.

6 CONCEPTUAL SITE MODEL (CSM)

This Conceptual Site Model (CSM) applies to the Phase 2 area only as the Phase 1 area is covered by T&P's 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI).

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), Omnia have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area. A residential end use has been adopted given the proposed site development.

6.1.1 On-site Potential Sources

- Onsite Ara of burning identified on Phase 1 walkover;
- Onsite Historic and current agricultural land usage of the site; and,

6.1.2 Off-site Potential Sources

- 109m northeast Airfield (Historic);
- 161m northwest Water Pumping Station (current);
- 144m west Infilled pit/quarry (Historic); and,
- 231m south Infilled quarry (Historic)

6.1.3 Potential Pathways

- Dermal contact of impacted soils and dust;
- Ingestion of impacted soils and dust;
- Vertical and lateral migration;
- Inhalation of Vapours;
- Vertical and lateral migration into confined spaces; and,
- Inhalation of fibres.

6.1.4 Potential Receptors

- Future Site Users.
- Controlled Waters
 - Groundwater in underlying Principal Aquifer
 - Surface Water

Construction workers are not considered to be a plausible receptor due to management of their exposure through the use of suitable PPE and hygienic working practices as required under HSE/CDM regulations. Furthermore, the length of any exposure is considered to be very short in comparison to the criteria for which the adopted end use has been derived.

An Initial Conceptual Site Model has been prepared for the site and is presented overleaf within Table 6-1.

Table 6-1 Initial Conceptual Site Model

Source	Contaminant	Potential Migration	Potential	Likelihood of	Magnitude of	Overall Risk	Active /Inactive
Jource	containinaint	Pathway	Receptors	Occurrence	Occurrence	Rating	Active/mactive
On-Site Potential So	ources						
Area of burning identified in Phase 1		Vertical & Lateral Migration	Controlled waters (surface water)	Low	Minor	Low	
	Aromatic Hydrocarbons (PAH)		Controlled waters (groundwater)	Moderate	Minor	Low/Moderate	Active – further investigation required
		Ingestion of Impacted soils and dust	Future site users	Moderate	Moderate	Moderate	
		Dermal contact of impacted soils and dust	Future site users	Very low	Moderate	Low	
Historic and current agricultural land usage of the site	Herbicides and Pesticides	Ingestion of impacted soils and dust	Future site users	Very low	Moderate	Low	
		Pesticides Vertical and lateral migration	Controlled waters (surface water)	Very low	Moderate	Low	Active – further investigation required
			Controlled waters (groundwater)	Very low	Moderate	Low	
	Polycyclic Aromatic Hydrocarbons (PAH)	Vertical & Lateral Migration	Controlled waters (surface water)	Moderate	Minor	Low/Moderate	

			Controlled waters (groundwater)	Moderate	Minor	Low/Moderate	
		Ingestion of Impacted soils and dust	Future site users	Very low	Moderate	Low	
	Asbestos	Inhalation of fibres	Future Site Users	Very Low	Moderate	Low	
Off-Site Potential S	ources						
	Metals (As, B,	Dermal contact of impacted soils and dust	Future site users	Very low	Moderate	Low	
Historic Airfield (c.1954)	Cd, Cr, Pb, Hg, Se, Ni, Zn)	Ingestion of impacted soils and dust	Future site users	Very low	Moderate	Low	
	Polycyclic Aromatic Hydrocarbons (PAH)	Vertical & Lateral	Controlled waters (surface water)	Low	Minor	Low	
		iviigration	Controlled waters (groundwater)	Low	Minor	Low	Potentially Active – further investigation required
		Ingestion of Impacted soils and dust	Future site users	Very low	Moderate	Low	
		Inhalation of Vapours	Future site users	Moderate	Moderate	Moderate	
	Total Petroleum Hydrocarbons (TPH)	Ingestion of Impacted soils and dust	Future site users	Moderate	Moderate	Moderate	
		Dermal contact with impacted soils	Future site users	Low	Moderate	Low/Moderate	

		Vertical & Lateral Migration	Controlled waters (surface water)	Moderate	Moderate	Moderate		
		ingration	Controlled waters (groundwater)	Moderate	Moderate	Moderate		
	Asbestos	Inhalation of fibres	Future Site Users	Very Low	Moderate	Low	Potentially Active – further investigation required	
Airfield 109m	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn	Lateral migration	Future site users	Low	Moderate	Low/Moderate	Potentially Active – further	
northwest (1954- present)	Total Petroleum Hydrocarbons (TPH)	Lateral migration	Future site users	Low	Minor	Low	investigation required	
Water Pumping Station (161m northwest)	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn	Lateral migration	Future site users	Low	Moderate	Low/Moderate	Inactive – Due to the low mobility of metals, distance from site and the anticipated groundwater flow	
	Total Petroleum Hydrocarbons (TPH)	Lateral migration	Future site users	Low	Minor	Low	direction to the east, it is considered unlikely that any impact would have the potential to pose a significant risk to the site.	
Infilled pit 144- 145m west (1880- 1923)	Ground Gas (CH4, CO2)	Lateral migration	Future site users	Low	Severe	Low/Moderate	Potentially Active – further investigation required	
Infilled quarries 231-249m south (1898-1954)	Ground Gas (CH4, CO2)	Lateral migration	Future site users	Low	Severe	Low/moderate	Potentially Active – further investigation required	

7 PREVIOUS GROUND INVESITGATIONS

7.1 Desk Study and Ground Investigation Report by T&P Regen (ref: 2019Mar_CAM2362_DSGI, dated 8th March 2019).

A Desk Study and Geo-Environmental Risk Assessment was undertaken by T&P in March 2019 for the Phase 1 area of the site, located immediately south of Phase 2. This was undertaken in order to provide preliminary recommendations on any potential development issues with consideration of resident and environmental receptors, and geotechnical concerns. It is understood that David Wilson Homes have full reliance on this report.

7.1.1 Initial Conceptual Site Model

The initial conceptual side model (CSM) generated by T&P Regen identified historic potential sources of contamination both on and off site. The potentially active sources have been listed below. These are summarised below in Table 7-1 below.

Source	Potential Migration Pathway	Potential Receptors
	Dermal contact	
	Oral Ingestion	
	Permeation in drinking water supplies	
	Consumption of home-grown produce and plant uptake	Future Site Users and maintenance workers
	Inhalation of dust	(residential)
Made Ground	Inhalation of airborne particles/fibres or soil/water derived vapours;	
unrecorded	Apshyxition by accumulation of ground gases in	
development/ activities	internal/confined spaces where ground gases have migrated off-site.	
	Leaching of contaminants through unsaturated zone and subsequent impact on groundwater.	Groundwater
	Lateral migration in groundwater	Surface water
	Surface run off and overland flow	Future residents and maintenance workers
	Uptake via root systems	On-site flora
	Direct contact with corrosive substances (e.g. sulphates, hydrocarbons) in the soil and shallow groundwater.	Buildings and below ground services

Table	7-1	Conceptual	Side	Model	(CSM)	generated k	y T&P	Regen

Additional sources were also identified however were stated to be an unlikely risk. These were agricultural pest/weed control associated with former agricultural practices, potentially infilled former surface workings, sewage works/treatment tanks located 30m south of the south-eastern site area, electrical substation located 50m south west of the site.

7.1.2 Conclusions and recommendations

T&P Regen advanced 15no. trial in the Phase 1 area. Ground conditions from the T&P report comprise Topsoil, approximately 0.35m thick, over Gravels to approximately 1.50m below existing ground level further underlain by silty CLAY with frequent calcareous sand bands to the depth of investigation, attributed to weathered limestone Bedrock of the White Limestone Formation. No superficial deposits are noted on BGS Mapping or within the Trial Pit Locations undertaken by T&P Regen. Groundwater was encountered between 1.60m bgl to 1.80m bgl within TP102, TP105, TP109 and TP110 located to the east of the site associated with a stream running along the eastern boundary of the site.

Chemical testing was undertaken on 24no. soil samples within the Phase 1 area, of which none exceeded the adopted Tier 1 screening criteria and were classified as non-hazardous using HazWaste Online. A review of the soil data has not identified any elevated concentrations with respect to the adopted human health screen levels for a residential end use with homegrown produce. Following the completion of a Tier 1 Contaminated Land Risk Assessment, no active pollution pathways were identified based on a residential end use with homegrown produce and no formal remedial works were deemed to be required.

The T&P report did not consider the risk of ground gases to be prevalent, concluding that the site is low risk with no gas protection measures deemed necessary for the development. However, Omnia considered there to pose a potential gas risk from the infilled quarries to the west and south of the site and recommended that boreholes were installed with monitoring wells for a risk-averse approach as well as to monitor the high groundwater levels associated with soils to the east of the site, in proximity to a neighbouring stream, as this may have implications on proposed drainage and foundation design.

Infiltration testing was undertaken in 6no locations of which 4no locations in accordance with BRE 365 in TP101, TP103, TP106 and TP111, with three repeat fills, and two repeat fills in TP104 and TP112, yielding infiltration rates of 4.10x10⁻⁶m/s to 4.12x10⁻⁴m/s indicating low to medium permeability with good drainage conditions.

Whilst, the foundation assessment recommended that an allowable bearing capacity of 100kN/m² was acceptable at 1.00m bgl bearing into gravel or firm to stiff Clay and rising to 225kN/m² within the weathered limestone bedrock at 1.60-2.10m bgl, limited in-situ testing was undertaken on site. Deepening of foundations would be required where proposed houses are in proximity to the treeline around the perimeter of the site whilst houses outside of the zone of tree influence would have a minimum foundation depth of 1.00m bgl based on a High-Volume Change Soil, confirmed by 10no. Atterberg limits tested by T&P. Review of the geotechnical data presented in the report, the bearing capacities set out are purely based on laboratory testing and field descriptions and no in-situ testing data, such as Hand Shear Vanes and Standard Penetration Testing, has been undertaken. Therefore, Omnia recommended that in-situ testing via windowless sample boreholes was to be undertaken to provide supplementary investigation to facilitate foundation design.

The T&P report also undertook 5no. Californian Bearing Ratio via plunder tests along the proposed roadway. Tests yielded CBR values of 0.3-2.1% within the Clay and 2.2-4.2% within the Gravel. The report recommended that further in-situ CBR tests were undertaken via plate load testing to confirm design values.

From review of the T&P report Omnia consider there to be a ground gas risk from the infilled quarries located to the south and west of the site. From review of the historical mapping the time since infilling is <100 years (c.1975) as well as the potentially fractured nature of the limestone bedrock may give rise to potential pathways to the subject site.

Table 7-2	Revised	CSM for	Phase 1	area	- Omnia	review
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Source	Potential Migration Pathway	Potential Receptors
Area of burning in the Phase 1 area	Dermal Contact and Soil Ingestion	Future Site Users
Infilled historical quarries (130m west and 170m south)	Carbon Dioxide (CO ₂) and Methane (CH ₄) ground gas	Future Site Users

7.2 Flood Risk Assessment and Drainage Statement, Land out of Heyford Gran, Letchmere Farm, Upper Heyford, Oxfordshire by Infrastruct CS Ltd

Flood Risk Assessment has been undertaken for the Phase 1 and Phase 2 development area, detailed in Infrastruct CS Ltd Reports reference: 4388-LETCH-ICS-002-RP-C-07.003 dated October 2021, and 4388-LETCH-ICS-XX-RP-C-07.001 dated July 2021, respectively.

The FRA indicate that Phases 1 and 2 are within Flood Zone 1, which is land assessed as having a 1 in 1000 annual probability of river flooding in one year. Flooding from overland flow is considered to be low by the Environment Agency, with a Low hazard encroaching on the eastern boundary of Figure 7.1 of the Infrastruct CS report, with the Remainer of the site being classified as Very Low.

The FRA conclude that the site as having a Low risk from flooding from groundwater levels, surcharging from sewers and reservoirs, canals and other artificial sources. Within the current mitigation design there are swales and permeable paving in the Phase 1 area and swales, permeable paving and soakaways in the Phase 2 area, as detailed in Table 8.6 'Drainage Design Hierarchy' of the FRA.

8 SITE INVESTIGATION

8.1 General

A ground investigation was designed based on the clients requirements and the proposed site development as shown in Figure 2.0 (Appendix III).

Following completion of the desk study and a review of the available data, ground investigation works were required on site to investigate the potential for impacted materials to be present on-site from identified on-site and nearby off-site potential sources.

Following a review of the previous T&P report for the Phase 1 area (ref: 2019Mar_CAM2362_DSG) intrusive investigation included the advancement of plate load testing, as per the reports recommendations. Additionally, recommendations were made to DWH to advance additional borehole locations to provide supplementary in-situ testing data and information on ground conditions to infill data gaps within the previous report and provide a more robust geotechnical assessment.

Exploratory fieldwork was conducted over three (3no.) working days, commencing on 15th of December 2021 and comprised the following:

Potential Source/Rationale	Location Hole	Туре	Maximum Depth (m bgl)	Borehole Response Zone (m bgl)			
Phase 1 Area							
	WS107						
Windowless sampling with in-situ SPT	WS108		2.00	N/A			
testing to facilitate outline	WS109						
recommendations for foundation	WS110	Window					
design in the locations of the proposed	WS111	Samplo					
building footprints. To provide	WS112	Sample					
geotechnical information on the	WS113						
underlying soils via in-situ testing.	WS114						
	WS115						
Installation of Ground gas and groundwater monitoring installation	WS107			0.65-1.4			
for assessment of ground gases and	WS108			0.80-1.80			
outline recommendations of	WS110	Window		0.80-1.80			
protection measures. As well as monitoring groundwater levels in areas previously identified in the T&P report to have high groundwater, to the east of the site.	WS115	Sample	2.00	0.85-1.70			
Targeting areas where evidence of	HP101						
bonfires were observed on the site walkover.	HP102	Hand Pit	0.60	N/A			
Locations advanced in areas of	PLT101						
proposed roadways to assist	PLT102	Diata Laad		N/A			
pavement design by providing a CBR	PLT103	Tost	0.60				
value via plate load testing and DCP	PLT104	Test					
with confirmatory laboratory analysis,	PLT107						

Table 8-1 Site Investigation Summary

Detential Course (Detionals		Truce	Maximum	Borehole	
Potential Source/Rationale	Location Hole	туре	Depth (m høl)	(m hgl)	
as recommended in the previous T&P	PLT108		((11.281)	
report.	PLT109				
- 1	PLT110				
	DCP103				
	DCP104				
	DCP105				
	DCP106	Dynamic Cone	0.90	N/A	
	DCP107	Penetrometer			
	DCP108				
	DCP109				
	Phase 2 a	rea			
Windowless sampling to provide	WS101				
general spread across the site for	WS102				
assessment of potential contamination	WS103				
and geotechnical assessment.	WS104				
	WS105				
Windowless sampling with in-situ SPT		Window	2 00	N/A	
testing to facilitate outline		Sample	2.00	N/A	
recommendations for foundation					
design in the locations of the proposed	WS106				
building footprints. To provide					
geotechnical information on the					
underlying soils via in-situ testing.					
Installation of groundwater and	WS101			0.90-1.80	
ground gas monitoring standpipes to		Window Sample	2.00		
as migration during follow on	WS102			0.90-1.80	
monitoring.	WS105			1.00-1.80	
Locations advanced in areas of	PLT105	Plate Load	0.00		
proposed roadways to assist	PLT106	Test	0.60		
pavement design by providing a CBR	DCP101			N/A	
value via plate load testing and DCP	DCP102	Dynamic Cone	0.90		
testing.	DCP110	Penetrometer			
Trial pitting to provide general spread	TP101				
across the site for assessment of	TD102				
potential contamination and	11102				
geotechnical assessment.	TP103	Trial Pit	1.90	N/A	
To provide geotechnical assessment of	TP104				
soils across site through logging and		1			
obtaining samples for geotechnical	TP109				
laboratory testing.	64404				
For the assessment of drainage	SA101	4			
conditions of the shallow soils to	SA102	Soakaway	2.00	N/A	
nonosed soakaway design, in dreas of					
proposed soakaway uraniage.	3A104			1	

The exploratory hole locations are illustrated on Figure 3.0 (Appendix III). The ground conditions encountered are indicated on the exploratory hole logs, which are provided in Appendix VI.

8.2 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis including:

- CLEA Metals;
- Asbestos Fibres in Soil;
- Speciated Polycyclic Aromatic Hydrocarbons (PAH);
- Banded Total Petroleum Hydrocarbons (TPH);
- Phenols;
- Total Cyanide;
- Moisture Content;
- pH;
- Water Soluble Sulphate (2:1 Extract);
- Herbicides; and,
- Pesticides.

Element Materials Technology of Deeside undertook the analytical work in accordance with UKAS accreditation where applicable and the laboratory analysis certificates are presented as Appendix VII and discussed in Section 10.

Selected soil samples were submitted to I2 Analytical for a range of geotechnical testing, in accordance with UKAS methodology where applicable, comprising:

- Soaked CBR on remoulded specimen;
- Moisture content;
- Plasticity Index;
- Particle Size Distribution via the Wet/Dry Sieve Method;
- pH;
- Sulphate (as SO₄) Water Soluble (2:1); and
- BRE SD1 Suite.

The geotechnical analysis certificates are presented in Appendix VIII.

8.3 Ground Gas and Groundwater Monitoring

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using an infrared gas analyser (GA5000), calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an internal flow pod.

Gas concentrations were recorded at thirty second intervals until gas concentrations stabilised for three (3no.) consecutive readings (a minimum of ninety seconds) at each location, at which point the maximum concentrations of CH_4 and CO_2 , together with the lowest concentration of O_2 were recorded.

Groundwater monitoring was undertaken using an electronic dip tape to record the depth to groundwater. Ground gas and groundwater results are presented in Section 8.3.5 and discussed in Section 9.2.

9 GROUND AND GROUNDWATER CONDITIONS

This section covers both the Phase 1 and Phase 2 areas and summarises the findings of the site investigation summarised in Section 7.

9.1 Summary of Ground Conditions

Geology encountered within the Phase 1 and Phase 2 areas of site generally corresponds with that shown on BGS Mapping and the findings have been outlined below.

9.1.1 Made Ground

Made Ground was encountered in HP101 and HP102, in the Phase 1 area, to a maximum depth of 0.60m bgl. Made Ground was encountered in areas where bonfires had previously been lit had consisted of firm brown slightly sandy CLAY with frequent ash and rare medium sand sized brick fragments. No Made Ground was encountered within the previous T&P report locations TP101-115 (ref: 2019Mar_CAM2362_DSG).

Made Ground was not encountered in the Phase 2 area.

9.1.2 Topsoil

Topsoil was encountered in all intrusive locations across the Phase 1 (WS107-114) and Phase 2 (WS101-106, SA101-104, TP101-104) area, with the exception of HP101 and HP102 to a maximum depth of 0.80m bgl (WS105). It was generally encountered as soft brown slightly sandy (slightly gravelly) CLAY with frequent rootlets. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse limestone.

Topsoil was encountered within all the previous T&P report locations (TP101-115) (ref: 2019Mar_CAM2362_DSG), comprising a firm, gravelly CLAY with a typical thickness of 0.20-0.50m.

9.1.3 Superficial Deposits

Superficial deposits were not encountered in the Phase 1 or Phase 2 areas within the current phase or the previous phases of investigation undertaken by T&P. This confirms published BGS mapping.

9.1.4 Bedrock Geology

9.1.4.1 White Limestone Formation

Bedrock geology attributed to the White Limestone Formation were encountered across the site at depths ranging from 0.30-2.0mbgl, across all intrusive locations. The bedrock generally comprised of brown and light grey subrounded limestone COBBLES with a firm orangish brown slightly sandy slightly gravelly CLAY infill. Gravel is subangular to subrounded fine to coarse limestone. Locally it also consisted of orangeish, yellowish, brownish sandy gravelly CLAY and light yellow slightly sandy clayey subangular to subrounded fine to coarse GRAVEL. Gravel is subangular to subrounded fine to coarse limestone. Clays were locally noted as being friable (WS112).

Bedrock geology was encountered within all the previous T&P report locations (TP101-115) (ref: 2019Mar_CAM2362_DSG) underlying the topsoil comprising a firm to stiff, gravelly CLAY with gravels encountered from 0.60 to 1.55m bgl. Competent limestone bedrock was noted at depths ranging 1.50-2.10m bgl, which prevented further excavation.

A summary of encountered limestone rockhead, where borehole refusals were encountered due to slow or no progression, is summarised in the table below.

Table 9-1 Summary of shallow rock encountered

Phase	Locations	Depth (m bgl)						
Omnia GI								
	WS101	1.80						
	WS102	1.80						
4	WS103	0.45						
T	WS104	1.75						
	WS105	2.00						
	WS106	1.60						
	WS107	1.50						
	WS108	2.00						
	WS109	1.75						
	WS110	1.80						
	WS111	1.00						
	WS112	1.65						
	WS113	1.30						
n	WS114	1.20						
2	WS115	1.80						
	SA102	1.60						
	SA103	1.70						
	SA104	1.90						
	TP101	1.35						
	TP102	1.60						
	TP103	1.90						
	TP104	1.60						
	T&P Regen GI							
	TP101	1.50						
	TP102	1.70						
	T103	1.55						
	TP104	1.90						
	TP105	1.75						
	TP106	1.60						
	TP107	2.05						
1	TP108	1.50						
	TP109	1.80						
	TP110	1.80						
	TP111	1.60						
	TP112	1.80						
	TP113	2.10						
	TP114	1.80						
	TP115	1.60						

9.1.5 Groundwater Conditions

Groundwater was encountered in a number of locations during site investigation and the T&P site investigation, as summarised in Table 9-2.

Location	Depth (m bgl)	Strata	Type of Water Strike				
Phase 1 area (Omnia GI)							
WS107	1.45	Sand	Seepage				
WS108	1.50	Clay	Seepage				
WS109	1.50 rising to 0.90	Limestone	Strike				
WS110	1.75 rising to1.50	Clay	Strike				
WS115	1.75	Limestone	Strike				
	Phase 2 area	(Omnia GI)					
WS105	1.80 rising to 0.90	Clay	Strike				
WS106	1.10	Clay	Strike				
SA101	1.80 rising to 1.10 after 20 minutes	Clay	Strike				
SA102	1.60	Clay	Seepage				
SA103	1.70	Clay	Seepage				
SA104	1.80	Limestone cobbles	Seepage				
TP103 (SA)	1.80	Clay	Strike				
TP104	1.60 rising to 1.0	Clay	Strike				
TP109	1.20	Clay	Seepage				
Phase 1 area (T&P GI)							
TP102	1.60 rising to 1.40	Gravelly Clay	Strike				
TP105	1.75 rising to 1.60	Silty Clay	Strike				
TP109	1.80 rising to 1.50	Silty Clay	Strike				
TP110	1.80 rising to 1.60	Silty Clay	Strike				

Table 9-2 Summary of Groundwater Conditions

Groundwater was generally encountered in the east of the site in proximity to a stream running down the east boundary of the site. It is therefore considered likely that shallow groundwater in the eastern area of the site is in hydraulic continuity with the surface watercourse. The presence of shallow groundwater may impact drainage design and it is recommended that consultation with a drainage engineer is undertaken.

The influence of ground water is further discussed in Section 12.5.

9.2 Laboratory Classification Analysis

Soil classification testing, including Atterberg Limits, Moisture Content, Particle Size Distribution and pH and Sulphate results are summarised in Table 9-3 – Table 9-7 with analysis certificates presented in Appendix VII and Appendix VIII.

9.2.1 Soil Plasticity

Five (5no.) samples, from the Phase 2 area, taken from cohesive deposits across the site were submitted to the laboratory for laboratory plasticity analysis. The results of this analysis have been summarised in Table 9-3 below.

Table 9-3 Summary of Soil Plasticity

Location	Depth (m bgl)	Geology	Natural Moisture Content (%)	Liquid Limit	Plastic Limit (%)	Plasticity Index (%)	Percentage passing 425μm sieve (%)	Modified Plasticity Index	Plasticity	Volume Change Potential
	1	Pha	se 2 area: (Omnia	Ground	Investig	gation, A1175	4/1.0		
WS101	1.20- 1.40	Yellowish Brown CLAY	26	64	22	42	100	42	High	High
WS101	1.50- 1.70	Yellowish brown very sandy CLAY	12	30	16	14	100	14	Low	Low
WS102	1.50- 1.60	Yellowish brown CLAY	29	74	27	47	100	47	Very High	High
WS104	0.70- 1.00	Brown slightly gravelly very sandy CLAY	19	32	18	14	92	13	Low	Low
TP104	0.80- 1.00	Cream colour gravelly sandy very clayey SILT	15	26	14	12	83	10	Low	Low
		Phase 1 a	rea: T&P G	round	investiga	tion, 2	019Mar_CAM	2362_DSG		L
TP102	0.80- 1.00	Yellow brown and light grey very clayey very sandy GRAVEL	10	29	16	13	39	5	Low	Negligible
TP102	1.20- 1.40	Yellowish brown slightly gravelly slightly sandy silty CLAY	14	30	17	13	74	10	Low	Low
TP103	0.90- 1.10	Yellowish brown slightly gravelly sandy CLAY	15	33	13	20	79	16	Low	Low
TP105	0.80- 1.00	Yellowish brown slightly gravelly sandy CLAY	17	38	15	23	75	17	Medium	Low
TP105	1.50- 1.70	Light grey and yellowish brown slightly gravelly	16	39	15	24	66	16	Medium	Low
		slightly sandy CLAY								
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TP107	0.60- 0.80	Yellowish brown clayey sandy GRAVEL	5	30	15	15	28	4	Low	Negligible
TP107	1.30- 1.50	Brown and light brown sandy silty CLAY with occasional shell fragments	33	76	18	58	98	57	Very High	High
TP111	0.50- 0.70	Yellowish brown sandy clayey GRAVEL	5.9	24	14	10	14	1	Low	Negligible
TP115	0.60- 0.80	Light brown sandy clayey GRAVEL	77.3	31	17	14	21	3	Low	Negligible
TP115	1.10- 1.30	Yellowish brown slightly gravelly sandy CLAY	16	35	14	21	79	21	Medium	Medium

The results presented in Table 9-3 indicate that the fine-grained soils in the Phase 2 area (Omnia GI) between a depth of 0.70-1.70m bgl are of a low to very high plasticity clay with a low to high volume change potential.

In order to provide supplementary information to the above for the geotechnical assessment discussed in Section 9, information was reviewed from the previous T&P report for the Phase 1 area of the site (ref: 2019Mar_CAM2362_DSGI). T&P undertook ten (10no.) Atterberg limit testing within the near surface (0.50m to 1.70m bgl) fine grained soils, with results displayed in Table 16.2 (pages 35-36) of the report. Results indicated that liquid limits were between 24-76%, plastic limits between 14-18% with a modified plasticity index between 1-57%. T&P's results are consistent with findings of the Phase 2 area, indicating that soils were of a low to high volume change potential, with 9no. out of the 10no. samples analysed the majority of results being low volume change potential. The T&P report have assessed soils to be of high-volume change based on a single result (TP107 0.60-0.80m bgl). Soils below this depth in TP107 show a low volume change.

Based on the findings of above, cohesive soils across both the Phase 1 and Phase 2 area have a total of fifteen (15no.) results. Of which, eight (8no.) give a low volume change result, four (4no.) results were negligible (modified PI of <10%) and three (3no.) suggest a high-volume change. Volume change has been plotted in Figure 4.0 of Appendix III. Based on this information soils to the southwest of Phase 1 and to the west of the Phase 2 are of High volume change and remaining soils will be assessed as soils with a low volume change potential, which is a less conservative approach than the T&P report, however sufficient representative soil samples have been analysed to provide confidence that a lower volume change is suitable for sections of the site.

9.2.2 Particle Size Distribution Analysis

Three (3no.) soil samples were submitted to the laboratory for Particle Size Distribution (PSD) analysis, with the results presented below in Table 8-3. The results differ from onsite descriptions slightly, with the samples from TP103 and TP104 being logged as clay on site but found to be silts in lab testing. The sample from WS104 was found to be sandier than when logged in the field.

Depth (m			Granulometric Composition (%)								
Location	bgl)	Laboratory Description	Fines (<0.063mm)	Sand	Gravel	Cobbles					
TP103	0.50-0.80	Cream colour gravelly clayey very sandy SILT	63	28	9	0					
TP104	0.80-1.00	Cream colour gravelly sandy very clayey SILT	70	21	9	0					
WS104	0.70-1.00	Brown slightly gravelly very sandy CLAY	53	43	4	0					

Table 9-4 Summary of Particle Size Distribution

The previous report for the Phase 1 area by T&P (ref: 2019Mar_CAM2362_DSGI) did not undertake any Particle Size Distribution testing.

9.2.3 Uniformity Coefficient

From the PSD analysis the uniformity coefficient, which is a shape parameter for the assessment of grading, has been calculated and is presented in the table below. From this the grading classification can be assigned using BS 8004:2015.

Table 9-5 Summary of coefficients of uniformity

Location	Depth (m bgl) Laboratory Description C		Uniformity Coefficient	Grading
Phase 2				
TP103	0.50-0.80	Cream colour gravelly clayey very sandy SILT	33	Well graded, Multi graded
TP104	0.80-1.00	Cream colour gravelly sandy very clayey SILT	20	Well graded, Multi graded
WS104	0.70-1.00	Brown slightly gravelly very sandy CLAY	>100	Well graded, Gap graded

9.2.4 California Bearing Ratio (CBR) Testing

Soaked recompacted CBR testing was undertaken on selected soils samples in areas of proposed roadways. The California Bearing Ratios of soil samples were determined using a 2.5kg rammer, at both recompacted and soaked moisture contents. The results are summarised in Table 9-6 below.

Table 9-6 California Bearing Ratio (Soaked)

Sample	Initial Moisture Content	Final Mo Conter	oisture It (%)	CBR Value (%)	
	(70)	Тор	Bottom	Тор	Bottom
Phase 1 area					
PLT104 0.30-0.50m bgl	15	20	18	2.2	3.6
Phase 2 area					
PLT105 0.30-0.50m bgl	19	19	18	1.9	3.1
PLT106 0.20-0.50m bgl	15	27	26	2.9	3.6

California Bearing Ratio (CBR) testing, the did not have average values calculated, as the results were not within +/-10% of the mean value. The top values ranged from between 1.9% and 2.9% whilst bottom values ranged between 3.1% and 3.6%. In-situ testing CBR values results were also undertaken using a Dynamic Cone Penetrometer (DCP) testing and Plate Load Testing (PLT), discussed in Section 9.3. CBR value for DCP testing ranged between 1.0% to 176%, where higher percentages are attributed to limestone cobbles and flint. Plate load tests were also undertaken where CBR values ranged from 1.0 to 4.0%. The lower range of laboratory CBR results (1.9% to 2.9%) generally confirm the lower ranges of the in-situ testing, which values are consistent with a Clay.

9.2.5 pH and Sulphate

Chemical analysis for pH and soluble sulphate content are summarised in Table 9-7 below with analysis certificates presented as Appendix VII and VIII.

Location	Depth (m bgl)	SO₄ in 2:1 water / soil (mg/l)	pH Value
Phase 2 area	(
SA102	0.00-0.40	<1.5	8.06
SA103	0.00-0.30	<1.5	7.91
WS101	0.50-0.80	7.4	8.22
WS103	0.30-0.40	<1.5	8.1
WS105	0.20-0.30	23.8	6.56
WS101	1.20-1.40	9.8	8.4
WS102	1.50-1.60	5.8	8.3
TP104	0.80-1.00	8.9	8.6
WS104	0.70-1.00	6.33	8.5
WS105	1.50-1.60	2.4	8.5
TP103	0.50-0.80	1.4	8.6

Table 9-7 Summary of pH and Sulphate Data

Due to the size of the dataset (>10), characteristic pH and SO₄ values were calculated using the mean of the highest 20% measured sulphate concentrations and the mean of the lowest 20% measured pH value as stated in the BRE Special Digest (2005) producing a site characteristic value for sulphate of 16.8mg/l and a pH value of 7.2. This corresponds to a concrete classification of DS1 AC-1.

The previous report for the Phase 1 area by T&P (ref: 2019Mar_CAM2362_DSGI) recommended a suitable design mix for concrete as DS1 AC-1, which is consistent with the above assessment.

9.2.6 BRE SD1 Testing

Three (3no.) samples were tested for total sulphate and total sulphur testing (BRE SD1 suite) in the Phase 2 area. Analysis has been summarised below, assessing the potential for sulphides in natural ground.

Table 9	9-8 Summar	of BRE	SD1	Testing
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Location	Depth (m bgl)	Total Acid Soluble Sulphate AS % SO₄	Total Sulphur TS % S	Total Potential Sulphate TPS % SO4	Oxidised Sulphides OS % SO₄
Phase 2					
WS101	1.20-1.40	0.053	0.021	0.063	0.010
WS102	1.50-1.60	0.031	0.014	0.042	0.011
TP104	0.80-1.00	0.075	0.027	0.081	0.006

Referring to Section C5.1.1 in BRE Special Digest 1 (2005) it is considered that if the number of oxidisable sulphides is greater than 0.3% SO₄ in a significant number of samples, sulphides are most likely present. All three of the total oxidised sulphides tested in the table above are not greater than 0.3% SO₄ suggesting that for the selected soil samples the sulphides have not been identified to be oxidisable.

Total Potential Sulphate (TPS) ranges from 0.042% to 0.081%. It is suggested that with a data set with less than 5 samples, the highest measures value for TPS should be taken as the characteristic value. A TPS of 0.081 % SO₄ has therefore been adopted.

Utilising Table C1 and the sulphate classes for groundwater and the water extracts tests the results are indicative of a Design Sulphate Class 1 and an Aggressive Chemical Environment for Concrete of AC-1.

9.3 In-Situ Testing

9.3.1 Standard Penetration Tests (SPT)

Standard Penetration Tests (SPT) were carried out in all windowless sampling boreholes in accordance with techniques outlined in BS1377, to assess the strength/density of the underlying strata. The 'N' value (number of blows per 300mm penetration) was recorded for each test. The results of these insitu tests, including full blow counts, are presented on the borehole logs within Appendix VI and discussed in Section 12.

9.3.2 Dynamic Cone Penetrometer (DCP) Testing

In-situ California Bearing Ratio (CBR) values for near surface strata were obtained via Dynamic Cone Penetrometer (DCP) testing and were undertaken at ten (10no.) locations within areas of proposed access infrastructure, as presented on Figure 3.0, Appendix III. The results are summarised in Table 9-9 below with CBR values of underlying strata provided.

The DCP results sheets are included within Appendix X. CBR results have been given from the blow counts across the strata tested, abnormally high blow counts are likely attributed from larger granular material within the strata and have been excluded as they are not considered to be representative.

Table 9-9 Summary of In-situ CBR Results

Location	Depth (mm bgl)	CBR Value (%)
	0-225	4.3
	225-405	14.2
DCP101	405-535	30.8
	535-840	9.9
	840-900	21.8
	0-225	10.1
DCB103	225-285	45.4
DCF 102	285-555	29.6
	555-900	99.8
	0-420	5.2
DCP103	420-730	12.3
	730-926	106.3
	0-230	1.0
DCP104	230-400	23.2
DCF104	400-580	45.4
	580-770	103.5
	770-900	117.0
	0-265	3.6
	265-445	28.0
DCP105	445-575	73.2
	575-665	39.1
	665-900	50.2
	0-360	2.6
	360-410	20.9
DCP106	410-760	7.0
	760-830	22.5
	830-885	176.0
	0-530	4.5
DCP107	530-630	26.5
	630-780	22.8
	780-916	78.5
	0-205	1.1
DCP108	205-650	3.1
	650-918	9.3
	0-325	6.0
DCP109	325-610	7.8
	610-800	28.0
	800-900	148.2
	0-245	6.0
DCP110	245-495	78.6
	495-900	33.1

CBR values between 1.0% and 176.0% have been determined using the DCP between ground level and 926mmbgl. Values above 100% are likely caused by gravel obstructions during the test and are not considered to be representative of the ground conditions. DCP results generally ranged between 1.0 to 10.1% within the top 600mm increasing with depth due to a higher cobble content. Laboratory CBR results ranged from 1.9% and 2.9% (top values) whilst bottom values ranged between 3.1% and 3.6%. In-situ testing is generally higher than that of laboratory CBR testing due to the in-situ cobbles of limestone bedrock within the soil profile.

The previous report for the Phase 1 area by T&P (ref: 2019Mar_CAM2362_DSGI) gave results of 0.3-2.1% CBR using a plunger. T&P recommended that in-situ testing via plate load should be undertaken to provide design value for road design.

9.3.3 Plate Load Testing (PLT)

Plate Load Testing was undertaken on the site in ten (10no.) locations across the Phase 1 and Phase 2 areas below topsoil on bedrock of the White Limestone Formation to a maximum depth of 0.3m bgl, per the T&P report recommendations. Locations of the testing positions is presented within Figure 3.0 in Appendix III.

The results of the Plate Load Testing are listed in Table 9-10Error! Reference source not found. below and results are in Appendix XI.

Location	Ground Description	Depth (m bgl)	Maximum Applied Stress (kPa)	Maximum Settlement (mm)	CBR Value (%)
Phase 1					
PLT101	Gravelly clay	0.3	120	2.10	2.0
PLT102	Gravelly clay	0.3	67	2.11	1.0
PLT103	Gravelly clay	0.3	71	2.08	1.0
PLT104	Gravelly clay	0.3	83	2.04	2.0
PLT107	Gravelly clay	0.3	67	1.88	1.0
PLT108	Gravelly clay	0.3	87	2.08	2.0
PLT109	Gravelly clay	0.3	73	2.06	1.0
PLT110	Gravelly clay	0.3	69	2.07	1.0
Phase 2					
PLT105	Gravelly topsoil	0.3	131	1.90	4.0
PLT106	Gravelly clay	0.3	36	1.79	1.0

Table 9-10 Plate Load Testing results

CBR values obtained from undertaking Plate Load Testing across the Phase 1 and Phase 2 areas gave CBR values ranging from 1.0 to 4.0%. Laboratory CBR results ranged from 1.9% and 2.9% (top values) whilst bottom values ranged between 3.1% and 3.6%. Plate load testing results generally confirm the top values from the laboratory CBR test results of 1.9 to 2.9%, which are generally consistent with the upper bound results for the plate load testing.

Adopting a conservative approach, it is recommended that a value of 1.0% is used for the design of roadways. It is recommended that confirmatory CBR testing is undertaken at formation level prior to construction.

9.3.4 Soil Infiltration Testing – Falling Head Permeability Test

In-situ soil infiltration testing was undertaken in the Phase 2 area in general accordance with BRE 365 – *Soakaway Design* within the near surface at locations SA102, SA103, TP102 and TP103 to a maximum depth of 2.0m bgl.

Initially soakaway positions were undertaken in SA101 and SA104 targeted a proposed soakaway to the east of the site. However, groundwater was encountered at depths of 1.80m rising to 1.10m in SA101, and depths of 1.80m rising to 0.80m in SA104. Therefore, different positions were allocated to undertake the tests which was discussed with the client. Soil Infiltration test certificates are presented as Appendix XII and summarised in Table 9-11 below.

Location	Pit Dimensions (L x W x D)	Depth to groundwater (m bgl)	Strata Type	Duration of test (hrs:mm)	Soil Infiltrations Rate (m/s)	
			Sandy Cravelly	5:00	1.44x10 ⁻⁵	
SA102	1.00 X 0.5 X	1.60		3:59	1.55x10 ⁻⁵	
	1.50		CLAT	6:55	1.30x10 ⁻⁵	
\$4102	1.90 x 0.55 x	1 70	Sandy Gravelly	25.10	Linsuccessful test	
34103	1.45	1.70	CLAY	25.10	Unsuccessful test	
TD102 (SA)	1.60 x 0.55 x	NI / A	Sandy Gravelly	24.00	Unsuccossful tost	
TF102 (SA)	1.35	N/A	CLAY	24.00	Unsuccessiul test	
			Sandy Gravelly	18:00	3.62x10 ⁻⁶	
TP103	1.05 X U.45 X	1.80		4:00	1.19x10 ⁻⁵	
	1.05		CLAT	7:00	1.23x10 ⁻⁵	

Table 9-11 Summary of Soil Infiltration Testing of the Phase 2 area

Test results were considered to be successful at location SA102 and TP103, whilst in locations TP102 and SA103, the effective storage depth intercepts were not reached such that the tests were unsuccessful and therefore soil infiltration rates could not be calculated.

The soil infiltration rates calculated for TP103 (design value of 3.62x10⁻⁶) and SA102 (design value of 1.30x10⁻⁵) are indicative of low permeability with good to poor drainage conditions (Carter and Bentley, 1981).

T&P Regen conducted six (6no.) infiltration tests in the Phase 1 area of the site and concluded that the site has relatively good drainage conditions with results displayed in Table 15.1 on page 33 (ref: 2019Mar_CAM2362_DSGI). Within T&P locations TP104 and TP112 inferred infiltration was calculated, due to slower infiltration rates and 2no. fills, and were assumed that pits would discharge 50% volume within a 24-hour period. T&P Regen undertook infiltration testing was undertaken in accordance with BRE 365 in TP101, TP103, TP106 and TP111, with three repeat fills, and two repeat fills in TP104 and TP112, yielding infiltration rates of 4.10x10⁻⁶m/s to 4.12x10⁻⁴m/s indicating low to medium permeability with good drainage conditions. T&P Regen avoided the eastern part of the site due to shallow groundwater.

In accordance with BRE 365 the lowest of the drainage rates for each location should be used as the design value.

9.3.5 Ground Gas

Three (3no.) ground gas and groundwater monitoring visits have been undertaken across seven (7no.) monitoring wells at the site between 23/12/2021 and 21/01/2022. The results of the gas and groundwater monitoring are presented in Table 9-12 overleaf.

Table 9-12 Summary of Ground Gas and Groundwater Monitoring Results

Well	Date	CH₄ Peak %v/v	CH₄ Steady %v/v	CH₄ GSV I/hr	CO₂ Peak %v/v	CO₂ Steady %v/v	CO₂ GSV I/hr	O2 %v/v	Atmos (mb)	Atmos. Dynamic	Flow (l/hr)	Depth to Base (m bgl)	Depth to Water (m bgl)
Phase 2 area	<u>a</u>												
	23/12/2021	0.1	0.1	0.0003	0.9	0.9	0.0027	20.2	992	Rising	0.3	1.78	Dry
WS101	07/01/2022	0.3	0.3	0.0009	1.0	1.0	0.003	20.0	995	Steady	0.3	1.76	1.45
	21/01/2022	0.6	0.6	0.0018	1.4	1.1	0.0042	20.6	1024	Steady	0.3	1.78	1.59
	23/12/2021	0.1	0.1	0.0003	0.8	0.8	0.0024	20.2	992	Rising	0.3	1.85	1.50
WS102	07/01/2022	0.3	0.3	0.0009	1.0	1.0	0.003	20.3	995	Steady	0.3	1.82	1.60
	21/01/2022	0.6	0.6	0.0018	1.1	1.1	0.0033	20.7	1025	Steady	0.3	1.85	1.48
	23/12/2021	0.1	0.1	0.0002	0.7	0.3	0.0014	20.7	992	Rising	0.2	1.85	1.05
WS105	07/01/2022	0.3	0.3	0.0018	0.2	0.2	0.0012	21.5	996	Steady	0.6	1.83	1.20
	21/01/2022	0.6	0.6	0.0018	2.8	2.8	0.0084	12.8	1024	Steady	0.3	1.74	1.14
Phase 1 area	<u>a</u>					•		•				•	
	23/12/2021	0.1	0.1	0.0003	0.6	0.5	0.0018	20.8	993	Rising	0.3	1.63	Dry
WS107	07/01/2022	0.3	0.3	0.0006	1.5	1.5	0.003	18.7	996	Steady	0.2	1.60	1.45
	21/01/2022	0.6	0.6	0.0018	1.6	1.6	0.0048	19.9	1024	Steady	0.3	1.6	Dry
	23/12/2021	0.1	<0.1	0.0002	1.4	1.4	0.0028	19.0	994	Rising	0.2	1.90	1.20
WS108	07/01/2022	0.3	0.3	0.0006	0.8	0.3	0.0024	21.8	996	Steady	0.3	1.92	1.62
	21/01/2022	0.6	0.6	0.0018	2.4	2.4	0.0072	17.9	1024	Steady	0.3	1.83	1.18
	23/12/2021	<0.1	<0.1	0.0002	0.5	0.5	0.001	20.4	993	Rising	0.2	1.90	1.57
WS110	07/01/2022	0.3	0.3	0.0006	0.7	0.7	0.0014	17.6	996	Steady	0.2	1.90	1.80
	21/01/2022	0.6	0.6	0.0018	1.2	1.1	0.0036	18.0	1024	Steady	0.3	1.90	1.54
	23/12/2021	0.1	<0.1	0.0001	1.6	1.5	0.0016	19.0	994	Rising	0.1	1.87	Dry
WS115	07/01/2022	0.3	0.3	0.0009	0.7	0.7	0.0021	20.8	996	Steady	0.3	1.84	1.72
	21/01/2022	0.6	0.6	0.0018	1.9	1.9	0.0057	19.0	1024	Steady	0.3	1.84	Dry

10 TIER 1 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

Omnia has undertaken a Tier 1 qualitative risk assessment for the Phase 2 area of site to determine if any potential contaminants within the underlying soils pose an unacceptable level of risk to the identified receptors.

10.1 Human Health Risk Assessment

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published by the EA (Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV)) and where absent, Generic Assessment Criteria (GACs) published by LQM/CIEH Suitable for Use Levels (S4UL) 2015. Based on the proposed development comprising residential dwellings with private gardens, associated soft landscaping and parking, Omnia has adopted screening values for a residential end use with home grown produce. The origin of the GAC values are presented within Appendix IX.

The results of this comparison have been summarised within Table 10-1.

Table 10-1 Summary of Inorganic and Hydrocarbon	Toxicity Assessment for	a Residential End	Use with Home Grown	Produce
of the Phase 2 area				

Determinant	Units	GAC	n	МС	Loc. of Ex	Pathway	Assessment
Inorganics							
Metals							
Arsenic	mg/kg	37	5	22.5	N/A	1	No Further Action
Beryllium	mg/kg	1.7	5	1.4	N/A	1	No Further Action
Boron	mg/kg	290	5	2.2	N/A	1	No Further Action
Cadmium	mg/kg	11	5	0.2	N/A	2	No Further Action
Chromium (III)	mg/kg	910	5	58.3	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	5	<0.3	N/A	2	No Further Action
Copper	mg/kg	2,400	5	14	N/A	2	No Further Action
Lead	mg/kg	200	5	24	N/A	1	No Further Action
Mercury	mg/kg	40	5	<0.1	N/A	1	No Further Action
Nickel	mg/kg	180	5	25.3	N/A	1,2	No Further Action
Selenium	mg/kg	250	5	<1	N/A	1,2	No Further Action
Vanadium	mg/kg	410	5	79	N/A	2	No Further Action
Zinc	mg/kg	3,700	5	63	N/A	2	No Further Action
General Inorganics							
Asbestos	%	0.001	5	NAD	N/A	5	No Further Action
Total Cyanide *	mg/kg	50	5	<0.5	N/A	1	No Further Action
Organics							
General Organics							
Phenol	mg/kg	280	5	<0.15	N/A	2	No Further Action
РАН							
Naphthalene	mg/kg	2.3	5	<0.04	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	5	<0.03	N/A	2	No Further Action
Acenaphthene	mg/kg	210	5	<0.05	N/A	2	No Further Action
Fluorene	mg/kg	170	5	<0.04	N/A	2	No Further Action
Phenanthrene	mg/kg	95	5	<0.03	N/A	2	No Further Action
Anthracene	mg/kg	2,400	5	<0.04	N/A	2	No Further Action
Fluoranthene	mg/kg	280	5	0.06	N/A	1,2	No Further Action

Determinant	Units	GAC	n	МС	Loc. of Ex	Pathway	Assessment
Pyrene	mg/kg	620	5	0.05	N/A	1,2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	5	<0.06	N/A	1	No Further Action
Chrysene	mg/kg	15	5	0.04	N/A	1	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	5	<0.07	N/A	1	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	5	<0.02	N/A	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	5	<0.04	N/A	1	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	5	<0.04	N/A	1	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	5	<0.04	N/A	1	No Further Action
Benzo(ghi)Perylene	mg/kg	320	5	<0.04	N/A	1	No Further Action
Banded TPH							
TPH EC 5-6**	mg/kg	42	5	<0.1	N/A	4	No Further Action
TPH EC >6-8**	mg/kg	100	5	<0.1	N/A	4	No Further Action
TPH EC >8-10**	mg/kg	27	5	<5	N/A	4	No Further Action
TPH EC> 10-12**	mg/kg	74	5	<10	N/A	2	No Further Action
TPH EC> 12-16**	mg/kg	140	5	<10	N/A	2	No Further Action
TPH EC> 16-21**	mg/kg	260	5	<10	N/A	1	No Further Action
TPH EC> 21-35**	mg/kg	1,100	5	39	N/A	1	No Further Action
TPH EC> 35-44**	mg/kg	1,100	5	<10	N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. Omnia has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit. (vap) – GAC presented exceeds the vapour saturation limit.

Following the completion of a Tier 1 Contaminated Land Risk Assessment, no active pollution pathways were identified based on a residential end use with homegrown produce.

10.1.1 Area of identified burning within the Phase 1 parcel

Two (2no.) areas of burning were noted within the Phase 1 area being covered by the previous T&P report (ref: 2019Mar_CAM2362_DSGI dated March 2019) and were identified in the site walkover of the current phase of works, to the northeast and southeast of the Phase 1 area. The burning of wood can create the production of PAH as part of the burning process, as PAHs are formed as a result of incomplete combustion of carbon-containing materials.

Following the excavation and inspection of near surface soils it was considered that the areas of burning, identified on Figure 5 in Appendix III, were likely to contain elevated PAH concentrations, exceeding the adopted Tier I screening values, in the immediate areas of the former fires (shown in Photograph 4 and 5), therefore no samples underwent chemical analysis.

As a result, it is recommended that the immediate areas of the burnt ground (Figure 5) is surface scraped, removing the topsoil, and the materials are removed from site and disposed of at an appropriate waste disposal facility via a registered waste carrier.

10.1.2 Herbicides and Pesticides

Two (2no.) composite soil samples were sent for laboratory analysis for herbicides and pesticides. All samples yielded concentrations of less than the laboratory limit of detection and therefore herbicides and pesticides are not considered to have the potential to pose a significant risk to future site users.

10.2 T&P Regen Report (ref: 2019Mar_CAM2362_DSGI) Tier 1

The previous T&P report undertook testing on 24no. soil samples within the Phase 1 area, of which none exceeded the adopted Tier 1 screening criteria. Soils were tested for heavy metals, anions, inorganics, phenols, PAH, pH and Total Organic Carbon. PAH results were noted to be below the laboratory limit of detection. Results were also compared to the GAC values set out above, with no exceedances encountered. A review of the soil data has not identified any elevated concentrations with respect to the adopted human health screen levels for a residential end use with homegrown produce.

10.3 Ground Gas Assessment

This ground gas assessment covers both the Phase 1 and Phase 2 areas of the site.

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report C665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007). However, it is recommended that the full ground gas assessment and any recommended protection measures are agreed with the local authority prior to the adoption of any protection measures on-site. Furthermore, the installation of any gas protection measures should be validated by a suitably qualified engineer.

The results of the ground gas monitoring and calculated Gas Screening Values (GSVs) are presented in Table 9-12.

Three (3no.) rounds of ground gas monitoring have been undertaken at locations WS101, WS102, WS105, WS107, WS108, WS110 and WS115 within both Phase 1 and Phase 2 areas of the site. CH_4 concentrations were recorded to a maximum concentration of 0.60% v/v at all locations. CO_2 concentrations were recorded to a maximum of 2.8% v/v at location WS105. Ground gas flow rates were recorded across the site, with a maximum flow rate of 0.6/hr recorded at WS105.

In accordance with the methodology outlined within the CIRIA publication C665, Omnia have utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). The maximum GSV calculated for methane was 0.0018l/hr whilst the maximum GSV for carbon dioxide was 0.0084l/hr.

It is understood that the proposed development is for a residential end use through the construction of 122 dwellings comprising a mix of semi-detached, terraced and detached housing with associated landscaping and parking, as well as two (2no.) blocks of flats with parking, associated infrastructure, public open space and swales.

Therefore, the proposed development is composed of low-rise residential dwellings assessed under the NHBC Traffic Light System as **Situation B** and a managed apartment building with central building management assessed under BS8485:2015 classed as a **Type B** building.

10.3.1 NHBC Traffic Light System - Situation B - Low Rise Housing

Guidance set out in CIRIA Publication C665 stipulates that, for classification under the NHBC Traffic Light System, a site must have the characteristic maximum concentrations and GSVs for CH_4 of <1%v/v and <0.16l/hr, respectively and for CO_2 a maximum concentration and GSV of <5% v/v and <0.78l/hr, respectively.

The calculated GSV for CH_4 is 0.0018l/hr and for CO_2 is 0.0084l/hr, and therefore, is considered green under the NHBC Traffic Light system.

Developments classified as green do not require any special ground gas protection measures.

10.3.2 BS 8485:2015 - Type B Building – Private ownership with Central building Management

Guidance set out in BS 8485:2015, which is equivalent to the characteristic situations of the modified Wilson & Card classification set out in CIRIA C665, stipulates a site characteristic maximum GSV of <0.07 l/hr, with typical maximum permissible concentrations of 1% v/v (CH₄) and/or 5% v/v (CO₂) for classification as Characteristic Situation 1 (CS1).

The maximum recorded concentrations and GSVs for CH_4 (0.6% v/v) and CO_2 (2.8% v/v) meet the criteria for classification as CS1.

Developments classified as CS1 do not require special ground gas protection measures.

The previous report by T&P for the Phase 1 area (ref: 2019Mar-CAM2362_DS&GI dated March 2019) did not identify any gas risk and therefore stated that no special gas protection measures were required for the site.

11 REVISED CONCEPTUAL SITE MODEL

Following completion of the Tier 1 risk assessment, a potentially active pollution pathway has been identified based on a Residential End Use with Homegrown Produce from the two areas of burning identified on the Phase 1 area (Figure 5.0 in Appendix III).

Source	Primary Migration Pathway	Potential Receptors	Probability of Exposure	Discussion of Pollutant Linkage
Identified area of burning noted to have elevated concentrations of PAHs in two areas in Phase 1 area	Dermal Contact, Ingestion and Inhalation	Future Site Users	Moderate	Elevated concentrations of PAH are likely to be identified within two areas of burning in the Phase 1 area. Whilst this material is likely to be removed from site during the enabling works, attention should be given upon removal to prevent cross- contamination during the works. It is recommended that the immediate areas of the burnt ground (Figure 5) is surface scraped, removing the topsoil, and the materials are removed from site and disposed of at an appropriate waste disposal facility via a registered waste carrier. Upon removal of the impacted material, it is recommended that validation works are undertaken to confirm that the associated concentrations have been removed successfully.

12 GEOTECHNICAL ASSESSMENT

12.1 Proposed Development

It is understood that the proposed development comprises 122no. residential dwellings, comprising a range of terraced, semi-detached and detached housing as well as 2no. blocks of flats with parking, associated infrastructure, public open space and swales. The development will be split into Phase 1, the southern field, comprising 89no. units and Phase 2, the northern fields, comprising 33no. units.

This geotechnical assessment covers both the Phase 1 and Phase 2 areas of the proposed development.

The outline proposed site layout is presented as Figure 2.0 within Appendix III.

12.2 Site Preparation

The site should be cleared of any vegetation below the areas of proposed development and stripped in accordance with Series 200 of Specification of Highway Works.

Any roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting voids in-filled with suitable compacted material. This should also be undertaken for any redundant or re-routed services.

12.3 Ground Profile

Based on the findings on the current ground investigation, ground conditions at the site comprise Topsoil generally between 0.20-0.30m thick. Underlying the Topsoil bedrock geology, the White Limestone Formation was encountered. This generally comprised a range of cobbles, gravel, sand and clay was found in varying amounts. The cobbles and gravels comprised limestone. Depth to bedrock limestone is presented in Table 9-1, where depths range from 0.45m bgl (WS103 in the north of Phase 2) to 2.10m bgl (TP113 in the west of Phase 1), however generally bedrock depth ranged from 1.50m bgl to 2.00m bgl.

Groundwater was encountered between 1.10m bgl (WS106) to 1.80m bgl (WS105, SA101, TP104 of the Omnia investigation and TP109 and TP11 of the T&P Regen investigation), in the east of the site, and is likely in hydraulic continuity with the existing stream.

12.4 Shallow Foundations

The following geotechnical assessment has been undertaken based on in-situ testing, laboratory analysis, and descriptions on the underlying geology. Foundation depths presented are based on a minimum presumed bearing value, using Tomlinson (2001) Tables 2.4 and 2.5, for a particular foundation type and are subject to design. Line loadings have not been made available such that the final depth and type of foundation required following design could vary.

It is considered that Made Ground and Topsoil would not form suitable founding strata due to characteristic variability and the associated potential for differential settlement. As such it is recommended that loads are transferred through the Topsoil or Made Ground to a depth at which competent geology, sufficient to support the proposed load, is encountered.

12.4.1 In Situ-Testing

Standard Penetration Testing was undertaken throughout the cohesive fine grained White Limestone Formation. The results are presented in Graph 12-1 below:





The SPT data shows that within cohesive deposits of the White Limestone Formation SPTs varied from N=10 at 1.20mbgl to N=50 at 2.00mbgl.





The SPT data shows what within granular deposits of the White Limestone Formation SPTs varied from N=31 at 1.20mbgl to N=50 at 2.00mbgl.

12.4.2 Shear strength

The undrained Shear Strength of the fine-grained White Limestone Formation have been determined by using the widely accepted empirical relationship, where f_1 is based on the correlation factor based on the plasticity index of the soil (Stroud, 1974):

$$C_u = f_1 \times SPTN$$

Using a correlation factor of 4.5 gives characteristic undrained shear strengths (C_{uk}) of 45kN/m² at 1.20m bgl rising to 225kN/m² at a depth of 2.00m bgl for the White Limestone Formation represented in Graph 12-3 below. These values suggest the formation is medium to very high strength material.

Undrained Shear strength was also assessed via in-situ testing with a Hand Shear Vane within hand dug trial pits in window sample locations. Results from in-situ testing and laboratory testing are presented on Graph 12-3.

Graph 12-3 Shear Strength vs Depth



12.4.3 Bearing capacity

12.4.3.1 White Limestone Formation

Bearing Capacity at 1.00m bgl

At a depth of 1.00m bgl within the fine-grained soils of the White Limestone Formation, SPT N values range of N=10-50. Utilising the data in Graph 12-3 undrained shear strength from in-situ testing data indicate shear strength range from 45kN/m² to 225kN/m², indicating medium to very high strength material. Utilising an undrained shear strength of 45kN/m² it is considered that a traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 100-200kN/m².

Hand shear vane results at a depth of 1.50m bgl indicated undrained shear strengths of 63kN/m2 to 113kN/m2 and a bearing capacity of approximately 150kN/m² is likely to be achieved in the finegrained soils of the bedrock. At a depth of 1.00m bgl within the coarse-grained soils of the White Limestone Formation, attributed to the weathered limestone, SPT N values range of N=31-50, indicating medium dense to very dense material. Utilising an N value of N=31, it is considered that a traditional strip foundation of 1.00m width at a depth of approximately 1.00m bgl provides a presumed bearing capacity of approximately 500kN/m².

Bearing Capacity at 1.80-2.00m bgl

At a depth of 1.80m bgl within the weathered limestone of the White Limestone Formation, SPT N values were N=>50, which is presumed to be where limestone bedrock has been encountered.

At a depth of 2.00m bgl within the coarse-grained soils of the White Limestone Formation, SPT N values N=50 were recorded, indicating very dense material. It is considered that a traditional strip foundation of 1.00m width at a depth of approximately 2.00m bgl provides a presumed bearing capacity of approximately >800kN/m².

The Previous T&P report (ref. CAM2362_DSGI) concluded that a bearing capacity of 100kN/m² was appropriate at a depth of 1.00m bgl in the gravel or stiff Clay, which is consistent with the assessment above. An allowable bearing capacity of 225kN/m² was deemed appropriate, by T&P, for foundation on weather limestone at depth encountered between 1.60m bgl to 2.10m bgl. The geotechnical assessment within the T&P report was based on limited in-situ testing, therefore the supplementary testing undertaken by Omnia within WS107 to WS115 in the Phase 1 area provides quantitative data, showing that the weathered limestone provides a higher bearing capacity than the 225kN/m² stated.

12.5 Groundwater Levels

Groundwater was encountered as between 1.00m and 1.80mbgl across the east of site during the ground investigation, predominantly along the eastern side of both the Phase 1 to Phase 2 areas. Groundwater was noted to be standing at 0.90mbgl within TP104, WS109 and WS105 after a period of 20 minutes.

Previous Ground Investigation was undertaken by T&P and indicates that groundwater was encountered in four (4no.) out of fifteen (15no.) intrusive locations. These locations were focused along the east side of the site where groundwater levels were found to be between 1.60 and 1.80 mbgl.

The position of the groundwater table has a significant effect on the bearing capacity of the soil. The presence of groundwater table at a depth less than the width of the foundation from the foundation base will reduce the bearing capacity of the soil, often by half.

12.6 Building Near Trees

12.6.1 NHBC Minimum Depth to Foundations

The soils on site have been shown via laboratory analysis to generally be of low to very high plasticity and low to high volume change potential. Modified plasticity indices generally ranged from 10% to 47%, with the majority of results being between 10 to 21%. It is considered that soils of the White Limestone Formation are predominantly low-volume change across the majority of the site, however high volume change soils were found to the southwest of Phase 1 and to the west of the Phase 2.

NHBC guidance offers two foundation depth scenarios dependant on future planting regimes for Low Volume Change Soils which utilises Tables 4 and 5 of NHBC Chapter 4.2 – Building Near Trees, summarised in Table 12-1 and Table 12-2 below.

 Table 12-1 Minimum depth of foundations (after NHBC 2021)

Volume change potential	(A) Minimum foundation depth (m) (allowing for restricted new planting)	(B) Minimum foundation depth (m) (where planting is outside the zone of influence of trees)
High	1.50	1.00
Medium	1.25	0.90
Low	1.00	0.75

Table 12-2 New tree planting (after NHBC 2021)

Water demand	No tree planting zone for column A in Table 12-1	No tree planting zone / zone of influence for column B in Table 12-1	
High	1.0 x mature height	1.25 x mature height	
Moderate	0.5 x mature height	0.75 x mature height	
Low	0.2 x mature height	0.50 x mature height	

NHBC guidance indicates a minimum foundation depth of 1.00m bgl for high volume change soils and 0.75m bgl for low volume change soils outside of the zone of tree influence (Column B, Table 12-1), which is dependent on the tree species but may be up to 1.25 x mature tree height (Table 12-2). Foundation depths will need to be increased within the zones of influence of existing or recently removed trees, as set out by NHBC Guidance (Chapter 4.2 – Building near Trees).

12.6.2 Lateral pressure and heave

Where foundations are more than 1.5m deep, within the influence of trees which are to remain or be removed, and may be subject to heave, they should be protected by voids, void formers or compressible materials to be take into account the effects of lateral swelling of soils. Minimum thicknesses of voids are set out in Table 7 of NHBC Chapter 4.2 – Building Near Trees.

Guidance is set out in the NHBC guidance and the basic requirement is that compressible material or void former should be installed on the inside faces of external foundation walls. With piled foundation additional voids are required below ring beams. Position of heave precautions are set out in Table 8 of NHBC Chapter 4.2 – Building Near Trees.

12.7 Geohazards

12.7.1 Dissolution Features

Due to the soluble nature of limestone, there is a risk to foundations due to the potential pre-existence of voids or cavities due to dissolution of the rock. No natural cavities were identified within a 500m radius, and the hazard associated with the dissolution of soluble rocks was Very Low, as identified within the Groundsure report and summarised in Table 4-2.

Whilst no visual evidence of solution features were identified within the intrusive investigation works from the borehole logs and trail pit logs, should visual signs of solution features be identified in the earthworks and construction phases, such as foundation excavation, contact with a Geotechnical Engineer should be made and further assessment should be undertaken.

12.8 Excavations

High groundwater was encountered during site works along the eastern side of both the Phase 1 and Phase 2 areas. This was confirmed during follow-on monitoring visits. High groundwater may cause pit instability during foundation excavation if open for prolonged periods and excavations should be battered back to a safe angle or suitable shorting techniques adopted to provide stability. Where sand deposits are encountered with high groundwater, running sands may be encountered, which may require the local deepening of foundations. It is recommended that special construction techniques are utilised, when necessary, when excavating foundations, such as dewatering.

The previous T&P report 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI) also advised that groundwater ingress into excavations may be an issue and further advised that specialist dewatering techniques may be required if ingress is not very rapid.

12.9 Ground Floor Slabs

Due to the lateral variably of ground conditions across the site and the presence of expansive soils below the Topsoil, it is considered that ground floor slabs are not suitable for adoption and therefore a suspended floor slab should be adopted in accordance with NHBC Chapter 5.2 to mitigate against the effects of differential settlement.

If levels were to be changed on site requiring steps in the substructure, further consideration should be given to the adoption of floor slabs, with reference to NHBC Standards (2011) Chapter 5 – Substructure, ground floors, drainage and basements.

The previous report by T&P 'Desk Study and Ground Investigation Report' dated March 2019 (ref: 2019Mar_CAM2362_DSGI) also recommended suspended ground floor slabs.

12.10 Road Pavement Construction

CBR values obtained from both Plate Load Testing and Dynamic Cone Penetrometer testing have provided a conservative initial design value of 1-2% which is typical of a firm Clay. It is recommended that confirmatory testing at formation level is undertaken during road construction, where the value may be improved on.

12.11 Concrete Durability

Soils encountered beneath the site have been classified as DS-1, Aggressive Chemical environment for Concrete Classification (ACEC) AC-1 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

12.12 Discussion

At this stage loading of the proposed houses have not been provided, however, it is considered that the site is suitable for shallow foundations for a standard low-rise house type bearing into the White Limestone Formation, providing bearing capacities of 100kN/m² in the firm to stiff Clays of the White Limestone Formation and bearing capacities of 500-800kN/m² within the granular soils and weathered bedrock limestone.

A minimum foundation depth of 0.75m bgl, for low volume change soils, and 1.00m bgl for high volume change soils, is anticipated for fine-grained geology of the White Limestone Formation outside the zone of tree influence, in accordance with NHBC guidance. Where foundations are within the influence of trees foundation depths and areas of restricted new planting foundations will require locally deepening. The extent to which they should be deepened should be in accordance with NHBC guidance, Chapter 4.2 – Building Near Trees (Tables 4 and 5). However, where bedrock limestone is encountered at shallower depths, as it is considered to be non-expansive it will mitigate against the necessity for over deepening of foundation in the influence of trees. Existing mature trees that are presumed to be remaining along the eastern and western extents of site. At present an Arboricultural Report has not been provided for the site, it is recommended that a tree circle diagram is produced for the site, showing areas that foundations would require deepening in accordance with NHBC Chapter 4.2 guidance and would facilitate the production of a Foundation Zoning Plan.

Where foundations are likely to span different strata types, such as the Clays and Limestones of the White Limestone Formation, a reinforced foundation is recommended to minimise different settlement.

Groundwater was generally encountered between 1.10m bgl to 1.80m bgl rising to approximately 0.90m bgl to 1.50m bgl. Additionally, groundwater levels between 1.05m bgl to 1.80m bgl were noted on return monitoring visits. High groundwater may cause excavation instability in granular deposits and reduce the bearing capacity of the soils.

Should loadings exceed those set out above then alternative founding solutions will need to be explored.

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7.

Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths.

13 CONCLUSIONS AND RECOMMENDATIONS

Revised Conceptual Site Model

Elevated concentrations of PAH are considered likely to be present within two areas of burning (Figure 5) in the Phase 1 area (Photograph 4 and 5), which are considered to have the potential to present a significant risk to future site users and therefore limited localised remedial works, comprising the removal and off-site disposal of topsoil, will be required in these areas.

Concrete Classification

Soils encountered beneath the Phase 2 area of site have been classified as DS-1, Aggressive Chemical environment for Concrete Classification (ACEC) AC1 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

Ground Gas Classification

Three rounds of gas monitoring have been undertaken across both the Phase 1 and Phase 2 areas of site.

According to CIRIA publication C665, the Phase 1 and Phase 2 areas of site are classified as Green under the NHBC Traffic Light System. Green indicates a negligible ground gas regime, for which no special gas protection measures are required in the construction of new dwellings or extensions.

According to BS 8485:2015+A1(2019), the site is classified as a Characteristic Situation 1 (CS1); a very low hazard potential. In CS1, neither Type A nor Type B buildings, both of which are included within the proposed development, require special ground protection gas measures.

Permeability Testing

T&P conducted six (6no.) infiltration tests in the Phase 1 area of the site, of which 4no locations were in accordance with BRE 365, yielding infiltration rates of 4.10×10^{-6} m/s to 4.12×10^{-4} m/s indicating low to medium permeability with good drainage conditions. T&P avoided the eastern part of the site due to shallow groundwater.

Four (4no.) soil infiltration tests were undertaken within the Phase 2 area consisting of TP102 (SA), SA102, SA103 and TP103. TP102 (SA) and SA103 were unsuccessful due to the effective storage depth intercepts were not reached within a 24-hour period, whilst SA102 and TP103 were considered successful. The soil infiltration rates calculated for TP103 (design value of 3.62×10^{-6}) and TP103 (design value of 1.30×10^{-5}) are indicative of low permeability with good to poor drainage conditions.

Consideration should be given to shallow groundwater encountered on the eastern side of both the Phase 1 and Phase 2 areas, SA101 and SA104 were unable to be tested due to high groundwater encountered on excavation. This may have implication on the viability of soakaway features within the current proposed drainage strategy (Infrastruct CS Ltd Reports reference: 4388-LETCH-ICS-002-RP-C-07.003 dated October 2021, and 4388-LETCH-ICS-XX-RP-C-07.001 dated July 2021).

Geotechnical Assessment

The site should be cleared of any vegetation below the areas of proposed development and stripped in accordance with Series 200 of Specification of Highway Works.

Neither Topsoil nor Made Ground would be considered to form a suitable founding stratum, due to their characteristic variabilities and associated potential for differential settlement. As such, it is recommended that loads are transferred through the Made Ground and/or Topsoil to a depth at which competent bedrock sufficient to support the proposed load, is encountered.

It is considered appropriate for low-rise housing to be founded at a minimum 1.00m bgl within high volume change soils in the southwest of Phase 1 and the west of Phase 2, and a minimum of 0.75m bgl within low volume change soils across the remainder of the site. Firm to stiff clays of the White Limestone Formation provide bearing capacities of 100-200kN/m², whereas granular deposits and weathered bedrock limestone provide bearing capacities of 500-800kN/m².

If bearing capacities prove insufficient for the proposed scheme, alternative foundation solutions, such as a piled foundation solution may be suitable for the site. However, further ground investigation works would be required

in order to prove competency of the encountered White Limestone Formation to a sufficient depth below building footprints.

It is considered that ground floor slabs are not suitable for adoption and therefore a suspended floor slab should be adopted in accordance with NHBC Chapter 5.2 to mitigate against the effects of differential settlement.

Recommendations

Environmental

Areas of burning were noted within the Phase 1 area being covered by the previous T&P report (ref: 2019Mar_CAM2362_DSGI dated March 2019) and were identified in the current phase of ground investigation.

It is recommended that a localised excavation via a surface scrape is undertaken in the immediate areas of burning and disposed of as hazardous waste to an appropriately licensed waste disposal facility. Upon removal of the impacted material, it is recommended that validation works are undertaken to confirm that the associated concentrations have been removed successfully.

If during the development stage any evidence of contamination is identified, works should be halted, and contact made with a suitably qualified Environmental Consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the regulator to achieve sign off of the works.

Geotechnical

Whilst no visual evidence of solution features were identified within the intrusive investigation works from the borehole logs and trail pit logs, should visual signs of solution features be identified in the earthworks and construction phases, such as foundation excavation, contact with a Geotechnical Engineer should be made and further assessment should be undertaken.

Subject to regulatory requirements, the potential requirement exists to calculate bearing capacities and undertaken settlement analysis for foundations through production of a Geotechnical Design Report (GDR) which would provide calculations to current guidance, UK National Annex to EC7.

APPENDIX I

LIMITATIONS

- 1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Omnia and the Client as indicated in Section 1.2.
- 2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
- 3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
- 4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
- 5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
- 6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
- 7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
- 8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
- 9. Omnia cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by Omnia is owned by them, and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Omnia in this connection without their explicit written agreement there to by Omnia.
- 10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II

GLOSSARY

AST	Above Ground Storage Tank				
BGS	British Geological Survey				
BSI	British Standards Institute				
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes				
CIEH	Chartered Institute of Environmental Health				
CIRIA	Construction Industry Research Association				
CLEA	Contaminated Land Exposure Assessment				
CSM	Conceptual Site Model				
DNAPL	Dense Non-Aqueous Phase Liquid (Chlorinated Solvents, PCB)				
DWS	Drinking Water Standard				
EA	Environment Agency				
EQS	Environmental Quality Standard				
GAC	General Assessment Criteria				
GL	Ground Level				
GSV	Gas Screening Value				
HCV	Health Criteria Value				
ICSM	Initial Conceptual Site Model				
LNAPL	Light Non-Aqueous Phase Liquid (Petrol, Diesel, Kerosene)				
ND	Not Detected				
LMRL	Lower Method Reporting Limit				
NR	Not Recorded				
РАН	Polycyclic Aromatic Hydrocarbon				
РСВ	Poly-Chlorinated Biphenyl				
PID	Photo-Ionisation Detector				
QA	Quality Assurance				
SGV	Soil Guideline Value				
SPH	Separate Phase Hydrocarbon				
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)				
SPT	Standard Penetration Test				
SVOC	Semi Volatile Organic Compound				
UST	Underground Storage Tank				
VCCS	Vibro Concrete Columns				
VOC	Volatile Organic Compound				
WTE	Water Table Elevation				
UNITS					
M	Metres				
KIVI %	Riometres				
% %\//\/	Percent Volume in Air				
MB	Milli Bars (Atmospheric Pressure)				
L/HR	Litres Per Hour				
μG/L	Micrograms Per Litre (Parts Per Billion)				
РРВ	Parts Per Billion				
MG/KG	Milligrams Per Kilogram (Parts Per Million)				
PPM	Parts Per Million				
MG/M ³	Milligram Per Metre Cubed				
M BGL	Metres Below Ground Level				
M BCL	Metres Below Cover Level				

MAODMetres Above Ordnance Datum (Sea Level)KN/M2Kilo Newtons Per Metre SquaredμMMicrometre

APPENDIX III

DRAWINGS











Letchmere Farm, Upper

Heyford, OX25 5HA

28/01/2022

A.ing

			The second
SA		5A103	SA101
	TP111	TP103	TP108
Tennis Court	TFP.113		TP110
TP107		TP109 TP109 TP105	
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Project Number: A11754 Job Title:	Client: David Wilson Homes Date:	Drawn By: G.Larcombe Authorised By:	Drawing Title: Figure 3.2 Intrusive Trial pit and

Soakaway Location Plan

with proposed drainage




APPENDIX IV

PHOTOGRAPHS







Photograph 6 – Looking north within the Phase 1 area.



Photograph 7 – Looking north within the Phase 1 area.

APPENDIX V

HISTORICAL MAPS





451959 225857





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Production date: 09 December 2021





451959 225857

Client Ref: Report Ref: Grid Ref:	A11754_PO31v2 GS-8391754 451953, 225953	
Map Name:	County Series	Ν
Map date:	1900	
Scale:	1:2,500	
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Production date: 09 December 2021





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Client Ref: Report Ref: Grid Ref:	A11754_PO31v2 GS-8391754 451953, 225953	
Map Name:	County Series	Ν
Map date:	1922	
Scale:	1:2,500	
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Production date: 09 December 2021





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Map Name:	National Grid	Ν
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Scale:	1:10,000	
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Production date: 09 December 2021

APPENDIX VI

EXPLORATORY HOLE LOGS

Project Land at Lethmere Farm, Upper Heyford Project No. A1754 Co-ords: 452000.0 - 22875.00 HP101 Sheet 1 of 1 Location: Labor Homere (Southern) 0.3 Science Science Sign berges and history Open to the science in the scienc									Trialpit No
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	Stabili	ty: Stable	е						AGS

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OM	NIA					Tri	al Pit Log	HP102
								Sheet 1 of 1
Projec	t Land at	Letchme	ere Farm, Upper	Projec	t No.		Co-ords: 451959.00 - 225749.00	Date
Name	: Heyward			A1175	4		Level:	17/12/2021
Locati	on: Letchme	ere Farm	i, Upper Heyford				Dimensions 0.3 (m):	Scale
		<i>r</i> 1 11	(Q)				Depth O	Logged
Client	David W	nison HC	omes (Southern)				0.60	
ater rike	Sample	es and I	n Situ Testing	Depth	Level	Legend	Stratum Description	
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								angular to
							sub-rounded fine to coarse limestone.	
	0.40 - 0.50	ES						
							0.45-0.60m bgl: Becomes gravelly.	-
				0.60				
							End of pit at 0.60 m	
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							Trialp	oit No
OMNIA					Tri	al Pit Log	PLT	101
						U	Sheet	1 of 1
Project La Name: He	nd at Letchme eyward	ere Farm, Upper	Projec A1175	≿t No. i4		Co-ords: 451903.59 - 225896.95 Level: 119.47	Da 16/12	ate /2021
Location: Le	tchmere Farm	1. Upper Hevford				Dimensions	Sc	ale
						(m): Depth	1:: Log	20 aed
Client: Da	avid Wilson Ho	omes (Southern)				0.40		T
Strike	th Type	Results	Depth (m)	Level (m)	Legend	Stratum Description		
<u>×</u> ⊼ Dep	th Type	Results	0.25 0.40	(11)		Grass over soft brown sandy CLAY. (TOPSOIL) Orangeish brown slightly sandy gravelly C fine to coarse. Gravel is angular to sub-ro coarse limestone. End of pit at 0.40 m	CLAY. Sand is unded fine to	2
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								Trialpit No
OMNIA						Tri	al Pit Log	PLT102
								Sheet 1 of 1
Project	Land at Lo	etchme	ere Farm, Upper	Projec	t No.		Co-ords: 451903.94 - 225846.24	Date
	Tieywaru			A1175	94		Level: 119.10 Dimensions	16/12/2021 Scale
Location:	Letchmer	e Farm	, Upper Heyford				(m):	1:20
Client:	David Wil	son Ho	mes (Southern)		1		0.50	Logged CT
ke te	Samples	s and l	n Situ Testing	Depth	Level	Legend	Stratum Description	
> 00 - 5		1900		0.20	118.90		Grass over soft brown sandy CLAY. (TOPSOIL) Orangeish brown slightly sandy gravelly CLAY. fine to coarse. Gravel is sub-angular to sub-rou to coarse limestone.	Sand is
				0.50	118.60		(WHITE LIMESTONE FORMATION) End of pit at 0.50 m	
								4
Remarks: Stability:	Cleare	d by Mi	idlands Survey. No gro	undwate	er encou	ntered.		AGS

								Trialpit No
OM	NIA					Tri	al Pit Log	PLT103
								Sheet 1 of 1
Project Name:	Land at Heywar	Letchme d	ere Farm, Upper	Projec A1175	st No. 54		Co-ords: 451913.41 - 225797.06 Level: 118.36	Date 16/12/2021
Locatio	n: Lotchme	oro Form	Lipper Heyford	I			Dimensions	Scale
LUCALIO							(m):	1:20
Client:	David W	/ilson Ho	mes (Southern)				0.50	Logged CT
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								Trialpit No
OM	NIA					Tri	al Pit Log	PLT104
							_	Sheet 1 of 1
Project	Land at	Letchme	ere Farm, Upper	Projec	t No. ⊿		Co-ords: 451905.52 - 225748.08	Date
	litymarc			AIII3	/4		Dimensions	Scale
Locatio	on: Letchme	re ⊦arm	, Upper Heyford				(m):	1:20
Client:	David W	ilson Ho	omes (Southern)		1		0.60	Logged CT
/ater trike	Sample	es and I	n Situ Testing	Depth (m)	Level (m)	Legenc	I Stratum Description	
Wat Wat	Depth	Туре	Results	0.30 0.60	(m) 115.55 115.25		Grass over soft brown sandy CLAY. Sand is fin- coarse. (TOPSOIL) Orangeish brown sandy gravelly CLAY. Sand is medium. Gravel is angular to sub-rounded fine limestone. (WHITE LIMESTONE FORMATION) End of pit at 0.60 m	e to
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Stabilit	y: Stabl	e						AGS

								Trialpit N	lo
OM	INIA					Tri	al Pit Log	PLT10)5
							_	Sheet 1 o	f 1
Projec	t Land at	Letchme	ere Farm, Upper	Projec	ct No.		Co-ords: 451912.45 - 225959.05	Date	21
		<u> </u>		AIII3	94		Dimensions	Scale	
Locati	ion: Letchm	ere ⊦arm	, Upper Heyford				(m):	1:20	
Client	: David V	Vilson Ho	mes (Southern)				0.50	Logged CT	i
e e	Sampl	les and I	n Situ Testing	Depth	l evel				
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								Trialpit No	
OM	INIA					Tri	al Pit Log	PLT106	;
								Sheet 1 of 1	1
Projec	ct Land at	Letchme	ere Farm, Upper	Projec	ct No.		Co-ords: 451987.89 - 225958.11	Date	
		<u> </u>			/4		Dimensions	Scale	
Locati	ion: Letchm	ere ⊦arm	, Upper Heyford				(m):	1:20	
Client	: David V	Vilson Ho	omes (Southern)				0.50	Logged CT	
e er	Sampl	es and I	n Situ Testing	Depth	Level			01	
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							Trialpit No
OMNIA					Tri	al Pit Log	PLT107
							Sheet 1 of 1
Project I Name:	Land at Letchme Hevward	ere Farm, Upper	Projec	t No.		Co-ords: 451973.35 - 225884.72	Date
		Linner Lieufeud				Dimensions	Scale
Location:	Letchmere Farm	, Upper Heylord				(m):	1:20
Client:	David Wilson Ho	mes (Southern)				0.50	Logged CT
ke	Samples and I	n Situ Testing	Depth	Level	legend	Stratum Description	
Stri Stri	epth Type	Results	(m)	(m)			ad is fine
			0.20	117.84		Grass over soft brown slightly sandy CLAY. Sat to medium. (TOPSOIL) Orangeish brown sandy gravelly CLAY. Sand is medium. Gravel is sub-angular to sub-rounded coarse limestone. (WHITE LIMESTONE FORMATION) End of pit at 0.50 m	a fine to fine to fine to 1 - 2 - 3 - 3 -
Remarks:	Cleared by M	idlands Survey. No grou	undwate	er encou	ntered.		4 -
Stability:	Stable.						AGS

								Trialpit	No
OM	INIA					Tri	al Pit Log	PLT1	80
							_	Sheet 1	of 1
Projec Name	ct Land at	Letchme d	ere Farm, Upper	Projec	t No. ⊿		Co-ords: 451982.29 - 225824.84	Date 16/12/20	121
	ion: Lotohm	oro Form			-		Dimensions	Scale)
LUCAL		ele Falli					(m):	1:20	
Client	: David W	/ilson Ho	omes (Southern)				0.50	Logge CT	d
/ater trike	Sample	es and I	n Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description		
≤ Ø	Deptil	Type	Results	()			Grass over soft brown slightly sandy CLAY. Sar	nd is fine	-
							to coarse. (TOPSOIL)		-
				0.20	116.56	<u>~~~</u> ~~	Orangeish brown sandy gravelly CLAY. Sand is	fine to	1 -
	0.30 - 0.50	В					 coarse. Gravel is angular to sub-rounded fine to limestone. 	o coarse	
							(WHITE LIMESTONE FORMATION)		
				0.50	116.26	1001 + <u>1 6</u> 1, 1	End of pit at 0.50 m		-
									-
									-
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Remo		ed by M	idlands Survey, No are	undwate	er encou	ntered			
			indiando ourvey. No giù	anawalt		noreu.			
Ctok:		~							5
SIADII	ny. Stabl	e							

_								Trialpit No
OM	NIA					Tri	al Pit Log	PLT109
							-	Sheet 1 of 1
Project	Land at I	Letchme	re Farm, Upper	Projec	t No.		Co-ords: 451956.78 - 225770.37	Date
		_			94		Dimensions	Scale
Locatio	n: Letchme	re ⊦arm	, Upper Heyford				(m):	1:20
Client:	David W	ilson Ho	mes (Southern)		1		Depth 0.50	Logged CT
Vater ttrike	Sample Depth	es and Ir	n Situ Testing Results	Depth (m)	Level (m)	Legend	I Stratum Description	
Wa	Depth	Type	Results	(m) 0.30 0.50	(m) 116.01 115.81		Soft brown sandy CLAY. Sand is fine to coarse (TOPSOIL) Dark orangeish brown sandy gravelly CLAY. Si to medium. Gravel is angular to sub-rounded fi coarse limestone. (WHITE LIMESTONE FORMATION) End of pit at 0.50 m	and is fine ine to
								4 -
Remark Stability	ks: Clear y: Stable	ed by Mi	dlands Survey. No g	jroundwate	er encou	⊥ intered.	I	AGS

										Trialpit N	10
OM	INIA							Tri	al Pit Log	PLT11	10
									–	Sheet 1 c	of 1
Projec Name	ct La e: H€	nd at l eyward	Letchme 1	ere Farm, Upp	ber	Projec A1175	t No. 4		Co-ords: 451879.33 - 225782.94 Level: 118.69	Date 16/12/20	21
Locati	ion: Lo	tchmo	re Form	Lipper Heyf	ord				Dimensions	Scale	
Locat			aciani						(m):	1:20	
Client	: Da	avid W	ilson Ho	omes (Southe	rn)				0.50	Logged CT	1
/ater trike	S	ample	es and I	n Situ Testin	g i	Depth (m)	Level (m)	Legend	Stratum Description		
≤ Ø	Бер	'u i	Type	Result	.5	()			Grass over soft brown slightly sandy CLAY. Sar	nd is fine	
									to medium. (TOPSOIL)		-
									()		-
						0.30	118.39		Orangeish brown sandy gravelly CLAY. Sand is	fine to	-
									coarse. Gravel is angular to sub-rounded fine to limestone.	o coarse	-
						0.50	118.19	<u></u>	(WHITE LIMESTONE FORMATION)	/	
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											4 -
Rema	ırks:	Clear	ed by M	lidlands Surve	ey. No grou	Indwate	er encou	ntered.	1		
1			,								
Stabili	ity:	Stable	Э.							AG	Ъ
L	,										

								Trialpit	No
OM	INIA					Tri	al Pit Log	SA10)1
								Sheet 1	of 1
Proje	ct Land at	Letchme	re Farm, Upper	Projec	ct No.		Co-ords: 452006.82 - 225933.24	Date	;
Name	e: Heyward	3		A1175	54		Level: 116.25	15/12/20	021
Locat	ion: Letchme	ere Farm	, Upper Heyford				(m): 2.5	1:20	3
Client	:: David W	/ilson Ho	mes (Southern)				2.00	Logge	ed:
ater ike	Sample	es and li	n Situ Testing	Depth	Level	Legend	I Stratum Description		
ŝ	Depth	Type	Results	(11)	(11)		Grass over soft brown sandy CLAV		
	0.00 - 0.40 0.40 - 0.80 0.80 - 1.00 1.00 - 2.00	ES B B		0.40	115.85		Grass over soft brown sandy CLAY. (TOPSOIL) Firm brown gravelly CLAY with some limestone (WHITE LIMESTONE FORMATION)	cobbles.	
Rema	arks: Clear	ed by Mi	dlands Survey Grou	Indwaters	strike at 7	1.80m b	al rising to 1.10m bal.		4
Stabil	ity: STAB		alanus survey. Grot	anuwater s	Suike al	1.001110(grinang to 1. rolli byl.	AC	àS

								Trialpit No		
OM	NIA				I rial Pit Log					
						,	5	Sheet 1 of 1		
Projec Name	t Land at l Hevward	_etchme I	re Farm, Upper	Project A1175	ct No. 54		Co-ords: 451880.66 - 225933.13	Date		
Locati	on: Letchme	re Farm	Upper Hevford		, T		Dimensions 2.5	Scale		
							(m): Depth	1:20		
Client	: David W	ilson Ho	mes (Southern)	1	1	,	1.60	CT		
'ater rike	Sample	es and li	n Situ Testing	Depth (m)	Level	Legend	Stratum Description			
S ₽	Depth 0.00 - 0.40	Type ES	Results				Grass over soft brown slightly sandy CLAY.			
	0.00 - 0.40	ES B B		0.40 0.60	119.45 119.25 118.25		Grass over soft brown slightly sandy CLAY. (TOPSOIL) Soft brown sandy gravelly CLAY with abundant to sub-rounded limestone cobbles. Sand is fine coarse. Gravel is angular to sub-rounded fine to fint and limestone. (WHITE LIMESTONE FORMATION) Soft light brown sandy gravelly CLAY with abur angular to sub-rounded limestone cobbles. San to coarse. Gravel is angular to sub-rounded fine coarse limestone. (WHITE LIMESTONE FORMATION) End of pit at 1.60 m	angular to o coarse ndant nd is fine e to 2 2 3 3		
Rema	rks: Clear	ed bv Mi	dlands Survey Seer	age at 1 (60m bal		1			
Stabili	ity: STAB				<u> </u>			AGS		

								Trialpit No	
OM	NIA					Tri	al Pit Log	SA103	
							0 1 154040 00 005004 50	Sheet 1 of 1	
Projec	t Land at Hevward	Letchme 1	ere Farm, Upper	Projec	CT NO.		Co-ords: 451943.88 - 225931.52	Date	
		-			/ -		Dimensions 2.5	Scale	
Locati	on: Letchme	ere ⊦arm	i, Upper Heyford				(m):	1:20	
Client	: David W	ilson Ho	omes (Southern)		1		1.70	Logged CT	
ike	Sample	es and I	n Situ Testing	Depth	Level	Legend	Stratum Description		
<u>> 0</u>	0.00 - 0.30	ES		0.30	118.57		Grass over soft brown slightly sandy CLAY. Sar to medium. (TOPSOIL) Soft brown sandy gravelly CLAY with abundant to sub-rounded limestone cobbles. Sand is fine coarse. Gravel is angular to sub-rounded fine to limestone. (WHITE LIMESTONE FORMATION)	angular to o coarse	
	0.70 - 1.00	В						1 -	
	1.20 - 1.60	В							
Rema	rks: Clear	ed by M	idlands Survey. Seepa	1.70	117.17		End of pit at 1.70 m	2	
Stabili	ity: STAB	ILE	· -)	J				AGS	

Samples Depth Samples Depth Co-ords: 451996.67 - 225973.32 Location: Letchmere Farm, Upper Heyford Dimensions 2.5 Client: David Wilson Homes (Southern) Depth 0 1.90 Samples and In Situ Testing Depth (m) Meson 0.40 - 0.80 ES 0.40 117.10 Grass over soft brown sandy CLAY. 0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles 0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles 0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles 0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles 0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles 1.00 - 1.90 B 1.90 115.60 Soft brown gravelly CLAY with limestone cobbles 1.90 115.60 End orphatil 1.90 m End orphatil 1.90 m	SA104 Sheet 1 of 1 Date
Project Name: Land at Letchmere Farm, Upper Heyward Project No. A11754 Co-ords: 451996.67 - 225973.32 Level: Location: Letchmere Farm, Upper Heyford Dimensions 2.5 Client: David Wilson Homes (Southern) Depth 0 1.90 Samples and In Situ Testing Depth 0 0.00 - 0.40 ES 0.40 117.10 0.40 - 0.80 ES 0.40 117.10 0.40 - 0.80 ES 0.40 117.10 0.80 - 1.00 B 0.40 117.10 1.00 - 1.90 B 1.90 Soft brown gravely CLAY with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION)	Sheet 1 of 1 Date
Project Land at Letchmere Farm, Upper Project No. A11754 Co-ords: 451996.67 - 225973.32 Location: Letchmere Farm, Upper Heyford Dimensions 2.5 Client: David Wilson Homes (Southern) Depth I.90 Image: Signature	Date
Instruct Instruct Instruct Instruct Instruct Location: Letchmere Farm, Upper Heyford Dimensions 2.5 Client: David Wilson Homes (Southern) Depth Instruction Image: Second Structure Depth Type Results Image: Second Structure Depth Type Results Image: Second Structure Depth Type Results Image: Second Structure O.40 - 0.80 ES O.40 Image: Output Structure O.40 Instructure Soft brown gravely CLAY with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION) Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure Image: Output Structure	15/12/2021
Location. Letrimete rain, opper region (m): Depth Depth Client: David Wilson Homes (Southern) 1.90 1.90	Scale
Client: David Wilson Homes (Southern) Barpies and In Situ Testing Depth Depth Type Results Cmm 0.00 - 0.40 ES 0.40 - 0.80 ES 0.40 - 0.80 ES 0.80 - 1.00 B 1.00 - 1.90 B 1.00 - 1.90 B 1.00 - 1.90 B 1.90 115.60	1:20
Barbon Samples and In Situ Testing Depth Level (m) Legend Stratum Description 0.00 - 0.40 ES 0.00 - 0.40 ES Soft brown sandy CLAY. (TOPSOIL) Grass over soft brown sandy CLAY. (TOPSOIL) 0.40 - 0.80 ES 0.40 117.10 Soft brown gravely CLAY with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION) 0.80 - 1.00 B 1.00 - 1.90 B 1.90 115.60	Logged CT
Soft Depth Type Results (m) (m) C 0.00 - 0.40 ES 0.40 ES Grass over soft brown sandy CLAY. (TOPSOIL) Grass over soft brown sandy CLAY. (TOPSOIL) 0.40 - 0.80 ES 0.40 117.10 Soft brown gravely CLAY with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION) 0.80 - 1.00 B 1.00 - 1.90 B Image: Soft brown gravely clay with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION) Image: Soft brown gravely clay with limestone cobbles is subangular to subrounded fine to coarse limes is subangular to subrounded fine to coarse limes if the train	
0.40 - 0.80 ES 0.40 117.10 Soft brown gravelly CLAY with limestone cobbles is subangular to subrounded fine to coarse limes (WHITE LIMESTONE FORMATION) 0.80 - 1.00 B Image: Comparison of the coarse limes is subangular to subrounded fine to coarse limes is subrounded fine to coarse limes is subrounded fine to coarse limes is subangular to subrounded fine to coarse limes is subrounded fine to coa	
	s. Gravel stone. 1
Remarks: Cleared by Midlands Survey. Seenage at 1.80m bol	4
Stability: STABLE	AGS

								Trialpit No		
OM	NIA				Trial Pit Log					
								Sheet 1 of 1		
Projec	t Land at	Letchme	re Farm, Upper	Projec	t No.		Co-ords: 451891.66 - 225952.76	Date		
	. noyward	-		AII75	4		Dimensions 2.5	Scale		
Locati	on: Letchme	ere ⊦arm,	Upper Heyford				(m):	1:20		
Client	: David W	/ilson Ho	mes (Southern)		1	1	1.35	Logged CT		
ater ike	Sample	es and Ir	n Situ Testing	Depth	Level	Legend	Stratum Description			
Str Va	Depth	Туре	Results	(m)	(m)			die fine		
	0.00 - 0.40 0.50 - 0.80 0.50 - 1.00 1.00 - 1.35	ES B B		0.40	119.13		Grass over soft brown slightly sandy CLAY. Sar to coarse. (TOPSOIL) Orangeish brown sandy gravelly CLAY. Abunda angular to sub-angular limestone cobbles. Grav angular to sub-rounded fine to coarse limestone (WHITE LIMESTONE FORMATION) End of pit at 1.35 m	nd is fine int rel is a. 1 - 2 - 3 -		
								4 -		
Rema	rks: Clear	ed by Mi	dlands Survey. No gro	undwate	er encou	ntered.	1			
Stabili	ty: STAB	BLE						AGS		

								Trialpit No
OM	NIA					Tri	al Pit Log	TP102
 								Sheet 1 of 1
Projec Name	t Land at l	Letchme I	ere Farm, Upper	Projec	t No. 4		Co-ords: 451923.19 - 225969.99	Date 15/12/2021
		ro [c===		11173	-r		Dimensions 2.5	Scale
Locati	on. Leichme	ie Farm	, оррег пеутога				(m): south solution	1:20
Client:	: David W	ilson Ho	omes (Southern)		1			Logged CT
ater rike	Sample	es and I	n Situ Testing	Depth	Level	Legend	Stratum Description	
Wate Strike	Depth 0.00 - 0.30 0.50 - 0.80 0.50 - 1.00 1.00 - 1.60	Type ES B B	Results	0.40 1.60	118.53 117.33		Grass over soft brown slightly sandy CLAY. San to medium. (TOPSOIL) Orangeish brown sandy gravelly CLAY with abulimestone cobbles. Sand is fine to coarse. Gravangular to sub-rounded fine to coarse limestone (WHITE LIMESTONE FORMATION) End of pit at 1.60 m	Indant el is 2
Rema	rks:							3 -
Stabili	ty: STAB	LE						AGS

								Trialpit No	
OM	INIA					Tri	al Pit Log	TP103	
								Sheet 1 of 1	
Projec	ct Land at	Letchme	ere Farm, Upper	Projec	t No.		Co-ords: 451968.33 - 225950.79	Date	
, and				AII75	94		Dimensions 2.5	Scale	
Locat	ion: Letchme	ere Farm	, Upper Heyford				(m):	1:20	
Client	:: David W	ilson Ho	mes (Southern)				Depth 0.1	Logged CT	
ater ike	Sample	es and l	n Situ Testing	Depth	Level	Legend	Stratum Description		
Str Ve	Depth	Туре	Results	(m)	(m)		Cross over off brown condu CLAV. Sond is find	a ta	
	0.00 - 0.30 0.50 - 0.80 0.50 - 1.00 1.20 - 1.90	ES B B		0.30	118.02		Grass over soft brown sandy CLAY. Sand is fine medium. (TOPSOIL) Light brown slightly sandy gravelly CLAY. Sand coarse. Gravel is angular to sub-rounded fine to limestone. (WHITE LIMESTONE FORMATION)	e to	
								4 -	
Rema Stabil	irks: itv: STAR			_	_	_		AGS	

								Trialpit No	
OM	NIA					Tri	al Pit Log	TP104	
								Sheet 1 of 1	
Projec Name	t Land at l : Hevward	Letchme 1	ere Farm, Upper	Projec	t NO. ⊿		Co-ords: 452008.20 - 225962.68	Date 15/12/2021	
Loooti	on: Lotohmo	ro Form	Linner Heyford	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-		Dimensions 2.5	Scale	
Locati	on. Letchine	re rann	, оррег пеутога				(m):	1:20	
Client	: David W	'ilson Ho	mes (Southern)		ſ			Logged CT	
ater ike	Sample	es and l	n Situ Testing	Depth	Level	Legend	Stratum Description		
st K	Depth	Туре	Results	(m)	(m)		Cross over off brown condu CLAV. Sond is fin	a ta	
	0.00 - 0.40 0.50 - 0.80 0.80 - 1.00 1.20 - 1.60	ES		0.50	116.75		Class over soft brown slightly sandy slightly grav (TOPSOIL) Soft very light brown slightly sandy slightly grav CLAY. Sand is fine to coarse. Gravel is angular angular fine to coarse limestone. (WHITE LIMESTONE FORMATION)	relly to sub- 2 3	
									-
				<u>4 - ب دام</u>				4	_
Rema Stabili	ty: STAB	ea by Mi	iaianas survey. Groun	dwater s	Trike at 2	1.60m bộ	gi rising to v.90m bgi.	AGS	

								Trialpit N	No	
OMI	NIA					Tr	ial Pit Log	TP10	TP109	
L							-	Sheet 1 o	of 1	
Project Name [.]	Land at Hevwar	Letchme d	re Farm, Upper	Projec	21 NO.		Co-ords: -	Date 16/12/20	121	
1 4 -			llum on llos fored				Dimensions 2.5	Scale	21	
Localio	n: Leichme	ere Farm	, Opper Heylord				(m):	1:20		
Client:	David W	/ilson Ho	mes (Southern)				1.20	Logged CT	d	
/ater trike	Sampl	es and li	n Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description			
≤ õ	Deptil	Type	Results				Grass over soft brown sandy CLAY. Sand is fine	e to	_	
				0.50			Coarse. (TOPSOIL)	Sand is		
							(WHITE LIMESTONE FORMATION)			
				1.20			End of hit of 1 20 m		-	
									2	
									4 -	
Remark	ks: Clear	red by Mi	dlands Survey. Seep	age at 1.2	20m bgl.		1			
Stability	y: STAE	BLE						AG	S	

OMNIA							Borehole No.		
				Borehole Log				WS101	
							U	Sheet 1 of 1	
Project Name: Land at Letchmere Farm, Upper Heyward			re Farm, Upper Pr A´	oject No. 11754		Co-ords:	451896.07 - 225974.56	Hole Type WS	
Location: Letchmere Farm, Upper Heyford			, Upper Heyford			Level:	119.29	Scale 1:25	
Client: David Wilson Homes (Southern)						Dates:	16/12/2021 - 16/12/2021	Logged By JC	
Well Water	Samples	Samples and In Situ Testing		Depth	Level	Legend	Stratum Descriptior	י ז	
Surikes	Depth (m)	Туре	Results	(11)	(11)		Cross over soft brown slightly cond		
	0.00 - 0.30 0.50 - 0.80 1.20 - 1.40 1.50 - 1.70 1.80	ES ES	N=12 (1,2/2,3,3,4) 50 (25 for 75mm/50 for 15mm)	0.40 0.80 1.00 1.45 1.80	118.89 118.49 118.29 117.84 117.49		Grass over soft brown slightly sand (TOPSOIL) 0.30-0.40m bgl: Becomes orangish brown. Orangey brown slightly sandy claye Gravel is sub-angular to sub-rounde coarse limestone. (WHITE LIMESTONE FORMATION Orangey brown clayey SAND with a angular limestone cobbles. (WHITE LIMESTONE FORMATION Orangey brown firm sandy CLAY w gypsum crystals (up to 15mm). (WHITE LIMESTONE FORMATION Orangey brown grey firm sandy des CLAY. (WHITE LIMESTONE FORMATION End of borehole at 1.80 m	y CLAY. ey GRAVEL. ed fine to i) abundant sub- i) ith abundant i) ssicated i) 2 3	
Remarks 1. Position sca	anned with ca	librate	d CAT & 'Genny' pri	or to exca	vation.			5	
									Borehole No.
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OM	INIA					Bo	reho	ole Log	WS102
								0	Sheet 1 of 1
Projec	t Name:	Land at Le Heyward	etchme	re Farm, Upper	Project No. A11754		Co-ords:	451917.61 - 225945.04	Hole Type WS
Locati	on:	Letchmere	Farm	Upper Hevford			Level:	119.30	Scale
				,					1:25
Client	:	David Wils	on Ho	mes (Southern)	1	T	Dates:	16/12/2021 - 16/12/2021	JC
Well	Water Strikes	Samples	s and I	In Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description	ı
		0.10 - 0.20	ES	Results				Grass over soft orangeish brown sl CLAY with frequent rootlets. (TOPSOIL)	ightly gravelly
		0.30 - 0.80 0.40 - 0.50	B ES		0.25	119.05		Brown and light grey slightly sandy angular to sub-rounded fine to coar GRAVEL with frequent sub-angular cobbles. (WHITE LIMESTONE FORMATION	very clayey rse limestone limestone
		0.85		N=42 (8,19/19,10,6,7)	0.85	118.45		Sub-angular limestone COBBLES yellowish brown slightly gravelly sa Gravel is sub-angular to sub-round medium limestone. (WHITE LIMESTONE FORMATION	with infill of ndy CLAY. ed fine to
	>	1.30 - 1.40	D		1.25	118.05		Yellowish brown silty fine to mediur (WHITE LIMESTONE FORMATION	n SAND. N)
		1.50 - 1.60	D	HVP=97 HVR=3	1.45 7	117.85		Firm orangeish brown and greenish with abundant sand sized gypsum	n grey CLAY
		1.70 - 1.80	D	HVP=115 HVR=3	1.65	117.65		(WHITE LIMESTONE FORMATION Very stiff light grey and orange slight	1)
		1.80		50 (10,16/50 for	1.80	117.50		CLAY.	D /
									3 -
Rema 1. Pos	rks sition sca	anned with ca	librate	d CAT & 'Genny'	prior to exca	vation.			AGS

								Borehole No	o.
OMNIA					Bo	reho	ole Log	WS103	\$
							U	Sheet 1 of 1	1
Project Name:	Land at Le Heyward	etchmer	re Farm, Upper	Project No. A11754		Co-ords:	451942.55 - 225965.49	Hole Type WS	
Location:	Letchmere	Farm	Upper Heyford	1			118 70	Scale	
	Letchinere	; i aiiii,				Level.	110.70	1:25	
Client:	David Wils	on Hor	nes (Southern)			Dates:	16/12/2021 - 16/12/2021	Logged By JC	
Well Water Strikes	Samples	s and l	n Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description	1	
	Depth (m)	туре	Results				Grass over soft dark brown slightly CLAY with frequent rootlets.	gravelly	
	0.00 0.40	F 0		0.20	110.40		(TOPSOIL) 0.20m bgl: Becomes gravelly.		-
	0.30 - 0.40	ES		0.30	118.40		Limestone BEDROCK.	1)	-
				0.45	118.25		End of borehole at 0.45 m	9	-
									-
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Remarks						I			
1. Position sca	anned with ca	librated	ICAI & 'Genny'	prior to excav	vation. Har	id pits refu	ised due to bedrock.	AGS	3

								Borehole No.
OMNIA	OMNIA				Bo	reho	ole Log	WS104
								Sheet 1 of 1
Project Name	e: Land at Le Heyward	etchme	ere Farm, Upper F A	Project No. 11754		Co-ords:	451971.77 - 225934.99	Hole Type WS
Location:	Letchmere	e Farm	, Upper Heyford			Level:	118.34	Scale
								1:25
Client:	David Wils	son Ho	mes (Southern)	-1	1	Dates:	16/12/2021 - 16/12/2021	JC
Well Water Strikes	Sample	s and I	In Situ Testing	Depth (m)	Level (m)	Legend	Stratum Descriptior	ı
Strikes	 Depth (m) 0.00 - 0.30 0.40 - 0.50 0.40 - 0.60 0.70 - 1.00 1.20 1.20 - 1.30 1.55 - 1.75 1.75 	Type ES B D D	Results HVP=152 HVR=26 HVP=81 HVR=37 HVP=97 HVR=46 N=43 (8,10/14,15,9,5) 50 (18,7/50 for 75mm)	(m) 0.40 0.65 1.00 1.20 1.45 1.75	(m) 117.94 117.69 117.34 117.14 116.89 116.59		Grass over firm brown slightly sand CLAY with frequent subrounded lim cobbles. Gravel is angular to sub-a coarse. (TOPSOIL) Firm orangey brown slightly sandy (TOPSOIL) Firm to stiff light yellow slightly sand (TOPSOIL?) Orangish yellow slightly clayey grav to coarse SAND. Gravel is fine to c limestone. (WHITE LIMESTONE FORMATION Light yellowish grey slightly silty gra coarse SAND. Gravel is sub-angula rounded fine to medium limestone. (WHITE LIMESTONE FORMATION Stiff light yellowish brown slightly sa gravelly dessicated CLAY. Gravel is to sub-rounded fine to medium lime (WHITE LIMESTONE FORMATION End of borehole at 1.75 m	y gravelly lestone ngular fine to CLAY. dy CLAY. /velly medium oarse l) avelly fine to ar to sub- l) andy slightly s sub-angular setone. l) 2 - 3 - 4 -
Remarks								5 -
1. Position sc	canned with ca	librate	d CAT & 'Genny' pi	rior to exca	vation.			AGS

									Borehole No.
OM	INIA					Bo	reho	ole Log	WS105
								0	Sheet 1 of 1
Projec	t Name:	Land at Le Heyward	tchme	re Farm, Upper Pı A	roject No. 11754		Co-ords:	452006.97 - 225947.56	Hole Type WS
Locati	on:	Letchmere	Farm	. Upper Hevford			Level:	117.35	Scale
									1:25
Client	:	David Wils	on Ho	mes (Southern)			Dates:	16/12/2021 - 16/12/2021	JC
Well	Water Strikes	Sample:	s and	In Situ Testing	Depth (m)	Level (m)	Legend	Stratum Descriptior	1
Well	Strikes	David Wilson Homes (Southern) Samples and In Situ Testing Depth (m) Type Results 0.20 - 0.30 ES			0.85 1.20 1.80 2.00	(m) 116.50 116.15 115.55 115.35		Stratum Description Grass over stiff brown slightly sand frequent rootlets. (TOPSOIL) 0.15m bgl: Becomes orangish brown. Orangeish brown silty gravelly fine SAND. Gravel is sub-angular to sub to coarse limestone. (WHITE LIMESTONE FORMATION Firm light yellow slightly sandy grave Gravel is sub-angular to sub-rounded coarse limestone. (WHITE LIMESTONE FORMATION 1.35-1.45m bgl: Light yellow slightly sandy angular to sub-rounded fine to medium lime Stiff light yellow slightly gravelly CL sub-angular to sub-rounded fine to limestone. (WHITE LIMESTONE FORMATION End of borehole at 2.00 m	to coarse p-rounded fine I) relly CLAY. ed fine to I) clayey sub- sstone GRAVEL. AY. Gravel is medium I) 3 -
									4 -
Rema 1. Pos	rks ition sca	anned with ca	librate	d CAT & 'Genny' pri	or to excav	vation.		1	AGS

L

								Borehole No	o.	
OM	INIA					WS106	\$			
								0	Sheet 1 of 1	1
Projec	t Name:	Land at Le Heyward	etchme	ere Farm, Upper P A	roject No. 11754		Co-ords:	451982.99 - 225973.10	Hole Type WS	
l ocati	on:	Letchmere	e Farm	Upper Hevford			l evel:	117.70	Scale	
				·····					1:25	
Client	: 	David Wils	son Ho	omes (Southern)	1	1	Dates:	16/12/2021 - 16/12/2021	JC	
Well	Water Strikes	Sample:	s and	In Situ Testing	Depth (m)	Level (m)	Legend	Stratum Descriptior	ı	
			Турс	results				Grass over soft brown slightly sand	y CLAY with	
		0.10 - 0.30	ES					frequent rootlets. (TOPSOIL)		-
		0.30 - 0.50	ES					0.30m bgl: Becomes orange.		-
					0.55	447.45				-
		0.60 - 0.70	В		0.55	117.15		Light yellow sandy clayey fine to co GRAVEL. Gravel is sub-angular to	arse sub-rounded	-
					0.70	117.00	· · · · · · · · · · · · · · · · · · ·	fine to medium limestone.	n (-
							· · · · · · · · · · · · · · · · · · ·	Firm to stiff light greyish brown sligh	itly gravelly	-
		1 10 - 1 20						to medium limestone.		1 -
		1.20		18 (26 for 0mm/18 fo	r 1.20	116.50	· · · · · · · · · · · · · · · · · · ·	Vellowish brown slightly sandy clay	l) ev sub-	-
		1.30 - 1.50	D	225mm)	1.30	116.40		angular to sub-rounded medium to	coarse	-
									1)	-
		1.60		50 (25 for 75mm/50	1.55 1.60	116.15 116.10	XX	angular to sub-rounded fine to med	ium	-
				ior 75mm)				Imestone.	1)	-
								Light grey slightly silty gravelly fine SAND. Gravel is sub-angular to sub	to coarse	-
								to medium limestone. (WHITE LIMESTONE FORMATION	1)	2 -
								End of borehole at 1.60 m	//	-
										-
										-
										-
										-
										3 —
										-
										-
										-
										-
										-
										-
										4 —
										-
										-
										-
										-
										-
										-
										5 —
Rema	rks									
1. Pos	ition sca	anned with ca	librate	d CAT & 'Genny' pr	ior to exca	vation.				
									AGN)

									Borehole No.
OM	NIA					Bo	reho	ole Log	WS107
									Sheet 1 of 1
Projec	t Name:	Land at Le Heyward	tchme	re Farm, Upper P	Project No. 11754		Co-ords:	451986.76 - 225900.68	Hole Type WS
Locati	on:	Letchmere	Farm	ı, Upper Heyford			Level:	117.75	Scale
									1:25
Client	: 	David Wils	son Ho	mes (Southern)		1	Dates:	17/12/2021 - 17/12/2021	JC
Well	Water Strikes	Sample:	s and	In Situ Testing	Depth (m)	Level (m)	Legend	Stratum Descriptior	1
		Deptir (iii)			0.25	117.50		Grass over soft brown slightly sand frequent rootlets. (TOPSOIL)	y CLAY with
		0.30 - 0.40 0.30 - 0.50	B B	HVP=79 HVR=34				(TOPSOIL)	-
		0.60 - 0.90	В	HVP=89 HVR=50	0.55	117.20		Light yellow slightly sandy gravelly CLAY. Gravel is sub-angular to sub to coarse limestone. (WHITE LIMESTONE FORMATION 0.80-1.20m bgl: Becomes dark yellow.	dessicated -rounded fine I) 1 –
		1.20		N=40 (4,5/6,9,13,12) 1.20	116.55		Light yellow slightly sandy clayey so sub-rounded fine to coarse limestor	ub-angular to
	1.20 1.40 - 1.50		50 (25 for 75mm/50 for 25mm)	1.40 1.50	116.35		(WHITE LIMESTONE FORMATION Dark yellow slightly gravelly clayey SAND. Gravel is angular to sub-rou coarse limestone. (WHITE LIMESTONE FORMATION End of borehole at 1.50 m	i) fine to coarse nded fine to i) 2	
Rema	rks	apped with co		d CAT & 'Coppu' pr	ior to except	otion			4
1.103			instate	a ora a comy pr					AGS

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						Borehole No				
OM	INIA					Bo	reho	ole Log	WS108	
							_	•	Sheet 1 of 1	
Projec	t Name:	Land at Le Heyward	etchme	re Farm, Upper	Project No. A11754		Co-ords:	452009.89 - 225852.11	Hole Type WS	
Locati	on:	Letchmere	e Farm.	Upper Heyford			Level:	116.34	Scale	
									1:25	
Client	:	David Wils	son Ho	mes (Southern)			Dates:	17/12/2021 - 17/12/2021	JC	
Well	Water Strikes	Sample:	s and I	n Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description	1	
		Deptil (III)	туре	Itesuits				Grass over firm brown slightly sand	y CLAY with	
		0.10 - 0.20	ES					frequent rootlets. (TOPSOIL) 0.25-0.60m bal: Becomes orange.		
		0.40 - 0.60	В	HVP=76 HVR=4	7					
		0 60 - 0 90	в	HVP=85 HVR=5	5 0.60	115.74		Firm dark vallow alightly condy grou		
		0.00 - 0.30						Gravel is sub-angular to sub-rounde	ed fine to	
								coarse limestone. (WHITE LIMESTONE FORMATION	1)	
		1 10 - 1 30			1.05	115.29		1.00m bgl: Becomes light yellow.	1 ·	
	· ·	1.10 - 1.30		N=24 (4,4/3,5,7,9))			slightly gravelly CLAY. Gravel is sub	p-angular to	
	•							(WHITE LIMESTONE FORMATION	one. I)	
					1 50	114.04		1.20-1.30m bgl: Yellowish brown slightly sa angular to sub-angular fine to medium lime.	ndy clayey stone GRAVEL.	
					1.50	114.04		1.45-1.50m bgl: Very thin bed of yellowish & medium SAND.	prown silty fine to	
	1.65 - 1.75 D							Pinkish brown and yellowish brown limestone COBBLES with infill of fir	sub-rounded m yellowish	
								brown sandy CLAY. (WHITE LIMESTONE FORMATION	I)	
	-	2.00		50 (20,5/50 for	2.00	114.34	۵°°°°°	End of boroholo at 2.00 m	., 2 .	
									3 -	
Rema 1. Pos	rks sition sca	anned with ca	librated	d CAT & 'Genny'	prior to exca	vation.			AGS	

									Borehole No.
OM	INIA					Bo	reho	ole Log	WS109
								0	Sheet 1 of 1
Projec	t Name:	Land at Le Heyward	tchme	re Farm, Upper	Project No. A11754		Co-ords:	451984.17 - 225790.96	Hole Type WS
Locati	on:	Letchmere	Farm	, Upper Heyford			Level:	115.84	Scale
Client:	:	David Wils	on Ho	mes (Southern)			Dates:	15/12/2021 - 15/12/2021	Logged By
	Water	Samples	s and l	In Situ Testing	Depth	Level			
Well	Water Strikes	Samples Depth (m) 0.30 - 0.50 0.30 - 0.50 0.60 - 0.80 1.20 1.20 - 1.30 1.60 - 1.70 1.75	B B B B B	In Situ Testing Results HVP=79 HVR=113 HVP=98 HVR=45 0(5,19/6,9,10,14) HVP=63 HVR=13 50 (25 for 75mm/50 for 150mm)	Depth (m) 0.30 3 0.50 1.50 0 1.75	Level (m) 115.54 115.34 114.34 114.09		Stratum Description Grass over soft brown silty CLAY. (TOPSOIL) Firm orangeish brown silty CLAY. (TOPSOIL) Firm yellow slightly sandy gravelly Gis sub-angular to sub-rounded fine- limestone. (WHITE LIMESTONE FORMATION 1.00m bgl: Becomes stiff. Firm to stiff orangeish grey becomin slightly sandy slightly gravelly CLAA sub-angular fine to medium limesto (WHITE LIMESTONE FORMATION 1.50-1.55m bgl: Limestone cobble. 1.70-1.75m bgl: Limestone cobble. End of borehole at 1.75 m	JC n CLAY. Gravel to medium J) ng light grey (. Gravel is ne. J) 2 3 3 4
Rema	rks								5 -
1. Pos	sition sca	anned with ca	librate	d CAT & 'Genny' p	rior to exca	vation.			AGS

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								Borehole No.	
OM	INIA					Bo	reho	ole Log	WS110
							1		Sheet 1 of 1
Projec	t Name:	Land at Le	etchme	ere Farm, Upper	Project No. A11754		Co-ords:	451933.69 - 225730.32	Hole Type WS
Locati	on:	Letchmere	e Farm	, Upper Heyford			Level:	114.32	Scale
Client:	:	David Wils	son Ho	mes (Southern)			Dates:	15/12/2021 - 15/12/2021	Logged By
	Water	Sample	s and	In Situ Testina	Depth	Lovel			
Well	Strikes	Depth (m)	Туре	Results	(m)	(m)	Legend	Stratum Descriptior	ו
		0.00 - 0.30	ES	HVP=66 HVR=16	6 0.30	114.02		Grass over soft to firm orangey bro gravelly CLAY. Gravel is sub-angula rounded fine to medium limestone. (TOPSOIL)	wn slightly
				HVP=90 HVR=26	5		· · · · · ·	Gravel is sub-angular to sub-round	ed fine to
		0.50 - 0.60	В		0.50	113.82		(WHITE LIMESTONE FORMATION Firm yellow gravelly CLAY. Gravel i	N)
		0.80 - 1.00	В		0.80	113.52		to sub-rounded fine to coarse limes (WHITE LIMESTONE FORMATION Yellow clayey sub-angular to sub-ro	stone. N) punded
		1.00 - 1.20	D		1.00	113.32		medium to coarse limestone GRAV (WHITE LIMESTONE FORMATION Stiff orange slightly sandy slightly g	EL. 1 - ravelly CLAY
		1.20		N=33 (12 for	1.20	113.12		with frequent pockets of stiff light gi	rey slightly o sub-rounded
		1.30 - 1.40	D	/5mm/9,8,8,8)				fine to coarse limestone. (WHITE LIMESTONE FORMATION	v /
		1.50 - 1.60	D		1.50	112.82	-	Light yellow dessicated clayey sub- sub-rounded fine to medium limest	angular to
	_				1.60	112.72		locally tending to gravelly CLAY.	4)
		1.75		50 (34 for 75mm/5 for 75mm)	1.80	112.52		Orange gravelly clayey fine SAND.	Gravel is medium
				,				limestone.	N 2
								Light orange slightly sandy clayey s sub-rounded fine to coarse limesto (WHITE LIMESTONE FORMATION End of borehole at 1.80 m	ne GRAVEL.
									-
									3 -
									-
									4 -
									-
									5 -
Rema 1. Pos	rks iition sca	anned with ca	llibrate	d CAT & 'Genny' p	prior to exca	vation.			AGS

										lo.
OM	NIA					Bo	reho	ole Log	WS11 [,]	1
							-1	•	Sheet 1 of	1
Projec	t Name:	Land at Le Heyward	tchme	re Farm, Upper	Project No. A11754		Co-ords:	-	Hole Type WS	9
Locati	on:	Letchmere	Farm	, Upper Heyford			Level:		Scale	
Client		David Wils	on Ho	mes (Southern)			Dates:	17/12/2021 - 17/12/2021	Logged B	у
	Matar	Samples	and	In Situ Testing	Donth		Dates.		JC	
Well	Strikes	Depth (m)	Туре	Results	(m)	(m)	Legend	Stratum Description	I	
		0.10 - 0.20	ES					Grass over soft brown slightly sand (TOPSOIL)	y CLAY.	
					0.25			Greyish brown sub-angular limestor with light brown slightly sandy slight CLAY infill. Gravel is sub-angular to fine to medium limestone. (WHITE LIMESTONE FORMATION	ne cobbles Iy gravelly sub-rounded	
		1.00		N=50 (7,18/50 fc 290mm)	or 1.00			End of borehole at 1.00 m		2 3
										4
Remai 1. Pos undert	rks ition sca aken aft	anned with ca ter scanning f	librate or ser\	d CAT & 'Genny' ⁄ices.	prior to exca	avation. Ha	nd pit refus	ed at 1.00m bgl. SPT test	AG	S

									Borehole No.
OMN	MNIA				Bo	reho	ole Log	WS112	
								6	Sheet 1 of 1
Project N	ame:	Land at Le Heyward	tchme	re Farm, Upper	Project No. A11754		Co-ords:	451876.14 - 225759.82	Hole Type WS
l ocation [.]		Letchmere	Farm	Upper Hevford			l evel:	118.33	Scale
							20101.	110.00	1:25
Client:		David Wils	on Ho	mes (Southern)			Dates:	15/12/2021 - 15/12/2021	Logged By JC
Well Wa	′ater rikes	Samples	s and I	Results	Depth (m)	Level (m)	Legend	Stratum Description	ı
vveii Str	rikes	Depth (m) 0.00 - 0.20 0.50 - 0.80 1.00 - 1.10 1.20 - 1.40 1.40 - 1.60 1.65	Type ES D D	Results	(m) 0.25 0.50 1.00 1.10 2 1.40 0 1.65	(m) 118.08 117.83 117.33 117.23 116.93 116.68		Grass over soft brown slightly sand gravelly CLAY. Gravel is sub-angula rounded fine to coarse limestone. (TOPSOIL) Brown and light grey clayey slightly angular fine to coarse limestone CC Gravel is sub-angular to sub-round coarse limestone. (WHITE LIMESTONE FORMATION Orangeish brown clayey gravelly fin SAND with frequent sub-angular to s fine to coarse limestone. (WHITE LIMESTONE FORMATION Orangeish reddish brown silty fine t SAND. (WHITE LIMESTONE FORMATION Firm brown becoming light brown s CLAY. (WHITE LIMESTONE FORMATION 1.0-1.20m bgl: Very thin bed of clayey fine SAND. Dessicated light yellow gravelly CL angular fine to medium limestone. I thin beds of limestone. (WHITE LIMESTONE FORMATION End of borehole at 1.65 m	y slightly ar to sub- gravelly sub- DBBLES. ed fine to J) ne to coarse nestone ub-angular J) to medium J) ightly sandy J) e to coarse AY. Gravel is Frequent very J) 2 - 3 - 4 -
									5
Remarks 1. Positio	n scar	nned with cal	librated	d CAT & 'Genny' p	 prior to excav	vation.		1	AGS

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									Borehole N	lo.
OM	INIA					Bo	reho	ole Log	WS113	3
								0	Sheet 1 of	i 1
Projec	t Name:	Land at Le Heyward	tchme	re Farm, Upper	Project No. A11754		Co-ords:	451882.25 - 225822.20	Hole Type WS	e
Locati	on:	Letchmere	Farm	, Upper Heyford			Level:	118.36	Scale 1:25	
Client	:	David Wils	son Ho	mes (Southern)			Dates:	15/12/2021 - 15/12/2021	Logged B JC	у
Well	Water	Samples	s and	In Situ Testing	Depth	Level	Legend	Stratum Descriptior	1	
Well	Land at Letchmere Farm, Upper Heyford David Wilson Homes (Southern) Water Samples and In Situ Testing Depth (m) Type Results 0.30 - 0.40 ES 0.60 - 0.70 0.60 - 0.70 D N=31 (6,7/10,10, 0.70) 1.30 50 (25 for 10mm for 75mm) Strikes 1.30 50 (25 for 10mm for 75mm)			Depth (m) 0.25 ,3) 50 1.30	Level (m) 118.11		Stratum Description	h elly silty -rounded fine 	2	
										5
Rema 1. Pos	rks sition sca	anned with ca	librate	d CAT & 'Genny'	prior to exca	vation.			AG	5

Borehole Log ws11 Sheet 1 o Sheet 1 o Project Name: Land at Letchmere Farm, Upper / Project No. A11754 Co-ords: 451886.88 - 225888.83 Hole Try Well Location: Letchmere Farm, Upper Heyford Level: 119.54 Scale Veal Strikes Samples and In Situ Tosting Depth Level 119.54 Logged E Veal Weiter Samples and In Situ Tosting Depth Level Legend Stratum Description Veal Weiter Samples and In Situ Tosting Depth Co-ords: Afritable Stratum Description Veal Veal 0.10 - 0.20 ES 0.25 119.29 Stratum Description Co-ords: Hom sighty analytic to sub-rounded function of sub-rounded function coarse imaching. 1.20 68 (4,1868 for 1600 min) 1.28 118.24 Hom Stratum Description Composition Stratum Description 1.20 68 (4,1868 for 1600 min) 1.28 118.34 Hom Stratum Description Stratum Description Hom Stratum Description 1.20 68 (4,1868 for 1600 min) 1.28 118.34		Borehole No	Borehole										
Project Name: Land at Latchmere Farm, Upper Project No. A11754 Co-ords: 451886.68 - 225898.83 Hole Type WS Location: Letchmere Farm, Upper Heyford Level: 119.54 Scale Client: David Wilson Homes (Southern) Dates: 17/12/2021 - 17/12/2021 Logged E 1.25 Weiter Strikes Samples and In Situ Testing Depth (m) Depth (m) Type Results (m) Level: Grass over soft brown slightly sandy slightly gravely CLAY. Gravel is sub-angular to sub- rounded fine to coarse limpton 0.30 - 1.00 B 0.25 119.29 Grass over soft brown slightly sandy slightly gravely CLAY. Gravel is sub-angular to sub- rounded fine to coarse limpton 1.20 68 (4.16/68 for 160mm) 1.20 118.34 Test of the coarse limpton	MNL	WS114	e Log 🔰 ws1	reho	Bo					INIA	OM		
Project Name: Land at Lettchmere Farm, Upper Heryford Co-ords: 451886.68 - 225898.83 Project No. Wei Location: Letchmere Farm, Upper Heryford Level: 119.54 Scale 12.5 Client: David Wilson Homes (Southern) Dates: 17/12/2021 - 17/12/2021 Logged B Ucged B Weiter Samples and In Situ Testing Depth (m) Dapth Level: Legend Stratum Description 0.30 - 1.00 B 0.25 119.29 Grass over soft brown slightly any slightly gravelic (Z.K) Gravel is sub-angular to sub-rounded file to coarse sub-angular to sub-rounded file to coarse slightly any slightly gravely CLAY. Gravel is sub-angular to sub-rounded file to coarse slightly any slightly gravely CLAY. Gravel is sub-angular to sub-rounded file to coarse slightly and slightly and slightly and slightly slightly and slightly and slightly and slightly and slightly and slightly and slightly and slightly and slightly and slightly and slightly and sl		Sheet 1 of 1	Sheet 1	1		Due is at Nie							
Location: Letchmere Farm, Upper Heyford Level: 119.54 Scale 1.25 Client: David Wilson Homes (Southern) Dates: 17/12/2021 - 17/12/2021 Legged Joc Well Samples and In Situ Testing Depth (m) Depth (m) Level (m) Level (m) Crass over oth brown slightly gravely (ZAV Gravel is sub-angular to sub- runded fine to coarse linestone. (TOPEQI) Stratum Description 0.30 - 1.00 B 0.25 119.29 Stratum Description 119.29 0.30 - 1.00 B 0.25 119.29 119.20 118.34 Stratum Description Stratum Description 120 B 0.25 119.29 Stratum Description 120 B 0.25 119.29 Stratum Description 121 Stratum Description Stratum Description Stratum Description 122 0.30 - 1.00 B 0.25 119.29 123 118.34 Stratum Description Stratum Description 124 1.20 188 (4.16/68 for 100mm) 1.20 118.34	oject Nam	WS	1886.68 - 225898.83 WS	Co-ords:		A11754	ere Farm, Upper	etchme	Land at Le Heyward	t Name:	Projec		
Client: David Wilson Homes (Southern) Dates: 17/12/2021 - 17/12/2021 Logged E Well Water Samples and In Situ Testing Depth (m) Level (m) Level (m) Level (m) Level (m) Stratum Description 0.10 - 0.20 ES 0.30 - 1.00 B 0.25 119.29 Grass over soft brown slightly gravely slightly gravely cLAY carels is sub-rounded into coarse limestore. 1.20 68 (4,16/88 for 160mm) 1.20 118.34	cation:	Scale	9 54 Scale	l evel:			ation: Letchmere Farm Upper Hevford						
Client: David Wilson Homes (Southern) Dates: 17/12/2021 - 17/12/2021 Luggent JC Well Strikes Samples and In Situ Testing Depth (m) Depth (m) Depth (m) Level (m) Level (m) Crass over soft brown sliphtly sandy sliphtly gravelly CLAV. Gravel is sub-angular to sub- rounded fine to carse lise Sub-angular to sub-rounded limestone COBELS with firm cangular to sub- rounded fine to carse 1 1.20 68 (4,16/68 for 160mm) 1.20 118.34		1:25	1:25										
Water Strike Samples and in Situ Testing Depth (m) Depth (m) Type Results Depth (m) Level (m) Level (m) Legend Stratum Description Image: Stratum Description 0.10 - 0.20 ES 0.30 - 1.00 B 0.25 119.29 Image: Stratum Description Orange stratum Description Image: Stratum Description 0.30 - 1.00 B Image: Stratum Description Orange stratum Description Orange stratum Description Image: Stratum Description 0.30 - 1.00 B Image: Stratum Description Orange stratum Description Orange stratum Description Image: Stratum Description 0.30 - 1.00 B Image: Stratum Description Orange stratum Description Orange stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Orange stratum Description Orange stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description Image: Stratum Description	ient:	JC	7/12/2021 - 17/12/2021 JC	Dates:	1		mes (Southern)	son Ho	David Wils	:	Client		
0.10 - 0.20 ES 0.30 - 1.00 B 0.30 - 1.00 B 0.30 - 1.00 B 1.20 68 (4,15/68 for 160mm) 1.20 68 (4,15/68 for 160mm)	Vell Wate Strike	ı	Stratum Description	Legend	Level (m)	Depth (m)	In Situ Testing Results	s and I	Sample: Depth (m)	Water Strikes	Well		
0.30-1.00 B 0.23 119.28 Constraints Con		y slightly ar to sub-	ss over soft brown slightly sandy slightly velly CLAY. Gravel is sub-angular to sub- nded fine to coarse limestone.		110.20	0.25		ES	0.10 - 0.20				
1.20 68 (4,16/68 for 1.20 118.34) sub-rounded geish brown /. Gravel is coarse J) y CLAY.	PSOIL) wn and light grey sub-angular to sub-rounded estone COBBLES with firm orangeish brown htly sandy slightly gravelly CLAY. Gravel is -angular to sub-rounded fine to coarse estone. <u>HTE LIMESTONE FORMATION</u>) <u>n bgl: Infill becomes firm</u> orange sandy CLAY.		119.29	0.23		В	0.30 - 1.00				
			End of borehole at 1.20 m		118.34	1.20	68 (4,16/68 for 160mm)		1.20				
Remarks 1. Position scanned with calibrated CAT & 'Genny' prior to excavation.	emarks Position s				vation.	prior to excav	d CAT & 'Genny'	librate	anned with ca	rks	Rema 1. Pos		

									Borehole No.
OM	INIA					Bo	reho	ole Log	WS115
								-	Sheet 1 of 1
Projec	t Name:	Land at Le Heyward	*tchme	re Farm, Upper	Project No. A11754		Co-ords:	451960.92 - 225830.50	Hole Type WS
Locati	on:	Letchmere	Farm	, Upper Heyford			Level:	117.61	Scale 1:25
Client	:	David Wils	son Ho	mes (Southern)			Dates:	15/12/2021 - 15/12/2021	Logged By JC
Well	Water	Samples	s and	In Situ Testing	Depth	Level	Legend	Stratum Description	
vven	Strikes	Depth (m)	Туре	Results	(m)	(m)		Grass over soft brown slightly grave	
		0.30 - 0.40 0.40 - 0.80 1.20 1.30 - 1.50 1.75 - 1.80 1.80	ES B	HVP=101 HVR=50 HVP=16 HVR=38 N=19 (5,6/6,5,3,5 50 (25 for 75mm/5 for 40mm)	0.25 0.40 0.80 1.00 1.25 0 1.75 1.80	117.36 117.21 116.81 116.61 116.36 115.86 115.81		Grass over soft brown slightly grave Gravel is sub-angular to sub-rounde coarse limestone. (TOPSOIL) Orange slightly sandy CLAY. Sand i medium. (WHITE LIMESTONE FORMATION Firm light yellowish slightly sandy d CLAY. (WHITE LIMESTONE FORMATION Light greyish yellow gravelly sandy CLAY. Gravel is sub-angular to sub to coarse limestone. (WHITE LIMESTONE FORMATION Light greyish yellow slightly silty san angular to rounded fine to coarse. (WHITE LIMESTONE FORMATION Stiff light yellowish brown slightly sa dessicated CLAY. Gravel is sub-ang rounded fine to medium limestone. (WHITE LIMESTONE FORMATION 5. Orange silty slightly gravelly fine to SAND. Gravel is sub-angular mediu limestone. (WHITE LIMESTONE FORMATION End of borehole at 1.80 m	elly CLAY. ed fine to is fine to is fine to is fine to is fine to i) essicated -rounded fine i) dessicated -rounded fine i) andy gravelly gular to sub- i) coarse i) coarse i) to coarse i) 3 - 3 -
Rema 1. Pos	rks	anned with ca	librate	d CAT & 'Genny' p	prior to exca	vation.			5 -
									AGS

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APPENDIX VII

CHEMICAL ANALYSIS CERTIFICATES



Element Materials Technology Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

Omnia 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP		
Attention :	Grace Larcombe	
Date :	10th January, 2022	
Your reference :	A11754	
Our reference :	Test Report 21/20346 Batch 1	
Location :	Lechmere Fam	
Date samples received :	18th December, 2021	
Status :	Final Report	
Issue :	1	

Thirty seven samples were received for analysis on 18th December, 2021 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

HAPmise

Hayley Prowse Project Manager

Please include all sections of this report if it is reproduced

Client Name:						
Reference:						
Location:						
Contact:						
EMT Job No:						

Omnia A11754 Lechmere Fam Grace Larcombe

Report : Solid

EMT Job No:	21/20346										
EMT Sample No.	1-4	22-23	26-27	60-61	62-63	68-69			1		
Sample ID	Phase 1 WAC Topsoil	SA102	SA103	WS101	WS103	WS105					
Depth		0.00-0.40	0.00-0.30	0.50-0.80	0.30-0.40	0.20-0.30			D		
COC No / misc							 	 	abbrevi	e attached n ations and a	otes for all cronyms
Ocertain and							 	 			
Containers	VJI	VJ	VJ	VJ	VJ	VJ	 	 			
Sample Date	15/12/2021	15/12/2021	15/12/2021	16/12/2021	16/12/2021	16/12/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1				Linito	Method
Date of Receipt	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021			LOD/LOR	Units	No.
Arsenic [#]	-	22.5	17.8	12.7	18.1	16.6			<0.5	mg/kg	TM30/PM15
Barium [#]	-	76	64	34	61	53			<1	mg/kg	TM30/PM15
Beryllium	-	1.4	1.2	0.8	1.2	1.1			<0.5	mg/kg	TM30/PM15
Cadmium [#]	-	0.2	0.2	<0.1	0.2	<0.1			<0.1	mg/kg	TM30/PM15
Chromium #	-	58.3	45.7	25.6	43.2	48.6			<0.5	mg/kg	TM30/PM15
Copper [#]	-	14	11	9	13	12			<1	mg/kg	TM30/PM15
Lead [#]	-	24	20	6	18	17	 		<5	mg/kg	TM30/PM15
Mercury [#]	-	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Nickel [#]	-	25.3	20.5	15.2	20.4	19.9	 		<0.7	mg/kg	TM30/PM15
Selenium"	-	<1	<1	<1	<1	<1			<1	mg/kg	TM30/PM15
Vanadium	-	79	1.0	50	10	52			<1	mg/kg	TM30/PM15
Vialer Soluble Boron	-	63	53	26	56	48			<0.1	mg/kg	TM30/PM15
Zine		00	00	20	00	40	 		-0	ing/ig	
PAH MS											
Naphthalene [#]	-	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	-	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene [#]	-	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	-	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	-	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	0.06	0.04	<0.03	0.04	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene [#]	-	0.05	<0.03	< 0.03	< 0.03	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene "	-	<0.06	<0.06	< 0.06	<0.06	<0.06			< 0.06	mg/kg	
Chrysene	-	<0.04	<0.02	<0.02	<0.03	<0.02			<0.02	mg/kg	
Benzo(a)pyrene #	_	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	-	<0.04	<0.04	< 0.04	<0.04	<0.04			<0.04	ma/ka	TM4/PM8
Dibenzo(ah)anthracene [#]	-	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	-	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	<0.6	<0.6	<0.6	<0.6	<0.6			<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	93	93	90	91	88	 		<0	%	TM4/PM8

Client Name:
Reference:
Location:
Contact:
EMT Job No:

Omnia A11754 Lechmere Fam Grace Larcombe 21/20346

Report : Solid

											-		
EMT Sample No.	1-4	22-23	26-27	60-61	62-63	68-69							
Sample ID	Phase 1 WAC Topsoil	SA102	SA103	WS101	WS103	WS105							
Depth		0.00-0.40	0.00-0.30	0.50-0.80	0.30-0.40	0.20-0.30					Please se	e attached n	otes for all
COC No / misc											abbrevi	ations and a	cronyms
Containors	VIT	N/ I	N I	N I	N/I	N I							
Containers	VJI	VJ	VJ	VJ	VJ	VJ							
Sample Date	15/12/2021	15/12/2021	15/12/2021	16/12/2021	16/12/2021	16/12/2021							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							Method
Date of Receipt	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021					LOD/LOR	Units	No.
Pesticides													
Organochlorine Pesticides													
Aldrin	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Alpha-HCH (BHC)	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Beta-HCH (BHC)	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Delta-HCH (BHC)	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Dieldrin	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan I	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan II	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan sulphate	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Endrin	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Gamma-HCH (BHC)	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Heptachlor	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Heptachlor Epoxide	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-DDE	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-DDT	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-TDE	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Total Methoxychlor	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Diazinon	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Dicniorvos	<10	-	-	-	-	-					<10	ug/kg	TM42/PM8
Ethion	<10	-	-	-	-	-					<10	ug/kg	
Ethyl Parathion (Parathion)	<10	-	-	-	-	-					<10	ug/kg	TM42/PW0
	<10	_		_	_	_					<10	ug/kg	TM42/PM8
Malathion	<10	-		_	_	-					<10	ug/kg	TM42/PM8
Methyl Parathion	<10	-		-	-	-					<10	ug/kg	TM42/PM8
Mevinphos	<10	-	-	-	-	-					<10	ua/ka	TM42/PM8
	-										-	5.5	
	I	1	1	1			1						

Client Name:
Reference:
Location:
Contact:
EMT Job No:

Omnia A11754 Lechmere Fam Grace Larcombe

21/20346

Report : Solid

EMT Sample No.	1-4	22-23	26-27	60-61	62-63	68-69						
Sample ID	Phase 1 WAC Topsoil	SA102	SA103	WS101	WS103	WS105						
Depth		0.00-0.40	0.00-0.30	0.50-0.80	0.30-0.40	0.20-0.30				Please se	e attached n	otes for all
COC No / misc										abbrevi	ations and a	cronyms
Containers	VIT	N I	V I	V I	N I	V I						
Containers	VJI	VJ	VJ	VJ	VJ	vJ						
Sample Date	15/12/2021	15/12/2021	15/12/2021	16/12/2021	16/12/2021	16/12/2021						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil					-	-
Batch Number	1	1	1	1	1	1					Linite	Method
Date of Receipt	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021				LOD/LOR	Units	No.
Acid Herbicides												
2,3,6 - TBA	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
2,4 - D	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
2,4 - DB	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
2,4,5 - T	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
4 - CPA	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Benazolin	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Bentazone	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Bromoxynil	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Clopyralid	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Dicamba	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Dichloroprop	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Diclofop	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Fenoprop	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Flamprop	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Flamprop – isopropyl	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
loxynil	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
МСРА	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
мсрв	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PM8
Mecoprop	<0.1	-	-	-	-	-				<0.1	mg/kg	
Pieloram	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/PIVIO
Triclopyr	<0.1	-	-	-	-	-				<0.1	mg/kg	TM42/FW0
Поруг	-0.1	-	_	_	_	_				-0.1	iiig/kg	110142/1 1010
EPH >C8-C10 (EH_1D_Total)#	-	<5	<5	<5	<5	<5				<5	ma/ka	TM5/PM8
EPH >C10-C12 (EH_1D_Total)#	-	<10	<10	<10	<10	<10				<10	ma/ka	TM5/PM8
EPH >C12-C16 (EH 1D Total)#	-	<10	<10	<10	<10	<10				<10	ma/ka	TM5/PM8
EPH >C16-C21 (EH 1D Total)*	-	<10	<10	<10	<10	<10				<10	mg/kg	TM5/PM8
EPH >C21-C35 (EH 1D Total)#	-	27	21	<10	39	<10				<10	mg/kg	TM5/PM8
EPH >C35-C44 (EH_1D_Total)	-	<10	<10	<10	<10	<10				<10	mg/kg	TM5/PM8
EPH >C8-C44 (EH_1D_Total)	-	<30	<30	<30	39	<30				<30	mg/kg	TM5/PM8
GRO (>C4-C6)	-	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
GRO (>C6-C8) (HS_1D_Total) #	-	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
GRO (>C4-C8)	-	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
Total Phenols HPLC	-	<0.15	<0.15	<0.15	<0.15	<0.15				<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	25.0	30.2	31.8	21.7	25.7	22.5				<0.1	%	PM4/PM0
												THORE
Hexavalent Chromium"	-	<0.3	<0.3	<0.3	<0.0045	<0.3				<0.0045	mg/kg	TM38/PM20
Chromium III	-	58.2	×0.0015 //5.7	25.6	12.0	18.6				~0.0015	g/i ma/ka	NONE/NONE
	-	50.5		20.0	73.2	-0.0				-0.0	iiig/kg	
	1	1	1	1	1	1	1	1	1	1		1

Client Name:
Reference:
Location:
Contact:
EMT Job No:

A11754 Lechmere Fam Grace Larcombe 21/20346

Omnia

Report : Solid

EMT Sample No.	1.4	22.22	26.27	60.61	60.60	69 60					
Ewir Sample No.	1-4	22-23	20-27	00-01	02-03	00-09					
Sample ID	Phase 1 WAC Topsoil	SA102	SA103	WS101	WS103	WS105					
Depth		0.00-0.40	0.00-0.30	0.50-0.80	0.30-0.40	0.20-0.30			Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and a	cronyms
Containers	VIT	V I	V I	V I	V I	V I		 			
Containers	VJI	VJ	VJ	VJ	VJ	VJ					
Sample Date	15/12/2021	15/12/2021	15/12/2021	16/12/2021	16/12/2021	16/12/2021		 			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1				l lucitor	Method
Date of Receipt	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021	18/12/2021			LOD/LOR	Units	No.
Total Cyanide [#]	-	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM89/PM45
Total Organic Carbon [#]	-	1.93	-	-	1.80	0.92			<0.02	%	TM21/PM24
рН #	-	8.06	7.91	8.22	8.10	6.56			<0.01	pH units	TM73/PM11

Client Name:	Omnia
Reference:	A11754
Location:	Lechmere Fam
Contact:	Grace Larcombe

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/20346	1	SA102	0.00-0.40	23	30/12/2021	General Description (Bulk Analysis)	soil/stones
					30/12/2021	Asbestos Fibres	NAD
					30/12/2021	Asbestos ACM	NAD
					30/12/2021	Asbestos Type	NAD
					30/12/2021	Asbestos Level Screen	NAD
21/20346	1	SA103	0.00-0.30	27	30/12/2021	General Description (Bulk Analysis)	soil/stones
					30/12/2021	Asbestos Fibres	NAD
					30/12/2021	Asbestos ACM	NAD
					30/12/2021	Asbestos Type	NAD
					30/12/2021	Asbestos Level Screen	NAD
21/20346	1	WS101	0.50-0.80	61	31/12/2021	General Description (Bulk Analysis)	Soil/Stones
					31/12/2021	Asbestos Fibres	NAD
					31/12/2021	Asbestos ACM	NAD
					31/12/2021	Asbestos Type	NAD
					31/12/2021	Asbestos Level Screen	NAD
21/20346	1	WS103	0.30-0.40	63	31/12/2021	General Description (Bulk Analysis)	Soil/Stones
					31/12/2021	Asbestos Fibres	NAD
					31/12/2021	Asbestos ACM	NAD
					31/12/2021	Asbestos Type	NAD
					31/12/2021	Asbestos Level Screen	NAD
21/20346	1	WS105	0.20-0.30	69	31/12/2021	General Description (Bulk Analysis)	Soil/Stones
					31/12/2021	Asbestos Fibres	NAD
					31/12/2021	Asbestos ACM	NAD
					31/12/2021	Asbestos Type	NAD
					31/12/2021	Asbestos Level Screen	NAD

Client Name: Omnia Reference: A11754

Reference:A11754Location:Lechmere FamContact:Grace Larcombe

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
21/20346	1	WS101	0.50-0.80	60-61	РАН	Sample holding time exceeded
21/20346	1	WS103	0.30-0.40	62-63	РАН	Sample holding time exceeded
21/20346	1	WS105	0.20-0.30	68-69	РАН	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

Notification of Deviating Samples

Matrix : Solid

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/20346

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

EMT Job No.: 21/20346

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
Ν	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/20346

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
ТМ30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
ТМ36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co- elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

EMT Job No: 21/20346

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co- elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM42	Modified US EPA method 8270D v5:2014. Pesticides and herbicides by GC-MS	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377- 3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

APPENDIX VIII

ORIGIN OF GAC VALUES



Determinant	Unit	GAC	Origin of Risk Assessment Value
Inorganics			
Metals			
Arsenic	mg/kg	37	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	
Boron	mg/kg	290	
Cadmium	mg/kg	11	LOM CIEH Suitable for Lice Lovels (S4UL) 2015
Chromium (III)	mg/kg	910	
Chromium (VI)	mg/kg	6	
Copper	mg/kg	2,400	
Lead	mg/kg	200	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 report.
Mercury	mg/kg	40	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	4
Selenium	mg/kg	250	LQM CIEH Suitable for Use Levels (S4UL) 2015
Vanadium	mg/kg	410	
Zinc	mg/kg	3,700	
General Inorganics			
Total Cyanide	mg/kg	50	Dutch Intervention Values 2010
Asbestos	%	0.001%	OEC Derived Value based on ICRCL
Organics			
General Organics			
Phenol	mg/kg	280	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
РАН			
Naphthalene	mg/kg	2.3	
Acenaphthylene	mg/kg	170	
Acenaphthene	mg/kg	210	
Fluorene	mg/kg	170	
Phenanthrene	mg/kg	95	
Anthracene	mg/kg	2,400	
Fluoranthene	mg/kg	280	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in
Pyrene	mg/kg	620	SR3 (EA 2009) 1% SOM
Benzo(a)Anthracene ⁽	mg/kg	7.2	
Chrysene	Chrysene mg/kg 15		
Benzo(b)Fluoranthene	mg/kg	2.6	
Benzo(k)Fluoranthene	mg/kg	77	
Benzo(a)Pyrene	mg/kg	2.2	
Indeno(123-cd)Pyrene	mg/kg	27	

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Determinant	Unit	GAC	Origin of Risk Assessment Value	
Dibenzo(a,h)Anthracene	mg/kg	0.24		
Benzo(ghi)Perylene	mg/kg	320		
втех				
Benzene	mg/kg	0.087		
Toluene	mg/kg	130	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM	
Ethylbenzene	mg/kg	47		
Xylenes	mg/kg	56	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene	
TPH CWG (Speciated)				
Aliphati	5			
Aliphatic EC 5-6	mg/kg	42		
Aliphatic EC >6-8	mg/kg	100		
Aliphatic EC >8-10	mg/kg	27	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in	
Aliphatic EC >10-12	mg/kg	130	SR3 (EA 2009) 1% SOM	
Aliphatic EC > 12-16	mg/kg	1,100		
Aliphatic EC > 16-35	mg/kg	65,000		
Aliphatic EC >35-44 mg/kg		65,000		
Aromati	с			
Aromatic EC 5-7	mg/kg	70		
Aromatic EC>7-8	mg/kg	130		
Aromatic EC> 8-10	mg/kg	34		
Aromatic EC> 10-12	mg/kg	74	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM	
Aromatic EC> 12-16	mg/kg	140		
Aromatic EC> 16-21	mg/kg	260		
Aromatic EC> 21-35	mg/kg	1,100		
Aromatic EC> 35-44	mg/kg	1,100		
Banded TPH			Γ	
TPH EC 5-6*	mg/kg	42		
TPH EC >6-8*	mg/kg	100		
TPH EC >8-10*	mg/kg	27		
TPH EC> 10-12*	mg/kg	74	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in	
TPH EC> 12-16*	mg/kg	140	SR3 (EA 2009) 1% SOM, utilising the most conservative of the Ali/Aro chain lengths.	
TPH EC> 16-21*	mg/kg	260		
TPH EC> 21-35*	mg/kg	1,100		
TPH EC> 35-44*	mg/kg	1,100		

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Notes

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(i) Benzo (b) Fluoranthene (2.6mg/kg) Benzo (k) Fluoranthene (77mg/kg)

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APPENDIX IX

GEOTECHNICAL ANALYSIS CERTIFICATES



Grace Larcombe Omnia Environmental Consulting 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP



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

t: 01923 225404 f: 01923 237404 e: reception@i2analytical.com

e: grace.larcombe@omnia-consulting.co.uk

Analytical Report Number : 22-31138

Project / Site name:	Land at Lechmere Farm, Upper Heyford	Samples received on:	23/12/2021
Your job number:	A11754	Samples instructed on/ Analysis started on:	23/12/2021
Your order number:	98	Analysis completed by:	11/01/2022
Report Issue Number:	1	Report issued on:	11/01/2022
Samples Analysed:	6 soil samples		

Signed:

Karolina Marek PL Head of Reporting Team For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	-	4 weeks from reporting
leachates	-	2 weeks from reporting
waters	-	2 weeks from reporting
asbestos	-	6 months from reporting

Page 1 of 5

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.





Analytical Report Number: 22-31138 Project / Site name: Land at Lechmere Farm, Upper Heyford Your Order No: 98

Lab Sample Number		2128112	2128113	2128114	2128115	2128116		
Sample Reference		WS101	WS102	TP104	WS105	WS104		
Sample Number		None Supplied	None Supplied	None Supplied	None Supplied	None Supplied		
Depth (m)				1.20-1.40	1.50-1.60	0.80-1.00	1.50-1.60	0.70-1.00
Date Sampled				16/12/2021	16/12/2021	16/12/2021	16/12/2021	16/12/2021
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	18	14	11	15
Total mass of sample received	kg	0.001	NONE	1.0	1.0	1.0	1.0	1.0

General Inorganics

pH - Automated		N/A	MCERTS	8.4	8.3	8.6	8.5	8.5
Total Sulphate as SO4	%	0.005	MCERTS	0.053	0.031	0.075	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)		0.00125	MCERTS	0.0098	0.0058	0.0089	0.024	0.063
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	23.6	63.3
Water Soluble Chloride (2:1) (leachate equivalent)		0.5	MCERTS	0.7	0.6	1.5	-	-
Total Sulphur		0.005	MCERTS	0.021	0.014	0.027	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)		2	NONE	< 2.0	< 2.0	< 2.0	-	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	< 2.5	< 2.5	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample





Analytical Report Number: 22-31138 Project / Site name: Land at Lechmere Farm, Upper Heyford Your Order No: 98

Lab Sample Number				2128117
Sample Reference	TP103			
Sample Number				None Supplied
Depth (m)				0.50-0.80
Date Sampled				15/12/2021
Time Taken	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	12
Total mass of sample received	kg	0.001	NONE	1.0

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6
Total Sulphate as SO4	%	0.005	MCERTS	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	13.5
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-
Total Sulphur	%	0.005	MCERTS	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-

U/S = Unsuitable Sample I/S = Insufficient Sample





Analytical Report Number : 22-31138

Project / Site name: Land at Lechmere Farm, Upper Heyford

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2128112	WS101	None Supplied	1.20-1.40	Light brown clay and sand.
2128113	WS102	None Supplied	1.50-1.60	Light brown clay and sand.
2128114	TP104	None Supplied	0.80-1.00	Light brown clay and sand.
2128115	WS105	None Supplied	1.50-1.60	Light brown clay and sand.
2128116	WS104	None Supplied	0.70-1.00	Brown clay and sand with vegetation.
2128117	TP103	None Supplied	0.50-0.80	Light brown clay and sand.




Analytical Report Number : 22-31138

Project / Site name: Land at Lechmere Farm, Upper Heyford

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP- OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN- 82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland. Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.



DETERMINATION OF LIQUID AND PLASTIC LIMITS Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



ient:			OMN	IA Envir	onmental C	onsul	ting						Client	Refere	nce: A11	754	
ient	Addre	ess:	3-6 T	he Qua	rtordock Dr	ort Sol	ont						J	ob Num	ber: 22-3	81132	
			Ports	mouth.	PO6 4TP	1000	ont,						Dat	e Samp	oled: 16/1	2/2021	
													Date	e Recei	ved: 23/1	2/2021	
onta	ct:		Grace	Earcor	nbe								D	ate Tes	ted: 12/0	1/2022	
te A	ddres	s:	Land	at Lech	mere Farm	, Uppe	er Heyfor	d					S	ampled	By: Clie	nt - JC	
stin	g carr	ied out at i	2 Analy	rtical Lin	nited, ul. Pi	oniero	w 39, 41	-711 Ruda	Slaska,	Poland	1						_
est l	Resu	ilts:															
bora	atory F	Reference:	21280	086									Dep	oth Top	[m]: 1.20	1	
le N	lo.:		WS10	01									Dept	h Base	[m]: 1.40		
mpl	le Ref	erence:	Not G	liven									Sa	mple T	ype: D		
mpl	le Des	scription:	Yello	wish bro	wn CLAY												
mpl	le Pre	paration:	Teste	ed in nat	ural condition	on											
A	s Rec	eived Wat	er		Liguid Lir	nit		Plasti	c Limit		Pl	asticity I	ndex	T	% Pa	ssing 4	25
	Conte	ent [W] %	•		[WL]%	6		[W	p]%			[lp]%	6		BS	Test Si	ev
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								LIQU	ID LIMI	IT							
		Legend, ba	ased or	1 BS EN	I ISO 14688	} 2:201 Plastiv	18 Geote	chnical invo	estigatio	in and	testing – Id it	entification	on and	l classif	ication of	soil	
			CI	Clav		L	Low		belo	ow 35							
			Si	Silt		M	Medium		35 t	to 50							
						н	High		50 t	to 70							
					,	v ·	Very hig	n	exc	eeding	70						
					ł	0	Organic		app	end to	classificati	on for or	ganic i	material	(eg CIH	0)	

Remarks: Re-issue 1: Additional results for Atterberg (sample 2128089)

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Katarzyna Koziel Technical Reviewer

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022



DETERMINATION OF LIQUID AND PLASTIC LIMITS Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client: Client Address:			OMN	A Envir	onmental C	onsult	ting				Client F	Reference	: A11754	
Client	t Addr	ess:	3-6 TI	he Quar	terdeck Pr	ort Sole	ent				Jol	o Number	r: 22-31132	
			Ports	mouth, I	206 4TP		5111,				Date	Sampled	1: 16/12/2021	1
				····,							Date	Received	: 23/12/202 ⁻	1
Conta	act:		Grace	e Larcor	nbe						Da	te Tested	12/01/2022	2
Site A	Addres	SS:	Land	at Lech	mere Farm	, Uppe	r Heyfor	ď			Sa	mpled By	r: Client - JC	1
Testii	ng car	rried out at i	2 Analy	tical Lin	nited, ul. Pi	oniero	w 39, 41	-711 Ruda S	laska, Polan	d				
Fest	Resu	ults:												
abor	ratory	Reference:	21280)87							Dept	h Top [m]	: 1.50	
lole	No.:		WS10	J1							Depth	Base [m]	: 1.70 	
amp	ple Re	terence:	Not G	iven vich bro			AV				San	nple lype); D	
Samp	ple De	eparation:	Teste	d in nat	ural conditi	on	211							
-	As Ree	ceived Wat	er		Liquid Li	nit		Plastic	Limit	Plas	sticity Index	<u> </u>	% Passing	425
	Cont	tent [W] %)		[WL]9	0		[Wp]%	_	[lp] %		BS Test S	Sieve
		12			30			11	3		14		100	
	80]											1	
	70											ILling	5	
	70												1	
	60	_	_			_								_
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	Ū	0	10	2	0	30	2	10 5 LIQUII	50 € D LIMIT	50 7	70 80		90	10
		Legend, ba	ased on	BS EN	ISO 14688	3 2:201 Diseti-	18 Geote	echnical inve		testing – Ide	ntification and	classificat	tion of soil	
			CI	Clay		Plastic	ny w		Liquia Lin	111				
			Si	Silt		∟ I M I	∟ow Medium		35 to 50					
			0	0.11		H I	High		50 to 70					
						v v	Very hig	h	exceeding	j 70				
						0 (Organic		append to	classificatio	n for organic m	aterial (e	eg CIHO)	
ote:	: Wate	er Content b	y BS 13	377-2: 1	990: Claus	e 3.2								
						en contrato de								

Remarks:	Re-issue 1: Additional results for Atterberg (sample 2128089)
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Katarzyna Koziel Technical Reviewer

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022



DETERMINATION OF LIQUID AND PLASTIC LIMITS Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



lient:	:		OMN	IA Envir	onmental C	onsulti	ng				Client R	eferenc	e: A11754	
lient	Addre	ess:	3-6 TI Portsi	he Quar mouth, I	terdeck, Po PO6 4TP	rt Solei	nt,				Job Date : Date F	Numbe Sample Receive	er: 22-31132 d: 16/12/2021 d: 23/12/2021	
Conta	ct:		Grace	e Larcor	nbe						Dat	e Teste	d: 12/01/2022	
Site A	ddres	s:	Land	at Lech	mere Farm,	Upper	Heyfor	d			Sar	npled B	y: Client - JC	
"estin	g can	ried out at i	2 Analy	tical Lin	nited, ul. Pie	onierow	/ 39, 41	-711 Ruda S	laska, Polan	d		-	•	
est	Resu	ilts:												
abora	atory I	Reference:	21280	088							Depth	n Top [m	n]: 1.50	
lole N	lo.:		WS10	02							Depth	Base [m	n]: 1.60	
amp	le Ref	erence:	Not G	Given							Sam	ple Typ	e: D	
ampl	le Des	scription:	Yellov	wish bro	wn CLAY									
ampl	le Pre	paration:	Teste	d in nat	ural condition	on								
A	s Rec Conte	eived Watent [W] %	er 5		Liquid Lir [WL]%	nit 6		Plastic [Wp	Limit] %	Pla	sticity Index [lp] %		% Passing 4 BS Test Si	25µn eve
		29			74			2	7		47		100	
y index	70 - 60 - 50 - 40 -									н	cv	A	e line	-
PLASTICI	30 -							CIM			SIV			-
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		Legenu, bi				Plastici	tv		Liquid Lin	itesting – ide nit		105511100		
			CI	Clav	i i	L L	ow		below 35					
			Si	Silt	j	M N	ledium		35 to 50					
						н н	ligh		50 to 70					
						1 11		-	ovcooding	1 70				
						v v	ery nigi	1	eveeening	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				

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Remarks:

Re-issue 1: Additional results for Atterberg (sample 2128089)

Signed

Technical Reviewer

Katarzyna Koziel

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022



DETERMINATION OF LIQUID AND PLASTIC LIMITS Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client: **OMNIA Environmental Consulting** Client Reference: A11754 **Client Address:** Job Number: 22-31132 3-6 The Quarterdeck, Port Solent, Date Sampled: 16/12/2021 Portsmouth, PO6 4TP Date Received: 23/12/2021 Contact: Grace Larcombe Date Tested: 13/01/2022 Site Address: Land at Lechmere Farm, Upper Heyford Sampled By: Client - JC Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland **Test Results:** Laboratory Reference: 2128089 Depth Top [m]: 0.80 **TP104** Depth Base [m]: 1.00 Hole No.: Not Given Sample Type: B Sample Reference: Sample Description: Cream colour gravelly sandy very clayey SILT Tested after >425um removed by hand Sample Preparation:

As Received Water
Content [W] %Liquid Limit
[WL] %Plastic Limit
[Wp] %Plasticity Index
[Ip] %% Passing 425µm
BS Test Sieve1526141283



Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:	Re-issue 1: Additional results for Atterberg (sample 2128089)		
		Katarzyna Koziel	-

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0

High

Very high

Organic

Signed

50 to 70

exceeding 70

Technical Reviewer

append to classification for organic material (eg CIHO)

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022



DETERMINATION OF LIQUID AND PLASTIC LIMITS Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client: **OMNIA Environmental Consulting** Client Reference: A11754 **Client Address:** Job Number: 22-31132 3-6 The Quarterdeck, Port Solent, Date Sampled: 16/12/2021 Portsmouth, PO6 4TP Date Received: 23/12/2021 Contact: Grace Larcombe Date Tested: 13/01/2022 Site Address: Land at Lechmere Farm, Upper Heyford Sampled By: Client - JC Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland **Test Results:** Depth Top [m]: 0.70 Laboratory Reference: 2128091 WS104 Depth Base [m]: 1.00 Hole No.: Not Given Sample Type: B Sample Reference: Brown slightly gravelly very sandy CLAY Sample Description: Tested after washing to remove >425um Sample Preparation: As Received Water Liquid Limit **Plastic Limit Plasticity Index** % Passing 425µm Content [W]% [WL]% [Wp]% [lp]% **BS Test Sieve**



Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:	Re-issue 1: Additional results for Atterberg (sample 2128089)	
i tomanto.		

0

Organic

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Katarzyna Koziel Technical Reviewer

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022

append to classification for organic material (eg CIHO)



4041

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:

Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:

1990: Clause 8.2

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB

Client Reference: A11754

Job Number: 22-31132

Date Sampled: 16/12/2021

Date Received: 23/12/2021

Sampled By: Client - JC

Date Tested: 12/01-13/01/2022



OMNIA Environmental Consulting Client: Client Address: 3-6 The Quarterdeck, Port Solent, Portsmouth, PO6 4TP Contact: Grace Larcombe

Site Address: Land at Lechmere Farm, Upper Heyford Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

			Sample	9				tent W]	tent 892-1		Atte	rberg			Density		#	
Laboratory Reference	Hole No.	Reference	Depth Top	Depth Base	Type	Description	Remarks	Water Con BS 1377-2 [Water Con BS EN ISO 17 [W]	% Passing 425um	WL	Wp	lp	bulk	dry	PD	Total Porosity	
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%	
2128089	TP104	Not Given	0.80	1.00	В	Cream colour gravelly sandy very clayey SILT	Atterberg 4 Point	15		83	26	14	12					
2128086	WS101	Not Given	1.20	1.40	D	Yellowish brown CLAY	Atterberg 4 Point	26		100	64	22	42					
2128087	WS101	Not Given	1.50	1.70	D	Yellowish brown very sandy CLAY	Atterberg 4 Point	12		100	30	16	14					
2128088	WS102	Not Given	1.50	1.60	D	Yellowish brown CLAY	Atterberg 4 Point	29		100	74	27	47					
2128091	WS104	Not Given	0.70	1.00	в	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	19		92	32	18	14					
2128090	WS105	Not Given	1.50	1.60	D	Light brown SAND		15										

Note: # Non accredited; NP - Non plastic

Comments:

Re-issue 1: Additional results for Atterberg (sample 2128089)

Signed:

Katarzyna Koziel **Technical Reviewer**

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for and on behalf of i2 Analytical Ltd

Date Reported: 20/01/2022

GF 234.14



4041

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client Reference: A11754 Job Number: 22-31132 Date Sampled: 16/12/2021 Date Received: 23/12/2021 Date Tested: 12/01 - 13/01/2022 Sampled By: Client - JC

OMNIA Environmental Consulting Client: **Client Address:** 3-6 The Quarterdeck, Port Solent, Portsmouth, PO6 4TP Contact: Grace Larcombe Site Address: Land at Lechmere Farm, Upper Heyford

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

			Sample	•							
Laboratory Reference	Hole No.	Reference	Depth Top m	Depth Base m	Туре	Description	Remarks	wc %	Sample preparation / Oven temperature at the time of testing		
2128089	TP104	Not Given	0.80	1.00	В	Cream colour gravelly sandy very clayey SILT		15	Sample was quartered, oven dried at 106.5 °C		
2128086	WS101	Not Given	1.20	1.40	D	Yellowish brown CLAY		26	Sample was quartered, oven dried at 109 °C		
2128087	WS101	Not Given	1.50	1.70	D	Yellowish brown very sandy CLAY		12	Sample was quartered, oven dried at 109 °C		
2128088	WS102	Not Given	1.50	1.60	D	Yellowish brown CLAY		29	Sample was quartered, oven dried at 109 °C		
2128091	WS104	Not Given	0.70	1.00	в	Brown slightly gravelly very sandy CLAY		19	Sample was quartered, oven dried at 106 °C		
2128090	WS105	Not Given	1.50	1.60	D	Light brown SAND		15	Sample was quartered, oven dried at 109 °C		

Comments: Re-issue 1: Additional results for Atterberg (sample 2128089)

Signed:

Katarzyna Koziel **Technical Reviewer**

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for and on behalf of i2 Analytical Ltd



DETERMINATION OF PARTICLE SIZE DISTRIBUTION Tested in Accordance with: BS 1377-2: 1990 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Clie Clie Cor Site <u>Tes</u> Lab	ent: ent Ac ntact: Add <u>sting c</u> orato	ldress: ress: carried o esults: ry Refer	<i>ut at i2</i> rence:	OMNIA 3-6 The Portsm Grace I Land at <i>Analytia</i> 212808	Enviror → Quarter outh, Pe Larcoml t Lechm <u>cal Limi</u> 39	nmenta erdeck, O6 4TF be nere Fa i <i>ted, ul.</i>	Il Cor Port rm, U <u>Pion</u>	nsultii Sole Ipper <i>iero</i> w	ng nt, Heyl ⁄ 39,	ford 41-7	11 F	Ruda	Sl	ask	a, F	201	land	1						Cii	J Dat Dat Dat Dat	Re ob e S e R e R e ate sam	efer Nui San ece Te Iple	ena mb nple eive este ed E	ce: er: ed: ed: ed: By: m]:	A11 22-3 16/1 23/1 13/0 Clie	754 3113 12/20 12/20 01/20 nt	2)21)21)22 JC			
Hol	e No.	:		TP104																				D	ept	hΒ	las	e (r	n]:	1.00)				
Sar	nple l	Reference	ce:	Not Giv	ren																				Sa	mp	ble	Ту	oe:	В					
Sar	nple l	Descripti	ion:	Cream	colour (gravelly	sanc	dy ve	ry cla	ayey	SILI																								
Sar	nple	Preparat	lion:	Sample) was qu	uartere	d, ove	en dr	ied at	t 106	5.0 °(C an	d D	rok	en	do	wn	by I	nar	nd.	~ ~	A \ /F					-								T
		CLAY	Fine	M	<u>SILI</u> ledium	Coar	se	F	ine		SANI /Iediu	m m	(Coal	rse	-		Fine	1	8	<u>GR</u> Me	<u>AVE</u> diun	:L n	С	oars	se	- 0	COB	BLE	S	BC	DULD	ERS		
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		300			100	_	0.0	422	-		6	7				Ì	Silt	u									-				-	3			
		150			100		0.0	304			6	4				C	Clay	1													2	27			
		125			100		0.0	219			6	1																							
	\vdash	90			100	_	0.0	158	-+		5	6 1		-		Г			G	rar	lin	a A	nak	veid											
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		1.18			90																														
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		0.42	5		86																														
	\vdash	0.3	,		80																														
		0.15	-		77	-																													
		0.063	3		70																														
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Sianed:

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022

Katarzyna Koziel

Technical Reviewer

GF 100.21



DETERMINATION OF PARTICLE SIZE DISTRIBUTION Tested in Accordance with: BS 1377-2: 1990 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Clie Clie Con Site <u>Tes</u> Lab	nt: nt Ac tact: Add ting c t Re orato	ddress: ress: carried of esults: ory Refere	<i>ut at i2</i> rence:	OMNIA Envi 3-6 The Qua Portsmouth, Grace Larco Land at Lect Analytical Li 2128091	ronmental C Interdeck, Po PO6 4TP Imbe Inmere Farm, I <i>mited, ul. Pic</i>	onsulting rt Solent, Upper Hey onierow 39,	/ford 41-711	l Ruda	Slaska, I	Poland				Client F Jo Date Date Sa Dept	Refer o Nu Sar Rec te T mple	rend imbe nple eive este ed E	e: A1 er: 22 ed: 16 ed: 23 ed: 13 ed: 13 by: Cli n]: 0.7	1754 -3113/ /12/20 /12/20 /01/20 ent - J	2 21 21 22 C	
Hole	No.	.:		WS104										Depth	Bas	e [n	n]: 1.0	00		
San	nple	Reference	ce:	Not Given										Sar	nple	Тур	e: B			
San	nple	Descripti	ion:	Brown slight	ly gravelly ve	ery sandy C														
San	ple	Preparat	ion:	Sample was	quartered, o	oven dried a	at 106.0	C and	broken		by hand	d.								
		CLAY	Fine	Medium	Coarse	Fine	Me	dium	Coarse	F	ine	Med	ium	Coarse	- 3	СОВІ	BLES	BO	ULDERS	8
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		0.425	5	89																
		0.3	,	82																
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		0.063	3	52																
Note	e: Te	sted in A	\ccorda	nce with BS	1377:Part 2:	1990, claus	es 9.2	and 9.5												
Rer	nark	(S:	Re-iss	sue 1: Additio	onal results for	or Atterber	g (samo	ole 2128	3089)											
		-17					- • •		, 01			Kata	7/12	Koziel						

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sianea:

for and on behalf of i2 Analytical Ltd

Technical Reviewer

Page 1 of 1 Da

GF 100.21



DETERMINATION OF PARTICLE SIZE DISTRIBUTION Tested in Accordance with: BS 1377-2: 1990 i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Clie Clie Cor Site Tes Lab Hol Sar Sar	ent: ent Ad atact: e Addr st Re orator e No.: nple F nple D	dress: ess: <u>arried ou</u> sults: ry Referenc Referenc Descriptio	<i>ut at i2</i> ence: e: on:	OMNIA 3-6 The Portsm Grace I Land at Analyti 212809 TP103 Not Giv Cream	. Enviror ∋ Quarte outh, P(Larcomt t Lechm <u>cal Limi</u>)2 /en colour (nment erdeck O6 4T be ere Fa <u>ted, ut</u>	al Co , Por P arm, <u>, Pio</u>	onsul t Sol Uppe niero	ting ent, er He <u>wr 39</u> /ery s	yford , <u>41-</u> ; sandy	7 <u>11 ;</u> r SIL	<u>Ruda</u> .T	a Si	lask	ka, F	Pol	and	1					C	lient J Dat Dat S Dep Sa	t Re lob te S are Sam pth B amp	efero Nur Sam ecce Te ple Top Sase	enc nbe ple eive este d B c [n c [n Typ	ee: A er: 2 ed: 1 ed: 2 ed: 1 By: (n]: (n]: (ee: E	A117 22-3 15/12 23/12 13/0 ² Clien 0.50 0.80	54 1132 2/202 2/202 1/202 1/202 t - J(:1 :1 :2 :2			
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		0.6			87																													
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		0.3	,		81	_																												
	\vdash	0.212			75	\neg																												
		0.063	1		63																													
Not	e: Tes	sted in A	ccorda	nce wit	h BS13	77:Pa	rt 2:1	990,	claus	ses 9	.2 a	nd 9	.5																					
Re	mark	s:	Re-iss	sue 1: A	Remarks: Re-issue 1: Additional re)																			

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Katarzyna Koziel Technical Reviewer

for and on behalf of i2 Analytical Ltd

Page 1 of 1

Date Reported: 20/01/2022



DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR) SOAKED Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client:		OMNIA Er	vironmental (Consulting				Client Reference: A11754				
Client Address: 3-6 The Quarter Portsmouth, PO				ort Solent,					Job Nu Date Sar Date Rec	mber: 22-3 npled: 16/1 eived: 23/1	31132 12/2021 12/2021	l I
Con	tact:	Grace Lar	combe						Date T	ested: 12/0	01/2022	2
Site Test	Address:	Land at Le	chmere Farm	i, Upper Hey	/ford 41_711 R	uda Slaska	Poland		Sample	ed By: Clie	nt - JC	
Tes Labo Hole Sam	t Results: pratory Reference: No.: uple Reference: uple Description:	2128083 PLT105 Not Given Yellowish	brown sandy	clayey GRA	VEL		, round		Depth To Depth Bas Sample	op [m]: 0.30 se [m]: 0.50 Type: B)	
Spe	cimen Preparatio	n:										
Con	dition	Remoulde	d					Soak	ing details			
Deta	iils	Recompac	cted with spec	ified standa	rd effort u	sing 2.5kg r	ammer	Perio Time Amoi	d of soaking to surface int of swell records	ed -	5 2 0.11	days days mm
Mate	erial retained on 2	Omm sieve r	emoved	6	61 %			Dry d	lensity after soakin	ng	1.74	Mg/m3
Initia	al Specimen detail	s Bulk	density	2.	08 Mg	/m3		Surch	narge applied		8	kg
		Dry	density	1.	74 Mg. 9 %	/m3					4.8	kPa
		WOR			0 /0							
				Force v	Penetrat	ion Plots						
	0.90											
	0.80 -								A N			
	0.00							سعر				
	0.70						- All All All All All All All All All Al					
	0.60 9						*				Гор da	ta
Å	0.00									*	Гор va	lues
lied	0.50										Гор со	rrection
App	0.40							-			Base d	ata
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		1 mm										
	0.10											
	0.00											
	0	1	2	3	4	5	6		7 8			
				Pe	enetration	mm						
Res	ults		Curve		CBR	Values, %		7	Moisture			
			correction	2.5mm	5mm	Highes	t Average	e				
	TOF	b	No	1.7	1.9	1.9		-	19			
	BAS	ε	No	2.7	3.1	3.1			18			
Ren	narks: CB	R tested afte	r 5 days of so	aking.			Test/ Spec	imen	Re-issue 1: Addi	tional resul	ts for A	tterberg
				9		Si	specific rem	narks: Katar	(sample 2128089 zyna Koziel	9		
Opinio	ons and interpretations	expressed herein	are outside of the	e scope of the U	KAS Accredit	ation. This		Tech	nical Reviewer			
report labora	may not be reproduced atory. The results include	other than in ful ad within the repo	l without the prior ort relate only to th	written approval ne sample(s) sul	of the issuin mitted for te	g sting.		for a	nd on behalf of i2	Analytica	I Ltd	
						Pa	ge 1 of 2	Date	e Reported: 20/01	/2022		GF 330.



DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR) SOAKED

Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Olisati	OMNIA Environmental Consulting	Olicat Deference: A11754
Client:	Ominia Environmental Consulting	Client Reference: ATT754
Client Address:	2 6 The Questerdeck Best Selent	Job Number: 22-31132
	S-6 The Quarterdeck, For Soleni,	Date Sampled: 16/12/2021
	Forshould, FO0 41F	Date Received: 23/12/2021
Contact:	Grace Larcombe	Date Tested: 12/01/2022
Site Address:	Land at Lechmere Farm, Upper Heyford	Sampled By: Client - JC
Testing carried out at i2	2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland	
Test Results:		
Laboratory Reference:	2128083	Depth Top [m]: 0.30
Lister Nie -	DI TAOS	Death Dear Inch 0 50

Hole No.: PLT105 Sample Reference: Not Given Sample Description: Yellowish brown sandy clayey GRAVEL Depth Top [m]: 0.30 Depth Base [m]: 0.50 Sample Type: B



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Signed

for and on behalf of i2 Analytical Ltd

Page 2 of 2

Date Reported: 20/01/2022

Technical Reviewer



DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR) SOAKED Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Clien	t:	1	OMNIA Env	vironmental	Consul	lting					Client Refe	rence:	A11754	
Clien	t Address:		3-6 The Qu	arterdeck, F	Port Sol	lent,					Job Nu Data Sau	umber:	22-31132	
			Portsmouth	n, PO6 4TP							Date Sa	mpied:	23/12/2021	
Cont	act:	1	Grace Larc	ombe							Date Tet	ested:	12/01/2022	
Site	Address:		Land at Leo	chmere Farr	n, Uppe	er Heyford					Sampl	ed By:	Client - JC	
Testi	ng carried	out at i2	Analytical L	imited, ul. F	Pioniero	ow 39, 41-7	'11 Rua	a Slaska, I	Poland					
Test	Results	:												
Labo	ratory Refe	erence:	2128084								Depth To	op [m]:	0.20	
Hole	No.:		PLT106								Depth Bas	se [m]:	0.50	
Sam	ple Refere	nce:	Not Given								Sample	Type:	В	
Sam	ple Descrip	otion:	Yellowish b	rown CLAY										
Spec	imen Prej	paration:												
Cond	lition		Remoulded	l						Soak	ing details			
Deta	ils		Recompact	ted with spe	cified s	tandard eff	ort usin	g 2.5kg rai	nmer	Perio	d of soaking		5	days
										Time	to surface	lad	2	days
Mate	rial retaine	d on 20m	nm sieve re	moved		0	%			Dry d	lensity after soaki	ng	1.70	mm Mg/m3
Initia	Specimer	n details	Bulk	densitv		1.96	Ma/m	3		Surch	harge applied		8	ka
maa	opeointer	1 dotailo	Dry d	lensity		1.71	Mg/m	3		Garo	narge applied		4.9	kPa
			Moist	ture content		15	%							
	0.80				Fo	orce v Pen	etratio	n Plots						
	0.70													
	0.70													
									-					
	0.60 🗝												-	
	0.50						1				*		— Top da	ta
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Resu	iitə			correction				iues, 70			Content			
				applied	2.5r	mm 5	mm	Highest	Averag	e	%			
		TOP		No	2.	.9	2.5	2.9			27			
		BASE		Yes	3.	.6	3.0	3.6			26			
Der	aulua:	000	hand all -	E days of a	a a luin c			Т	est/ Spec	imen	Re-issue 1: Add	itional	esults for A	tterberg
Kem		CBR	lesied aπer	o uays of S	oaking.			sp	ecific ren	narks:	(sample 212808)		
								Siar	ned.	Kata	rzyna Koziel			
Opinio	ns and interon	etations exe	ressed herein :	are outside of th	e scone r	of the UKAS A	ccreditatio	on. This		rech	inical Reviewer			
report	may not be rep	produced ot	her than in full	without the prior	written a	pproval of the	issuing			for a	nd on behalf of i	2 Analy	tical Ltd	
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Remarks:

Opinions and interpreta

TEST CERTIFICATE

DETERMINATION OF THE CALIFORNIA BEARING **RATIO (CBR) SOAKED**

Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client:	OMNIA Environmental Consulting	Client Reference: A11754
Client Address:	2.6 The Questerdack Bott Scient	Job Number: 22-31132
	S-0 The Quarterdeck, Fort Soleni,	Date Sampled: 16/12/2021
		Date Received: 23/12/2021
Contact:	Grace Larcombe	Date Tested: 12/01/2022
Site Address:	Land at Lechmere Farm, Upper Heyford	Sampled By: Client - JC
Testing carried out at it	2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland	
Test Results:		
Laboratory Reference:	2128084	Depth Top [m]: 0.20
Hole No.:	PLT106	Depth Base [m]: 0.50
Sample Reference:	Not Given	Sample Type: B
Sample Description:	Yellowish brown CLAY	
	CBR Soaked Graph	



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report may not be reproduced other than in full without the prior written approval of the issuing	
laboratory. The results included within the report relate only to the sample(s) submitted for testing.	

CBR tested after 5 days of soaking.

Page 2 of 2

specific remarks:

Signed

for and on behalf of i2 Analytical Ltd

(sample 2128089)

Katarzyna Koziel

Technical Reviewer



DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR) SOAKED Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Clier	nt: Addresse	OMNIA Envi	ironmental (Consulting				Client Reference: A11754	
3-6 The Quarterdeck, Port Portsmouth, PO6 4TP								Date Sampled: 16/12/2021	
Cont	act:	Grace Larco	mbe					Date Received: 23/12/2021 Date Tested: 12/01/2022	
Site	Address:	Land at Lecl	hmere Farm	n, Upper Hey	ford			Sampled By: Client - JC	
Test	ing carried out at	2 Analytical Li	imited, ul. P	ionierow 39,	41-711 R	uda Slaska, F	Poland		
Test	t Results:	2128085						Dopth Top (m): 0.30	
Hole	No.:	2128085 PLT104						Depth Top [m]: 0.30 Depth Base [m]: 0.50	
Sam	ple Reference:	Not Given						Sample Type: B	
Sam	ple Description:	Yellowish br	own slightly	gravelly sar	ndy CLAY				
Spec	cimen Preparatio	n:							
Cond	dition	Remoulded						Soaking details	
Deta	ils	Recompacte	ed with spec	ified standa	rd effort us	ing 2.5kg ran	nmer	Period of soaking5daysTime to surface2days	
Mate	erial retained on 20)mm sieve ren	noved	() %			Amount of swell recorded 0.02 mm Dry density after soaking 1.81 Mg/m	3
Initia	I Specimen detail	s Bulkid	lensitv	2.	08 Ma/	m3		Surcharge applied 8 kg	
		Dry de	ensity	1.	81 Mg/	m3		4.9 kPa	
		Moistu	ure content	1	5%				
				Force v	Penetrati	on Plots			
	0.90		—						
	0.80								
	0.00							A A A A A A A A A A A A A A A A A A A	
	0.70						- man		
_	0.60								
Υ Σ	0.50			and the second s				#· Top values	
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ce A	0.40		1		-			Base data	
For	0.30			***				O Base values	
	1	Ϊ.						Base Correct	ion
	0.20								
	0.10								
	0.00								
	0	1	2	3	4	5	6	7 8	
				Pe	enetration	mm			
Resu	ults	[Curve		CBR \	/alues, %		Moisture	
			applied	2.5mm	5mm	Highest	Average	e %	
	TOF	_ [Yes	2.1	2.2	2.2		20	
	BAS		INO	3.0	3.5	3.0	ļ	10	
Rem	narks: CB	R tested after	5 days of so	baking.		T	est/ Spec ecific rem	cimen Re-issue 1: Additional results for Atterber narks: (sample 2128089)	g
						Sign	ed:	Katarzyna Koziel Technical Reviewer	
Opinio	ons and interpretations e	xpressed herein a	re outside of the	e scope of the U	KAS Accredite	ation. This		for and on behalf of i2 Analytical I to	
labora	tory. The results include	d within the report	relate only to the	he sample(s) sub	or the issuing mitted for tes	ting.	1.450		000 ·
						Page	e 1 of 2	Date Reported: 20/01/2022 GF	330.8



Sample Description:

TEST CERTIFICATE

DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR) SOAKED

Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd Unit 8 Harrowden Road Brackmills Industrial Estate Northampton NN4 7EB



Client:	OMNIA Environmental Consulting	Client Reference: A11754
Client Address:	2 6 The Quarterdeck, Port Selent	Job Number: 22-31132
	Portsmouth PO6 4TP	Date Sampled: 16/12/2021
		Date Received: 23/12/2021
Contact:	Grace Larcombe	Date Tested: 12/01/2022
Site Address:	Land at Lechmere Farm, Upper Heyford	Sampled By: Client - JC
Testing carried out at is	2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland	
Test Results:		
Laboratory Reference:	2128085	Depth Top [m]: 0.30
Hole No.:	PLT104	Depth Base [m]: 0.50
Sample Reference:	Not Given	Sample Type: B

Yellowish brown slightly gravelly sandy CLAY



		Signed Kata	arzyna Koziel
Remarks.	CBR lested alter 5 days of soaking.	specific remarks:	(sample 2128089)
Domorkov	CBD tested after 5 days of seeking	Test/ Specimen	Re-issue 1: Additional results for Attert



Technical Reviewer

for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Page 2 of 2

Date Reported: 20/01/2022

APPENDIX X

IN-SITU DYNAMIC CONE PENETROMETER TEST CERTIFICATES

Site Name:	Upper Heyfo	ord		Test Date:	21/01/2022
Site Ref:	A11754		ONTRIA	Test Location:	DCP101
Initial Depth:	18	mm bgl	UTIT THE	Test No.:	1 of 1
Final Depth:	902	mm bgl		Undertaken By:	TH



Site Name:	Upper Heyfo	rd		Test Date:	21/01/2022
Site Ref:	A11754		ONTIN	Test Location:	DCP102
Initial Depth:	21	mm bgl	OTHE HE	Test No.:	1 of 1
Final Depth:	901	mm bgl		Undertaken By:	ТН



Site Name:	Upper Heyfo	ord		Test Date:	23/12/2021
Site Ref:	A11754		ONTIN	Test Location:	DCP103
Initial Depth:	111	mm bgl		Test No.:	1 of 1
Final Depth:	901	mm bgl		Undertaken By:	CT/TH



Site Name:	Upper Heyfo	ord		Test Date:	23/12/2021
Site Ref:	A11754		ONTIN	Test Location:	DCP104
Initial Depth:	93	mm bgl	CIVII VIII I	Test No.:	1 of 1
Final Depth:	900	mm bgl		Undertaken By:	CT/TH



Site Engineer:	Engineer: Date: Checked and Approved By:		Date:	Location
СТ/ТН	23/12/2021	JC	25/01/2022	DCP104

Site Name:	Upper Heyfo	ord		Test Date:	21/01/2022
Site Ref:	A11754		OI OILA	Test Location:	DCP105
Initial Depth:	55	mm bgl	Oluli uli i	Test No.:	1 of 1
Final Depth:	902	mm bgl		Undertaken By:	TH



Site Engineer:	Date:	Checked and Approved By:	Date:	Location
тн	21/01/2022	JC	24/01/2022	DCP105

Site Name:	Upper Heyfo	rd		Test Date:	23/12/2021
Site Ref:	A11754		ONTRIA	Test Location:	DCP106
Initial Depth:	123	mm bgl	UTIT THE	Test No.:	1 of 1
Final Depth:	885	mm bgl		Undertaken By:	CT/TH



Site Engineer:	Date:	Checked and Approved By:	Date:	Location
СТ/ТН	23/12/2021	JC	25/01/2022	DCP106

Site Name:	Upper Heyfo	ord		Test Date:	23/12/2021
Site Ref:	A11754		ONTRIA	Test Location:	DCP107
Initial Depth:	138	mm bgl	UTIT THE	Test No.:	1 of 1
Final Depth:	891	mm bgl		Undertaken By:	CT/TH



Site Name:	Upper Heyfo	ord		Test Date:	23/12/2021
Site Ref:	A11754		OMNIA	Test Location:	DCP108
Initial Depth:	198	mm bgl	Ommini	Test No.:	1 of 1
Final Depth:	918	mm bgl		Undertaken By:	CT/TH



Site Name:	Upper Heyfo	rd		Test Date:	23/12/2021
Site Ref:	A11754		OMNIA	Test Location:	DCP109
Initial Depth:	98	mm bgl		Test No.:	1 of 1
Final Depth:	875	mm bgl		Undertaken By:	CT/TH



Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%) In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name: Upper Heyford			Test Date:	21/01/2022	
Site Ref:	A11754		ONDUIA	Test Location:	DCP110
Initial Depth:	57	mm bgl	OTHE HE I	Test No.:	1 of 1
Final Depth:	905	mm bgl		Undertaken By:	TH



Start Depth (mm bgl)	End Depth (mm bgl)	Layer Range (mm)	Blows per Layer	DCP mm/Blows per Layer	Average Layer CBR Value (%)
0	245	225	6	41	6.0
245	495	250	70	4	78.6
495	900	405	50	8	33.1
omments					
<u> </u>					
Site Engineer:	Date:	Checked and Appr	oved By:	Date:	Locatio
ТН	21/01/2022	JC		25/01/2022	DCP11

APPENDIX XI

PLATE LOAD TESTING CERTIFICATES



Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-1 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

Test Location: 105Date of Test: 16/12/2021Description: Gravelly TopsoilReaction Load: 5 Tonne ExcavatorMaterial Class: FormationWeather: WetLayer: 0.3m BGLPlate Diameter (mm): 300Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.35	32
360	0.69	52
540	1.02	69
720	1.41	117
900	1.90	131

Maximum Applied Stress (kPa):	131
Maximum Settlement (mm):	1.90
Equivalent CBR Value (%):	4
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	34

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time







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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-2 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

Test Location: 106Date of Test: 16/12/2021Description: Orange ClayReaction Load: 5 Tonne ExcavatorMaterial Class: FormationWeather: WetLayer: 0.3m BGLPlate Diameter (mm): 300Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.51	22
360	0.78	26
540	1.05	29
720	1.37	32
900	1.79	36

Maximum Applied Stress (kPa):	36
Maximum Settlement (mm):	1.79
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	11

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)









For and on behalf of Hixtra Ltd

Authorised signatory

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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-3 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

Test Location: 107Date of Test: 16/12/2021Description: Gravelly ClayReaction Load: 5 Tonne ExcavatorMaterial Class: FormationWeather: WetLayer: 0.3m BGLPlate Diameter (mm): 300Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.35	26
360	0.71	35
540	1.10	47
720	1.48	55
900	1.88	67

Maximum Applied Stress (kPa):	67
Maximum Settlement (mm):	1.88
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	18

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time







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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-4 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 108
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
jour v	(mm)	(kPa)
0	0.00	12
180	0.42	38
360	0.86	52
540	1.24	60
720	1.63	74
900	2.08	87

Maximum Applied Stress (kPa):	87
Maximum Settlement (mm):	2.08
Equivalent CBR Value (%):	2
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	21

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time







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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-5 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 109
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.42	30
360	0.84	39
540	1.23	49
720	1.60	59
900	2.06	73

Maximum Applied Stress (kPa):	73
Maximum Settlement (mm):	2.06
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	17

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time





Kevin Shorthouse Authorised signatory

For and on behalf of Hixtra Ltd

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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-6 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 104
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.44	38
360	0.71	52
540	1.23	62
720	1.64	74
900	2.04	83

Maximum Applied Stress (kPa):	83
Maximum Settlement (mm):	2.04
Equivalent CBR Value (%):	2
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	22

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time





For and on behalf of Hixtra Ltd



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Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-7 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 110
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.39	28
360	0.81	38
540	1.31	50
720	1.64	57
900	2.07	69

Maximum Applied Stress (kPa):	69
Maximum Settlement (mm):	2.07
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	17

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time



Kevin Shorthouse

For and on behalf of Hixtra Ltd

Authorised signatory

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Hixtra Ltd Unit 103, Caxton Court Garamonde Drive Milton Keynes MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-8 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

Test Location: 103Date of Test: 16/12/2021Description: Gravelly ClayReaction Load: 5 Tonne ExcavatorMaterial Class: FormationWeather: WetLayer: 0.3m BGLPlate Diameter (mm): 300Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.47	29
360	0.94	40
540	1.25	49
720	1.66	59
900	2.08	71

Maximum Applied Stress (kPa):	71
Maximum Settlement (mm):	2.08
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	17

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time







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Hixtra Ltd Unit 103, Caxton Court Garamonde Drive Milton Keynes MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-9 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 102
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.42	25
360	0.89	35
540	1.22	43
720	1.65	56
900	2.11	67

Maximum Applied Stress (kPa):	67
Maximum Settlement (mm):	2.11
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	16

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time





For and on behalf of Hixtra Ltd



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Hixtra Ltd Unit 103, Caxton Court Garamonde Drive Milton Keynes MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 7165-10 Report Date: 16/12/2021 Client: Omnia Consulting Ltd Address: 3-6 The Quarterdeck Port Solent Portsmouth PO6 4TP Site: Land at Lechmere Farm, Camp Road, Upper Heyford, OX25 5TB.

Test Details

 Test Location: 101
 Date of Test: 16/12/2021

 Description: Gravelly Clay
 Reaction Load: 5 Tonne Excavator

 Material Class: Formation
 Weather: Wet

 Layer: 0.3m BGL
 Plate Diameter (mm): 300

 Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

Test Results

Time (s)	Settlement	Plate Stress
	(mm)	(kPa)
0	0.00	12
180	0.45	28
360	0.75	38
540	1.14	57
720	1.60	91
900	2.10	120

Maximum Applied Stress (kPa):	120
Maximum Settlement (mm):	2.10
Equivalent CBR Value (%):	2
Modulus of Subgrade Reaction, k ₇₆₂ (MN/m ² /m):	23

Note: Supplemental test method, calculation of Equivalent CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)



Settlement/Time



For and on behalf of Hixtra Ltd



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APPENDIX XII

BRE DG365 SOAKAWAY TEST CERTIFICATES

Cit - D - f	Lechmer	e Farm, Upper	Heytord			
Site Reference:		A11724		010	TA	
lest Date:		15/12/2021			IA	
Trial Pit Identific	ation:	SA102		Omn	III	
Trial Pit Length (m):	1.60	———————————————————————————————————————			
Trial Pit Width (I	m):	0.50				
Trial Pit Depth (I	m):	1.50		SOIL INFILTR	ATION RATE TES	ST
Groundwater Le	vel (m bgl):	1.60		See BRE DG365, So	akaway Design	(2016).
			T	-		
<u>Geolo</u>	<u>ay Description:</u>		lest	Parameters	TES	<u>T1</u>
0.00.0.40m bal	l: Grace over coft brown		Effective St	orage Depth (m):	Time (min)	Deptn (
slight	ly sandy CLAY.			0.90	2.00	0.62
(TOPSOIL)		75% Effective	Storage Depth (m):	4.00	0.64
				0.68	6.00	0.66
0.40-0.60m k	ogl: Soft brown sandy			0.00	8.00	0.67
gravelly CLAY w	ith abundant angular to		(i.e. Depth Belo	w Ground Level) (m):	10.00	0.69
fine to coarse (Gravel is angular to sub-			0.83	15.00	0.72
rounded fin	e to coarse flint and		25% Effective	Storage Depth (m):	25.00	0.73
li	imestone.			0.22	30.00	0.81
(WHITE LIME	STONE FORMATION)			0.23	40.00	0.86
0.004.00	Coff Kohn ha		(i.e. Depth Belo	w Ground Level) (m):	50.00	0.90
0.60-1.60m bgl	: Soft light brown sandy			1.28	60.00	0.95
sub-rounded lin	nestone cobbles. Sand is		Effective Storage De	nth Across 75% - 25% (m).	90.00	1.05
fine to coarse.	Gravel is angular to sub-		Energive Storage De	pur Across 75% - 25% (M):	150.00	1.1/
rounded fine	to coarse limestone.			0.45	180.00	1.27
(WHITE LIME	STONE FORMATION)		Time to Fall to 75	% Effective Depth (min):	210.00	1.32
		[35	240.00	1.37
			Time 4- 5-84- 0-		300.00	1.43
		-	Time to Fall to 25	% Effective Depth (min):		
				190		
			Vp759	%-25% (m3):		
			· · · ·	0.36		
				0.50		
		-	As	50% (m2):	_	
				2.69		
		-	Tn75%	-25% (mins):		
				155		
				177		
	DESIGN		TION RATE, f (m/s):	1.44E-05]	
Comments:	DESIGN		NTION RATE, f (m/s):	1.44E-05]	
Comments:	DESIGN	SOIL INFILTRA	TION RATE, f (m/s):	155 1.44E-05	240	3
Comments:			120	155 1.44E-05	240	3
Comments:	60		120 Time (mis)	155 1.44E-05	240	3
Comments:	60		120 Time (mins)	155 1.44E-05	240	
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05 180	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	133 1.44E-05	240	3
Comments:	60 60		120 Time (mins)	133 1.44E-05	240	3
Comments:	60 60		120 Time (mins)	133 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60 60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60		120 Time (mins)	153 1.44E-05	240	3
Comments:	60 60 60 60 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		120 Time (mins)	153 1.44E-05 180 25% Effective Stream (Text		3
Comments:	60 60 Test 1	L	120 Time (mins)	153 1.44E-05 180 180 	240	3
Comments:	60 60 60 60 60 61 61 61 61 61 61 61 61 61 61 61 61 61	L	120 120 Time (mins) ctive Storage (Test 1)	133 1.44E-05 180 180 25% Effective Storage (Test roved By: Date:		Locatie
Comments:	60 60 —————————————————————————————————	SOIL INFILTRA	120 120 Time (mins) Ctive Storage (Test 1) -	1.44E-05 180 180 25% Effective Storage (Test roved By: Date: DRAFT		

	Lechmere	Farm, Upper Heyford				
Site Reference:		A11724		and the state		
Test Date:	1	5/12/2021		M	TA	
Trial Pit Identification	1	SA102	- 0	IVIIN	IA	
Trial Pit Length (m):	-	1.60				
Trial Pit Width (m):		0.50				
Trial Pit Depth (m):		1.50		SOIL INFILTRA	TION RATE TES	т
Groundwater Level (m bgl):	1.60	See B	RE DG365, Soa	kaway Design	(2016).
	·					
Geology Descrip	tion:		Test Parameters		TES	<u>T 2</u>
			Effective Storage Depth (n):	Time (min)	Depth
0.00-0.40m bgl: Grass ove	er soft brown		0.89		0.00	0.61
slightly sandy Cl	AY.		75% Effective Channel Danth		2.00	0.63
(TOPSOIL)			75% Effective Storage Deptr	1 (m):	4.00	0.64
0 40-0 60m bel: Soft br	own sandy		0.67		8.00	0.00
gravelly CLAY with abunda	ant angular to		(i.e. Depth Below Ground Lev	el) (m):	10.00	0.69
sub-rounded limestone co	bbles. Sand is			,,,,	15.00	0.72
fine to coarse. Gravel is an	ngular to sub-		0.83		20.00	0.74
rounded fine to coars	e flint and		25% Effective Storage Depth	n (m):	25.00	0.77
limestone.	DAATION)		0.22		30.00	0.80
WHITE LIMESTONE FO	RIVIATION)		(i.e. Denth Belger Committe	al) (ma):	40.00	0.84
0.60-1.60m bgl: Soft light	brown sandy		n.e. Depth Below Ground Lev	eij (m):	50.00	0.89
gravelly CLAY with abunda	ant angular to		1.28		90.00	1.04
sub-rounded limestone co	bbles. Sand is	Effec	tive Storage Depth Across 75%	% - 25% (m):	120.00	1.14
fine to coarse. Gravel is an	ngular to sub-		0.44		150.00	1.22
rounded fine to coarse	limestone.		0.44		180.00	1.28
(WHITE LIMESTONE FO	RMATION)	Tir	ne to Fall to 75% Effective Dep	oth (min):	210.00	1.34
			37.00		239.00	1.39
			an to Fall to 25% Effective Day	ath (main).		
				Jun (mini).		
			180.00			
			Vp75%-25% (m3):			
			0.35			
			As50% (m2):			
			2.66			
			Tp75%-25% (mins):			
			1/12 00			
	DESIGNIS		ATE f(m/s):		1	
	1 1/2 311319 3		AIE, I (III/3/, I I I I	5		
	DESIGNS	OIL INFILTRATION R	, , , , ,	55E-05	1	
Comments:	DESIGNS			55E-05	1	
Comments:	DESIGN S			55E-U5	1	
Comments:	DESIGNS			<u></u>	1	
Comments:	DESIGN 3				1	
Comments:			100	490	1	
Comments:	60 60		120	180	J	
0.00	60		120 Time (mins)	180	1	
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60 60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180	· · · · · · · · · · · · · · · · · · ·	
Comments:	60 60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60 60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60		120 Time (mins)	180		
Comments:	60 	75%, Effertius Str	120 Time (mins) aae (Test 1) 25% Effectiv	180		
Comments:	60 Fest 1		120 Time (mins)	180 e Storage (Test 1)		
Comments:	60 60 Test 1		120 Time (mins) age (Test 1) 25% Effectiv	180 e Storage (Test 1		
Comments:	60 	75% Effective Sto	120 Time (mins) rage (Test 1) 25% Effectiv	180 e Storage (Test 1) Date:		Locati
Comments:	60 60 Test 1 -		120 Time (mins) age (Test 1) 25% Effectiv	180 180 e Storage (Test 1) Date: DRAFT		Locati

	Lechmere Farm	, Upper Heyford				
Site Reference:	A11	724				
Test Date:	15/12	/2021	\cap	M		
Trial Dit Identification:	54	102	U.	IVIIN	IA	
Trial Pit Length (m)	3A. 1	60				
Trial Pit Width (m):	0.	50				
Trial Pit Depth (m):	1.	50	s	OIL INFILTRAT	ION RATE TES	т
Groundwater Level (m bgl)	: 1.	60	See BR	E DG365, Soa	kaway Design	(2016).
Geology Descript	ion:		Test Parameters		TES	<u>T 3</u>
		E	ffective Storage Depth (m	ı):	Time (min)	Depth
0.00-0.40m bgl: Grass ove	r soft brown		0.90		0.00	0.60
slightly sandy CL	AY.	750	(Effective Starage Douth	().	2.00	0.62
(TOPSOIL)		/57	Enective Storage Depth	(m):	4.00	0.63
0.40-0.60m bgl: Soft bro	own sandy		0.68		8.00	0.04
gravelly CLAY with abunda	nt angular to	(i.e.	Depth Below Ground Leve	l) (m):	10.00	0.67
sub-rounded limestone col	obles. Sand is			,, ,	15.00	0.69
fine to coarse. Gravel is an	gular to sub-		0.85		20.00	0.72
rounded fine to coarse	flint and	259	6 Effective Storage Depth	(m):	25.00	0.74
limestone.			0.23		30.00	0.77
		11.0	enth Below Ground Louis	l) (m):	40.00	0.81
0.60-1.60m bgl: Soft light	prown sandy	(1.6.	Jepth Below Ground Leve	ı <i>j</i> (111).	50.00	0.85
gravelly CLAY with abunda	nt angular to		1.28		90.00	0.89
sub-rounded limestone col	obles. Sand is	Effective S	torage Depth Across 75%	- 25% (m):	120.00	1.07
fine to coarse. Gravel is an	gular to sub-		0.45		150.00	1.15
rounded fine to coarse	imestone.		0.45		180.00	1.21
(WHITE LIMESTONE FOR	(WATION)	Time to	Fall to 75% Effective Dep	th (min):	210.00	1.27
			43		240.00	1.31
		Time to	Fall to 25% Effective Dom	th (min)·	360.00	1.41
		Time to	rail to 25% Effective Dep		415.00	1.52
			215		110.00	1.0 1
			Vp75%-25% (m3):			
			0.36			
			0.00			
			As50% (m2):			
			2.69			
			Tn75%-25% (mins):			
			172			
			172			
			5 (m / -).			
			1 (11/ 3/. 1.3			
		NFILTRATION RATE,	<u> </u>			
Comments:		NFILTRATION RATE,	•			
Comments:		NHEIRATION RATE,				
Comments:		NHLIKATION KATE,				
Comments:		NHLTRATION RATE,				
Comments:	60		400		0	
Comments:	60		180	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	3
Comments:	60		180 ne (mins)	24	0	3
Comments:	60		180 ne (mins)	24	0	5
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	5
Comments:	60		180 ne (mins)		0	5
Comments:	60		180 ne (mins)	24	0	:
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60		180 ne (mins)	24	0	3
Comments:	60		180 ne (mins)		0	
Comments:	60		180 ne (mins)	24	0	
Comments:	60 60 60 60 60	120 120 Tir	180 ne (mins)	24		
Comments:	60 60 Test 1	120 120 Tir	180 ne (mins)	24 Storage (Test 1)		
Comments:	60 	120 120 Th 75% Effective Storage (180 ne (mins)	24		
Comments:	60 	120 120 Tin 75% Effective Storage (Test 1) 25% Effective	24 Storage (Test 1)		Locatio









